Engineers, Inc.

LINDLEY SOUTH LANDFILL
ENGINEERED CAP
SITE No. 851008
STEUBEN COUNTY, NEW YORK

POST-CLOSURE MONITORING AND MAINTENANCE OPERATIONS MANUAL

OCTOBER 1997
REVISED SEPTEMBER 1998
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C&S Engineers, Inc.
1099 AIRPORT BOULEVARD
NORTH SYRACUSE, NEW YORK 13212
(315) 455-2000

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INTRODUCTION

1.1 General

This Post-Closure Landfill Monitoring and Maintenance Operations Manual has been prepared consistent with the requirements established in 6NYCRR Part 360-2.15(i)(7). This manual describes the post-closure activities and procedures that should be utilized by landfill personnel to provide that the facility is maintained with minimal environmental impacts. As such, the manual contains, in addition to this introductory section, the following:

Section 2 - Post-Closure Environmental Monitoring Plan: includes details on the duration and frequency of the post-closure monitoring activities and locations of monitoring points. Additionally, this section describes the methods and procedures for sample collection, handling, analysis, and chain of custody documentation.

Section 3 - Post-Closure Maintenance Operations Plan: describes post-closure inspection and corrective action activities which should occur concurrent with the post-closure environmental monitoring program.

Section 4 - Contingency Plan: describes predetermined courses of action to be taken should potentially harmful or environmentally threatening situations occur during the closure and post-closure maintenance of the landfill.

The procedures included within these sections shall be performed on a regular basis so that the facility is maintained in an environmentally sound manner during the closure and post-closure period.

It should be noted that this Post-Closure (Environmental) Monitoring and Maintenance Operations manual is separate from the previously prepared Lindley South Landfill leachate storage and transfer station Operation and Maintenance (O&M) manual.

This Manual is generally organized to cover topics in the chronological order that will be encountered in the maintenance operation, such as development and construction of the final cover system, landfill environmental monitoring, and closure and post-closure maintenance. Personnel can refer to specific items by locating them in the Table of Contents which is organized by major topics for easy reference. Personnel shall periodically review the manual to assure conformance to the requirements established in 6NYCRR Part 360. If maintenance procedures must be modified, this Manual shall be revised to reflect the changes.

1.2 Site Description

The Lindley South Landfill, which is located on Gibson Road, in the Town of Lindley, Steuben County, is approximately 12 acres in size, with dimensions of approximately 320 feet wide (north-south) and approximately 1,650 feet long (east-west). The general area proximate to the site is rural, with adjacent properties consisting of primarily forest land and farmland. The landfill is located along the lower portion of a long sloping hillside, with surface water and groundwater generally draining to the northeast. Landfill operations are currently active at the Lindley North Landfill, which is located immediately north of the inactive Lindley South Landfill, across Gibson Road. Figure 1 is a site plan showing existing features.

1.3 Site History

The Lindley South Landfill began operations in 1977 and continued through 1983 when capacity was reached. The total quantity of fill and cover material at the Lindley South Landfill site is reported to be approximately 336,767 cubic yards. Fill at the site averages approximately 20 feet in height above the natural grade with a maximum height of 30 feet at the center of the site in the form of an east-west oriented ridge. Upon completion of the landfill operations, a 2-foot thick cap of natural material, obtained from the North Landfill area, was placed over the landfill and seeded. Although the landfill is unlined and there were no leachate collection, removal, or storage provisions incorporated into the landfill's original construction, a retrofitted leachate collection system, an intermediate cap, and a relatively complete vegetative cover are currently in-place over the Lindley South Landfill.

Since initial landfill operations began, the landfill has been owned by the Town of Lindley and operated by the Steuben County Highway Department. Municipal solid wastes were accepted from 11 towns within Steuben County while industrial wastes were previously accepted from Corning Glass Works from 1979 to 1980. In general, industrial wastes included heavy metals, such as lead and other inorganic matter, from Corning Glass Works manufacturing operations. The disposal of wastes at the site was completed with the written approval of the New York State Department of Environmental Conservation (NYSDEC) and generally in accordance with accepted practices at the time. (Cherill 1985).

Routine site inspections by the NYSDEC frequently reported leachate outbreaks flowing indirectly into a local unnamed stream (apparently the Tributary to Glendening Creek). In 1979, a local resident had complained that leachate, migrating from the landfill to a local stream, had subsequently caused adverse health impacts on farm animals, while other complaints faulted landfill leachate contamination, to the local groundwater supply, as a reason for human illnesses.

In 1983, the NYSDEC performed sampling and analysis of leachate from the landfill which identified elevated levels of zinc and sulfur. In 1984, a study was initiated by Steuben County to identify supplemental methods of leachate control at the site. The study recommended that a retrofitted leachate collection system be installed in the landfill. In 1985, samples of the leachate were collected and analyzed by General Testing Corporation, which identified detectable concentrations of aromatic and halogenated organic compounds.

In addition to the above items and the recently completed Remedial Investigation (RI), a number of other studies have been performed at the Lindley South Landfill over its history. In September 1988, H&A of New York was contracted to install three water level piezometers at the landfill in order to evaluate groundwater underflow conditions by periodic rounds of water level measurements. Water levels obtained from the piezometers indicated a groundwater flow direction to the northeast at a gradient of approximately 0.061 feet per foot. A study by Hunt Engineers and Architects, in 1989 was performed to evaluate the causes of leachate generation and provide recommend methods to reduce the volume of leachate generated.

The study concluded that approximately 2,800 gallons of groundwater flows into the landfill each day, regardless of weather conditions, and that groundwater contributes to nearly half of the leachate removed from the collection system. The study's recommendations included the installation of a groundwater control system on the south side of the landfill to reduce groundwater flow into the fill material. Dependent on the efficiency of the control system in reducing leachate generation, the study also recommended the installation of a synthetic liner cover system. Subsequent to the 1989 study, Steuben County forces installed groundwater drainage systems around the South and West sides of the site.

SECTION 2

SECTION 2

ENVIRONMENTAL MONITORING PLAN

2.1 Introduction

This Environmental Monitoring Plan (EMP) is intended to provide information related to post-closure environmental monitoring for the Lindley South Landfill. This EMP will describe the proposed on-site and off-site monitoring including the specific monitoring points, sampling schedule, methods of sample collection, preservation analysis, documentation, and reporting. The EMP also describes conditions and schedules under which the existing and contingency water quality monitoring plans would be implemented. This EMP was prepared using 6NYCRR Part 360 Solid Waste Management Facilities (NYSDEC) as a guidance document as well as other information including the results of the Remedial Investigation completed by C&S in 1997. This EMP should be used to provide guidance for environmental monitoring during post-closure. The EMP should be periodically reviewed and updated in order to address revised or new regulations and requirements concerning the program.

2.2 Environmental Monitoring Points

Environmental monitoring points have been established at locations proximate to the landfill which consist of groundwater, surface water, and leachate sampling locations. These monitoring points have been established in consultation with the NYSDEC for the purpose of assessing water quality of the site and surrounding area.

2.2.1 Groundwater Monitoring Wells

The groundwater monitoring network for the Lindley South Landfill consists of 10 groundwater monitoring wells and 1 piezometer located throughout the site. Post-Closure environmental monitoring will be completed at the 7 monitoring wells listed in the following table. The location of the monitoring wells scheduled for post-closure monitoring are shown on Figure 2, while boring logs for the monitoring wells are included within Appendix A.

Well Location	Top of PVC Elevation	Depth to Well Bottom	Screen Interval
Shallow Monitoring Wells			
MW-1	1463.97	30.0'	10.0-30.0'
MW-2S	1460.37	28.5'	8.0-28.0'
MW-3	1486.59	25.5'	5.0-25.0'
MW-4	1515.01	26.7'	6.0-26.0'
GW-1	1544.44	55.4'	45.4-55.4'
GW-4	1482.67	48.0'	32.5-47.5'
Deep Monitoring Wells			
MW-2D	1460.08	97.0'	86.7-96.7'

2.2.2 Surface Water Sampling Points

Post-Closure surface water monitoring will be completed at 4 locations within the nearby tributary to Glendening Creek including upstream location SW-1, immediate downstream locations SW-2 and SW-4, and a remote downstream location SW-7. The location of the surface water monitoring points are shown on Figure 2.

2.2.3 Landfill Gas Monitoring Points

During the completion of remedial investigations at the site, the presence of explosive or volatile organic compound gases was not revealed at 21 temporary subgrade explosive gas monitoring locations, due primarily to the dense and fine grained nature of the glacial till soils which surrounds and underlies the landfill waste mass. Since the means for outward gas migration at the landfill appears to be minimal, it is planned that post-closure monitoring for landfill gases be accordingly completed on a semi-annual basis along the landfill perimeter, at the ground elevation at 15 to 20 pre-staked landfill cap perimeter locations, as shown in Figure 2A.

Landfill gas monitoring will include the direct reading measurement of percent LEL(percent lower explosive limit), as well as incidental parameters including percent oxygen, carbon monoxide concentration, and hydrogen sulfide concentration, using a *GasTech Safe-T-Mate GT-400 gas meter.* Monitoring for total volatile organic vapors will also be completed, using a *Mini-Rae photoionization detector.*

2.2.4 Residential Water Well Monitoring

Historically, Steuben County has implemented an annual residential well water sampling and analysis program, on an alternating basis, for a number of local private residential wells located in the general vicinity of the Lindley South Landfill. Consistent with these previous efforts, Steuben County has indicated that an annual residential well water monitoring program will be maintained for local private residential wells in the future. Residential water well monitoring will be completed on an annual basis, as part of the Post-Closure Environmental Monitoring Program. Annual residential well water sampling will be completed on an alternating basis as determined by the County, for the residences (locations shown on Figure 3) included within the following list.

Residence	Figure 3 Location
Judy Randall (well depth =105')	A
Hammond Sly	B
Joe Hale (well depth = 176')	C
Terrance Rhodes (well depth =250')	D
John & Pat Errington (well depth =170')	E
Dave & Nancy Fuller	F
William & Joyce Rhodes	G

Residential water well sampling will be completed for parameters included within the 6NYCRR Part 360 baseline list. Upon receipt, copies of the laboratory data will be submitted to Steuben County for distribution to the appropriate residents.

2.3 General Field Sampling Equipment

Field sampling equipment shall be manufactured of inert materials and designed to obtain samples with minimal agitation and contact with the atmosphere. The equipment shall be cleaned at the laboratory or other appropriate location and checked before use. It shall be protected during transportation to avoid contamination. Prior to sampling, all equipment shall be procured and accommodations for sample container delivery and sample shipment shall be made. The following is a list of general equipment that should be utilized during sampling events.

General Sampling Equipment:

- Chain of Custody Forms
- Field Log Book and Field Record Sheets
- Engineers Tape and Folding Ruler with 0.01 Foot Intervals
- Face-Safety Shield, Latex Gloves and Respirators
- Tyvek Coveralls and Boots
- Conductivity Meter with Calibrations Standards
- pH and Eh meters (portable electronic); pH paper;
- Thermometer (portable Hand-Held)
- Biodegradable Phosphate-Free Detergent
- Coolers (with ice) , Sample Bottles, and Aluminum Foil
- Duct and Filament Tape
- Paper Towels, Large Plastic Sheets and Decontamination Cloths
- Tap, Deionized, and Distilled Water
- Laboratory Grade Hexane
- 5 Gallon Wash Buckets

2.4 Sampling Protocols and Methods of Sample Collection

A Health and Safety Plan has been included within Appendix A for use and/or informational purposes as part of the Post-Closure Environmental Monitoring Program. Prior to initiation of the Post-Closure environmental monitoring program, a tour-introduction of the site to applicable sampling/laboratory personnel, as well as local Police and Fire Department personnel, shall be provided. Proper sample collection, preservation, handling, and analysis procedures must be followed in order to maintain sample integrity. The following protocols are designed to collect representative samples and maintain adequate QA/QC.

2.4.1 Groundwater Monitoring Wells

The monitoring wells to be sampled as part of the EMP are constructed of 2" diameter PVC riser pipe with a protective steel casing. Each of the site specific monitoring wells are presently equipped with dedicated PVC bailers. Water level elevations shall be recorded from each well location. Water elevations shall be identified for each well prior to purging and sampling. Measurements shall be taken from a point on the top of PVC riser pipe or on some other known point. The water level data shall be used to update the groundwater contour map. Water level measurements shall be obtained using an electronic measuring device. Other specific information for the well shall also be recorded. This includes the total depth of the well, distance from top of protective casing to the standing water, distance from top of protective casing to scribed mark on well casing, and surveyed land elevation. All measurements shall be taken within a 24 hour period to obtain consistent elevations and shall be recorded on the Monitoring Well Data Sheets. The procedure for measuring water levels in the monitoring wells is described below.

- Unlock and remove the well cap. Measure water level to nearest 0.01 foot with an electronic water level indicator. The water level indicator shall be decontaminated before moving to next well. The tape and cable are decontaminated by washing in a bucket of distilled water with a biodegradable, phosphate-free detergent solution, followed by a rinse with distilled water.

Standing water in the well shall be evacuated or purged prior to collecting a sample. It is reasonable to assume that removing 3 to 5 times the well volume of water in the well should replace standing water with formation water. Thus, prior to sampling, the sampling team shall purge the well by removing 3 to 5 times the well volume of water. Calculate the necessary volume of water to be removed as follows:

- Determine the length of the well from well boring logs = A (in feet).
- Measure the distance from the top of the well to the water level = B (in feet).
- Calculate the length of water column in the well = L (in feet) = A-B.
- Determine the diameter of the well = D (in inches).

Use the following equation to calculate one well volume of water:

V = one well volume in GALLONS.
D = diameter of well in INCHES.
L = length of standing water in well in FEET.

$$V = D^2 * L * 0.041$$

Note: The above equation factors in the conversion from inches to feet for the well diameter, cubic feet to gallons, and the constant pi (3.14). Multiply V times 3 to 5 to determine the total volume to be evacuated.

Determine the volume of water the bailer can hold. Divide the evacuation volume by the bailer volume to obtain the number of bails of water to be removed from the well. Record this on the Monitoring Well Data Sheet. Attach the polypropylene rope to the sample bailer then purge the well. A different dedicated rope shall be used for each well. After the calculated volume of water has been removed, the well shall be allowed to recover for 24 hours before samples are collected. The following procedures will be used for the subsequent collection of groundwater samples from the monitoring wells:

1. Prepare the Monitoring Well Data (Appendix B) and Chain-of-Custody sheets for each well. (Monitoring well logs are included within Appendix B);
2. Calibrate the field measurement instruments (pH, Eh, conductivity, turbidity) according to the instrument manufacturer's procedures for calibration;
3. Unlock and remove well cap;
4. Measure and record the depth to water from the top of the PVC riser pipe using a previously decontaminated electronic water level indicator;
5. With a dedicated PVC bailer, remove one bailer volume of well water and measure and record the initial pH, conductivity, temperature, and Eh. The bailer should be gently lowered into the well just enough to submerge the bailer below the top of the water level, and then gently remove the bailer. This procedure should be used to purge the well of at least 3 to 5 well volumes of water with the purged water discharged to a container and disposed of within leachate sump LS-3 located within the limits of the landfill liner system. This approach to well purging is used in an attempt to minimize the re-suspension of silt which may be present within the well. The 3 to 5 well volumes are computed using the calculated water volume of the well based upon the height of the column within the riser pipe and the diameter of the riser pipe. In cases where a low well volume is encountered, an additional allowance should be made for the sand pack volume of the bore hole;
6. If the well should go dry prior to purging the required 3 to 5 well volumes, allow an appropriate amount of time for the well to recover. If the required 3 to 5 well volumes cannot be purged from the well within a 24 hour period, due to poor well recharge proceed to sample the well within the 24 hours of initiation of well purging activities;

7. If/when expanded parameters sampling is being performed, immediately collect those samples intended for volatile, semi-volatiles, and PCB/pesticide analysis. Otherwise, remove the bailer and secure the well for sampling on the following day;
8. Collect the groundwater samples for laboratory and field parameters using the same bailer handling procedures as what was followed during well purging. If the field turbidity value is greater than 50 NTU's, it may be appropriate to additionally collect a duplicate sample(s) for soluble metals analysis;
9. If duplicate metals samples are collected for filtration and subsequent analysis of soluble metals (i.e., soluble metals of concern), proceed to filter such samples using appropriate filtration devices and membranes. The media used in the filtration should have been previously prepared by acid washing, subsequent rinsing with distilled water, and checked for neutral pH. The filtration device should be rinsed with nitric acid followed by a distilled water rinse and air dried between each use. If duplicate samples were collected for soluble metals analysis, a filter blank QC sample must be collected and analyzed for the respective routine or baseline parameter metals. When expanded parameter organic sample collection and analysis is performed, a trip blank for each day baseline parameter samples are collected, must accompany the samples in the field and must be analyzed for the respective baseline parameter organic;
10. Check pH of samples collected for total metals, ammonia, COD, cyanide, hardness, TKN, TOC, and phenols using pH paper to ensure that samples are preserved below a pH of 2.
11. Record on the Monitoring Well Data (Appendix B) and Chain-of-Custody sheets any pertinent information including sample appearance (color, odor, turbidity), adverse conditions related to the well installation, weather, needed maintenance, etc.;
12. Lock the well and decontaminate the sampling equipment (if necessary) which will be reused for sampling of other monitoring points, using appropriate and acceptable decontamination methods (i.e., which may include acid washing of filtration equipment, etc.).

Appendix C includes a listing of the requirements for sample containers, preservation techniques, and maximum holding times for the host of various routine, baseline, and expanded parameters.

2.4.2 Surface Water Sampling Points

Each of the surface water sampling points will be sampled by use of an intermediate sampling container (glass jar), either handheld or attached to an extension arm. The samples will be poured from the intermediate sampler into each of the sample collection bottles. The following procedures will be followed for the collection of the surface water samples:

1. Prepare the Chain-of-Custody sheets for each surface water sampling points;
2. Calibrate the field measurement instruments (pH, Eh, conductivity, turbidity, dissolved oxygen) according to the instrument manufacturer's procedures for calibration;
3. The surface water samples should be collected in a downstream to upstream progression;
4. Rinse the intermediate sampling container at least three times with the surface water to be sampled, prior to sample collection;
5. The surface water samples should be collected with the intermediate sampling container in such a manner as to minimize re-suspension of bottom sediment. Collect the surface water samples for laboratory and field analyses as close to the center of the stream as possible.
6. When analysis is performed for organic parameters, a trip blank for each day of sampling must accompany the samples in the field and be analyzed;
7. Check pH of samples collected for total metals, ammonia, COD, cyanide, hardness, TKN, TOC, and phenols using pH paper to ensure that samples are preserved below a pH of 2.
8. Record on the Chain-of-Custody sheets any pertinent information including sample appearance (color, odor, turbidity), weather, adverse conditions related to the sampling point, etc; and
9. Decontaminate the sampling equipment which will be reused for sampling of other monitoring points, using appropriate and acceptable decontamination methods.

Appendix C includes a listing of the requirements for sample containers, preservation techniques, and maximum holding times for the host of various routine, baseline, and expanded parameters.

2.4.3 Landfill Gas Monitoring

As previously described, post closure landfill gas monitoring will include the measurement of explosive gases at 15 to 20 pre-staked landfill cap perimeter locations during each monitoring event. Landfill gas monitoring shall be completed, concurrently during post-closure groundwater and surface water monitoring tasks, utilizing a multi-gas meter. The following procedures will be followed for the measurement of landfill gases at each of the landfill site:

1. Prepare Landfill Gas Monitoring Record Sheets (Appendix B);
2. Calibrate multi-gas meter prior to site arrival according to the manufacturers procedures for calibration;
3. Gas measurements shall be consistently taken at 15-20 pre-staked locations proximate to the perimeter of the landfill cap;

4. Prior to each gas measurement, the multi-gas meter shall be purged by assessing background ambient air quality for a minimum duration of one minute;
5. Gas measurements shall be completed for parameters including, percent LEL (lower explosive limit), percent oxygen, carbon monoxide concentration, and hydrogen sulfide concentration, with subsequent readings logged on the Landfill Gas Monitoring Record Sheets (Appendix B).
6. The results of each gas monitoring event shall be listed and interpreted within subsequent post-closure monitoring reports.

2.5 Field Parameters

Immediately after the well has been purged, field parameters shall be measured. Field parameters are measured by the field sampling team prior to and after samples are collected for laboratory analysis. It is important to measure the field parameters before and after laboratory analysis so as to evaluate the stability of the groundwater. All field test equipment shall be calibrated at the beginning of each sample day, and shall be checked and re-calibrated according to the manufacturer's specifications. Calibration information shall be reported with the analytical results. Parameters which are to be measured in the field include specific conductance, temperature, pH, turbidity, and Eh.

Specific Conductance

Electrical conductance or conductivity is the ability of a substance to conduct an electrical current. By definition, conductance is the reciprocal of resistance. Thus, the units for conductance are reported as reciprocal ohms or mhos. To avoid inconvenient decimals, data shall be reported in micromhos. Specific conductance shall be measured using a portable electronic instrument made for measuring specific conductance and shall be recorded on the Monitoring Well Data Sheet (Appendix B). The manufacturer's instruction for calibration, operation, and maintenance of the instrument shall be followed.

Temperature

The temperature of the recovered groundwater shall be measured with a portable hand held thermometer and recorded on the Monitoring Well Data Sheet (Appendix B). The thermometer used should be capable of measuring temperature to an accuracy of 0.5° F. The manufacturer's instructions for calibration, operation, and maintenance of the instrument shall be followed.

pH

The notation "pH" is used to represent the hydrogen-ion concentration and is the negative base 10 log of the hydrogen-ion activity in moles per liter. Although it is a concentration measurement, the pH is generally taken to mean hydrogen-ion activity rather than concentration and is reported in Standard Units (SU). The pH of the groundwater shall be measured with a portable electronic pH meter. The instrument shall be calibrated daily with standard known pH solutions. The pH meter should be capable of measuring pH to an accuracy of 0.05 standard pH units. The manufacturers instructions for calibration, operation, and maintenance of the instrument shall be followed. The pH reading shall be recorded on the Monitoring Well Data Sheet (Appendix B).

Redox Potential (Eh)

The term redox potential (Eh) is used to represent the relative intensity of oxidizing or reducing conditions in solutions. Groundwater in contact with air can be expected to show effects from oxygen. Measurements on reducing systems such as groundwater containing ferrous or ferric iron are meaningful only if oxygen is very carefully excluded from all parts of the sampling and measuring system. Eh measurements of pumped groundwater that has not contacted air requires special equipment and great care. Eh shall be measured using a portable, electronic Eh meter. The manufacturer's instructions for calibration, operation, and maintenance of the Redox Potential meter (tester), such as a "ORP Testr," meter shall be followed (an example of the calibration, maintenance, and operation instructions for the ORP Testr is included within Appendix C). The Eh reading shall be recorded on the Monitoring Well Data Sheet (Appendix B).

2.6 Sample Preservation

Many of the collected samples require preservation by chemical additives. For convenience purposes and QA/QC considerations, these preservatives are often added to the sample bottles in the laboratory, prior to sample collection. This approach reduces the amount of sample handling in the field and allows for more uniformity in sample preparation. The addition of chemical preservatives to the samples is dependent upon the type of analysis to be performed and the analytical methods to be employed. The laboratory should provide the needed information pertaining to the proper procedures for preservation of samples. Preservation techniques, container types, and holding times will be consistent with the most recent version on NYSDEC QA/QC protocols, as listed in Appendix C.

2.7 Chain-of-Custody Documentation

All samples collected as part of the EMP at the landfill must be in the custody of an approved person from the time the sample is collected until the sample is analyzed for the last time. This custody must be documented on a Chain-of-Custody form which must accompany the sample at all times. The person who is responsible for collecting the sample must sign their name and record the time and date of sample collection. If the sample is transported to the laboratory by someone other than the sampler, the courier must retain custody of the sample and the Chain-of-Custody form must have their signed name and the time and date of acceptance. This Chain-of-Custody must be maintained if sample analysis is to be subcontracted to a laboratory other than the prime. Finally, the signed Chain-of-Custody sheet must be included with the sample data report submitted to the engineer and subsequently to the NYSDEC. A Chain-of-Custody sheet must be completed for each set of sample bottles including QA/QC samples, collected from each environmental sampling point. The Chain-of-Custody sheets must also include information related to sample characterization. At a minimum, the Sample Characterization/Chain-of-Custody Sheet must include the following information; 1) Full laboratory name and address; 2) Job name/location/designation; 3) Sample name/designation

Monitoring Wells only

Date of well evacuation
Well depth
Depth to water (from top of riser pipe)
Well volume
Volume of water evacuated
Method of well evacuation
Field parameters (pH, temperature, color, appearance, etc.,) at the start and end of evacuation

All samples

Date and time of sampling
Method of sample collection (grab, composite, etc.,)
Field parameters (pH, Eh, temperature, conductivity, appearance, color, etc.,)
Sample preservatives
Analyses to be performed
Field notes stating any relevant information
Chain-of-Custody signature lines including spaces for date and time

2.8 Sample Identification

Sample identification documents shall be prepared to maintain sample identification. All samples shall be identified with a sample label. Identification labels shall be properly filled out and placed on the sample container after each sample is collected. Identification labels shall be consistent and similarly filled out for each sample collected and shall be consistent for all sampling rounds. The sample Identification tag or label shall include the following information:

- Project Name (ex. Lindley South Landfill Post-Closure Monitoring)
- Sample Identifier (ex. MW-1)
- Sample Type (ex. groundwater)
- Sample Collectors Name (in full)
- Sampling Date (mm/dd/yy)
- Sampling Time (hour:min)

Each sample shall be assigned a unique identifier which shall be the alphanumeric associated with the sampling location. For example, the groundwater sample identifier shall be used to track the sample through all subsequent handling, analysis, data reduction, and reporting procedures.

2.9 Analyses to be Performed

In accordance with correspondence from project specific NYSDEC personnel, quarterly Post-Closure groundwater and surface water monitoring at the Lindley South Landfill shall be completed for 6NYCRR Part 360 baseline parameters (1-quarter) and Part 360 routine parameters (3-quarters). As previously mentioned, residential water well monitoring shall be completed for Part 360 baseline parameters on an annual basis. The environmental and facility monitoring points shall be maintained during post-closure for a period of 30 years. The baseline and routine parameter lists, as identified in the 6NYCRR Part 360 Regulations (NYSDEC 1993), is presented in Appendix D. After the first five years of monitoring are complete, the County may request that NYSDEC modify the monitoring program.

2.10 Analytical Methodologies

Baseline and Routine parameter analysis of the samples collected during the Post-Closure Environmental Monitoring Program will be conducted according to New York State Department of Health (NYSDOH), 6NYCRR Part 360 NYSDEC (Oct. 1993), or United States Environmental Protection Agency (USEPA) accepted methodologies as listed in 6NYCRR Part 360-2.11(d)(6). Many of the leachate indicator parameters may also be analyzed according to methods described in "Standard Methods for the Examination of Water and Wastewater" (1989). It should be noted that many of the parameters may be analyzed by more than one acceptable methodology. Appendix D contains a representative list of analytical methods, representative method detection limits (MDLs), and the Chemical Abstract Service (CAS) numbers assigned to the specified parameters.

2.11 Reporting and Remedial Objective Requirements

Environmental Monitoring Reports will be submitted to the NYSDEC on an annual basis, after receipt of the analytical data results from the corresponding annual monitoring event. The report is intended to summarize the analytical data results for the sampling round, provide interpretations of such results, and report the observance of exceedences of NYSDEC water quality standards or guidance values (NYSDEC, 1991a).

The quarterly monitoring reports shall present the following information:

- Analytical data reports indicating the monitoring point designation of upgradient monitoring wells, date of sample collection, analytical results, QA/QC notations, method detection limits (MDLs), and Chemical Abstract Service (CAS) numbers for applicable parameters;
- A summary of the contraventions of NYSDEC water quality standards and guidance values, if any. Tables shall include units of measure, a column of action levels, descriptive sample IDs, and current and previous sample results tabulated for trend analysis;

- Tables or graphical representations comparing current and existing water quality, and upgradient and downgradient water quality which may include the use of Piper plots, Stiff diagrams, tables, or other analyses. Tables shall include units of measure, a column of action levels, descriptive sample IDs, and current and previous sample results tabulated for trend analysis;
- Listings of parameters determined to be above background conditions or statistically determined trigger values; and
- Interpretation and discussion of the environmental monitoring analytical results and recommendations for modifications to the Environmental Monitoring Plan based upon the observed exceedences of NYSDEC water quality standards and guidance values (NYSDEC, 1991a) or statistically determined trigger values.

Although it is usually preferred that Remedial Objectives or Action Levels be outlined prior to initiating Post-Closure monitoring, it should be noted that only a limited number of previous monitoring events have been conducted at the landfill. As such, it is planned that initial post-closure monitoring event data be assessed utilizing comparisons with 1) NYSDEC Water Quality Standards; 2) Background-Upgradient/Upstream data; and 3) Historical Data General Comparisons, at least until five rounds of historical monitoring data have been compiled (including the data generated as part of the two RI sampling events). A listing of the applicable NYSDEC Water Quality Standards (for routine and baseline list parameters), site specific Background-Upgradient/Upstream data, and Historical RI data, which will utilized to initially assess Post-Closure groundwater and surface water quality, are included within Appendix D.

It is intended that statistical trigger levels, based on historical and background data, be established in the near future when at least three additional rounds of environmental monitoring data have been obtained. Together with NYSDEC Water Quality Standards and Guidance Values, the statistical trigger levels will be utilized as Remedial Action Levels, to indicate the need for contingency monitoring and/or remediation at the site. As previously mentioned, it is planned that initial post-closure monitoring event data be assessed utilizing comparisons with 1) NYSDEC Water Quality Standards; 2) Background-Upgradient/Upstream data; and 3) Historical Data General Comparisons, at least until five rounds of historical monitoring data have been compiled.

Copies of the landfill monitoring reports, and associated correspondence, will be provided to:

Ms. Mary Jane Peachey
New York State Department of
Environmental Conservation
Region 8
Regional Hazardous Waste Engineer
6274 East Avon-Lima Road
Avon, New York 14414

2.12 Contingency Water Quality Monitoring Plan

The Contingency Water Quality Monitoring Plan (CWQMP) describes what actions should be taken with regard to the EMP, in the event that contamination is detected at certain environmental monitoring points. The environmental monitoring points subject to the CWQMP are the groundwater monitoring wells and surface water monitoring locations.

The determination of contamination may be made from the following criteria:

- Detection of an analyte above background concentrations;
- Detection of an analyte in exceedence of NYSDEC groundwater standards; and/or
- Determination of statistically significant increases in parameter concentrations between upgradient and downgradient conditions.

It should be noted that the detection of most metal parameters at elevated concentrations may be due to elevated sample turbidity. If elevated metal parameters meet any of the above criteria, and the sample turbidity is observed to be relatively high, additional assessment information can be determined through the analysis of filtered metals analysis. The filtered metal parameter concentration should then be subjected to the above mentioned criteria.

If significant or above background contamination by one or more of the baseline or routine parameters is determined at a groundwater or surface water monitoring point, then the affected monitoring point must be sampled for the parameter(s) of concern during a subsequent contingency sampling round within 3 months.

Subsequent sampling for parameters of concern must be conducted quarterly at the affected monitoring point until such time that it can be shown to the NYSDEC that the elevated parameter is not landfill-derived or that the release of the parameter from the landfill has been remediated.

If contamination, above background and above historical statistical trigger levels, by any toxic metal (antimony, arsenic, beryllium, barium, cadmium, chromium, chromium VI, copper, lead, mercury, nickel, selenium, silver, thallium, or zinc), cyanide, or volatile organic compound is determined at a groundwater or surface water monitoring point, the affected environmental monitoring point must be sampled for Part 360 expanded parameters during a contingency sampling round, following the monitoring event of occurrence. The contingency sampling must be followed until such time that it can be shown to the NYSDEC that the recently identified elevated parameter is not landfill-derived or that the release of the parameter from the landfill has been remediated. The cessation of contingency sampling is subject to NYSDEC approval. In instances where the existing water quality monitoring has indicated that contamination is present at any of the groundwater or surface water monitoring points, a trigger level will be established as part of the CWQMP which will specify a parameter concentration level which will serve as an action level before the CWQMP would be implemented. This statistical test would determine the acceptable range of the parameter concentration for a specified confidence level of 95%, as determined by a t-Test statistical analysis.

As previously noted, until at three additional monitoring events have been completed and a historical statistical database can be accordingly established, post-closure monitoring data will include a review and assessment of the analytical data as compared to 1) NYSDEC Water Quality Standards; 2) Background vs Downgradient/Downstream Data; and 3) Historical Data to determine potential impacts and the subsequent need for contingency monitoring. It is intended that statistical trigger levels, based on historical and background data, be established in the near future when at least three additional rounds of environmental monitoring data have been obtained. Together with NYSDEC Water Quality Standards and Guidance Values, the statistical trigger levels will be utilized as Remedial Action Levels, to indicate the need for contingency monitoring and/or remediation at the site.

SECTION 3

SECTION 3

POST-CLOSURE MAINTENANCE OPERATIONS PLAN

The Post-Closure Maintenance Operations Plan describes the procedures that will be utilized by Steuben County to provide proper maintenance of the facility and meet the applicable requirements of 6NYCRR Part 360 for a minimum period of 30 years after landfill closure.

3.1 GENERAL

The general site plan is shown on Figure 1. The site, consisting of a south and north landfill with the south landfill being closed and covered in accordance with the Engineering Plans and Specifications. The final cover system is a series of continuous layers of soil and geosynthetics placed over the existing cover material of the landfill, which serves to restrict infiltration of precipitation, support vegetation, control landfill gas and leachate, and promote surface drainage without erosion of the final cover system. The final cover system, starting at the surface, consists of 6 inches of topsoil, a barrier protection layer of 24-inches of soil, a geocomposite drainage layer, a geomembrane with a minimum thickness of 40 mils, a geotextile layer, and granular gas venting trenches. The topsoil layer is an uncompacted layer of soil suitable for vegetative growth. Combined with the barrier protection layer, the topsoil layer should provide an adequate root zone.

A geomembrane with a minimum thickness of 40 mils and a maximum coefficient of permeability of $1x10^{-12}$ cm/sec was installed as the low permeability barrier layer. A geocomposite drainage layer was placed between the barrier protection layer and the geomembrane to prevent liquid build-up on the geomembrane. The gas venting system consists of a series of stone filled trenches and risers that circumscribe the landfill. The gas venting system provides for the movement of landfill gas to the venting risers. The granular material used in this system consists of a NYSDOT No. 2 coarse aggregate meeting the requirements of NYSDOT Standard Specification Section 703-02.

3.2 SITE MAINTENANCE SCHEDULE

Annual post-closure inspection and corrective action activities will be conducted on a quarterly basis. The inspections will be scheduled to coincide with the quarterly inspections of the leachate storage facility, thus performing an integrated inspection of the overall South Landfill facility. Additionally, inspection activities will occur after heavy rain events which may be suspected of endangering the integrity of the cover system or drainage structures.

Inspections will encompass the closed landfill, the drainage systems, service road, and perimeter fence. The inspections will be performed by qualified personnel experienced in the construction and function of a multi-layered cover system, and are familiar with the history as well as the ongoing activities at the site.

Vehicular traffic on the landfill will be limited to the service road only, and will be restricted in size to pick-up trucks and smaller vehicles.

Inspection

The landfill cover system will be evaluated for overall integrity, as well as for other parameters as identified in Subsections 3.4 through 3.7 below. The service road will be inspected for differential settlement, rutting, or erosion. The perimeter chain link fence will be inspected for breaches in the fencing fabric, stability of fence posts, and for operability of the gates.

Corrective Action

When necessary, corrective actions will be performed in accordance with Subsections 3.4 through 3.7 below, and as identified herein. Repairs to geosynthetic liner components will be made by authorized service representatives of the respective manufacturers.

If, during the quarterly inspections, excessive leachate seepage is observed, the area and the extent of the seepage will be documented. A plan to mitigate the seepage and remediate the area will be prepared and forwarded to the NYSDEC for review and approval. When possible, remedial efforts will involve routing the seepage into the existing leachate collection system.

Repairs to the service road will be performed by placing, grading and compacting additional gravel material in the remedial area. Loose fence posts will be reinforced by encasing the loose post in concrete. Repairs to fencing materials will be made by authorized representatives of the fence manufacturer.

Repairs to the systems constituting the closed landfill site, including the cover system, service road, drainage systems and perimeter fence, will be made in conformance with the engineering plans and specifications for the landfill closure.

3.3 FINAL GRADES AND SIDE SLOPES

The final grading plan is shown on Figure 2. The final cover system has a minimum slope of 4 percent and a maximum slope of 33 percent in conformance with 6NYCRR, Part 360-2.13 (q)(2)(ii).

3.4 DRAINAGE AND EROSION CONTROL

Proper drainage and erosion control is necessary to maintain the integrity of the final cover system. Proper drainage design should minimize surface soil erosion, control peak rates of runoff, and prevent ponding. The final landfill grading plan has been designed to enhance proper surface drainage and direct the runoff to storm water management facilities.

Landfill slopes were designed and constructed as noted in Subsection 3.3 above. The minimum 4 percent slope will promote surface water runoff and minimize ponding. A designed maximum slope of 33 percent, along with the vegetative mix selected, will restrain surface flow velocities and minimize surface soil erosion or scouring.

The drainage control facilities consist of a perimeter drainage system located just inside the property boundaries. The system collects surface water from the site, directs the collected run-off toward Gibson Road on the east and west sides of the landfill, and discharges into the existing drainage channel along Gibson Road. The perimeter channels will cut off run-on to the final cover system from off site, and will prevent site run-off to adjacent properties. The perimeter drainage system was designed and constructed to withstand a peak discharge of a 24-hour, 25-year frequency storm. Synthetic erosion control matting and stone riprap were placed in those areas where channel velocities for the design peak discharge storm are anticipated to exceed the maximum non-erosive velocity for a vegetated earthen channel.

Inspection

The surface of the closed landfill will be inspected for erosion damage, particularly on the steeper sideslopes and around drainage structures. Personnel will look for damage such as rutting or washouts. The perimeter drainage system will be inspected for breaches in the drainage channels; and for system blockage due to debris build-up, sediment deposits, erosion or excessive vegetative growth. The integrity of the erosion control matting and riprap will also be examined.

Corrective Action

In the event that erosion damage is noted, corrective actions will be implemented. Minor erosion to the cover soil system will be repaired by installing the appropriate cover layer material and re-establishing vegetation. Areas which exhibit chronic erosion will be remediated by re-grading, installing supplemental erosion control materials, or diverting runoff from the area. The perimeter drainage system will be graded and maintained to be consistent with the originally constructed slopes. Erosion control materials will be repaired or replaced as necessary. Sediment and debris build-up in the drainage channels, particularly at culvert inlets, will be removed by hand digging to prevent damage to the channel's vegetative growth or synthetic erosion control material. More detailed remedial measures will be determined by the circumstances causing the erosion.

3.5 VEGETATIVE COVER MAINTENANCE

Cover vegetation will be maintained during the post-closure period for a minimum of 30 years. Vegetative cover will be established and maintained on the exposed final cover material within four months after placement of the final cover system. If this cannot be achieved due to seasonal constraints, measures such as installing geotextile coverings will be taken to maintain the integrity of the final cover system before the establishment of vegetative cover. After the vegetative cover is established, the cover will be mowed at least twice annually, or as necessary to control the growth of wild and deep-rooted vegetative species and to reduce the potential for introducing vector habitats.

Inspection

In order to prevent erosion of the final cover material, it is necessary to maintain the proper density and condition of the vegetative cover. Therefore, the condition of the vegetative cover will be evaluated during routine inspections. Investigations during the wet months will look for washouts of vegetation, while investigations during the dry months will look for signs of deterioration due to drought conditions. The inspection will also be performed to observe whether any brush or trees are becoming established on the landfill cover system.

Corrective Actions

When vegetation needs improvement, additional soil, seed and/or fertilizer will be applied as necessary. No herbicides or pesticides shall be used on the landfill cover. The seed mixture applied will be the same as that applied during initial seeding, unless it has been determined that the original mixture is not appropriate for the landfill conditions. If brush or tree growth is found, it will be cut at ground level and the cuttings removed.

3.6 ENVIRONMENTAL AND FACILITY MONITORING

Environmental and Facility monitoring points will be maintained and sampled during the post-closure period for a minimum of 30 years. Quarterly monitoring, including routine parameter list (three quarters) and baseline parameter list (one quarter) sampling, will be performed on the groundwater and surface water samples for a minimum of five years, after which time the County may request that NYSDEC revise the sampling frequency. Quarterly and annual summary reports of the results of the environmental and facility monitoring will be developed. A detailed description of the monitoring activities is included in Section 2 of this Post-Closure Environmental Monitoring Plan.

3.6.1 Groundwater Monitoring Wells

Inspection

During each quarterly site visit, the groundwater monitoring wells will be inspected. This inspection will include an evaluation of the integrity of the outer protective casing and concrete pad; the integrity of the inner well casing; the working condition of the well cap and lock; whether the well cap is securely locked; and the legibility of the well identification number.

Corrective Action

Maintaining the integrity of the groundwater monitoring wells is of paramount importance. Deficiencies in well integrity will be addressed by landfill personnel as soon as practicable. If damage is significant, a well installation contractor will be contacted for consultation and remedial measures.

3.6.2 Benchmarks

The benchmarks are the top of PVC risers for monitoring wells MW-1, MW-2S, MW-2D, MW-3, MW-4, GW-1 and GW-4.

Inspection

Settlement information is necessary to evaluate the integrity of the closure system. Thus, it is important to maintain the integrity of the reference benchmarks. Therefore, during each inspection, the reference benchmarks will be inspected.

Corrective Action

If problems with the reference benchmarks are discovered, they will be corrected as soon as practicable by resurveying to establish their new locations or elevations.

3.6.3 Gas Vents

Inspection

During each inspection, the gas vents will be inspected. This inspection will include an evaluation of the integrity of the vent riser for such things as cracks, breaks, displacement, settlement, or loose or missing screens.

Corrective Action

Deficiencies in the gas vents will be corrected as soon as practicable. If the riser has been displaced or has settled, the cause of the displacement or settlement will be determined and corrected appropriately.

3.7 SETTLEMENT AND SUBSIDENCE

Inspection

Settlement and subsidence will be monitored during the post-closure period. Investigations will include a visual inspection to identify readily discernible areas where settlement or subsidence has occurred.

Corrective Action

If minor localized areas of settlement are found, they will be corrected by the application of additional cover material and re-vegetated. If settlement is significant or areas of subsidence are noted, an investigation will be initiated to identify the cause of the problem and any potential damage to the cover system. If necessary, regrading will be conducted to maintain drainage and erosion control.

SECTION 4

SECTION 4

CONTINGENCY PLAN

4.1 INTRODUCTION

The purpose of a Contingency Plan, as required by 6NYCRR Part 360 Regulations, is to set forth an organized, planned and coordinated, technically and financially feasible, predetermined course of action to be taken when potentially harmful or environmentally threatening situations occur during the closure and post-closure operation of a landfill. The County shall be prepared to respond to problems that may be experienced during the post-closure period, including extraordinary, or possible "worst case" situations that may develop.

The Contingency Plan is an integral part of the Post-Closure Monitoring and Maintenance Operations Manual and is to be used by County personnel in responding to potentially harmful or environmentally threatening situations. It is designed to be used by the personnel responsible for post-closure maintenance of the landfill and is to be kept readily accessible. Maintenance personnel shall become familiar with identifying situations requiring contingency action and shall be instructed in the appropriate response.

4.2 EMERGENCY COORDINATOR AND ALTERNATES

The following is a List of Emergency Coordinators and Alternates:

	Title	Telephone
Emergency Coordinator:	Assistant Commissioner (Landfill)	(607) 776-9631
Alternate:	Commissioner of Public Works	(607) 776-9631

4.3 RESPONSIBILITIES

4.3.1 On-Site

The Assistant Commissioner will be in charge of the activities carried out at the Lindley South Landfill. He has primary responsibility for insuring that this Contingency Plan is implemented as described. He has the responsibility and authority to implement the provisions of the Contingency Plan and is the primary emergency coordinator. Secondary responsibility in his absence is assigned to the alternate emergency coordinator listed in Subsection 4.2. Selected County personnel have been designated as emergency response team members and are responsible for carrying out the details of the implementation program as directed by the Emergency Coordinator. Each of the individuals shall be thoroughly instructed in the implementation of the Contingency Plan and shall participate in both on-site and off-site training programs.

4.3.2 Off-Site

In the event of an emergency requiring assistance from off-site, such as fire, ambulance, etc., the "911" Steuben County Emergency Response System will be utilized to obtain the specific emergency response services needed.

4.3.3 Emergency Coordinator

The Assistant Commissioner is responsible for implementation of this Contingency Plan, establishment and supervision of the emergency response team, and conducting training programs for personnel assigned duties on the emergency response team.

A. Responsibilities of the Emergency Coordinator BEFORE the emergency include the following:

   - Insure there is an alternate emergency coordinator ready to take over in his absence who is fully trained and capable of implementing this contingency plan;
   - Be familiar with the physical layout of the facility and the operations carried out in each part of the facility;

- Develop an understanding of the emergency response organization and insure adequate staffing of the emergency response teams;

- Provide training for all members of the emergency response organization to ensure that all members know and understand their assigned responsibilities before, during, and after an emergency;

- Conduct regularly scheduled drills, meetings, and demonstrations to update training and evaluate performance of the emergency response team; and

- Establish close cooperation with local fire departments, including regularly scheduled visits to the site and briefing on potential hazards and facility emergency response procedures.

B. Responsibilities of the Emergency Coordinator DURING an emergency include the following:

- Direct and coordinate the emergency response team;

- Determine if assistance of emergency services are needed, and contact them for assistance if needed;

- Coordinate the efforts of the on-site emergency response team with off-site emergency response agencies;

- Supervise the evacuation of non-essential personnel from the area of the emergency, if required; and

- Assess possible hazards to human health or the environment that may result from a fire or explosion, considering both direct and indirect effects. The assessment shall include considerations of the effects of toxic, irritating, or asphyxiating gases, hazardous surface run-off due to water or chemical agents used to control fires, etc.

C. Responsibilities of the Emergency Coordination AFTER the emergency include the following:

- Assure that emergency situations will be thoroughly addressed;

- Supervise post emergency surveillance of any affected areas to insure that the emergency situation does not redevelop;

- Supervise post emergency clean-up and establishment of normal facility conditions;

- Supervise the restoration of emergency equipment and materials into a state of readiness (clean equipment, re-stock supplies which have been used in this emergency, etc.);
- Advise appropriate authorities when the emergency is over;
- Determine the cause of the emergency (employees who were near the scene should be questioned independently regarding their knowledge or observations of incidents preceding the emergency);
- Assess the effectiveness of, and modify if necessary, existing conditions to prevent future emergencies from similar causes;
- Modify existing emergency response procedures, if required;
- Record all actions taken under the Contingency Plan in the facility operating records;
- Notify the appropriate regulatory agencies as required by regulation; and
- Submit reports to the NYSDEC as described in Subsection 4.11 of this plan.

4.3.4 Emergency Response Team Members

A minimum of two County employees, one of whom shall be a qualified equipment operator, shall be assigned to the emergency response team.

A. Responsibilities of the Emergency Response Team BEFORE the emergency include the following:

- Participate in scheduled training programs, drills and demonstrations to develop requisite emergency response skills;
- Become familiar with start-up and operation of all emergency equipment maintained for use in an emergency; and
- Become familiar with the location, use, and availability of stocks of supplies and materials maintained for use during an emergency.

B. Responsibilities of the Emergency Response Team DURING the emergency include the following:

- Upon notification of an emergency, team members shall proceed to the landfill with their equipment. If the equipment is required to remove materials or trench and dike around the scene of the emergency, proceed as directed by the Emergency

Coordinator.

- If the equipment is not required, park it in a safe place away from the scene of activity without obstructing access to the scene. Perform duties as assigned by the Emergency Coordinator.

C. Responsibilities of the Emergency Response Team AFTER the emergency include the following:

- Assist in the clean-up of the emergency response area and restoration of the site.

- Stand safety watch, if required.

4.4 IMPLEMENTATION OF THE CONTINGENCY PLAN

The Contingency Plan shall be implemented in the following situations if a threat to human health or the environment is evident:

A. Fire and/or explosion

- A fire that could cause the release of toxic or explosive gases or materials;

- A fire that spreads and could possibly ignite materials at other locations on-site or could cause heat-induced explosions;

- A fire that could possibly spread to off-site areas;

- Use of water or water and chemical fire suppressant that could result in contaminated runoff;

- An imminent danger exists that an explosion could occur, causing a safety hazard due to flying fragments or shock waves;

- An imminent danger exists that an explosion could ignite equipment at the facility;

- An imminent danger exists that an explosion could result in release of leachate off-site; or

- An explosion has occurred.

B. Spills or material release

- A spill that could result in release of flammable liquids or vapors, thus causing a fire or gas explosion hazard;

- A spill that can be contained on-site, but where the potential exists for groundwater contamination; or

- A spill that cannot be contained on-site, resulting in off-site soil contamination and/or ground or surface water pollution.

C. Leachate Migration or Impacts to Local Groundwater or Surface Water

- Evidence of leachate migration or additional outbreaks from the landfill.

- Evidence of groundwater impacts which exceed historical conditions and/or background conditions; or

4.5 NON-CRITICAL INCIDENTS

This plan shall not be implemented for incidents which occur within the normal maintenance operations plan. Situations which occur in these areas are handled via routine operational procedures.

4.6 EMERGENCY RESPONSE PROCEDURES

4.6.1 Notification

In the event of any emergency at the Lindley South Landfill site, immediately contact the appropriate personnel according to the list presented in Subsection 4.2. Prior to calling, the party reporting the emergency should make note of where on the site the emergency is.

4.6.2 General Information

Communication is required for successful operation of a Contingency Plan. Successful communication should help ensure expeditious mustering of all personnel involved. Effective maintenance of a communication system during the emergency period is always important. The Emergency Coordinator or his Alternate will be notified by telephone or two-way radio when an emergency exists. All communication equipment should be periodically checked to make sure it is in good working condition and all defective communication equipment shall be repaired or replaced if necessary.

4.6.3 Emergency Notification List

In the event of an emergency, designated personnel shall be called as listed in Subsection 4.2. If the listed Emergency Coordinator cannot be reached, the Alternate shall be called.

4.7 SPECIFIC PROCESS CONTROL PROCEDURES

4.7.1 Fire

The likelihood of a fire at a closed landfill is relatively low. The intermediate cover consists of a minimum of 12 inches of compacted soil which in turn is overlain by the final cover system. This total system should be effective at sealing the landfill and thereby substantially reducing the possibility of spontaneous combustion. Additional fire prevention measures which should be taken for the closed landfill include:

- Designation of the closed landfill area as a "No Smoking" zone;
- Do not allow fires or open burning within 200 feet of the closed landfill area;
- Perform proper routine inspection of the gas venting system to document that the system properly vents gases and minimizes migrations of explosive gas from the site; and
- Perform routine inspection of the final cover system integrity to detect cover rupture which could allow waste to be exposed. Such exposure could provide an avenue for air to enter the waste mass to support combustion.

While the possibility of a fire at the closed landfill should be relatively low, provisions shall be made with the Local Fire Department to respond should a fire occur. Though the Emergency Response Team would have primary responsibility for responding to the emergency, the fire department would have responsibility for conducting the actual firefighting efforts. The Emergency Response Team would be available to assist in the firefighting effort by supplying and placing soil to help smother the fire or by containing runoff that may be contaminated due to the firefighting effort. After completion of the firefighting efforts, the Emergency Response team, with the assistance of a Contractor, would undertake necessary site restoration work, such as repairs to the final cover system and cleaning and returning equipment that does not belong to the fire department.

4.7.2 Landfill Gas

Gases are produced by the decomposition of organic matter in solid waste. The primary gases of decomposition are methane and carbon dioxide. Some nitrogen and oxygen and traces of hydrogen sulfide, ammonia, hydrogen, gaseous hydrocarbons, and volatile organic species are sometimes found in landfills. The amount and composition of gases produced depends on the quantity and characteristics of the wastes deposited, the amount of moisture present, and various other factors. Compaction of the refuse, which increases the density of the landfill, may decrease the rate of water infiltration into the landfill, which slows the ability of bacteria to biodegrade the waste. As a result, when waste is densely compacted, gas will be produced at lower rates over longer periods of time. Methane, like carbon dioxide, is odorless but unlike carbon dioxide, methane is relatively insoluble in water. In addition, methane is explosive at an atmospheric concentration of 5 to 15 percent by volume. Gas vents shall be constructed through the final cover layers to provide passive venting of landfill gases. These vents shall be constructed as part of the final cover system of the landfill. The monitoring and detection of landfill gases should be an important aspect of post-closure operations. Periodic testing for landfill gases shall be performed as part of the Maintenance Operations procedures at the following locations:

- Groundwater monitoring wells;
- Gas vents; and
- Perimeter of solid waste mass.

4.7.3 Structural Failure

Structural failures at the landfill could include:

- Landfill side slope failure;
- Sliding failure between layers of cover components; and
- Subsidence.

If a side slope failure were to occur, the following procedures shall be implemented:

- Contain and isolate sloughed materials which may be contaminated;

- If warranted, reinforce the failed area with additional embankment materials to prevent expansion of the failure;

- Contain liquids from the sloughed material which may be migrating away from the facility;

- If the failure allowed material to slough outside the limits of the landfill, construction of a temporary earthen berm around the affected material may be warranted to help contain waste and liquids;

- Should precipitation accumulate within the failed area, implement procedures to minimize infiltration of precipitation into the facility;

- Temporarily cover the failed area with on-site soils, and grade to drain to reduce infiltration of precipitation into the failed area;

- Construct temporary berms as necessary to divert surface runoff from the failed area;

- Once the system is under control, solicit opinions from consultants and other experts on repair and remediation of the failure and obtain concurrence from the NYSDEC prior to initiation of corrective action; and

- Groundwater and surface water monitoring should be performed on a regular basis to permit prompt evaluation with regard to water quality contravention.

Sliding failure between layers of cover components is not expected to occur. However, if such a failure should occur on a large scale, corrective action similar to the procedures outlined above for landfill side slope failure shall be taken. If such a failure should occur on a small scale, the County may elect to promptly repair the failure by quickly replacing the failed materials in kind in the field and returning the cover system to its original lines and grades. The cause of any failure should be investigated to prevent its recurrence.

A subsidence failure could be caused by settling of the waste due to decomposition of wastes in the landfill and time deformation of the waste under the load of the material on top of it. Minor subsidence can be expected to occur at any landfill facility. Major subsidence is not expected to occur at a landfill when the waste and cover materials are compacted. A minor subsidence prior to final capping could be corrected by the addition of cover material to return the area to its design grade if deemed necessary. A major subsidence shall be corrected in a manner similar to the steps for handling a landfill sideslope failure.

The cause of the subsidence shall be investigated so that measures can be devised to reduce the potential for future major subsidence.

4.7.4 Groundwater Contamination

If the post-closure environmental monitoring plan indicates groundwater contamination by one or more of the routine or baseline parameters, then a contingency water quality monitoring program shall be implemented. The contingency water quality monitoring plan shall be conducted in accordance with Subsection 2.10 of this manual and with 6NYCRR Part 360-2.11(c)(4)(iii). In general, if the aforementioned procedures at the landfill indicate further investigation is warranted, the following remedial actions shall be initiated:

- Prepare a program to determine the source and extent of contamination, to be submitted to the NYSDEC within four weeks after receipt of the confirming water analysis;
- Implement the program upon approval by the NYSDEC and complete necessary investigations. Prepare a report presenting the findings and conclusions, making recommendations for future actions including a time schedule for completing remedial work;
- If remedial construction is required, prepare final plans and specifications, following the NYSDEC approval of the remedial action report; and
- Implement remedial construction after NYSDEC approval of the final plans and specifications, in accordance with the approved time schedule.

4.7.5 Surface Water Contamination

In the event the analytical results of the surface water samples indicate that the background water quality levels or that 6NYCRR Part 701 surface water quality standards have been exceeded, or if contamination by one or more of the routine or baseline parameters is found, then the contingency water quality program shall be implemented. The contingency water quality monitoring plan shall be conducted in accordance with Subsection 2.10 of this manual and with 6NYCRR Part 360-2.11(c)(4)(iii). If the procedure outlined above indicates contamination is partially or completely due to the closed landfill, then the following remedial procedures shall be initiated:

- An attempt shall be made to determine the source of contamination by examining the landfill side slopes and existing drainage patterns in and around the landfill site for visible evidence of leachate contamination;

- Repairs shall be made to the final cover system wherever identified leachate seeps occur on the landfill;

- Eroded areas shall be regraded, gullies filled, and the repaired area reseeded;

- If the number of seeps becomes a problem, an investigation shall be done to determine the cause and the desired comprehensive remedial action objectives; and

- Concurrent with the immediate on-site activities, the County shall retain a consultant to study the feasibility of and develop treatment processes for, the specific contaminant or contaminants that are elevated above the allowable levels in the surface water.

4.7.6 Odors

The primary sources of odors at a landfill are the putrescible portions of the municipal refuse received at the site. The relative isolation and buffering of the site should control most, if not all, odors emanating from the site, by affording distance for them to dissipate. Should odors become an off-site problem after installation of the final cover system, the physical source of the odors shall be investigated to confirm that they are being emitted by the landfill and not some other source. If the odors are suspected to be from the landfill, the route of the odors travelling off-site shall be investigated. The anticipated path of odor emission would be from the cover system's gas vents and subsequently moving off-site with prevailing wind currents. Should this be the case, a study of the vented landfill gases shall be conducted to determine the composition of the gases and what methods are suitable for odor control and elimination. A less likely path for odor emission is through the soil around the perimeter of the closed landfill. If odors attributable to the closed landfill become a problem and are not being emitted by the gas venting system, the possibility of emission by migration of gas through the soil shall be investigated.

4.7.7 Vectors

Vectors are any animals or insects that may carry diseases or otherwise cause a nuisance or property damage. Part of the routine inspection of the final cover system shall be for evidence of damage to the final cover system caused by vectors. This will primarily consist of burrows dug by animals such as rabbits, groundhogs and the like. Insects should not be a problem due to the final cover system, which should prevent their penetration into the former landfill. Birds should not pose a problem due to the thick final cover system which would prevent them from gaining access to the waste. In the event a problem develops with vectors, an extermination program shall be developed and implemented by a New York State certified extermination company retained to perform this task. Such a program must be in strict conformance with the requirements of the NYSDEC and NYS Department of Health.

4.7.8 Equipment Breakdown

As there would normally be no operating equipment at the closed landfill, equipment breakdown should not be a problem.

4.8 EMERGENCY EQUIPMENT

4.8.1 Location of Emergency Equipment

Location of emergency equipment shall be at the Landfill Maintenance Building.

4.8.2 Emergency Organization Drill

A simulated fire emergency shall be conducted on an annual basis to provide opportunity to test the response of the emergency organization, evaluate effectiveness of the training program, and observe the performance of individual members of the emergency organization. Results of each scheduled drill shall be documented accordingly. Training shall be augmented as indicated to remedy deficiencies discovered through the drills.

4.9 EVACUATION PROCEDURES

The need to evacuate the site or local area shall be determined by the Emergency Coordinator. Should the landfill site need to be evacuated, members of the emergency response team would be assigned to direct anybody on-site not involved with responding to the emergency to a remote area and then secure access to the landfill site. Should neighboring homes also need to be evacuated, the Emergency Coordinator shall contact the County Police and Local Fire Departments for assistance. Members of the emergency response team could also be assigned to notify and assist residents in evacuating their homes.

4.10 REQUIRED REPORTS

With any fire, spill, or personal injury or property damage, a report shall be filed for future record. Suggested forms are included in Appendix B. A thorough investigation of each of these occurrences should be performed to identify the cause and to develop appropriate measures that should prevent or minimize reoccurrence of the incidents. As soon as practicable after an emergency situation has been cleared up, all employees involved in the incident who were working in the vicinity should be questioned individually to learn all available facts.

The appropriate forms shall be completed. Additional sheets may be required to record pertinent information or to detail necessary corrective action. Completion of this investigation does not supersede the requirements for notification to appropriate regulatory agencies. The Emergency Coordinator shall note the time, date, and details of any incident that requires implementation of the Contingency Plan. Within 15 days after the incident, the Emergency Coordinator, shall submit a written report of the incident to the NYSDEC which includes:

- Name, address, and telephone number of the owner or operator;
- Name, address, and telephone number of the facility;
- Date, time, and type of incident (i.e., fire, explosion);
- Name and quantity of materials involved;
- The extent of injuries, if any;
- An assessment of actual or potential hazards to human health or the environment, where this is applicable; and
- Estimated quantity and disposition of recovered material that resulted from the incident.

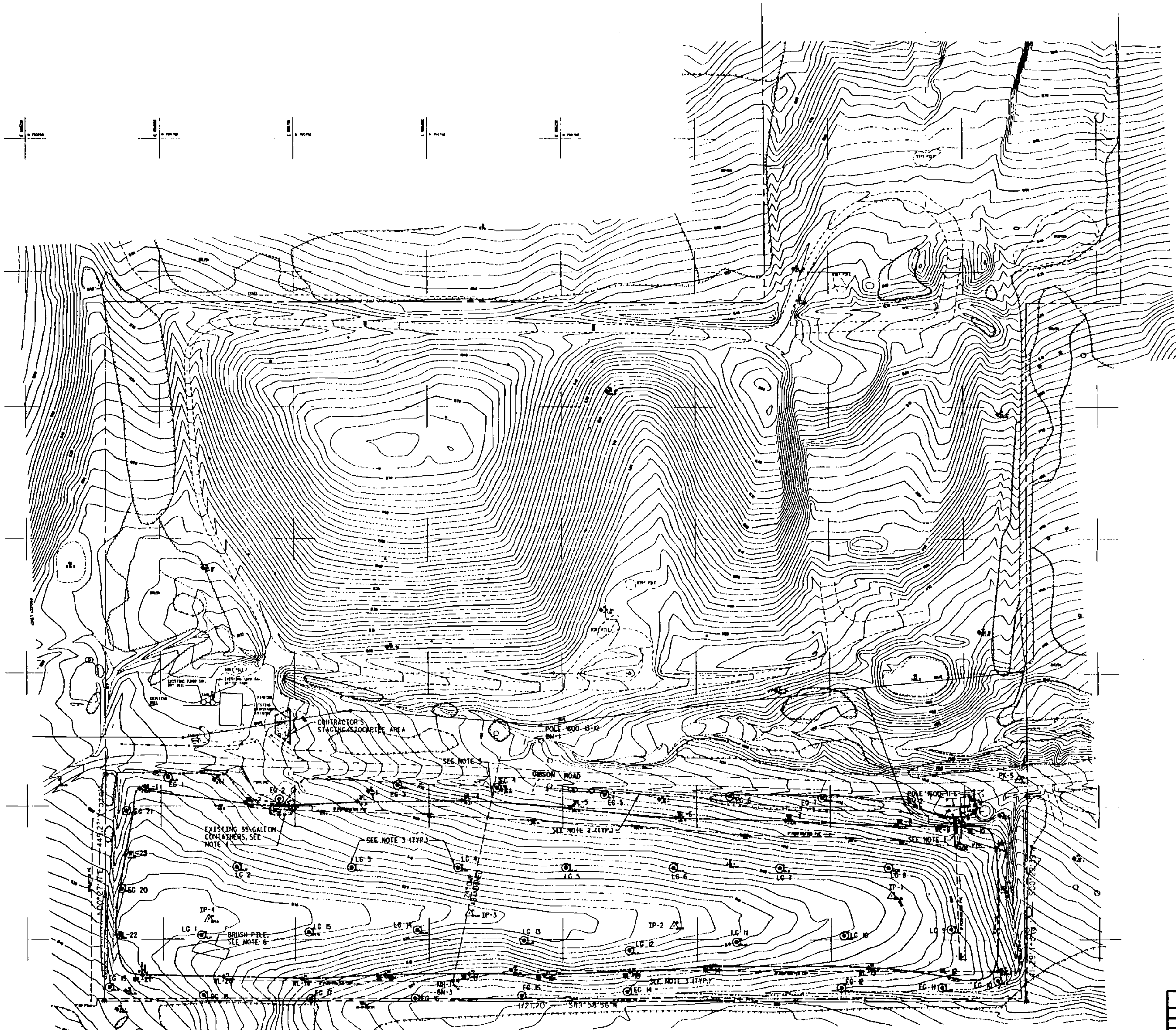
Copies of the landfill monitoring reports, and associated correspondence, will be provided to:

Ms. Mary Jane Peachey
New York State Department of Environmental Conservation
Region 8; Regional Hazardous Waste Engineer
6274 East Avon-Lima Road
Avon, New York 14414

FIGURES

FIGURE - 1

SITE PLAN



PLAN

SCALE: 1"=100'

100 0 100 200FT.

NO ALTERATION PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK EDUCATION LAW

N

NOTES :

1. EXISTING WOOD SHED, WOOD STAIRS, STEEL PIPING, AND STEEL I-BEAM PIPE SUPPORTS WITH CONCRETE FOOTERS SHALL BE REMOVED AND DISPOSED OF OFF-SITE BY CONTRACTOR (PAYMENT ITEM NO. 02110.21).

2. EXISTING CHAIN-LINK FENCE AND GATES WITHIN OWNER'S PROPERTY BOUNDARY SHALL BE REMOVED AND DISPOSED OF OFF-SITE BY CONTRACTOR (PAYMENT ITEM NO. 02110.21). SCOPE EXCLUDES THE FENCE AT THE LEACHATE STORAGE FACILITY, BETWEEN THE WOOD STAIRS AND THE STORAGE TANK.

3. EXISTING PVC EXPLOSIVE GAS STANDPIPES (EG-1 THROUGH EG-21, EXCEPT EG-8,9, AND 13 WHICH WERE PREVIOUSLY REMOVED) AND LANDFILL GAS STANDPIPES (LG-1 THROUGH LG-15) SHALL BE REMOVED AND DISPOSED OF OFF-SITE BY CONTRACTOR (PAYMENT ITEM NO. 02110.21).

4. EXISTING 55-GALLON CONTAINERS OF DRILLING WASTE SHALL BE DISPOSED OF BY CONTRACTOR (PAYMENT ITEM NO. 02110.21) IN THE SUBGRADE FILL AREA AT THE WEST END OF THE LANDFILL. CRUSH THE EMPTIED CONTAINERS AND PLACE IN THE FILL AREA PRIOR TO FILLING AREA WITH VENT TRENCH EXCAVATION WASTES. CONTAINER CONTENTS CONSIST OF DRILL CUTTINGS, SOILED PERSONAL PROTECTIVE EQUIPMENT, OR DECONTAMINATION WATER.

5. EXISTING 24 INCH DIAMETER CORRUGATED METAL DRAIN PIPE SHALL BE EXPOSED AT THE LOCATION SHOWN (APPROXIMATELY 15 FEET FROM THE WASTE LIMIT LINE AND APPROXIMATELY 6 FEET DEEP) ON THIS PLAN, AND THE EXCAVATION SHALL BE PROPERLY SHORED. SAW-CUT TOP OF PIPE. COMPLETELY FILL THE PIPE FROM POINT OF SAW-CUT TO THE OUTLET (APPROXIMATELY 65 FEET) WITH FLOWABLE FILL (K-KRETE OR EQUAL) EXHIBITING A 28-DAY COMPRESSIVE STRENGHT OF 100 PSI. PRIOR TO FILLING PIPE WITH FLOWABLE FILL MIX, INSERT A TEMPORARY PLUG AT DRAIN PIPE OUTLET. THE EXISTING PIPE, ALTHOUGH ABANDONED, IS KNOWN TO CONVEY LEACHATE. DISPOSAL OF WATER COLLECTED DURING THIS OPERATION SHALL BE INTO THE LEACHATE COLLECTION SYSTEM. WORK OF THIS OPERATION SHALL BE PAYED FOR UNDER PAYMENT ITEM NO. 02110.21

6. EXISTING BRUSH PILE SHALL BE DISPOSED OF WITHIN THE LANDFILL LIMITS, IN THE AREA DESIGNATED ON SHEET NO. 4 FOR WASTE/DEBRIS DISPOSAL.

REVISIONS

TOWN OF LINDLEY — STEUBEN COUNTY, NEW YORK

LINDLEY SOUTH LANDFILL
SITE NO. 851008
ENGINEERED CAP

EXISTING GENERAL PLAN

C&S Engineers, Inc.
SYRACUSE • BUFFALO • BINGHAMTON

DATE: JANUARY 1998

SCALE: AS SHOWN

FILE NO. 537.001.003

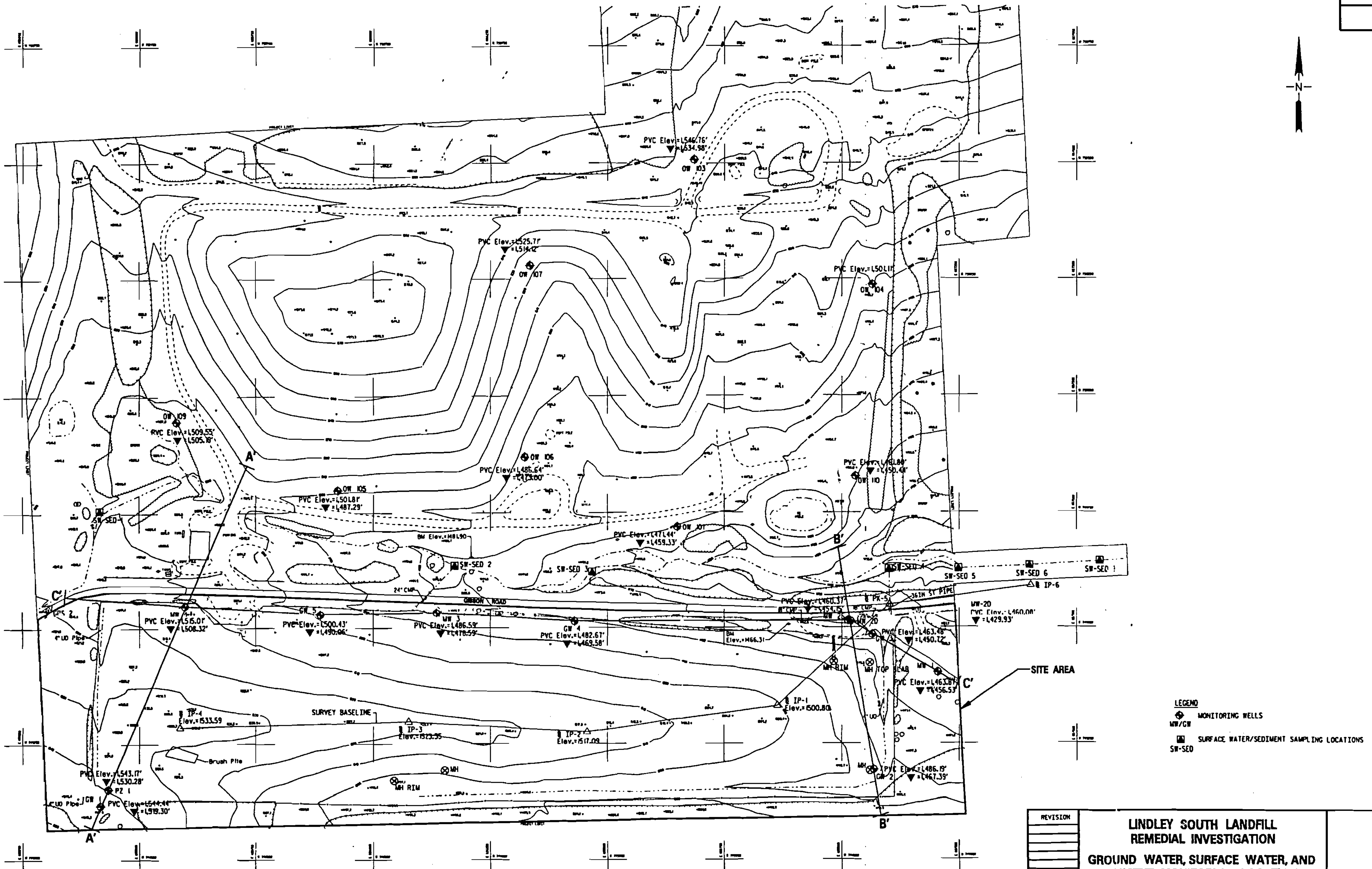
STATE OF NEW YORK — LICENSED PROFESSIONAL ENGINEER

SHEET NO.

22 DEC 97

FIGURE - 2

ENVIRONMENTAL MONITORING PLAN



SHEET NO.	TOTAL SHEETS

REVISION

LINDLEY SOUTH LANDFILL
REMEDIAL INVESTIGATION
GROUND WATER, SURFACE WATER, AND SEDIMENT MONITORING LOCATIONS
(INCLUDING CROSS-SECTION TRANSECTS)

TOWN OF LINDLEY NEW YORK

100' 100 0 100 200FT.

C&S Engineers, Inc. Copyright ©

DATE: MAY 1996

SCALE:

FILE NO.: 537.001.001

SHEET

NO ALTERATION PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW

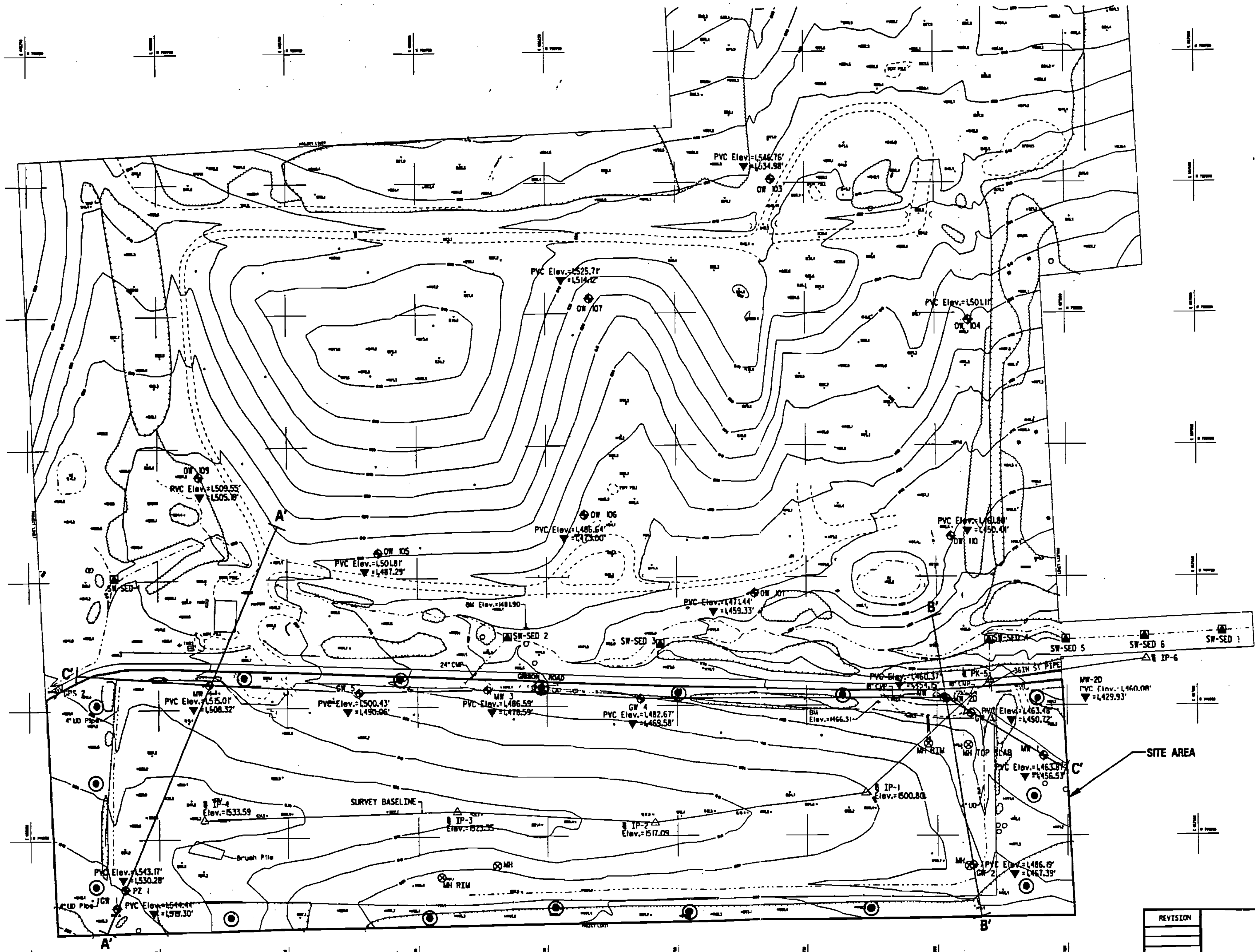
IN CHARGE OF: JOHN RAMOZA
MADE BY: S. SAWICKI II
CHECKED BY: ANDREW CALDERWOOD

CADD FILE: c:\dgn\1965pp03.dgn Thu May 16 15:14:48 1996

FIGURE - 2A

LANDFILL GAS MONITORING PLAN

SHEET NO.	TOTAL SHEETS



LEGEND

MW/GW — MONITORING WELLS

SW-SED — SURFACE WATER/SEDIMENT SAMPLING LOCATIONS

Landfill Gas Monitoring Locations

100 0 100 200FT.

100'

NO ALTERATION PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW

REVISION

LINDLEY SOUTH LANDFILL
REMEDIAL INVESTIGATION

LANDFILL GAS MONITORING PLAN

TOWN OF LINDLEY NEW YORK

C&S Engineers, Inc. Copyright ©

DATE: MAY 1996

SCALE:

FILE NO.: 537.001.001

SHEET

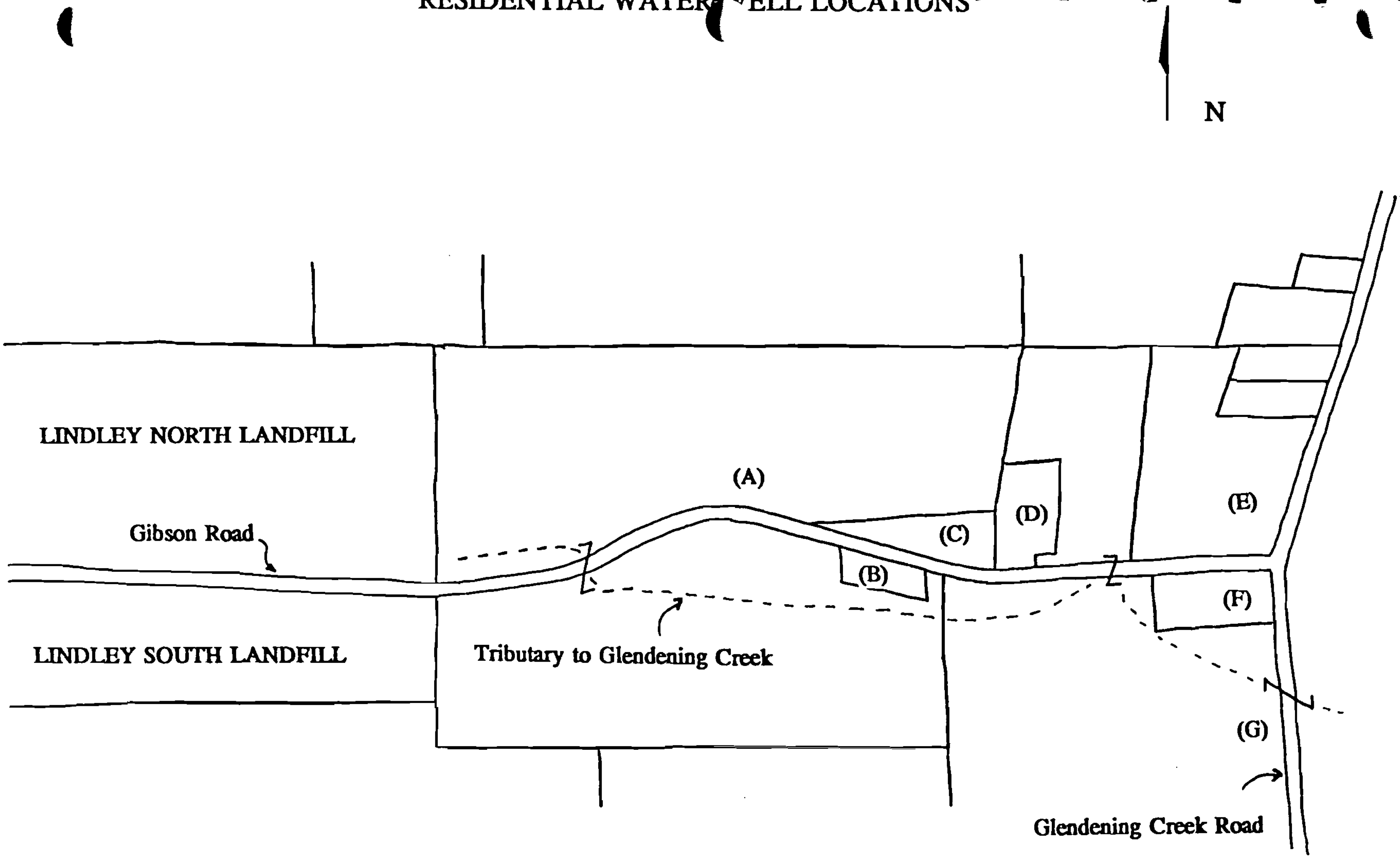
IN CHARGE OF: JOHN KANOZA
MADE BY: S. SAWICKI II
CHECKED BY: ANDREW CALDERWOOD

CADD FILE: c:\dgn\965tpp03.dgn Thu May 16 15:49:40 1996

FIGURE - 3

RESIDENTIAL WATER WELL
PROPERTY LOCATIONS

RESIDENTIAL WATER WELL LOCATIONS



LEGEND

Residence	Figure 3 Location
Judy Randall (well depth =105')	A
Hammond Sly	B
Joe Hale (well depth = 176')	C
Terrance Rhodes (well depth =250')	D
John & Pat Errington (well depth =170')	E
Dave & Nancy Fuller	F
William & Joyce Rhodes	G

APPENDIX - A

Boring Logs and Health & Safety Plan

BORING LOGS

EMPIRE SOILS INVESTIGATIONS INC.

SUBSURFACE LOG
GD-95-690

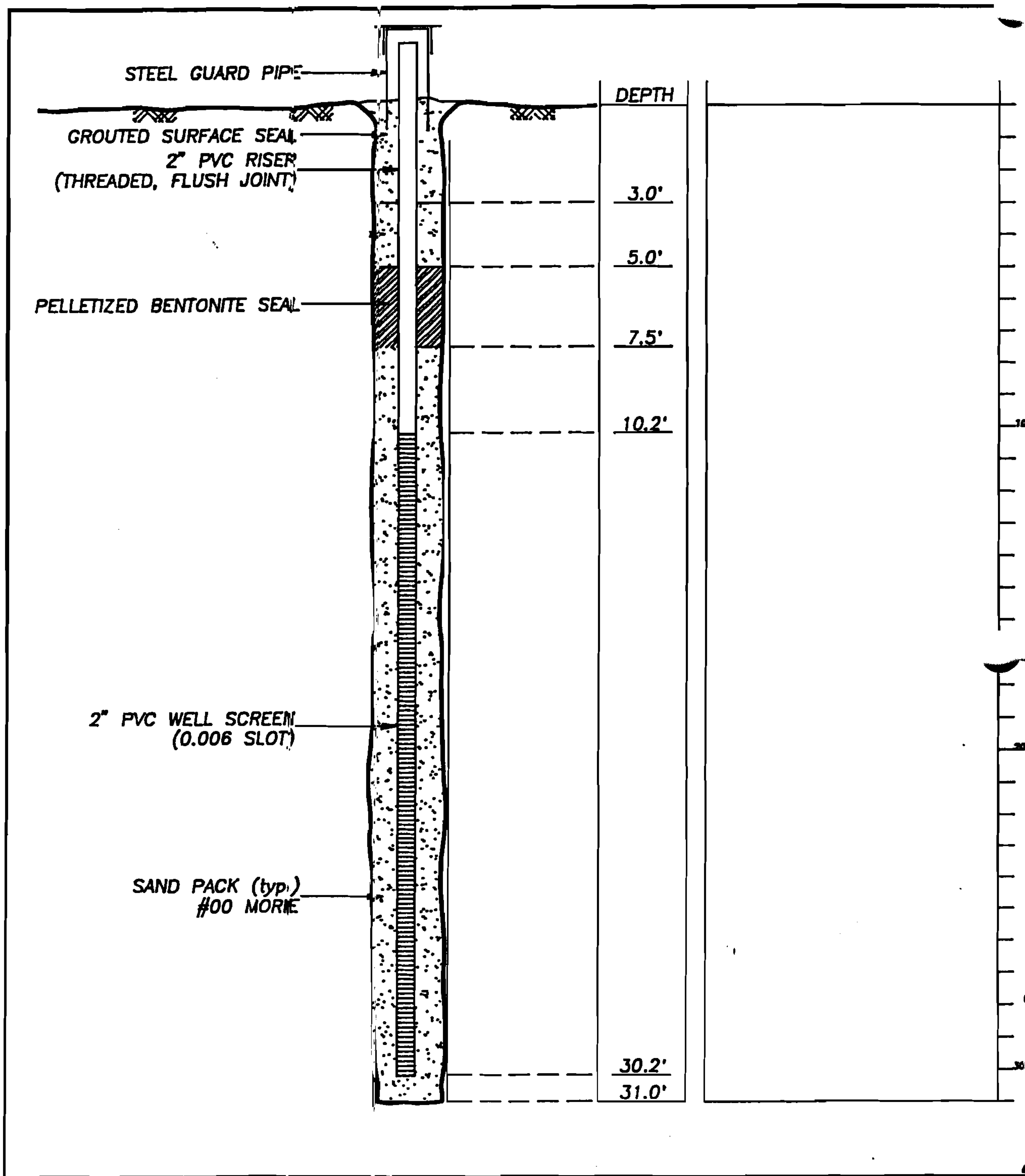
DATE
STARTED: 11-30-95
FINISHED: 12-9-95

BORING NO.: MW-1
SURF. ELEV.: NA ±
SHEET 1 OF 1

PROJECT: Lindley Landfill
LOCATION: Presho, NY
CLIENT: C&S Engineers

DEPTH-FT.	SAMPLE NO	0/6	6/12	12/18	18/24	N	REC	SOIL OR ROCK CLASSIFICATION	NOTES
0	1	1	2	4	8	6	1.2	TOPSOIL .3'	
								SILT, CLAY & fine SAND (Loose)	
	2	8	8	16	25	24	1.3	Few COBBLES @ 2-4' (Firm)	
	3	16	20	25	18	45			
5								Brown SILT, CLAY SAND & GRAVEL (Compact)	
	4	16	17	17	20	34	1.0		
	5	10	12	20	20	32	1.3		
10	6	18	20	22	24	42	1.5		
	7	20	22	21	21	43	1.2		
	8	21	75/	.5				Brown Dense TILL, SILTY CLAY, fine GRAVEL, CLAY & SAND (Very Compact)	
15	9	64	34	37	33	71	1.3		
	10	26	35	89	39	124	1.1		
20	11	12	15	17	22	32	1.4	Brown SILTY CLAY, fine GRAVEL, SAND (Compact)	
	12	27	35	75/	.3		1.0		
	13	72	21	22	45	43	.3		
25	14	18	47	100/	.2		.8	Brown Dense TILL, SILTY CLAY w/embedded GRAVEL & SAND (Compact)	
	15	8	13	21	32	34	1.2	Very Compact	
30								Boring Terminated @ 31.0'	At completion of sampling water @ 17.6'.
35									
40									

DRILLER: R. Bush
DRILL RIG: CME-75
METHOD OF INVESTIGATION: 6" Casing (ASTM D1586)
WEATHER:
CLASSIFIED BY: Driller



MONITORING WELL DETAILS

SCALE:	NTS
DATE:	MAY, 1996
PROJ. NO.:	GD-96-690
CAD FILE:	[illegible]
DRAWING NO.	2

MAXIM TECHNOLOGIES INC
Empire Soils Investigations, Inc., Division

MONITORING WELL NO. MW-1

LINDLEY LANDFILL
TOWN OF PRESHO, NY

DRAWN BY:	REV'D BY:
DWJ	

DATE STARTED: 11-22-95 FINISHED: 11-22-95	EMPIRE SOILS INVESTIGATIONS INC.	SUBSURFACE LOG GD-95-690	BORING NO.: MW-2S SURF. ELEV.: NA ± SHEET 1 OF 1

PROJECT: Lindley Landfill LOCATION: Presho, NY

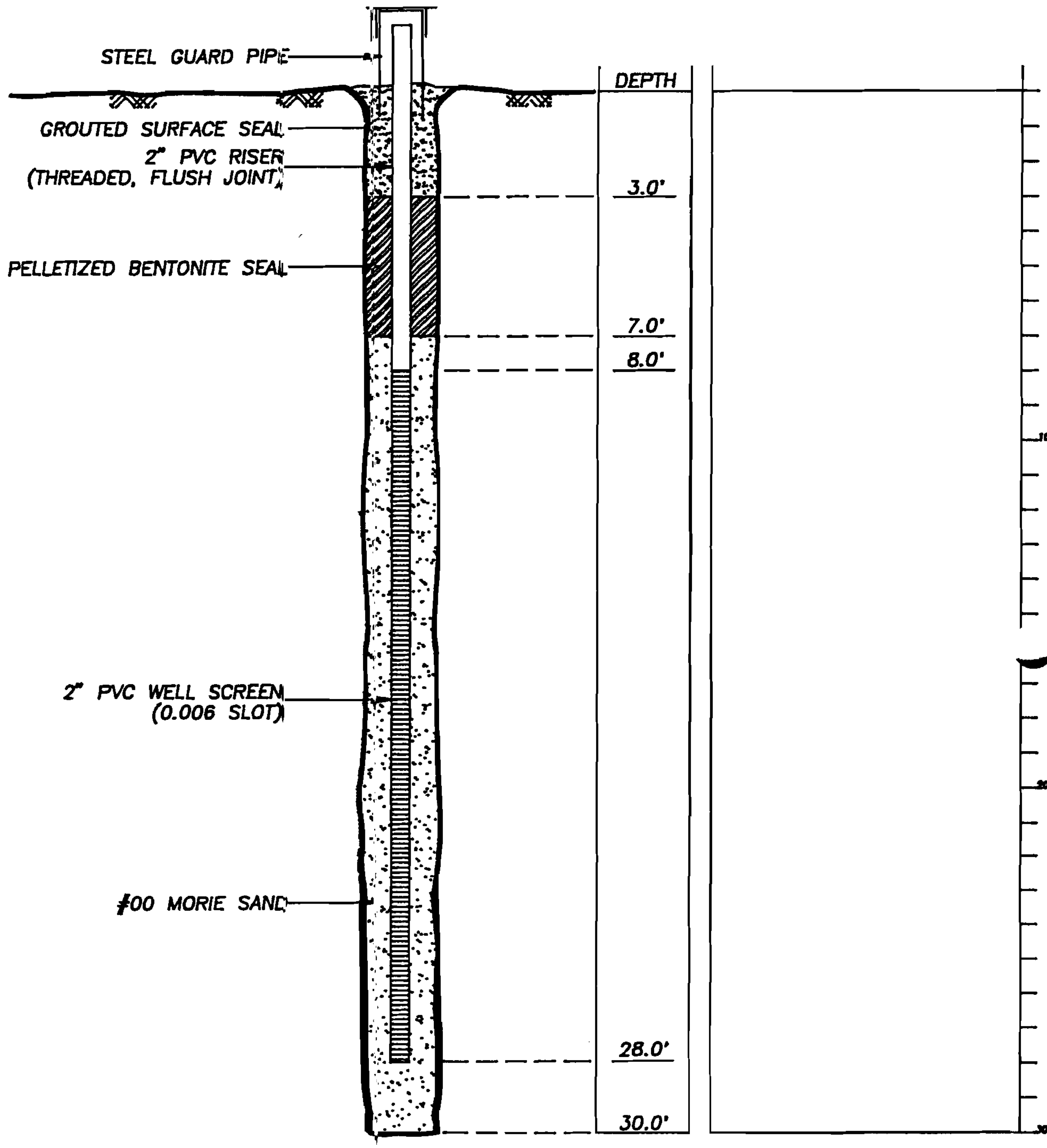
CLIENT: C&S Engineers

DEPTH-FT.	SAMPLES	SAMPLE NO	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	REC	SYMBOL	SOIL OR ROCK CLASSIFICATION	NOTES
0										TOPSOIL .4'	
										FILL 1.2'	
5		1					59	1.2		Brown SILT, CLAYEY SAND & GRAVEL (Very Compact)	
			9	22	37	50/1					
		2	24	17	22	75/3	39	1.1		Brown SILTY CLAY, SAND, GRAVEL & TILL (Compact)	
10		3	23	15	21	26	36	1.6			
		4	24	28	40	43	68	1.1			
15		5	12	23	24	32	47	1.2		Brown TILL, Sand, GRAVEL & CLAY (Moist)	
20											
25											
30										Boring Terminated @ 30.0'	At completion of sampling water @ 9.7'.
35											
40											

DRILLER: R. Bush DRILL RIG:

METHOD OF INVESTIGATION: 6" Casing (ASTM D1586)

WEATHER: CLASSIFIED BY: A. Marks



MONITORING WELL DETAILS

MAXIM TECHNOLOGIES INC Empire Soils Investigations, Inc., Division	MONITORING WELL NO. MW-2S LINDLEY LANDFILL TOWN OF PRESHO, NY	SCALE: NTS DATE: MAY, 1996 PROJ. NO.: GD-96-690 DWG. FILE: GD96 DRAWING NO.: 4
DRAWN BY: DWJ REV'D BY:		

DATE	EMPIRE SOILS INVESTIGATIONS INC.	SUBSURFACE LOG	BORING NO.: MW-2D
STARTED: 11-7-95		GD-95-690	SURF. ELEV.: NA ±
FINISHED: 11-21-95			SHEET 1 OF 3

PROJECT: Lindley Landfill LOCATION: Presho, NY

CLIENT: C&S Engineers

DEPTH-FT.	SAMPLE NO	0/6	6/12	12/18	18/24	N	REC	SOIL OR ROCK CLASSIFICATION	NOTES
0	1	1	2	2	5	4	1.8	TOPSOIL .3'	
								Brown SILT, CLAY, GRAVEL (Loose)	
	2	10	12	22	14	34	2.0	Firm-Moist	
	3	12	100/	.4			.5	Very Compact	
5									
	4	12	100/	.3			.5		
	5	38	75	100/	.2		1.2	CLAY changed to Light Gray	
10	6	17	22	25	22	47	1.0	Brown CLAY, SILT, embedded GRAVEL (Compact)	
	7	32	56	35	41	91	.7	Wet @ 12.5'	
	8	12	14	15	21	29	1.1		
15								SILT w/soft CLAY, powdered gravel (Firm)	
	9	20	24	25	28	49	1.1		
	10	12	17	16	14	33	.8		
20	11	17	25	27	19	68	1.1		
	12	30	34	30	22	64	1.2		
	13	20	100/	.3			1.3		
25								Brown CLAY, SILT, GRAVEL, & SAND, few COBBLES (Compact)	
	14	15	20	25	40	45	1.6		
	15	100/	.4					BOULDER	
								Green Clay, SILT & SAND	
30	16	15	15	20	22	67	1.5		
	17	28	34	28	30	106	1.8	Compact	
	18	15	16	24	20	187	2.0	Very Compact	
35								Compact	
	19	16	17	25	25	134	2.0		
	20	18	18	21	23	39	2.0		
40									

DRILLER: R. Bush DRILL RIG: CME-75

METHOD OF INVESTIGATION: 6" Casing (ASTM D1586)

WEATHER:

CLASSIFIED BY: Driller

DATE			
STARTED: 11-7-95	EMPIRE SOILS INVESTIGATIONS INC.	SUBSURFACE LOG	BORING NO.: MW-2D
FINISHED: 11-21-95		GD-95-690	SURF. ELEV.: NA ±
			SHEET 2 OF 3

PROJECT: Lindley Landfill LOCATION: Presho, NY

CLIENT: C&S Engineers

DEPTH-FT.	SAMPLES	SAMPLE NO	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	REC	SYMBOL	SOIL OR ROCK CLASSIFICATION	NOTES
40		21	19	25	25	18	50	2.0		Brown SILT, CLAY, fine GRAVEL & SAND (Compact)	
		22	13	30	40	30	70	1.8			
		23	13	17	30	30	47	1.8			
45											
		24	7	13	30	30	43	2.0			
		25	18	30	35	35	65	2.0		Very Compact	
50		26	20	25	30	35	55	2.0			
		27	10	24	20	25	44	1.1			
		28	22	27	23	29	50			Compact, Greenish Color	
55										Some Rock Fragments	
		29	60	100/	.2			.4		Rock Fragments	
										(Very Compact)	
			36	36	45	34					
60		30	36	45	61	111	67	1.5			
		31	101	97	89	90	106	1.1			
		32	36	52	82	83	187	.5			
65											
		33					134	.4			
70		34	42	76	81	75	157	.4			
75		35	96	100/	.2						
										Encountered ROCK @ 76.5'	
										Soft Layers of ROCK	
80											

DRILLER: R. Bush DRILL RIG: CME-75

METHOD OF INVESTIGATION: 6" Casing (ASTM D1586)

WEATHER: CLASSIFIED BY: Driller

DATE STARTED: 11-7-95 FINISHED: 11-21-95	EMPIRE SOILS INVESTIGATIONS INC.	SUBSURFACE LOG GD-95-690	BORING NO.: MW-2D SURF. ELEV.: NA ± SHEET 3 OF 3

PROJECT: Lindley Landfill LOCATION: Presho, NY

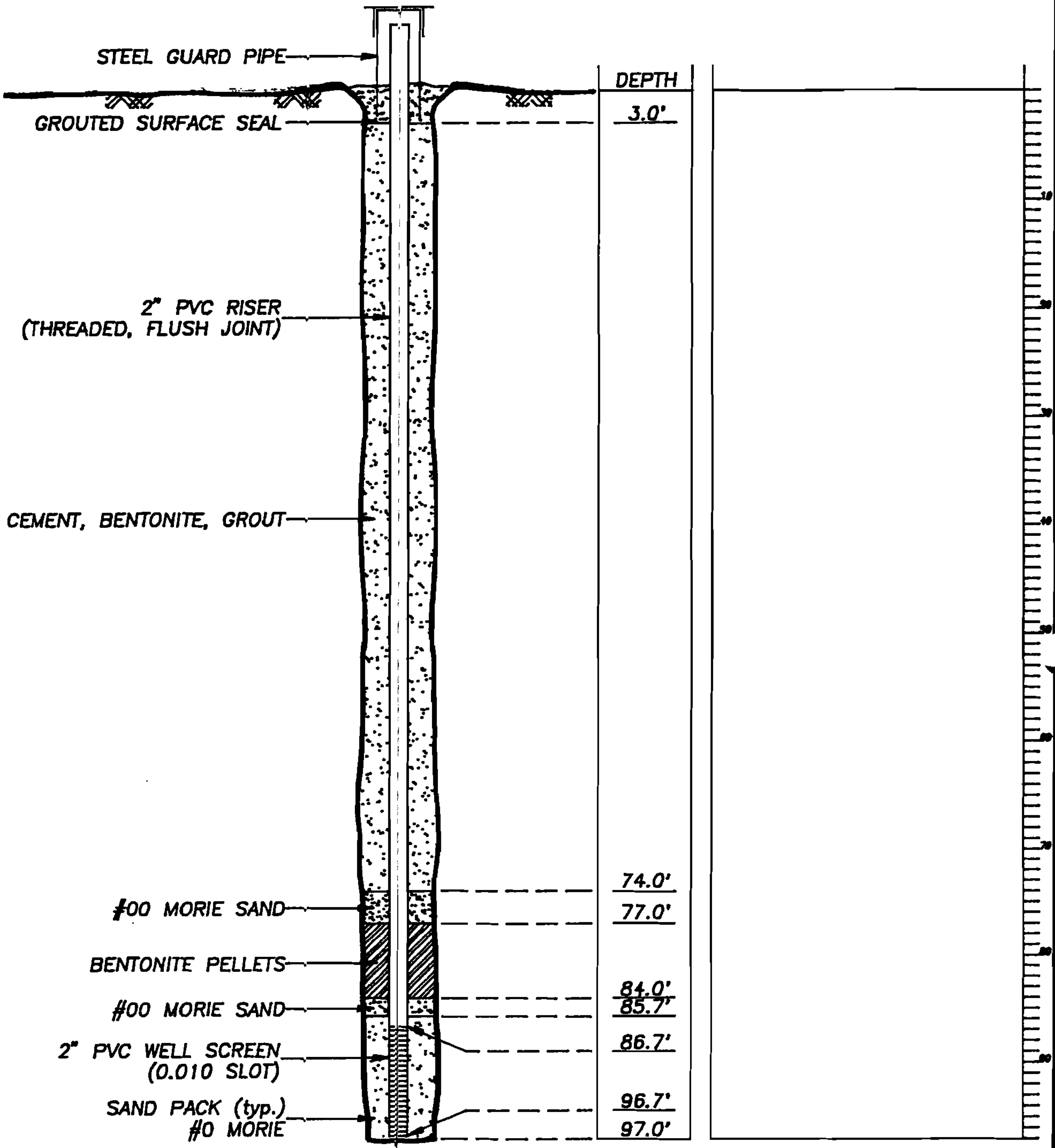
CLIENT: C&S Engineers

DEPTH-FT.	SAMPLES	SAMPLE NO	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	REC	SYMBOL	SOIL OR ROCK CLASSIFICATION	NOTES
80			100/	.2						RUN #1: 82'-84' RQD - 37.5% Rec. 4.7' Shale, Gray, medium hard to soft RUN #2: 87'-92' RQD - 91.2% Rec. 5.0' Shale, medium Gray medium hard Sandstone, Light Gray hard 97.6' RUN #3: 92'-97' RQD - 44.0% Rec. 5.0' Shale @ 94.3'	
85											
90											
95											
										Boring Terminated @ 97.0'	
100											With casing @ 82', waterlevel @ 30.5'
105											
110											
115											
120											

DRILLER: R. Bush DRILL RIG: CME-75

METHOD OF INVESTIGATION: 6" Casing (ASTM D1586)

WEATHER: CLASSIFIED BY: Driller



MONITORING WELL DETAILS

MAXIM TECHNOLOGIES INC Empire Soils Investigations, Inc., Division	MONITORING WELL NO. MW-2D	SCALE: NTS
	LINDLEY LANDFILL	DATE: MAY,1996
	TOWN OF PRESHO, NY	PROJ. NO.: GD-96-690
DRAWN BY: DWJ	REV'D BY:	DWG. FILE: GD9669
		DRAWING NO.: 3

DATE STARTED: 11-29-95 FINISHED: 11-30-95	EMPIRE SOILS INVESTIGATIONS INC.	SUBSURFACE LOG GD-95-690	BORING NO.: MW-3 SURF. ELEV.: NA ± SHEET 1 OF 1

PROJECT: Lindley Landfill LOCATION: Presho, NY

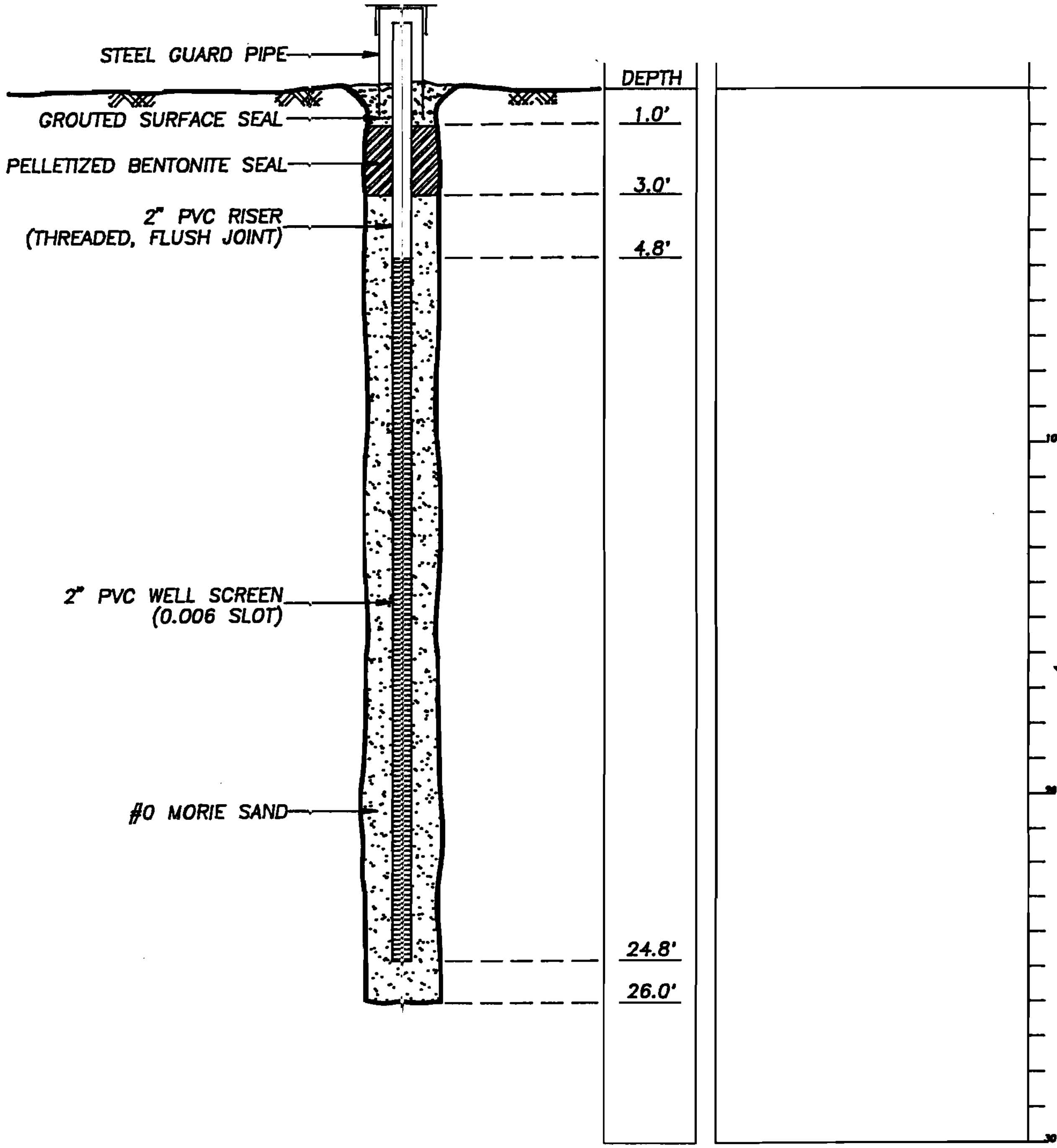
CLIENT: C&S Engineers

DEPTH-FT.	SAMPLES	SAMPLE NO	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	REC	SYMBOL	SOIL OR ROCK CLASSIFICATION	NOTES
0		1	4	7	6	6	13	.4		TOPSOIL .3'	
										Brown SILT, CLAY, fine GRAVEL, & SAND	
		2	9	10	12	12	22	1.1		Brown SILT, CLAY, coarse GRAVEL & SAND	
		3	9	9	9	5	18	1.2		(Dry-Firm)	
5											
		4	5	9	13	19	22	1.3			
		5	24	17	49	31	24	1.3			
10		6	10	15	27	34	42	1.1		Compact	
		7	20	17	17	31	34	1.5			
15		8	24	49	51	56	100	1.0		Very Compact	
		9	18	24	21	34	45	1.3		(Moist)	
		10	29	41	75/	.2	-	1.7			
20		11	24	24	27	36	51	1.2			
		12	23	37	34	42	71	1.2			
25		13	24	29	33	39	62				
										Boring Terminated @ 26.0'	At completion water @ 5.8'.
30											
35											
40											

DRILLER: R. Bush DRILL RIG: CME-75

METHOD OF INVESTIGATION: 6" Casing (ASTM D1586)

WEATHER: CLASSIFIED BY: Driller



MONITORING WELL DETAILS

MAXIM TECHNOLOGIES INC Empire Soils Investigations, Inc., Division	MONITORING WELL NO. MW-3 LINDLEY LANDFILL TOWN OF PRESHO, NY	SCALE: NTS DATE: MAY, 1996 PROJ. NO.: GD-96-690 DWG. FILE: GD9669 DRAWING NO.: 5
DRAWN BY: DWJ REV'D BY:		

EMPIRE SOILS INVESTIGATIONS INC.

SUBSURFACE LOG

GD-95-690

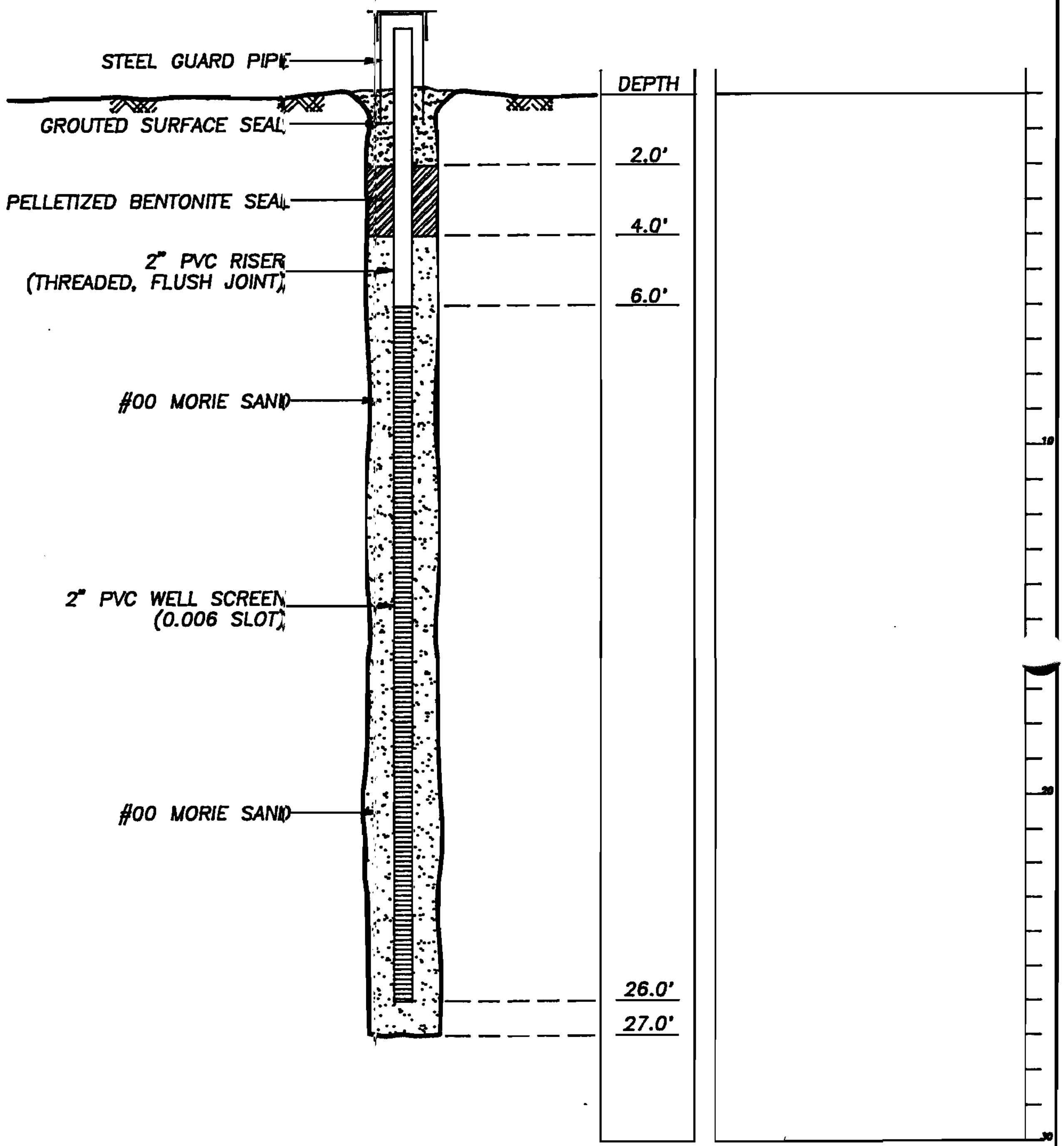
DATE STARTED: 11-27-95
FINISHED: 11-28-95

BORING NO.: MW-4
SURF. ELEV.: NA ±
SHEET 1 OF 1

PROJECT: Lindley Landfill
LOCATION: Presho, NY
CLIENT: C&S Engineers

DEPTH-FT.	SAMPLE NO	0/6	6/12	12/18	18/24	N	REC	SOIL OR ROCK CLASSIFICATION	NOTES
0	1	2	3	3	4	6	1.1	TOPSOIL .3'	
								Brown SILT, CLAY, SAND & GRAVEL (Loose)	
	2	5	17	16	15	33	1.3	SILTY, SAND GRAVEL & CLAY (Firm)	
	3	14	14	13	12	27	1.5		
5									
	4	23	30	27	37	25	1.5		
	5	10	13	13	17	39	1.2		
10	6	23	30	27	37	57	1.3	Brown SILTY CLAY, TILL	
	7	10	13	13	17	26	1.2		
	8	28	31	22	27	53	1.5		
15								Wet	
	9	12	25	17	23	42	–		
	10	20	20	29	28	49	1.0	Brown CLAY, SILT, SAND & GRAVEL (Compact)	
20	11	22	25	14	21	39	.8		
	12	20	30	25	18	55	1.0		
	13	10	9	11	15	20	.8		
25									
								Boring Terminated @ 27.0'	With hole @ 16.0', waterlevel @ 5.8'.
30									
35									
40									

DRILLER: R. Bush
DRILL RIG: CME-75
METHOD OF INVESTIGATION: 6" Casing (ASTM D1586)
WEATHER:
CLASSIFIED BY: Driller



MONITORING WELL DETAILS

MAXIM TECHNOLOGIES INC Empire Soils Investigations, Inc., Division	MONITORING WELL NO. MW-4 LINDLEY LANDFILL TOWN OF PRESHO, NY	SCALE: NTS DATE: MAY, 1996 PROJ. NO.: GD-96-690 DWG. FILE: GD96 DRAWING NO.: 6
DRAWN BY: DWJ	REV'D BY:	

EMPIRE SOILS INVESTIGATIONS INC.

SUBSURFACE LOG

GD-95-690

DATE STARTED: 12-5-95
FINISHED: 12-7-95

BORING NO.: PZ-1
SURF. ELEV.: NA ±
SHEET 1 OF 2

PROJECT: Lindley Landfill
LOCATION: Presho, NY
CLIENT: C&S Engineers

DEPTH-FT.	SAMPLE NO	0/6	6/12	12/18	18/24	N	REC	SOIL OR ROCK CLASSIFICATION	NOTES
0	1	1	3	4	5	7	1.0	TOPSOIL .3'	
								Brown SILT, CLAY, SAND, fine GRAVEL (Loose) (Dry)	
	2	6	13	15	28	25	1.3	Brown SILT, CLAY, GRAVEL & SAND (Firm-Compact)	
	3	12	21	23	26	44	1.2		
5									
10	4	11	11	12	16	23	1.2	Brown CLAY, SILT, embedded GRAVEL & SAND (Firm)	
15	5	10	14	14	16	28	1.6	Few COBBLES	
20	6	11	14	21	26	35	1.0		
25	7	21	25	36	31	61	1.2	Very Compact-Moist	
30	8	17	27	31	75	58	1.1	COBBLES	
35	9	21	32	50	62	82	1.5	BOULDERS	
40									

DRILLER: R. Bush
DRILL RIG: CME-75
METHOD OF INVESTIGATION: 6" Casing (ASTM D1586)
WEATHER:
CLASSIFIED BY: Driller

DATE
STARTED: 12-5-95
FINISHED: 12-7-95

EMPIRE SOILS INVESTIGATIONS INC.

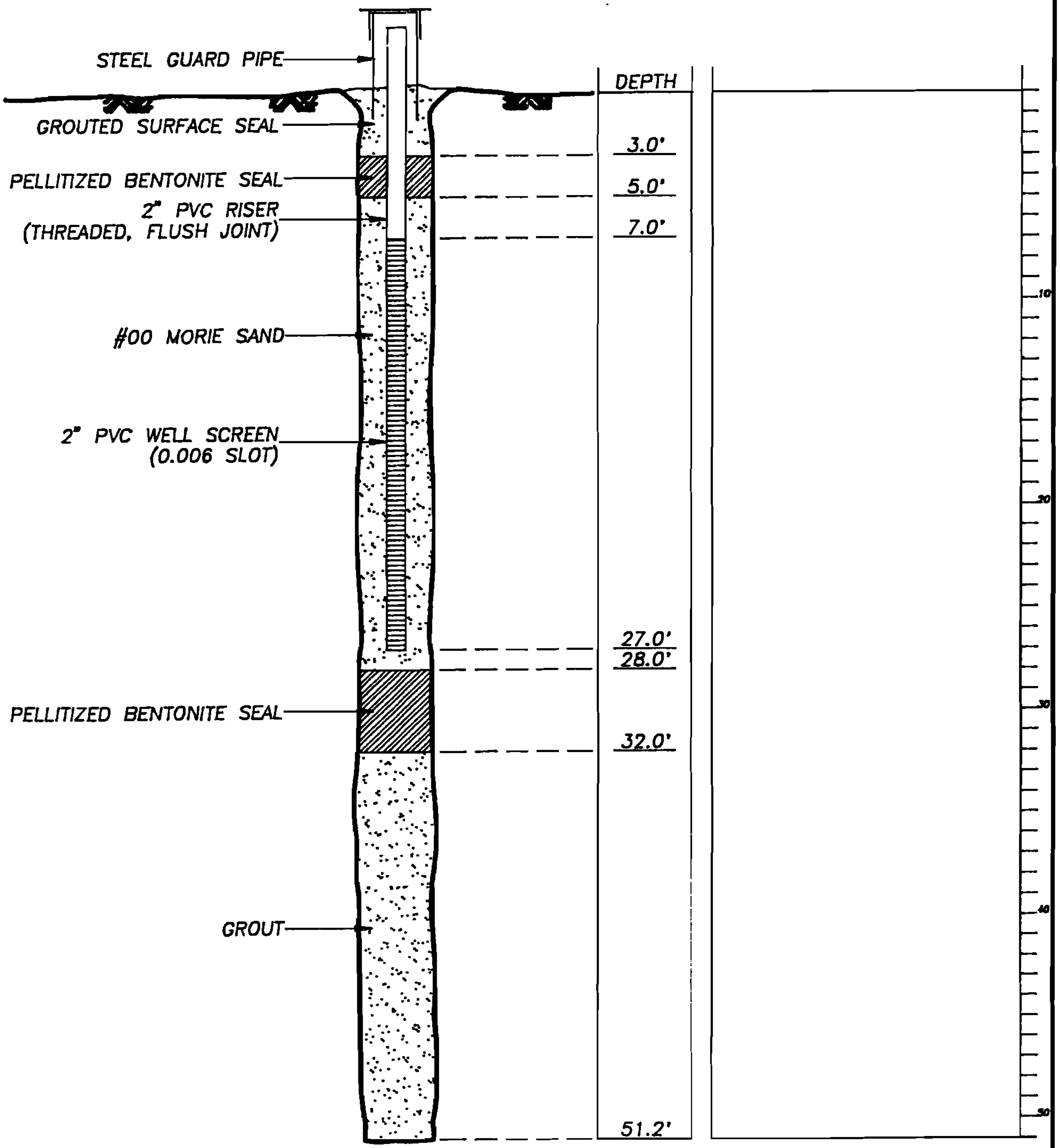
SUBSURFACE LOG
GD-95-690

BORING NO.: PZ-1
SURF. ELEV.: NA ±
SHEET 2 OF 2

PROJECT: Lindley Landfill
CLIENT: C&S Engineers
LOCATION: Presho, NY

DEPTH-FT.	SAMPLES	SAMPLE NO	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	REC	SYMBOL	SOIL OR ROCK CLASSIFICATION	NOTES
40		10	25	36	60	66	96	1.3		Dense TILL, COBBLES, GRAVEL SILT & CLAY (Very Compact)	
45		11	150/	.3				.3		Start of ROCK - SHALE - soft & hard layers RUN #1: 46.2-51.2' RQD - 4.2% Rec. 100%	
50											
										Boring Terminated @ 51.2'	
55											
60											
65											
70											
75											
80											

DRILLER: R. Bush
DRILL RIG: CME-75
METHOD OF INVESTIGATION: 6" Casing (ASTM D1586)
WEATHER:
CLASSIFIED BY: Driller



PIEZOMETER DETAILS

SCALE:	NTS
DATE:	MAY, 1996
PROJ. NO.:	GD-96-690
DWG. FILE:	GD96690
DRAWING NO.:	1

MAXIM TECHNOLOGIES INC
Empire Soils Investigations, Inc., Division

DRAWN BY: DWJ

REV'D BY:

PIEZOMETER NO. PZ-1

LINDLEY LANDFILL

TOWN OF PRESHO, NY

HEALTH & SAFETY PLAN

NOTIFICATION OF APPLICABILITY

The following Health and Safety Plan was prepared by C&S Engineers, Inc., in May 1998 for their employees and certified specifically for the administration and inspection of the Lindley South Landfill closure construction performed from June 1998 through October 1998.

Future activities at the site must be performed in accordance with individual site-specific Health and Safety Plans prepared by each contractor entering the site. The use of any portion of the following Health and Safety Plan in connection with any such future activity, or incorporation of any part of this plan into any other document without the express written consent of C&S Engineers, Inc., is strictly prohibited.

C & S Engineers, Inc.
5-10-99

Engineers, Inc.

LINDLEY SOUTH LANDFILL
ENGINEERED CAP
STEUBEN COUNTY, NEW YORK

HEALTH AND SAFETY PLAN

MAY 1998

Michael L. Howe, CIH

LINDLEY SOUTH LANDFILL
ENGINEERED CAP
STEUBEN COUNTY, NEW YORK

HEALTH AND SAFETY PLAN

C&S ENGINEERS, INC.
1099 AIRPORT BOULEVARD
NORTH SYRACUSE, NEW YORK 13212
(315) 455-2000

MAY 1998

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SECTION 1 – GENERAL INFORMATION

The Health and Safety Plan (HASP) described in this document will address health and safety considerations for all those activities that personnel employed by C&S Engineers, Inc., may be engaged in during construction of the engineered cap at the Lindley South Landfill in Steuben County, New York, and will be implemented by the Health and Safety Officer (HSO) during site work.

Compliance with this HASP is required of all C&S personnel who enter this site. The content of the HASP may change or undergo revision based upon additional information made available to the health, safety, and training (H&S) committee, monitoring results or changes in the technical scope of work. Any changes proposed must be reviewed by the H&S committee. This HASP was written specifically for those employees of C&S Engineers, Inc., and is not intended for use by others.

The construction contractor for the project is Tug Hill Construction, Inc., of Felts Mills, New York. All site control and project safety issues shall be coordinated through the construction contractor.

Responsibilities

Project Manager: Work Phone: (315) 455-2000	James Dickens (C&S Engineers, Inc.)
Site Health and Safety Officer: Work Phone: (607) 523-8873	John Virginia (C&S Engineers, Inc.)
Emergency Coordinator: Work Phone: (607) 523-8892	John Virginia (C&S Engineers, Inc.)

Emergency Phone Numbers

Fire Department:	(607)-937-5403
Ambulance:	(607)-936-4177
Police:	(607)-962-2112
Hospital:	(607)-937-7265 (607)-737-7806
Poison Control Center:	(800) 822-9761
Oil Spills and Hazardous Material Spills:	(800) 457-7362

SECTION 2 — HEALTH AND SAFETY PERSONNEL

2.1 Health and Safety Personnel Designations

The following information briefly describes the health and safety designations and general responsibilities which may be employed for the Lindley South Landfill engineered cap construction project.

2.2 Project Manager (PM)

The PM is responsible for the overall project including the implementation of the HASP. Specifically, this includes allocating adequate manpower, equipment, and time resources to conduct site activities safely.

2.3 Health and Safety Officer (HSO)

The HSO is the person on-site responsible for assuring that personnel under direction comply with the requirements of the HASP and that personal protective equipment needed for site work is available.

2.4 Emergency Coordinator

The Emergency Coordinator is responsible for implementation of the Emergency Plan as presented in Section 13 of this HASP, establishment and supervision of the emergency response team, conducting training programs for personnel assigned duties on the emergency response team.

SECTION 3 — PERTINENT SITE INFORMATION

3.1 Site Description

The Town of Lindley Landfill is a total of 123 acres in size and is located in the Town of Lindley, Steuben County, New York. The Lindley South Landfill is a 16 acre section of the overall landfill, situated on the south side of Gibson Road and approximately 4,000 feet west of Glendenning Creek Road.

The engineered cap construction project is a heavy civil construction project involving the installation of a synthetic liner cover, a gas venting system, and soil protective/topsoil layers. The project includes the installation of a gravel service road and a perimeter fence.

3.2 Site History

Waste disposal operations began at the Lindley South Landfill in 1977. Disposal methods were reportedly with written approval of NYSDEC and generally in accordance with accepted practices at that time. Municipal solid waste material was accepted at the site from 11 towns within Steuben County between 1977 and 1983. In addition to municipal waste material, industrial waste reportedly disposed of by the Corning Glass Works Company during 1979 and 1980, including lead fines, calcium fluoride sludge, and asbestos material. All landfill activities were stopped at the site in 1983 when the maximum capacity of the landfill was reached. Upon completion of the landfill activity, a 2 foot thick cap of natural material from the site was placed and seeded.

Although the landfill is unlined and there were no leachate collection, removal, or storage provisions incorporated into the landfill's original construction, a retrofitted leachate collection and storage system was installed in 1986. The system consists of 8-inch diameter perforated PVC piping enclosed in crushed stone buried within the waste mass along the North and East edges of the landfill, and interconnecting with the existing French drain system previously installed in 1978 along the south side of the landfill.

As a result of a Phase II site investigation completed in 1990, which identified potential leachate contamination and migration proximate to the site, the Lindley South Landfill was subsequently classified by the NYSDEC as a Class 2 Site (Site No. #851008) on the New York State Registry of Inactive Hazardous Waste Sites. In April 1995, Steuben County entered into an Order on Consent for the completion of a Remedial Investigation/Feasibility Study and appropriate remedial efforts at the site. This project is being performed as a result of the Remedial Investigation/Feasibility Study findings.

SECTION 4 — HAZARD ASSESSMENT AND HAZARD COMMUNICATION

The most likely routes of exposure during construction activities include skin absorption and inhalation due to exposure to leachate and gases, and limited exposure to waste, during site intrusive activities. The chemical hazards which may be associated with site activities were determined through examination of historical analytical data from groundwater, surface water, sediments, leachate, and air emission samples. A copy of the analytical data is presented in Appendix A and available Material Safety Data Sheets (MSDS) for these parameters are provided in Appendix B.

Mechanical hazards associated with heavy equipment must be recognized at the site. Additionally, physical hazards must be recognized. The ground surface may be littered with sharp objects such as scrap metal and glass, and the possibility of tripping or falling exists in most areas. During warm weather, contacts with vectors such as bees or wasps is also a concern.

It is assumed that site workers have the potential to be exposed to concentrations of hazardous substances. Relatively low concentrations of several hazardous substances have been identified in various media samples obtained from the site, including leachate, sediments, groundwater, surface water, and air. It is difficult to draw a correlation between the concentrations of contaminants found in one media and the potential for exposure to these contaminants to site workers. However, their presence may indicate that some potential for exposure to these compounds exist, and the requirements for protective measures and monitoring of exposure is based on this potential. Pertinent information regarding various hazardous substances identified is discussed below.

Benzene, CAS number 71-43-2—Benzene in its pure form is a colorless liquid with an aromatic odor. It is flammable and highly toxic. It is not expected that benzene will be present in a pure form but rather in low concentrations in the parts per billion range in the landfill. Benzene is classified as a potential human carcinogen be the American Conference of Governmental Hygienists (ACGIH). Exposure occurs primarily by inhalation and by skin absorption to a lesser degree. The federal Occupational Safety and Health Administration (OSHA) regulates worker exposure to benzene. Employers must assure that no employee is exposed to an airborne concentration of benzene in excess of one part of benzene per million parts of air (1 ppm) as an 8-hour time weighted average (TWA). In addition, no employee shall be exposed to an airborne concentration of benzene in excess of five (5) ppm as averaged over any 15 minute period. This limit is referred to as the Short-term Exposure Limit (STEL).

Toluene, CAS number 108-88-3—Toluene is a colorless liquid with an odor similar to benzene. It is flammable with explosive limits in air of 1.1 - 7.1%. It is toxic by inhalation, ingestion and skin absorption. Exposure to high concentrations in air cause central nervous system depression. It is expected that if toluene is present, it will be in low concentrations in the parts per billion range in the landfill. OSHA limits airborne exposure to 200 ppm as an eight hour TWA and to 300 ppm as a ceiling limit. OSHA has also established a 500 ppm 10-minute maximum peak. The ACGIH recommends that exposure be limited to 50 ppm as an eight-hour TWA.

Methylene Chloride, CAS number 75-09-2—(synonym: dichloromethane) Methylene Chloride is a colorless, volatile liquid with a penetrating ether-like odor. It is an eye, skin, and respiratory tract irritant. It is also a mild central nervous system depressant with exposure generally occurring through inhalation. Methylene chloride is a suspected human carcinogen. OSHA limits exposure to 25 ppm as an eight-hour TWA, and to 125 ppm as a STEL. The ACGIH recommends that exposure be limited to 50 ppm as an eight-hour TWA. If methylene chloride is present at the landfill, the airborne concentrations are expected to be very low or not detectable.

Trichloroethene, CAS number 79-01-6—(synonym: Trichloroethylene) Trichloroethene is a nonflammable mobile gas with a characteristic odor resembling that of chloroform. Moderate exposure can cause symptoms similar to alcohol inebriation. High concentrations of Trichloroethene can cause a narcotic effect. Trichloroethane has been found to induce hepocellular carcinomas. Heavy exposure has also been found to cause death by ventricular fibrillation. OSHA limits exposure to 100 ppm as an eight-hour TWA, with a ceiling limit of 200 ppm and a 300 ppm 5-minute maximum peak in any two hour period. ACGIH recommends exposure be limited to 50 ppm as an eight-hour TWA.

1,2-Dichloroethane, CAS number 107-06-2—(synonym: Ethylene Dichloride) 1,2-Dichloroethane has a characteristic pleasant odor and a sweet taste. Vapors of 1,2-Dichloroethane have been found to be irritating to the lungs and eyes and may disturb balance cause abdominal cramping. This substance has been listed as a carcinogen by the USEPA. OSHA limits exposure to 50 ppm as an eight-hour TWA, with a ceiling limit of 100 ppm and a 200 ppm 5-minute maximum peak in any three hour period. ACGIH recommends exposure be limited to 10 ppm as an eight-hour TWA.

Acetone, CAS number 67-64-1 (synonym - dimethylketone; 2-propanone). Acetone is a colorless volatile liquid with a pungent odor and sweetish taste. Acetone is extremely flammable and is considered a fire risk and is generally characterized by low to moderate toxicity by ingestion and inhalation. Prolonged or repeated topical use may cause dryness. Inhalation may produce headache, fatigue, excitement, bronchial irritation, and in large amounts narcosis. OSHA limits exposure to 1000 ppm as an eight-hour TWA. ACGIH recommends exposure be limited to 500 ppm as an eight-hour TWA.

2-Butanone, CAS number 78-93-1 (synonym - methyl ethyl ketone). 2-Butanone is a colorless liquid with an acetone-like odor and is a narcotic by inhalation. 2-Butanone should be considered a fire risk. OSHA limits exposure to 200 ppm as an eight-hour TWA.

Tetrachloroethene, CAS 127-18-4—(synonym: Tetrachloroethylene). Tetrachlorethane is a colorless nonflammable liquid with a an ethereal odor. In high concentrations tetrachlorethane can have a narcotic effect and can cause a defatting effect on the skin leading to dermatitis. OSHA limits exposure to 100 ppm as an eight-hour TWA, with a ceiling limit of 200 ppm and a 300 ppm 5-minute maximum peak in any three hour period. ACGIH recommends exposure be limited to 25 ppm as an eight-hour TWA.

PCB (Aroclor). PCBs are highly toxic colorless liquids. PCBs induce toxic effects in humans including chloracne, pigmentation of skin and nails, excessive eye discharge, swelling of eyelids, distinctive hair follicles, and gastrointestinal disturbances. PCB's have been listed as carcinogens by the USEPA and may also cause liver damage.

Cresol, CAS 1319-77-3—(synonym: 4 - Methylphenol). Cresol is a colorless or pinkish liquid with a sweet, tarry odor similar to phenol or creosote. It is eye, skin and respiratory tract irritant. It is a central nervous system depressant and a poison with exposure generally occurring through inhalation or skin absorption. OSHA limits airborne exposure to 5 ppm as an eight hour TWA. Exposure exceeding this limit may cause breathing difficulty, mental confusion and eventually lead to respiratory failure.

Lead, CAS 7439-92-1. Metallic lead is a heavy, ductile, soft gray solid. OSHA considers "Lead" to mean metallic lead, all inorganic lead compounds such as lead oxides and lead salts, and a class of organic lead compounds called soaps. All other organic lead compounds are excluded from this definition. Lead is a central nervous system poison with exposure generally occurring through inhalation or ingestion of lead bearing dusts. Symptoms of lead poisoning include weakness, insomnia, anemia, abdominal pain and tremors. OSHA limits exposure to lead to 0.050 mg/m^3 as an eight hour TWA, and an action limit of 0.030 mg/m^3.

SECTION 5 — TRAINING

5.1 Basic Training Required

Completion of the 40-hour Health and Safety Training for Hazardous Waste Operations and three days on the job training under the supervision of a qualified person is required for all employees who will perform work in areas where the potential for a toxic exposure exists.

5.2 Advanced Training

Advanced training, as necessary, will be provided to any personnel who will be expected to perform site work utilizing Level A protection or other specialized operation to be undertaken at the site.

5.3 Site-Specific Training

Training will be provided that specifically addresses the activities, procedures, monitoring, and equipment for the site operations prior to going on site. Training will include familiarization with site and facility layout, known and potential hazards, and emergency services at the site, and details of the provisions contained within this HASP. This training will also allow field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity.

5.4 Safety Briefings

C&S project personnel will be given briefings by the HSO on a daily or as needed basis to further assist site personnel in conducting their activities safely. Pertinent information will be provided when new operations are to be conducted. Changes in work practices must be implemented due to new information made available, or if site or environmental conditions change. Briefings will also be given to facilitate conformance with prescribed safety practices. When conformance with these practices is not being followed, or if deficiencies are identified during safety audits the project manager will be notified.

5.5 First Aid and CPR

The HSO will identify those individuals requiring this training in order to oversee emergency treatment if so required during field activities. It is expected that a selected number of field workers will have First Aid training and some members of the field team will have CPR training. These courses will be consistent with the requirements of the American Red Cross Association.

SECTION 6 — ZONES

6.1 Site Zones

Three types of site activity zones are identified for the engineered cap construction activities, including the Work Zone, Contamination Reduction Zone, and the Support Zone.

6.1.1 Work Zone (Exclusion Zone)

The Work Zone, or exclusion zone, is the area where contamination is known to be or likely to be present or area where activity is being conducted which has the potential to cause harm. Th

Work Zone will be any area of intrusive activity. It is anticipated that the location of the Work Zone will change as construction activities progress. No one may enter the Work Zone without the necessary protective equipment and without permission from the HSO.

6.1.2 Contamination Reduction Zone

The Contamination Reduction Zone is the area where personal and equipment decontamination will be conducted.

6.1.3 Support Zone

The Support Zone is considered the uncontaminated area. This area may include the C&S trailer command post or pre-work area which will provide for communications and emergency response. Appropriate safety and support equipment also will be located in this zone.

SECTION 7 — PERSONAL PROTECTIVE EQUIPMENT

7.1 General

The level of protection to be worn by field personnel will be defined and controlled by the HSO. Depending upon the type and levels of waste material present at the site, varying degrees of protective equipment will be needed. If the possible hazards are unknown, a reasonable level of protection will be taken until sampling and monitoring results can ascertain potential risks. The levels of protection listed below are based on USEPA Guidelines. A list of the appropriate clothing for each level is also provided.

<u>Level A</u> protection must be worn when a reasonable determination has been made that the highest available level of respiratory, skin, eye, and mucous membrane protection is needed. It should be noted that while Level A provides maximum available protection, it does not protect against all possible hazards. Consideration of the <u>heat stress</u> that can arise from wearing Level A protection should also enter into the decision making process.

Level A protection includes:

- Open Circuit, pressure-demand SCBA
- Totally encapsulated chemical resistant suit
- Gloves, inner (surgical type)
- Gloves, outer, chemical protective
- Boots, chemical protective

<u>Level B</u> protection must be used when the highest level of respiratory protection is needed, but hazardous material exposure to the few unprotected areas of the body (i.e., the back of the neck) is unlikely.

Level B protection includes:

- Open circuit, pressure-demand SCBA or pressure airline with escape air bottle
- Chemical protective clothing: Overalls and long sleeved jacket; disposal chemical resistant coveralls; coveralls; one or two piece chemical splash suit with hood
- Gloves, inner (surgical type)
- Gloves, outer, chemical protective
- Boots, chemical protective

Level C protection will be used when the required level of respiratory protection is known, or reasonably assumed, to be not greater than the level of protection afforded by air purifying respirators; and hazardous materials exposure to the few unprotected areas of the body (i.e., the back of the neck) is unlikely.

Level C protection includes:

- Full or half face air-purifying respirator
- Chemical protective clothing: Overalls and long-sleeve jacket; disposable chemical resistant coveralls; coveralls; one or two piece chemical splash suit
- Gloves, inner (surgical type)
- Gloves, outer, chemical protective
- Boots, chemical protective

Level D is the basic work uniform. It cannot be worn on any site where respiratory or skin hazards exist.

Level D protection includes:

- Safety boots/shoes
- Safety glasses
- Hard Hat with optional face shield

Note that the use of SCBA and airline equipment is contingent upon the user receiving special training in the proper use and maintenance of such equipment.

7.2 Personal Protective Equipment - Specific

Level D with some modification will be required when working in the work zone on this site. In addition to the basic work uniform specified by Level D protection, chemical protective gloves with a surgical type inner liner will be required when contact with soil, leachate or landfill material is likely. An upgrade to a higher level (Level C) of protection may occur if determined necessary by the HSO.

SECTION 8 — MONITORING PROCEDURES

8.1 Monitoring During Site Operations

All site environmental monitoring and meteorological monitoring of climatic conditions will be performed by the construction contractor in accordance with Section 8 of the contractor's Site Specific Health and Safety Plan.

8.2 Personnel Monitoring Procedures

Monitoring of C&S personnel may be performed as a contingency measure in the event that VOC concentrations are consistently above the established action level for the project, as identified in the contractor's Site Specific Health and Safety Plan. If the concentration of VOCs is above this action level, then amendments to the HASP must be made before work can continue at the site.

8.3 Medical Surveillance Procedures for Evidence of Personal Exposure

All C&S Engineers Inc. personnel who will be performing field work at the site must be medically qualified. Additional medical testing may be required by the HSO in consultation with the company physician if an overt exposure or accident occurs, or if other site conditions warrant further medical surveillance.

8.4 Heat Stress Monitoring

It is anticipated that heat stress may be a concern. Guidance relating to heat stress control is presented in Appendix C of this HASP.

SECTION 9 — COMMUNICATIONS

A telephone will be located in the C&S trailer for communication with emergency support services/facilities. Guidance relating to site communications which may be implemented depending on conditions and circumstances is presented in Appendix D of this HASP.

SECTION 10 — SAFETY CONSIDERATIONS FOR SITE OPERATIONS

10.1 General

Standard safe work practices that will be followed include:

- Do not climb over/under drums, or other obstacles.
- Do not enter the work zone alone.

- Practice contamination avoidance, on and off-site.
- Plan activities ahead of time, use caution when conducting concurrently running activities.
- No eating, drinking, chewing or smoking is permitted in work zones.
- Due to the unknown nature of waste placement at the site, extreme caution should be practiced during excavation activities.
- Apply immediate first aid to any and all cuts, scratches, abrasions, etc.
- Be alert to your own physical condition. Watch your buddy for signs of fatigue, exposure, etc.
- A work/rest regimen will be initiated when ambient temperatures and protective clothing create a potential heat stress situation.
- No work will be conducted without adequate natural light or without appropriate supervision.
- Task safety briefings will be held prior to onset of task work.
- Ignition of flammable liquids within or through improvised heating devices (barrels, etc.) or space heaters is forbidden.
- Entry into areas of spaces where toxic or explosive concentrations of gases or dust may exist without proper equipment is prohibited.
- Any injury or unusual health effect must be reported to the site health and safety officer.
- Prevent splashing or spilling of potentially contaminated materials.
- Use of contact lenses is prohibited while on site.
- Beards and other facial hair that would impair the effectiveness of respiratory protection are prohibited.
- Field crew members should be familiar with the physical characteristics of the work, including:
  - Wind direction in relation to potential hazardous sources
  - Accessibility to co-workers, equipment, and vehicles
  - Communication
  - Hot Zones (areas of known or suspected contamination)
  - Site Access
  - Nearest water sources
- The number of personnel and equipment in potentially contaminated areas should be minimiz[illegible] consistent with site operations.

10.2 Field Operations

10.2.1 Intrusive Operations

An HSO or designee will be present on-site during all intrusive work, e.g., drilling operations, excavations, trenching, and will provide monitoring to oversee that appropriate levels of protection and safety procedures are utilized by C&S Engineers, Inc., personnel.

The use of salamanders or other equipment with an open flame is prohibited and the use of protective clothing especially hard hats and boots, will be required during drilling or other heavy equipment operations. All contaminated equipment, e.g., augers, split spoons, drill pipe, backhoe, bucket, etc., will be placed on liner material when not in use, or when awaiting and during steam cleaning.

Communications will be maintained at all times.

10.2.2 Excavation Trenching

Guidance relating to safe work practices for C&S Engineers, Inc., employees regarding excavating/trenching operation is presented in Appendix E of this HASP.

SECTION 11 — DECONTAMINATION PROCEDURES

Decontamination involves physically removing contaminants and/or converting them chemically into innocuous substances. Only general guidance can be given on methods and techniques for decontamination. Decontamination methods will include:

- Removal and disposal of protective equipment
- Removal and thorough cleaning of protective equipment with detergent and water
- Thorough cleansing of the face and hands with soap and warm water

Decontamination procedures are designed to:

- Remove contaminants.
- Avoid spreading the contamination from the work zone.
- Avoid exposing unprotected personnel outside of the work zone to contaminants.

Contamination avoidance is the first and best method for preventing spread of contamination from a hazardous site. Each person involved in site operations must practice the basic methods of contamination avoidance listed below. Additional precautions may be required in the HASP.

- Know the limitations of all protective equipment being used.
- Do not enter a contaminated area unless it is necessary to carry out a specific objective.
- When in a contaminated area, avoid touching anything unnecessarily.

- Walk around pools of liquids, discolored areas, or any area that shows evidence of possible contamination.
- Walk upwind of contamination, if possible.
- Do not sit or lean against anything in a contaminated area. If you must kneel (e.g., to take samples), use a plastic ground sheet.
- If at all possible, do not set sampling equipment directly on contaminated areas. Place equipment on a protective cover such as a ground cloth.
- Use the proper tools necessary to safely conduct the work.

Specific methods that may reduce the chance of contamination are:

- Use of remote sampling techniques.
- Opening containers by non-manual means.
- Bagging monitoring instruments.
- Use of drum grapplers.
- Watering down dusty areas.

Equipment which will need to be decontaminated includes tools, monitoring equipment, and personal protective equipment. Items to be decontaminated will be brushed off, rinsed, and dropped into a plastic container supplied for that purpose. They will then be washed with a detergent solution and rinsed with clean water. Monitoring instruments will be wrapped in plastic bags prior to entering the field in order to reduce the potential for contamination. Instrumentation that is contaminated durin field operations will be carefully wiped down.

Heavy equipment, if utilized for operations where it may be contaminated, will have prescribed decontamination procedures to prevent hazardous materials from potentially leaving the site. The on-site contractor will be responsible for decontaminating all construction equipment prior to demobilization.

SECTION 12 — DISPOSAL PROCEDURES

All discarded materials, waste materials, or other objects shall be handled in such a way as to reduce or eliminate the potential for spreading contamination, creating a sanitary hazard, or causing litter to be left on-site. All potentially contaminated materials, e.g., clothing, gloves, etc., will be bagged or drummed as necessary and segregated for proper disposal. All contaminated waste materials shall be disposed of as required by the provisions included in the contract and consistent with regulatory provisions.

All non-contaminated materials shall be collected and bagged for appropriate disposal.

SECTION 13 — EMERGENCY PLAN

As a result of the hazards at the site, and the conditions under which operations are conducted, there is the possibility of emergency situations. This section has established procedures for the implementation of an emergency plan.

13.1 Emergency Coordinator

The Site Emergency Coordinator is John Virginia, C&S Resident Project Representative.

The Site Emergency Coordinator shall implement the emergency plan whenever conditions at the site warrant such action. The Site Emergency Coordinator will be responsible for assuring the evacuation, emergency treatment, emergency transport of site personnel as necessary, and notification of emergency response units (refer to phone listing in the beginning of this HASP) and the appropriate management staff.

13.2 Evacuation

In the event of an emergency situation, such as fire, explosion, significant release of toxic gases, etc., all personnel will evacuate and assemble in a designated assembly area (most likely the project trailer). The Emergency Coordinator will have authority to contact outside services as required. Under no circumstances will incoming personnel or visitors be allowed to proceed into the area once the emergency signal has been given. The Emergency Coordinator must see that access for emergency equipment is provided and that all ignition sources have been shut down once the alarm has been sounded.

Once the safety of all personnel is established, the Fire Department and other emergency response groups will be notified by telephone of the emergency.

13.3 Potential or Actual Fire or Explosion

Immediately evacuate the site and notify local fire and police departments, and other appropriate emergency response groups, if LEL values are above 25% in the work zone or if an actual fire or explosion has taken place.

13.4 Environmental Incident (spread or release of contamination)

Control or stop the spread of contamination if possible. Notify the Emergency Coordinator and the Project Manager. Other appropriate response groups will be notified as appropriate.

13.5 Personnel Injury

Emergency first aid shall be applied on-site as necessary. Then, decontaminate (en route if necessary) and transport the individual to nearest medical facility if needed.

The ambulance/rescue squad shall be contacted for transport as necessary in an emergency. The directions to the hospital and a map are found in Figure 1.

13.6 Personnel Exposure

Skin Contact: Use copious amounts of soap and water. Wash/rinse affected area thoroughly, then provide appropriate medical attention. Eyes should be thoroughly rinsed with water for at least 15 minutes.

Inhalation: Move to fresh air and/or, if necessary, decontaminate and transport to emergency medical facility.

Ingestion: Contact the Poison Control Center, decontaminate and transport to emergency medical facility.

Puncture Wound/ Laceration: Decontaminate, if possible, and transport to emergency medical facility. HSO will provide medical data sheets to medical personnel as requested.

13.7 Adverse Weather Conditions

In the event of adverse weather conditions, the HSO will determine if work can continue without sacrificing the health and safety of C&S field workers.

13.8 Incident Investigation and Reporting

In the event of an incident, procedures discussed in the C&S incident investigation and reporting policy, which is presented in Appendix F of this HASP, shall be followed.

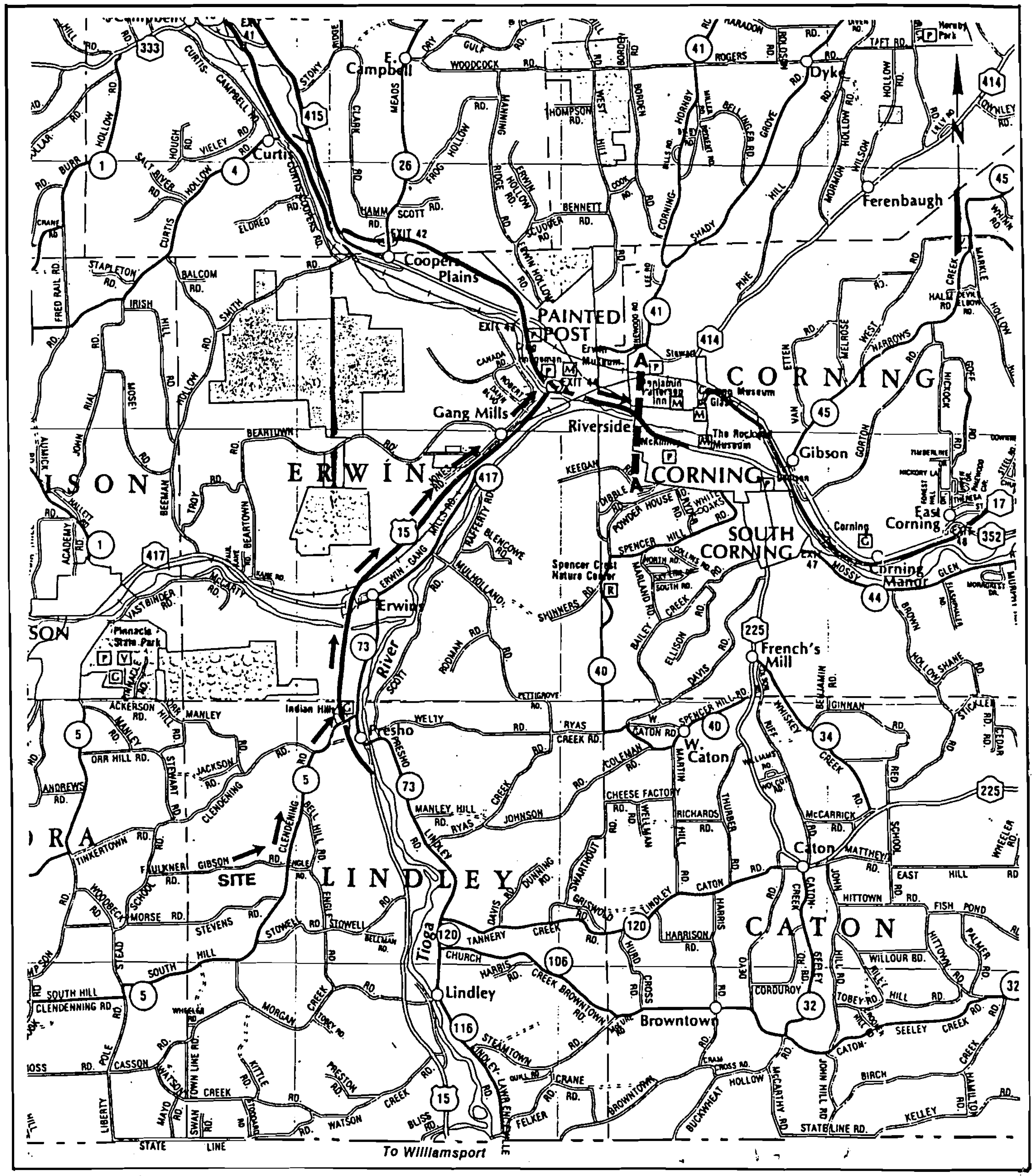
SECTION 14 — COMMUNITY RELATIONS

Community relations may be a sensitive matter. All C&S employees should be aware of issues associated with this specific site. Conversations with community members not involved in activities at the site should be limited. Conversations between site workers off the site, in restaurants, etc., should not include discussions of the potential hazards on the site nor should negative statements be made regarding the site.

SECTION 15 — AUTHORIZATIONS

C&S personnel authorized to enter the Site while operations are being conducted must be approved by the HSO. Authorization will involve completion of appropriate training courses, medical examination requirements, and review of this HASP. No C&S personnel should enter the work zone alone. Each C&S employee should check in with the HSO or Project Manager prior to entering the work zones.

SHEET NO. 1



RURAL ROUTE FROM SITE TO CORNING

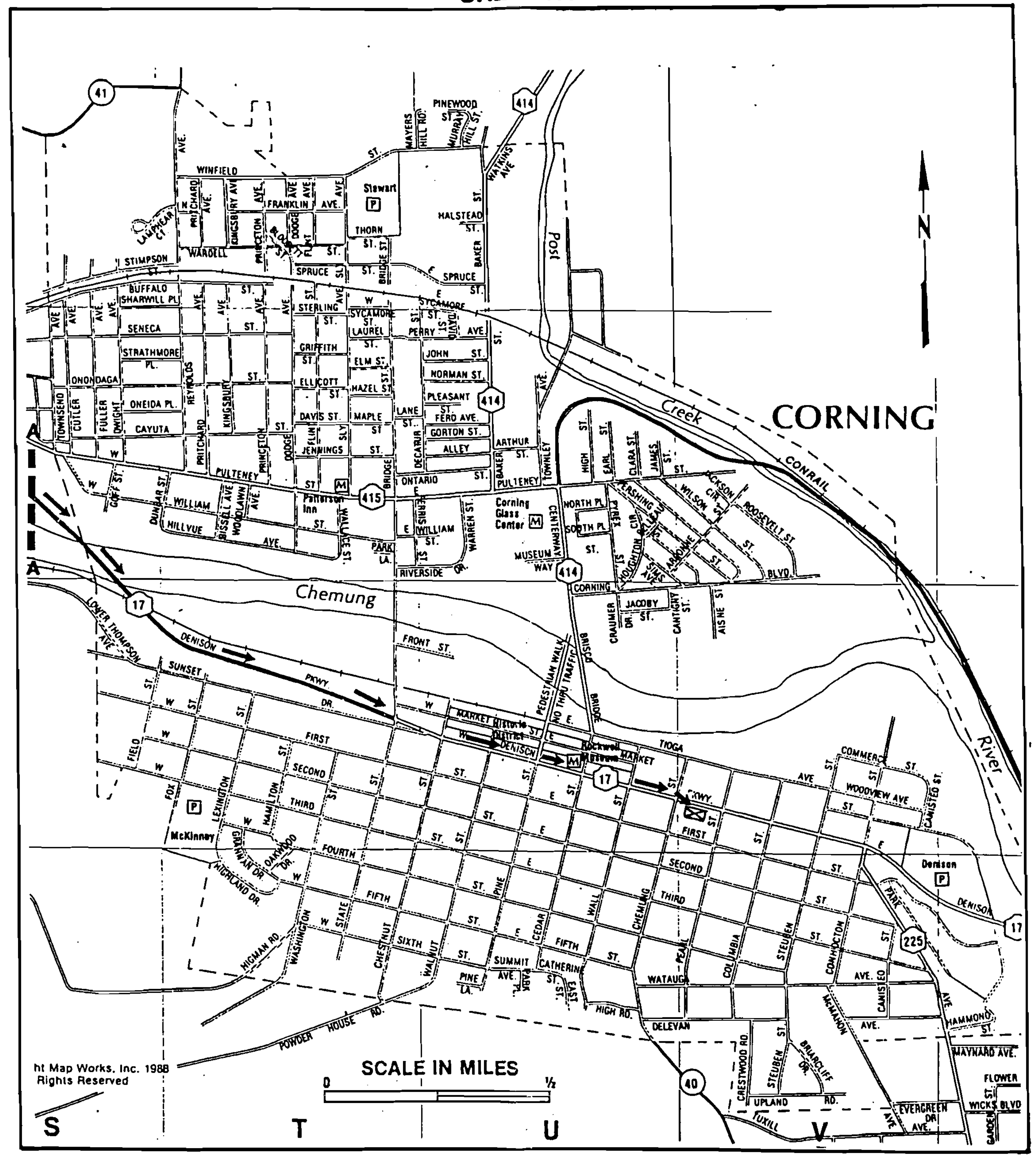
Scale: 1" = 2 Miles

A

REFER TO CORNING MAP SHEET NO. 2

A

SHEET NO. 2



CITY ROUTE

HOSPITAL

LINDLEY SOUTH LANDFILL
STEUBEN COUNTY, NEW YORK
HEALTH & SAFETY PLAN
HOSPITAL ROUTE

C&S Engineers, Inc.	SCALE: AS SHOWN	FIGURE 1

APPENDIX A

ANALYTICAL DATA

Town of Lindley - Steuben County

Phase II Investigations - Filtered Metals

		Class GA	Class GA	Groundwater Samples					Leachate	Surface Water Samples		
Parameters	Units	Standard	Guidance	GW-1	GW-2	GW-3	GW-4	GW-5	L-4	SW-5	SW-6	SW-7
Aluminum	ug/l	100		156	100	100	100	100	6090	1180	515000	1640
Antimony	ug/l		3	60	60	60	60	60	60	60	60	60
Arsenic	ug/l	25		5	5	5	5	12.7	16	5	78.1	10.6
Barium	ug/l	1000		52	82	115	25	254	1080	51.1	8110	863
Beryllium	ug/l		3	2	2	2	2	2	2	2	28	2
Cadmium	ug/l	10		5	5	5	5	5	111	5	2111	5.4
Calcium	ug/l			86400	59200	75200	245000	234000	1620000	84500	610000	354000
Chromium	ug/l	50		10	10	10	10	10	82	10	635	13
Cobalt	ug/l	5		10	10	10	10	10	70.2	10	535	13
Copper	ug/l	200		10	10	10	10	10	10	16.6	1150	10
Iron	ug/l	300		614	227	86	43	8750	895000	2180	1610000	72200
Lead	ug/l	25		5	5	5	5	5	13.8	5	5130	10.3
Magnesium	ug/l		35000	32300	54700	37300	68400	62500	337000	13100	255000	84100
Manganese	ug/l	300		1100	620	693	2410	25400	66700	62.7	44900	30200
Mercury	ug/l	2		0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.3	0.2
Nickel	ug/l			15	15	15	15	15	215	15	1080	19
Potassium	ug/l			3960	2970	18500	3620	1290	350000	1720	56300	39300
Selenium	ug/l	10		5	5	5	5	50	5	5	50	5
Silver	ug/l	50		10	10	10	10	10	10	10	10	10
Sodium	ug/l	20000		29700	17000	31900	78400	30600	1060000	5420	56300	152000
Thallium	ug/l			5	5	5	5	5	5	5	5	5
Vanadium	ug/l			10	10	10.6	10	10	310	10	789	20
Zinc	ug/l	300		11	20	15.6	25	19	1970	18.7	28900	236

Town of Lindley Landfill - Steuben County

Phase II Investigations - Volatile Organic Data

Parameter	Class GA Standard	Class GA Guidance	Groundwater Monitoring Wells GW-1	GW-2	GW-3	GW-4	GW-5	Leachate L-4	Surface Water Samples SW-5	SW-6	SW-7	SW-8
Units			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Methylene Chloride	5		4	5	6	6	20	1800	5	18	280	7
Acetone			12	32	16	33	120	9600	8	150	1000	94
1,1-Dichloroethene	5											
1,1-Dichloroethane	5						11					
Carbon Disulfide										5		96
Total 1,2-Dichloroethene												
2-Butanone				48			340	23000		250	2600	130
1,2-Dichloroethane	5											
1,1,1-Trichloroethane	5											
Carbon Tetrachloride	5											
Trichloroethene	5											
Benzene	0.7											
2-Methyl-2-Pentanone	5											
Tetrachloroethene	5											
Toluene	5						8	450		9		17
Chlorobenzene	5											
Total Xylenes	5											
Ethylbenzene	5											
Phenol	1						3	460		2	15	
2-Methylphenol							2	54				
4-Methylphenol								5400		31	600	
Benzoic Acid							36			12	650	
Diethylphthalate		50					2	320		2	16	
4,4-DDE					0.06							
4,4-DDD					0.02							
4,4-DDT					0.1							
Aroclor 1248				3.4								
Bis(2-ethylhexyl)phthalate	50		11	6	13		14		9	12	6	680

Town of Lindley South Landfill
Phase II Investigations - Volatile Organic Data

Parameter	Air Monitoring Samples Vent-7	Vent-8	GW-3
Units	ug/Cu. M.	ug/Cu. M.	ug/Cu. M.
Methylene Chloride	4500	4200	3.3
Acetone	870	560	36
1,1-Dichloroethene	9.6		
1,1-Dichloroethane	830	770	
Carbon Disulfide			
Total 1,2-Dichloroethene	79	62	
2-Butanone	1100	1800	6.6
1,2-Dichloroethane	22	19	
1,1,1-Trichloroethane	200	89	1.1
Carbon Tetrachloride			0.5
Trichloroethene	1100	840	
Benzene	59	51	1.5
2-Methyl-2-Pentanone		98	
Tetrachloroethene	850	690	
Toluene	1100	1520	2.2
Chlorobenzene		27	
Total Xylenes	570	940	2.3
Ethylbenzene	110	170	4.3

Quarterly Leachate Analytical Data - Water Quality and Metal Parameters

Parameters	Units	GA Standard	L-1	L-1	L-2	L-2	L-3	L-3
	Date	Sampled	01/23/95	04/18/95	01/23/95	04/18/95	01/23/95	04/18/95
NO3/NO2	mg/l	10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Alk.	mg/l		1300	1800	930	520	990	810
Chloride	mg/l	250	160	240	100	610	150	220
COD	mg/l		1500	1900	680	700	940	1000
NH3	mg/l	2.0	33	44	31	74	0.6	<0.5
Sulfate	mg/l	250	12	10	14	<10	6	39
TDS	mg/l	500	2200	4000	1200	2200	2800	4200
TOC	mg/l		250	560	220	460	460	640
Phenol	mg/l	0.001	0.56	0.18	<0.005	0.24	0.34	<0.05
Cadmium	mg/l	0.01	<0.005	<0.005	<0.005	0.008	<0.005	<0.005
Calcium	mg/l		150	190	150	230	110	120
Iron	mg/l	0.3	31	38	62	93	1.9	1.5
Lead	mg/l	0.025	0.008	0.014	0.019	0.011	0.017	0.018
Mg	mg/l	35	58	83	39	66	45	59
Mn	mg/l	0.3	3.1	4.3	4.4	5.9	1.8	0.96
K	mg/l		46	75	24	64	12	17
Sodium	mg/l	20	170	380	63	160	200	320
Hardness	mg/l		610	820	540	850	460	540

Quarterly Surface Water Analytical Data

Parameters	Units	GA Standard	SW-1	SW-1	SW-2	SW-2	SW-3	SW-3
Date		Sampled	01/23/95	04/17/95	01/23/95	04/17/95	01/23/95	04/17/95
NO3/NO2	mg/l	10	<0.2	<0.2	0.3	<0.2	<0.3	0.2
Alk.	mg/l		120	96	64	69	<100	130
Chloride	mg/l	250	6	8	22	24	23	35
COD	mg/l		<20	<20	<20	<20	110	140
NH3	mg/l	2	<0.5	<0.5	0.5	0.5	5.1	0.7
Sulfate	mg/l	250	<5	11	17	25	13	26
TDS	mg/l	500	130	150	110	160	240	340
TOC	mg/l		3	5	3	8	23	43
Phenol	mg/l	0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cadmium	mg/l	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Calcium	mg/l		27	26	22	23	26	32
Iron	mg/l	0.3	0.56	0.45	0.87	0.87	4.9	2.2
Lead	mg/l	0.025	0.013	0.001	0.009	<0.001	0.011	0.002
Mg	mg/l	35	4.8	5	5	5.7	7	9.1
Mn	mg/l	0.3	0.04	0.05	0.04	0.03	0.11	0.15
K	mg/l		1.5	1.1	1.5	1.3	3.2	2.2
Sodium	mg/l	20	6.7	7.5	9.3	13	15	25
Hardness	mg/l		87	86	76	81	94	120

APPENDIX B

MATERIAL SAFETY DATA SHEETS
(MSDS)

Benzene
02610

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Benzene
Catalog Numbers:
S79920ACS, B243 4, B243-4, B2434, B245 4, B245 500, B245-4, B245-500, B2454
B245500, B245J4, B411 1, B411 4, B411-1, B411-4, B4111, B4114, B414-1
Synonyms:
Benzol, coal naphtha, cyclohexatriene, phenyl hydride, pyrobenzol.
Company Identification: Fisher Scientific
1 Reagent Lane
Fairlawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
71-43-2	Benzene	>99%	200-753-7

Hazard Symbols: T F
Risk Phrases: 11 45 48/23/24/25

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW
Appearance: colourless. Flash Point: 12 deg F.
Danger! Extremely flammable liquid. Harmful if inhaled. May be harmful if absorbed through the skin. Aspiration hazard. Poison! May cause central nervous system effects. May cause eye and skin irritation. May cause respiratory and digestive tract irritation. May cause reproductive and fetal effects. Cancer hazard. May cause blood abnormalities. Harmful or fatal if swallowed.
Target Organs: Blood, central nervous system, bone marrow, immune system.

Potential Health Effects

Eye:

Causes eye irritation. May cause slight transient injury.

Skin:

Causes skin irritation. May be absorbed through the skin in harmful amounts. Direct contact with the liquid may cause erythema and vesiculation. Prolonged or repeated contact has been associated with the development of a dry scaly dermatitis or with secondary infections.

Ingestion:

Aspiration hazard. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. May cause effects similar to those for inhalation exposure. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.

Inhalation:

May cause respiratory tract irritation. May cause adverse central nervous system effects including headache, convulsions, and possible death. May cause drowsiness, unconsciousness, and central nervous system depression. Central nervous system effects may include confusion, ataxia, vertigo, tinnitus, weakness, disorientation, lethargy, drowsiness, and fially coma. Exposure may lead to irreversible bone marrow injury. Exposure may lead to aplastic anemia.

Chronic:

Possible cancer hazard based on tests with laboratory animals. Prolonged or repeated exposure may cause adverse reproductive effects. May cause bone marrow abnormalities with damage to blood forming tissues. May cause anemia and other blood cell abnormalities. Chronic exposure has been associated with an increased incidence of leukemia and multiple myelomas. Immunodepressive effects have been reported. Animal studies have reported fetotoxicity (growth retardation) and teratogenicity (exencephaly, angulated ribs, dilated brain ventricles).

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:

Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids. Get medical aid immediately.

Skin:
Get medical aid immediately. Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes.

Ingestion:
Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Possible aspiration hazard. Get medical aid immediately.

Inhalation:
Get medical aid immediately. Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Notes to Physician:
Treat symptomatically and supportively.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
Containers can build up pressure if exposed to heat and/or fire. As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. Vapors can travel to a source of ignition and flash back. Extremely flammable. Material will readily ignite at room temperature. Use water spray to keep fire-exposed containers cool. Containers may explode in the heat of a fire. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Vapors may form an explosive mixture with air.

Extinguishing Media:
Use water spray to cool fire-exposed containers. Water may be ineffective. Do NOT use straight streams of water. For large fires, use water spray, fog or regular foam. For small fires, use dry chemical, carbon dioxide, water spray or regular foam. Cool containers with flooding quantities of water until well after fire is out.

Autoignition Temperature: 1044 deg F (562.22 deg C)
Flash Point: 12 deg F (-11.11 deg C)
NFPA Rating: health-2; flammability-3; reactivity-0
Explosion Limits, Lower: 1.3%
Upper: 7.1%

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:
Use water spray to dilute spill to a non-flammable mixture. Avoid runoff into storm sewers and ditches which lead to waterways. Use water spray to disperse the gas/vapor. Remove all sources of ignition. Absorb spill using an absorbent, non-combustible material such as earth, sand, or vermiculite. A vapor suppressing foam may be used to reduce vapors.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Do not get in eyes, on skin, or on clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Avoid contact with heat, sparks and flame. Do not ingest or inhale. Use only in a chemical fume hood. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

Storage:
Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Use only under a chemical fume hood.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Benzene	0.5 ppm ; 1.6 mg/m3; 2.5 ppm STEL; 8 mg/m3 STEL	0.1 ppm TWA; NIOSH Potential Occupational Carcinogen - see	10 ppm TWA (apply only to exempt industry segments); 1 p

		Appendix A 500 ppm IDLH (not considering carcinogenic effects)	pm TWA; 5 ppm STEL; 0.5 ppm TWA action limit; Cancer hazard; Flammable (see 29 CFR 1910.1028)

OSHA Vacated PELs:
Benzene:
10 ppm TWA (unless specified in 1910.1028)

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29CFR 1910.134. Always use a NIOSH-approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Liquid
Appearance:	colourless
Odor:	sweetish odor - aromatic odor
pH:	Not available.
Vapor Pressure:	100 mm Hg
Vapor Density:	2.7 (Air=1)
Evaporation Rate:	2.8 (Ether=1)
Viscosity:	0.647mPa at 20C
Boiling Point:	176 deg F
Freezing/Melting Point:	42 deg F
Decomposition Temperature:	Not available.

Solubility: Slightly soluble.
Specific Gravity/Density: 0.88
Molecular Formula: C6H6
Molecular Weight: 78.042

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
Incompatible materials, ignition sources, excess heat.
Incompatibilities with Other Materials:
Benzene is incompatible with arsenic pentafluoride + potassium methoxide, diborane, hydrogen + raney nickel, interhalogens, oxidants, uranium hexafluoride, bromine pentafluoride, chlorine, chlorine trifluoride, chromic anhydride, nitryl perchlorate, oxygen, ozone, perchlorates, perchloryl fluoride + aluminum chloride, permanganates + sulfuric acid, potassium peroxide and silver perchlorate, iodine heptafluoride, and dioxygen difluoride.
Hazardous Decomposition Products:
Irritating and toxic fumes and gases.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 71-43-2: CY1400000
LD50/LC50:
CAS# 71-43-2: Inhalation, mouse: LC50 =9980 ppm; Inhalation, rat: LC50 =10000 ppm/7H; Oral, mouse: LD50 = 4700 mg/kg; Oral, rat: LD50 = 930 mg/kg; Skin, rabbit: LD50 = >9400 mg/kg.
Carcinogenicity:
Benzene -
ACGIH: A1-confirmed human carcinogen
California: carcinogen - initial date 2/27/87
NIOSH: occupational carcinogen
NTP: Known carcinogen
OSHA: Select carcinogen
IARC: Group 1 carcinogen
Epidemiology:
IARC has concluded that epidemiological studies have establi shed the relationship between benzene exposure and the dev elopment of acute myelogenous leukemia, and that there is

sufficient evidence that benzene is carcinogenic to humans. Animal studies have demonstrated fetoxicity (growth retardation) and teratogenicity (exencephaly, angulated ribs, dilated brain ventricles).

Teratogenicity:
Experimental teratogen. Animal studies have demonstrated fetoxicity (growth retardation) and teratogenicity (exencephaly, angulated ribs, dilated brain ventricles).

Reproductive Effects:
Experimental reproductive effects have been reported.

Neurotoxicity:
No information available.

Mutagenicity:
Chromosomal aberrations have been noted in animal tests.

Other Studies:
Please refer to RTECS CY1400000 for additional data.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
Minnow (distilled water) lethal, 5 ppm/6H. Sunfish (tap water) TLM=20 ppm/24H. Striped bass TLm96=100-10 ppm.

Environmental Fate:
No information reported.

Physical/Chemical:
No information available.

Other:
None.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.
RCRA D-Series Maximum Concentration of Contaminants:
CAS# 71-43-2: waste number D018; regulatory level = 0.5 mg/L.
RCRA D-Series Chronic Toxicity Reference Levels: CAS# 71-43-2: chronic toxicity reference level = 0.005 mg/L.
RCRA F-Series: None listed.
RCRA P-Series: None listed.
RCRA U-Series: CAS# 71-43-2: waste number U019 (Ignitable waste; Toxic waste).
CAS# 71-43-2 is banned from land disposal according

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: RQ,BENZENE
Hazard Class: 3
UN Number: UN1114
Packing Group: II
IMO
No information available.
IATA
No information available.
RID/ADR
No information available.
Canadian TDG
Shipping Name: BENZENE
Hazard Class: 3(9.2)
UN Number: UN1114
Other Information: FLASHPOINT -11 C

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA
CAS# 71-43-2 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA
Section 302 (RQ)
final RQ = 10 pounds (4.54 kg); receives an adjustable RQ of 10 pounds
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 71-43-2: acute, chronic, flammable.
Section 313
This material contains Benzene (CAS# 71-43-2, >99%),which is subject

to the reporting requirements of Section 313 of SARA Title III and
40 CFR Part 373.

Clean Air Act:
CAS# 71-43-2 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
CAS# 71-43-2 is listed as a Hazardous Substance under the CWA.
CAS# 71-43-2 is listed as a Priority Pollutant under the Clean Water Act.
CAS# 71-43-2 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
Benzene can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:
WARNING: This product contains Benzene, a chemical known to the state of California to cause cancer.
California No Significant Risk Level:
CAS# 71-43-2: no significant risk level = 7 ug/day

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: T F
Risk Phrases:
R 11 Highly flammable.
R 45 May cause cancer.
R 48/23/24/25 Toxic : danger of serious damage to health by prolonged exposure through inhalation, contact with skin and if swallowed.
Safety Phrases:
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 53 Avoid exposure - obtain special instructions before use.

WGK (Water Danger/Protection)
CAS# 71-43-2: 3

Canada

~~CAS# 71-43-2 is listed on Canada's DSL/NDSL List.~~
This product has a WHMIS classification of B2, D2A.
CAS# 71-43-2 is not listed on Canada's Ingredient Disclosure List.

Exposure Limits

CAS# 71-43-2:. OEL-AUSTRALIA:TWA 5 ppm (16 mg/m3);Carcinogen. OEL-BELGIUM:TWA 10 ppm (32 mg/m3);Carcinogen JAN9. OEL-CZECHOSLOVAKIA:TWA 10 mg/m3;STEL 20 mg/m3. OEL-DENMARK:TWA 5 ppm (16 mg/m3);Skin;Carcinogen? ?OEL-FINLAND:TWA 5 ppm (15 mg/m3);STEL 10 ppm (30 mg/m3);Skin;CAR. OEL-FRANCE:TWA 5 ppm (16 mg/m3);Carcinogen. OEL-GERMANY;Skin;Carcinogen. OEL-HUNGARY:STEL 5 mg/m3;Skin;Carcinogen. OEL-INDIA:TWA 10 ppm (30 mg/m3);Carcinogen. OEL-JAPAN:TWA 10 ppm (32 mg/m3);STEL 25 ppm (80 mg/m3);CAR. OEL-THE NETHERLANDS:TWA 10 ppm (30 mg/m3);Skin. OEL-THE PHILIPPINES:TWA 25 ppm (80 mg/m3);Skin. OEL-POLAND:TWA 30 mg/m3;Skin. OEL-RUSSIA:TWA 10 ppm (5 mg/m3);STEL 25 ppm (15 mg/m3);Skin;CAR. OEL-SWEDEN:TWA 1 ppm (3 mg/m3);STEL 5 ppm (16 mg/m3);Skin;CAR. OEL-SWITZERLAND:TWA 5 ppm (16 mg/m3);Skin;Carcinogen. OEL-THAILAND:TWA 10 ppm (30 mg/m3);STEL 25 ppm (7 mg/m3). OEL-TURKEY:TWA 20 ppm (64 mg/m3);Skin. OEL-UNITED KINGDOM:TWA 10 ppm (30 mg/m3). OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV. OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 1/05/1995 Revision #17 Date: 12/12/1997

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

**** MATERIAL SAFETY DATA SHEET ****

Toluene
23590

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Toluene
Catalog Numbers:
S80229, S80229-1, S80229-2, S80229HPLC, S80229SPEC, BPT290RS-115, BPT290RS-200, BPT290RS-28, BPT290RS-50, BW1671006, NC9475555, S802292MF, T289-4, T290 1, T290 4, T290-1, T290-4, T2901, T2904, T290J4, T290RS115, T290RS200, T290RS28, T290RS50, T290SK 1, T290SK 4, T290SK-1, T290SK-4, T290SK1, T290SK4, T290SS115, T291 4, T291-4, T2914, T2914LC, T2914LDT009, T2914LDT010, T291J4, T313 4, T313-4, T3134, T313SK 4, T313SK-4, T313SK4, T323 20, T323 4, T323-20, T323-4, T32320, T3234, T324 1, T324 20, T324 200, T324 4, T324 500, T324-1, T324-20, T324-200, T324-4, T324-500, T3241, T32420, T32420 001, T324200, T32420001, T3244, T324500, T324FB115, T324FB19 T324FB200, T324FB50, T324J4, T324RB115, T324RB19, T324RB200, T324RB50, T324RS115, T324RS200, T324RS28, T324RS50, T324S 4, T324S-4, T324S4, T324SK 4, T324SK-4, T324SK4, T324SK4LC, T324SS115, T324SS200, T324SS28, T324SS50, T326S20, T330 4, T330-4, T3304

Synonyms:
Methacide, methylbenzene, methylbenzol, phenylmethane, toluol.

Company Identification: Fisher Scientific
1 Reagent Lane
Fairlawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
108-88-3	Benzene, methyl-	>99	203-625-9

Hazard Symbols: XN F
Risk Phrases: 11 20

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: colourless. Flash Point: 40 deg F.
Danger! Flammable liquid. May cause skin irritation. Harmful if inhaled. This substance has caused adverse reproductive and fetal effects in animals. May cause central nervous system depression. Aspiration hazard. May be absorbed through the skin. Poison! May cause liver and kidney damage. Causes digestive and respiratory tract irritation. Harmful or fatal if swallowed. Causes eye irritation and possible transient injury.
Target Organs: Kidneys, central nervous system, liver.

Potential Health Effects

Eye:
Causes eye irritation. May result in corneal injury. Vapors may cause eye irritation.

Skin:
May cause skin irritation. Prolonged and/or repeated contact may cause irritation and/or dermatitis. May be absorbed through the skin.

Ingestion:
Aspiration hazard. May cause irritation of the digestive tract. May cause effects similar to those for inhalation exposure. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.

Inhalation:
Inhalation of high concentrations may cause central nervous system effects characterized by headache, dizziness, unconsciousness and coma. Inhalation of vapor may cause respiratory tract irritation. May cause liver and kidney damage. Vapors may cause dizziness or suffocation. Overexposure may cause dizziness, tremors, restlessness, rapid heart beat, increased blood pressure, hallucinations, acidosis, kidney failure, .

Chronic:
Prolonged or repeated skin contact may cause dermatitis. May cause cardiac sensitization and severe heart abnormalities. May cause liver and kidney damage.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids. Get medical aid immediately.

Skin:
Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.

Ingestion:
Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Possible aspiration hazard. Get medical aid immediately.

Inhalation:
Get medical aid immediately. Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Notes to Physician:
Causes cardiac sensitization to endogenous catelcholamines which may lead to cardiac arrhythmias. Do NOT use adrenergic agents such as epinephrine or pseudoepinephrine.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
Containers can build up pressure if exposed to heat and/or fire. As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. Vapors may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. Flammable Liquid. Can release vapors that form explosive mixtures at temperatures above the flashpoint. Use water spray to keep fire-exposed containers cool. Water may be ineffective. Material is lighter than water and a fire may be spread by the use of water. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Containers may explode when heated.

Extinguishing Media:
Use water spray to cool fire-exposed containers. Water may be ineffective. Do NOT use straight streams of water. For small fires, use dry chemical, carbon dioxide, water spray or regular foam. Cool containers with flooding quantities of water until well after fire is out. For large fires, use water spray, fog or regular foam.

Autoignition Temperature: 896 deg F (480.00 deg C)
Flash Point: 40 deg F (4.44 deg C)
NFPA Rating: health-2; flammability-3; reactivity-0

Explosion Limits, Lower: 1.1
Upper: 7.1

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:
Avoid runoff into storm sewers and ditches which lead to waterways. Remove all sources of ignition. Absorb spill using an absorbent, non-combustible material such as earth, sand, or vermiculite. A vapor suppressing foam may be used to reduce vapors. Water spray may reduce vapor but may not prevent ignition in closed spaces.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Use with adequate ventilation. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Avoid contact with heat, sparks and flame. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

Storage:
Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Benzene, methyl-	50 ppm ; 188 mg/m3	100 ppm TWA; 375 mg/m3 TWA 500 ppm IDLH	200 ppm TWA; C 300 ppm; C 300 ppm

OSHA Vacated PELs:
Benzene, methyl-:
100 ppm TWA; 375 mg/m3 TWA

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133.

Skin:
Wear appropriate protective gloves to prevent skin exposure.

Clothing:
Wear appropriate protective clothing to prevent skin exposure.

Respirators:
Follow the OSHA respirator regulations found in 29CFR 1910.134. Always use a NIOSH-approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Liquid
Appearance:	colourless
Odor:	sweetish odor - pleasant odor
pH:	Not available.
Vapor Pressure:	10 mm Hg
Vapor Density:	3.1 (Air=1)
Evaporation Rate:	2.4 (Butyl acetate=1)
Viscosity:	0.59 cP at 68F.
Boiling Point:	232 deg F
Freezing/Melting Point:	-139 deg F
Decomposition Temperature:	Not available.
Solubility:	0.6 mg/L H2O at 68F.
Specific Gravity/Density:	0.9 (Water=1)
Molecular Formula:	C6H5CH3
Molecular Weight:	92.056

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
Incompatible materials, ignition sources, excess heat.
Incompatibilities with Other Materials:
Ntrogen tetroxide, nitric acid + sulfuric acid, silver perchlorate, strong oxidizers, sodium dilfuoride, .
Hazardous Decomposition Products:
Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 108-88-3: XS5250000
LD50/LC50:
CAS# 108-88-3: Inhalation, mouse: LC50 =400 ppm/24H; Inhalation, rat: LC50 =49 gm/m3/4H; Oral, rat: LD50 = 636 mg/kg; Skin, rabbit: LD50 = 12124 mg/kg.
Carcinogenicity:
Benzene, methyl- -
ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Group 3 carcinogen
Epidemiology:
No information available.
Teratogenicity:
Specific developmental abnormalities included craniofacial effects involving the nose and tongue, musculoskeletal effects, urogenital and metabolic effects in studies on mice and rats by the inhalation and oral routes of exposure. Some evidence of fetotoxicity with reduced fetal weight and retarded skeletal development has been reported in mice and rats.
Reproductive Effects:
Effects on fertility such as abortion were reported in rabbits by inhalation. Paternal effects were noted in rats by inhalation. These effects involved the testes, sperm duct and epididymis.
Neurotoxicity:
No information available.
Mutagenicity:
No information available.
Other Studies:
None.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
Bluegill LC50=17 mg/L/24H Shrimp LC50=4.3 ppm/96H Fathead minnow LC50=36.2 mg/L/96H Sunfish (fresh water) TLm=1180 mg/L/96H
Environmental Fate:
From soil, substance evaporates and is microbially biodegraded. In water, substance volatilizes and biodegrades.
Physical/Chemical:
Photochemically produced hydroxyl radicals degrade substance.
Other:
None.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.
RCRA D-Series Maximum Concentration of Contaminants:
None listed.
RCRA D-Series Chronic Toxicity Reference Levels: None listed.
RCRA F-Series: None listed.
RCRA P-Series: None listed.
RCRA U-Series: CAS# 108-88-3: waste number U220.
CAS# 108-88-3 is banned from land disposal according to RCRA.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: TOLUENE
Hazard Class: 3
UN Number: UN1294
Packing Group: II
IMO
No information available.
IATA
No information available.
RID/ADR
No information available.
Canadian TDG
Shipping Name: TOLUENE
Hazard Class: 3(9.2)
UN Number: UN1294

Other Information: FLASHPOINT 4 C

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA
CAS# 108-88-3 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 108-88-3: Effective Date: October 4, 1982; Sunset Date: October 4
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA
Section 302 (RQ)
final RQ = 1000 pounds (454 kg)
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 108-88-3: acute, flammable.
Section 313
This material contains Benzene, methyl- (CAS# 108-88-3, >99%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
CAS# 108-88-3 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 108-88-3 is listed as a Hazardous Substance under the CWA.
CAS# 108-88-3 is listed as a Priority Pollutant under the Clean Water Act.
CAS# 108-88-3 is listed as a Toxic Pollutant under the Clean Water Act.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
Benzene, methyl- can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.

WARNING: This product contains Benzene, methyl-, a chemical known to the state of California to cause birth defects or other reproductive harm.

California No Significant Risk Level:

None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: XN F

Risk Phrases:

R 11 Highly flammable.

R 20 Harmful by inhalation.

Safety Phrases:

S 16 Keep away from sources of ignition - No smoking.

S 25 Avoid contact with eyes.

S 29 Do not empty into drains.

S 33 Take precautionary measures against static discharges.

WGK (Water Danger/Protection)

CAS# 108-88-3: 2

Canada

CAS# 108-88-3 is listed on Canada's DSL/NDSL List.

This product has a WHMIS classification of B2, D2B.

CAS# 108-88-3 is not listed on Canada's Ingredient Disclosure List.

Exposure Limits

CAS# 108-88-3:. OEL-AUSTRALIA:TWA 100 ppm (375 mg/m3);STEL 150 ppm (560 mg/m3). OEL-BELGIUM:TWA 100 ppm (377 mg/m3);STEL 150 ppm (565 mg/m3). OEL-CZECHOSLOVAKIA:TWA 200 mg/m3;STEL 1000 mg/m3. OEL-DENMARK:TWA 50 ppm (190 mg/m3);Skin. OEL-FINLAND:TWA 100 ppm (375 mg/m3);STEL 150 ppm;Skin. OEL-FRANCE:TWA 100 ppm (375 mg/m3);STEL 150 ppm (560 mg/m3). OEL-GERMANY:TWA 100 ppm (380 mg/m3). OEL-HUNGARY:TWA 100 mg/m3;STEL 300 mg/m3;Skin. OEL-JAPAN:TWA 100 ppm (380 mg/m3). OEL-THE NETHERLANDS:TWA 100 ppm (375 mg/m3);Skin. OEL-THE PHILIPPINES:TWA 100 ppm (375 mg/m3). OEL-POLAND:TWA 100 mg/m3. OEL-RUSSIA:TWA 100 ppm;STEL 50 mg/m3 L-SWEDEN:TWA 50 ppm (200 mg/m3);STEL 100 ppm (400 mg/m3);Skin. OEL-SWITZERLAND:TWA 100 ppm (380 mg/m3);STEL 500 ppm. OEL-THAILAND:TWA 200 ppm;STEL 300 ppm. OEL-TURKEY:TWA 200 ppm (750 mg/m3). OEL-UNITED KINGDOM:TWA 100 ppm (375 mg/m3);STEL 150 ppm;Skin. OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV. OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 1/04/1995 Revision #24 Date: 12/12/1997

**** MATERIAL SAFETY DATA SHEET ****

Dichloromethane
14930

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Dichloromethane
Catalog Numbers:
S71971, S71971-1, S80084, S80084-1, S80084-2SPEC, S80084HPLC, S80084SPEC, 01424LOT013, 01424LOT014, 0142RS50, 0143RS115, 0143RS200, 0143RS28, 0143RS50, BP1186 4, BP1186-4, BP11864, BP11864 001, BP11864001, BP1186RS115 BP1186RS200, BP1186RS28, BP1186RS50, BP1186SS 115, BP1186SS 200, BP1186SS 30, BP1186SS 50, BP1186SS115, BP1186SS200, BP1186SS28, BP1186SS30, BP1186SS50, BP0143RS-115, BP0143RS-200, BP0143RS-28, BP0143RS-50, BW4250RT50, 0123-1, D142 4, D142-4, 01424, D1424LOT011, D1424LOT012, D142SS115, 0142SS200, 0142SS28, 0142SS50, D143 1, 0143 4, D143-1, D143-4, D1431, D1434, D1434LC, D1434LOT002, D143SK 1, D143SK 4, D143SK-1, D143SK-4, 0143SK1, 0143SK4, 0143SK4001, 0143SS-11, 0143SS-115, 0143SS-20, D143SS-200, 0143SS-30, 0143SS-50, 0143SS115, 0143SS28, 0143SS50, D150 1, 0150 4, D150-1 D150-4, D1501, D1504, D150J4, D150SK 1, D150SK 4, D150SK-1, D150SK-4, D150SK1, D150SK4, D150SS 200, D150SS 30, D150SS 50, D150SS-11, D150SS-115, D150SS-20, D150SS-200, D150SS-30, D150SS-50, D150SS200, D150SS30, D150SS50, D151 1, D151 4, D151-1, D151-4, D1511, D1514, D1514002, D1514003, D1514004, D1514LC, D1514LOT029, D1514LOT030, D1514LOT038, D1514LOT039, D1514LOT040, D1514LOT043, D1514LOT044, D1514LOT046, D1514LOT047, D1514LOT049, D1514LOT052, D1514LOT053, D1514LOT054, D1514LOT062, D151RS200, D151RS28, D151SS115, D151SS200, D151SS28, D151SS50, D152-4, D154 4, D1544, D1544LOT009, D1544LOT031, D1544LOT038, D1544LOT039, D35 1, D35 4, D35-1, D35-4, D351, D354, D37 1, D37 20, D37 200, D37 200 001, D37 200 002, D37 4, D37 500, D37-1, D37-20, D37-200, D37-4, D37-500, D371, D3720, D37200, D37200 001, D37200 002, D37200001, D37200002, D37200004, D374, D37500, D37FB115, D37FB19, D37FB200, D37FB50, D37RB115, D37RB19, D37RB200, D37RB50, D37RS115, D37RS200, D37RS28, D37RS50, D37SK 4, D37SK-4, D37SK4, D37SS 115, D37SS-115, D37SS-200, D37SS-30, D37SS-50, D37SS115, D37SS200, D37SS28, D37SS50, FLBP1186RS-115, FLBP1186RS-200, FLBP1186RS-28, FLBP1186RS-50, FLD142RS-115, FLD142RS-200, FLD142RS-28, FLD142RS-50, D142RS115, D142RS200, D142RS28, D142RS50, S80084-1MF*, S800842SPEC, S80084MF*

Synonyms:
Methylene chloride, methylene dichloride, freon30

Company Identification: Fisher Scientific
1 Reagent Lane
Fairlawn, NJ 07410

For Information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
75-09-2	Methane, dichloro-	100	200-838-9

Hazard Symbols: XN
Risk Phrases: 40

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: colourless.
Caution! May cause respiratory tract irritation. May cause digestive tract irritation. May be harmful if swallowed. May cause central nervous system depression. May be absorbed through the skin. May cause fetal effects based upon animal studies. May cause reproductive effects based upon animal studies. May cause severe eye and skin irritation with possible burns. May cause cancer based on animal studies. May be harmful if inhaled.
Target Organs: Blood, central nervous system.

Potential Health Effects

Eye:
Contact with eyes may cause severe irritation, and possible eye burns.

Skin:
May be absorbed through the skin. Causes irritation with burning pain, itching, and redness. Prolonged exposure may result in skin burns.

Ingestion:
May cause irritation of the digestive tract. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure.

Inhalation:

Inhalation of high concentrations may cause central nervous system effects characterized by headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation. May cause blood changes. Overexposure may cause an increase in carboxyhemoglobin levels in the blood.

Chronic:
Possible cancer hazard based on tests with laboratory animals. Prolonged or repeated skin contact may cause dermatitis. May cause fetal effects.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids. Get medical aid immediately.

Skin:
Get medical aid. Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes.

Ingestion:
If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

Inhalation:
Get medical aid immediately. Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Notes to Physician:
Treat symptomatically and supportively.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors mixed with air in proper proportion will propagate a flame.

Extinguishing Media:
In case of fire, use water, dry chemical, chemical foam, or alcohol-resistant foam. Use water spray to cool fire-exposed containers.

Autoignition Temperature: 1033 deg F (556.11 deg C)

Flash Point: Not applicable.
NFPA Rating: health-2; flammability-1; reactivity-0
Explosion Limits, Lower: 15.1 @ 1030C
Upper: 17.3 @ 1480C

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:
Absorb spill with inert material, (e.g., dry sand or earth), then place into a chemical waste container.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Use with adequate ventilation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation.

Storage:
Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Methane, dichloro-	50 ppm ; 174 mg/m3	NIOSH Potential Occupational Carcinogen - see Appendix A 2300 ppm IDLH (not considering carcinogenic effects)	25 ppm TWA; 125 ppm STEL (15 min. TWA); 25 ppm TWA (8 hr.); 125 ppm STEL (15 min.); 12.5 ppm Action Level (see 29 CFR 19 10.1051)

OSHA Vacated PELs:
Methane, dichloro-:
500 ppm TWA

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133.

Skin:
Wear appropriate protective gloves to prevent skin exposure.

Clothing:
Wear appropriate protective clothing to prevent skin exposure.

Respirators:
Follow the OSHA respirator regulations found in 29CFR 1910.134. Always use a NIOSH-approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Liquid
Appearance:	colourless
Odor:	ethereal odor
pH:	Not available.
Vapor Pressure:	350 mm Hg @ 20
Vapor Density:	2.9 (Air=1)
Evaporation Rate:	Not available.
Viscosity:	Not available.
Boiling Point:	104 deg F
Freezing/Melting Point:	-142 deg F
Decomposition Temperature:	Not available.
Solubility:	Moderately soluble in water
Specific Gravity/Density:	1.33 (Water=1)
Molecular Formula:	CH2Cl2
Molecular Weight:	84.92

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable.
Conditions to Avoid:
Incompatible materials, strong oxidants.
Incompatibilities with Other Materials:
Incompatible with strong oxidizers. Can react dangerously with nitrogen tetroxide, liquid oxygen, potassium, sodium, sodium-potassium alloys, lithium, potassium hydroxide with N-methyl-N-nitroso urea, potassium t-butoxide, and finely powdered aluminum and magnesium. occurred with with mixtures of this materials and liquid ammonia or dimethylaminopropylamine.
Hazardous Decomposition Products:
Hydrogen chloride, phosgene, carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 75-09-2: PA8050000
LD50/LC50:
CAS# 75-09-2: Inhalation, mouse: LC50 =14400 ppm/7H; Inhalation, rat: LC50 =88 gm/m3/30M; Oral, rat: LD50 = 1600 mg/kg.
Carcinogenicity:
Methane, dichloro- -
ACGIH: A3 - Animal Carcinogen
California: carcinogen - initial date 4/1/88
NIOSH: occupational carcinogen
NTP: Suspect carcinogen
OSHA: Possible Select carcinogen
IARC: Group 2B carcinogen
Epidemiology:
No data available.
Teratogenicity:
No data available.
Reproductive Effects:
No data available.
Neurotoxicity:
No data available.
Mutagenicity:
No data available.
Other Studies:
No data available.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
This chemical has a moderate potential to affect some aquatic organisms. It is resistant to biodegradation, and has a low potential to persist in the aquatic environment. 96-hr. EC50 (loss of equilibrium); Fathead minnow: 99mg/L; 96-hr. EC10: 66.3 mg/L. Bluegill sunfish: 96-hr. LC50=220 mg/L; Water flea: 24-hr. LC50=2270 mg/L; No observed effect level:1550 mg/L.
Environmental Fate:
This material is not likely to bioconcentrate.
Physical/Chemical:
Not available.
Other:
Not available.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.
RCRA D-Series Maximum Concentration of Contaminants:
None listed.
RCRA D-Series Chronic Toxicity Reference Levels: None listed.
RCRA F-Series: None listed.
RCRA P-Series: None listed.
RCRA U-Series: CAS# 75-09-2: waste number U080.
CAS# 75-09-2 is banned from land disposal according to RCRA.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: DICHLOROMETHANE
Hazard Class: 6.1
UN Number: UN1593
Packing Group: III
IMO
No information available.
IATA
No information available.
RID/ADR
No information available.
Canadian TDG

Shipping Name: METHYLENE CHLORIDE
Hazard Class: 6.1
UN Number: UN1593

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA
CAS# 75-09-2 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 75-09-2: Effective Date: October 4, 1982; Sunset Date: October 4,
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA
Section 302 (RQ)
final RQ = 1000 pounds (454 kg)
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 75-09-2: acute, chronic.
Section 313
This material contains Methane, dichloro- (CAS# 75-09-2, 100%) which
is subject to the reporting requirements of Section 313 of SARA
Title III and 40 CFR Part 373.
Clean Air Act:
CAS# 75-09-2 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous
Substances under the CWA.
CAS# 75-09-2 is listed as a Priority Pollutant under the Clean Water
Act.
None of the chemicals in this product are listed as Toxic Pollutants
under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous
by OSHA.
STATE

Methane, dichloro- can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:
WARNING: This product contains Methane, dichloro-, a chemical known to the state of California to cause cancer.
California No Significant Risk Level:
CAS# 75-09-2: no significant risk level = 50 ug/day

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: XN
Risk Phrases:
R 40 Possible risks of irreversible effects.
Safety Phrases:
S 24/25 Avoid contact with skin and eyes.
S 36/37 Wear suitable protective clothing and gloves.
S 23C Do not breathe vapour.

WGK (Water Danger/Protection)
CAS# 75-09-2: 2

Canada
CAS# 75-09-2 is listed on Canada's DSL/NDSL List.
This product has a WHMIS classification of D1B, D2A.
CAS# 75-09-2 is not listed on Canada's Ingredient Disclosure List.

Exposure Limits
CAS# 75-09-2:. OEL-AUSTRALIA:TWA 100 ppm (350 mg/m3);Carcinogen. OEL-AUSTRIA:TWA 100 ppm (360 mg/m3). OEL-BELGIUM:TWA 50 ppm (174 mg/m3);Carcinogen. OEL-CZECHOSLOVAKIA:TWA 500 mg/m3;STEL 2500 mg/m3. OEL-DENMARK:TWA 50 ppm (175 mg/m3);Skin;Carcinoge. OEL-FINLAND:TWA 100 ppm (350 mg/m3);STEL 250 ppm (870 mg/m3). OEL-FRANCE:TWA 100 ppm (360 mg/m3);STEL 500 ppm (1800 mg/m3). OEL-GERMANY:TWA 100 ppm (360 mg/m3);Carcinogen. OEL-HUNGARY:STEL 10 mg/m3;Carcinogen. OEL-JAPAN:TWA 100 ppm (350 mg/m3). OEL-THE NETHERLANDS:TWA 100 ppm (350 mg/m3);STEL 500 ppm. OEL-THE PHILIPINES:TWA 500 ppm (1740 mg/m3). OEL-POLAND:TWA 50 mg/m3. OEL-RUSSIA:TWA 100 ppm;STEL 50 mg/m3. OEL-SWEDEN:TWA 35 ppm (120 mg/m3);STEL 70 ppm (25 mg/m3);Skin. OEL-SWITZERLAND:TWA 100 ppm (360 mg/m3);STEL 500 ppm. OEL-THAILAND:TWA 500 mg/m3;STEL 1000 mg/m3. OEL-TURKEY:TWA 500 ppm (1740 mg/m3). OEL-UNITED KINGDOM:TWA 100 ppm (350 mg/m3);STEL 250 ppm. OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV. OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 1/11/1995 Revision #50 Date: 12/12/1997

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

**** MATERIAL SAFETY DATA SHEET ****

Trichloroethylene
23850

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Trichloroethylene
Catalog Numbers:
S80327ACS-1, S80327ACS-2, NC9323848, S80232, S80237ACS-1, S80237ACS-2,
T340 4, T340-4, T3404, T341 20, T341 4, T341 500, T341-20, T341-4, T341-500
T34120, T3414, T341500, T341J4, T403 4, T403-4, T4034
Synonyms:
Ethylene trichloride, triclene, trichloroethene, benzinol cecolene
Company Identification: Fisher Scientific
1 Reagent Lane
Fairlawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
79-01-6	Trichloroethylene	100	201-167-4

Hazard Symbols: XN
Risk Phrases: 40 52/53

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: clear, colorless.
Warning! May cause central nervous system depression. Aspiration hazard. May cause liver damage. May cause reproductive effects based upon animal studies. Causes eye and skin irritation. May cause respiratory and digestive tract irritation. May cause cancer based on animal studies. Potential cancer hazard.
Target Organs: Central nervous system, liver.

~~Potential Health Effects~~

Eye:
Causes moderate eye irritation. May result in corneal injury. Contact produces irritation, tearing, and burning pain.

Skin:
Causes mild skin irritation. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis. May cause peripheral nervous system function impairment including persistent neuritis, and temporary loss of touch. Damage to the liver and other organs has been observed in workers who have been overexposed.

Ingestion:
Aspiration hazard. May cause irritation of the digestive tract. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.

Inhalation:
Inhalation of high concentrations may cause central nervous system effects characterized by headache, dizziness, unconsciousness and coma. May cause respiratory tract irritation. May cause liver abnormalities. May be harmful if inhaled. May cause peripheral nervous system effects.

Chronic:
~~Possible cancer hazard based on tests with laboratory animals.~~ Chronic inhalation may cause effects similar to those of acute inhalation. Prolonged or repeated skin contact may cause defatting and dermatitis. May cause peripheral nervous system function impairment including persistent neuritis, and temporary loss of ~~touch. Damage to the liver and other organs has been observed in~~ workers who have been overexposed.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids. Get medical aid immediately.

Skin:
Get medical aid if irritation develops or persists. Flush skin with plenty of soap and water.

Ingestion:
If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Possible aspiration hazard. Get medical aid immediately.

Inhalation:

Get medical aid immediately. Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Notes to Physician:
Treat symptomatically and supportively.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors can travel to a source of ignition and flash back. Combustion generates toxic fumes. Containers may explode in the heat of a fire.
Extinguishing Media:
Use water spray to cool fire-exposed containers. In case of fire use water spray, dry chemical, carbon dioxide, or chemical foam.
Autoignition Temperature: 778 deg F (414.44 deg C)
Flash Point: Not applicable.
NFPA Rating: health-2; flammability-1; reactivity-0
Explosion Limits, Lower: 12.5
Upper: 90.0

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks:
Absorb spill with inert material, (e.g., dry sand or earth), then place into a chemical waste container. Remove all sources of ignition. Provide ventilation.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Use only in a well ventilated area. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
Storage:

Keep away from sources of ignition. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Trichloroethylene	50 ppm ; 269 mg/m3; 100 ppm STEL; 537 mg/m3 STEL	NIOSH Potential Occupational Carcinogen - see Appendix A; see Appendix C for sup plementary exposure limits 1000 ppm IDLH (not considering carcinogenic effects)	100 ppm TWA; C 200 ppm; C 200 ppm

OSHA Vacated PELs:
Trichloroethylene:
50 ppm TWA; 270 mg/m3 TWA

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133.

Skin:
Wear appropriate protective gloves to prevent skin exposure.

Clothing:
Wear appropriate protective clothing to prevent skin exposure.

Respirators:
Follow the OSHA respirator regulations found in 29CFR 1910.134. Always use a NIOSH-approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Liquid
Appearance:	clear, colorless
Odor:	sweetish odor - chloroform-like
pH:	Not available.
Vapor Pressure:	58 mm Hg @20C
Vapor Density:	4.53
Evaporation Rate:	0.69 (CCl4=1)
Viscosity:	0.0055 poise
Boiling Point:	189 deg F
Freezing/Melting Point:	-121 deg F
Decomposition Temperature:	Not available.
Solubility:	Insoluble in water.
Specific Gravity/Density:	1.47 (water=1)
Molecular Formula:	C2HCl3
Molecular Weight:	131.366

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
Incompatible materials, ignition sources, oxidizers.
Incompatibilities with Other Materials:
Alkalis (sodium hydroxide), chemically active metals (aluminum, beryllium, lithium, magnesium), epoxies and oxidants. Can react violently with aluminum, barium, lithium, magnesium, liquid oxygen, ozone, potassium hydroxide, potassium nitrate, sodium, sodium hydroxide, titanium, and nitrogen dioxide. Reacts with water under heat and pressure to form hydrogen chloride gas.
Hazardous Decomposition Products:
Hydrogen chloride, carbon dioxide, chloride fumes.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:

~~CAS# 79-01-6: KX4550000~~

LD50/LC50:
CAS# 79-01-6: Inhalation, mouse: LC50 =8450 ppm/4H; Oral, mouse: LD50 = 2402 mg/kg; Oral, rat: LD50 = 5650 mg/kg; Skin, rabbit: LD50 = >20 gm/kg.

Carcinogenicity:
Trichloroethylene -
ACGIH: A5-not suspected as a human carcinogen
California: carcinogen - initial date 4/1/88
NIOSH: occupational carcinogen
OSHA: Possible Select carcinogen
IARC: Group 2A carcinogen

Epidemiology:
Suspected carcinogen with experimental carcinogenic, tumorig enic, and teratogenic data.

Teratogenicity:
No information available.

Reproductive Effects:
Experimental reproductive effects have been observed.

Neurotoxicity:
No information available.

Mutagenicity:
Human mutation data has been reported. IARC and the National Toxicology Program (NTP) stated that variability in the mutagencity test results with thichloroethylene may be due to the presence of various stabilizers used in TCE which are mutagens (e.g. epoxybutane, epichlorohydrin).

Other Studies:
None.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
Bluegill sunfish, LD50= 44,700 ug/L/96Hr. Fathead minnow, LC50=40.7 mg/L/96Hr.

Environmental Fate:
In air, substance is photooxidized and is reported to form phosgene, dichloroacetyl chloride, and formyl chloride. In water, it evaporates rapidly.

Physical/Chemical:
No information available.

Other:
None.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.
RCRA D-Series Maximum Concentration of Contaminants: CAS# 79-01-6: waste number D040; regulatory level = 0.5 mg/L.
RCRA D-Series Chronic Toxicity Reference Levels: CAS# 79-01-6: chronic toxicity reference level = 0.005 mg/L.
RCRA F-Series: None listed.
RCRA P-Series: None listed.
RCRA U-Series: CAS# 79-01-6: waste number U228.
CAS# 79-01-6 is banned from land disposal according to RCRA.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: TRICHLOROETHYLENE
Hazard Class: 6.1
UN Number: UN1710
Packing Group: III
IMO
No information available.
IATA
No information available.
RID/ADR
No information available.
Canadian TDG
Shipping Name: TRICHLOROETHYLENE
Hazard Class: 6.1(9.2)
UN Number: UN1710

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA
CAS# 79-01-6 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA
Section 302 (RQ)
final RQ = 100 pounds (45.4 kg)
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 79-01-6: acute, chronic, reactive.
Section 313
This material contains Trichloroethylene (CAS# 79-01-6, 100%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
CAS# 79-01-6 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 79-01-6 is listed as a Hazardous Substance under the CWA.
CAS# 79-01-6 is listed as a Priority Pollutant under the Clean Water Act.
CAS# 79-01-6 is listed as a Toxic Pollutant under the Clean Water Act.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
Trichloroethylene can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:
WARNING: This product contains Trichloroethylene, a chemical known to the state of California to cause cancer.
California No Significant Risk Level:
CAS# 79-01-6: ingestion: no significant risk level = 50 ug/day; inhalat
European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: XN
Risk Phrases:
R 40 Possible risks of irreversible effects.

R 52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 23 Do not inhale gas/fumes/vapour/spray.
S 36/37 Wear suitable protective clothing and gloves.
S 61 Avoid release to the environment. Refer to special instructions/Safety data sheets.

WGK (Water Danger/Protection)

CAS# 79-01-6: 3

Canada

CAS# 79-01-6 is listed on Canada's DSL/NDSL List.
This product has a WHMIS classification of D1B, D2B.
CAS# 79-01-6 is not listed on Canada's Ingredient Disclosure List.

Exposure Limits

CAS# 79-01-6: OEL-AUSTRALIA:TWA 50 ppm (270 mg/m3);STEL 200 ppm (1080 mg/m3). OEL-BELGIUM:TWA 50 ppm (269 mg/m3);STEL 200 ppm (1070 mg/m3). OEL-CZECHOSLOVAKIA:TWA 250 mg/m3;STEL 1250 mg/m3. OEL-DENMARK:TWA 30 ppm (160 mg/m3). OEL-FINLAND:TWA 30 ppm (160 mg/m3);STEL 45 ppm (240 mg/m3);Skin. OEL-FRANCE:TWA 75 ppm (405 mg/m3);STEL 200 ppm (1080 mg/m3). OEL-GERMANY:TWA 50 ppm (270 mg/m3);Carcinogen. OEL-HUNGARY:TWA 10 mg/m3;STEL 40 mg/m3. OEL-JAPAN:TWA 50 ppm (270 mg/m3). OEL-THE NETHERLANDS:TWA 35 ppm (190 mg/m3);STEL 100 ppm. OEL-THE PHILIPPINES:TWA 100 ppm (535 mg/m3). OEL-POLAND:TWA 50 mg/m3. OEL-RUSSIA:TWA 50 ppm;STEL 10 mg/m3. OEL-SWEDEN:TWA 10 ppm (50 mg/m3);STEL 25 ppm (140 mg/m3). OEL-THAILAND:TWA 100 ppm;STEL 200 ppm. OEL-TURKEY:TWA 100 ppm (535 mg/m3). OEL-UNITED KINGDOM:TWA 100 ppm (535 mg/m3);STEL 150 ppm;Skin. OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV. OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 2/10/1995 Revision #15 Date: 12/12/1997

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

**** MATERIAL SAFETY DATA SHEET ****

1,2-Dichloroethane
09390

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: 1,2-Dichloroethane
Catalog Numbers:
S79997, S79997SPEC, BP1100-500, E175 20, E175 4, E175 500, E175-20, E175-4, E175-500, E17520, E1754, E1754LC, E175500, E175J4, E190 4, E190-4, E1904
Synonyms:
Ethylene dichloride, 1,2- ethylene dichloride, glycol dichloride, ethane 1,2-dichloro-
Company Identification: Fisher Scientific
1 Reagent Lane
Fairlawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
107-06-2	Ethane, 1,2-dichloro-	100	203-458-1

Hazard Symbols: T F
Risk Phrases: 11 22 36/37/38 45

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: colourless. Flash Point: 58 F.
Warning! Flammable liquid. May cause central nervous system depression. May cause liver and kidney damage. Causes digestive and respiratory tract irritation. May cause severe eye and skin irritation with possible burns. May cause cancer based on animal studies.
Target Organs: Kidneys, central nervous system, liver.

Potential Health Effects

Eye:
Contact with liquid or vapor causes severe burns and possible irreversible eye damage. Vapors may cause eye irritation.

Skin:
Exposure may cause irritation and possible burns. May be absorbed through the skin.

Ingestion:
May cause central nervous system depression, kidney damage, and liver damage. May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause effects similar to those for inhalation exposure.

Inhalation:
Inhalation of high concentrations may cause central nervous system effects characterized by headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation. May cause liver and kidney damage.

Chronic:
Possible cancer hazard based on tests with laboratory animals. Prolonged or repeated skin contact may cause dermatitis. Prolonged or repeated eye contact may cause conjunctivitis. May cause liver and kidney damage.

****** SECTION 4 - FIRST AID MEASURES ******

Eyes:
Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids. Get medical aid immediately.

Skin:
Get medical aid. Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes.

Ingestion:
If victim is conscious and alert, give 2-4 cupfuls of milk or water. Get medical aid immediately.

Inhalation:
Get medical aid immediately. Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Notes to Physician:
Treat symptomatically and supportively.

Antidote:
None reported.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors can travel to a source of ignition and flash back.

Extinguishing Media:
For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. Use water spray to cool fire-exposed containers. Water may be ineffective.

Autoignition Temperature: 775 deg F (412.78 deg C)
Flash Point: 58 deg F (14.44 deg C)
NFPA Rating: health-2; flammability-3; reactivity-0
Explosion Limits, Lower: 6.2
Upper: 15.9

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:
Absorb spill with inert material, (e.g., dry sand or earth), then place into a chemical waste container. Remove all sources of ignition. Use a spark-proof tool.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well ventilated area. Use with adequate ventilation. Do not get on skin and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Avoid contact with heat, sparks and flame. Do not ingest or inhale. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

Storage:
Keep away from heat, sparks, and flame. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Local exhaust ventilation may be necessary to control any air contaminants to within their TLVs during the use of this product.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Ethane, 1,2-dichloro-	10 ppm ; 40 mg/m3	1 ppm TWA; 4 mg/m3 TWA; NIOSH Potential Occupational Carcinogen - see Appendix A ; see Appendix C for supplementary exposure limits 50 ppm IDLH (not considering carcinogenic effects)	50 ppm TWA; C 100 ppm; C 100 ppm

OSHA Vacated PELs:
Ethane, 1,2-dichloro-:
1 ppm TWA; 4 mg/m3 TWA

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133.

Skin:
Wear appropriate protective gloves to prevent skin exposure.

Clothing:
Wear appropriate protective clothing to prevent skin exposure.

Respirators:
Follow the OSHA respirator regulations found in 29CFR

1910.134. Always use a NIOSH-approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Liquid
Appearance:	colourless
Odor:	chloroform-like
pH:	Not available.
Vapor Pressure:	66 mm Hg @ 20 C
Vapor Density:	3.5 (Air=1)
Evaporation Rate:	0.3 (Butyl acetate=1)
Viscosity:	Not available.
Boiling Point:	181 deg F
Freezing/Melting Point:	-31.9 deg F
Decomposition Temperature:	Not available.
Solubility:	Silghtly soluble in water
Specific Gravity/Density:	1.26 (Water=1)
Molecular Formula:	C2H4Cl2
Molecular Weight:	98.934

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable.
Conditions to Avoid:
Incompatible materials, ignition sources, excess heat, electrical sparks.
Incompatibilities with Other Materials:
Incompatiblities with strong oxidizers, aluminum, ketone solvents, bases, roganic peroxides, alkali metals, reducing agents or nitric acid. Explosions have occurred with with mixtures of this materials and liquid ammonia or dimethylaminopropylamine.
Hazardous Decomposition Products:
Hydrogen chloride, carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 107-06-2: KI0525000
LD50/LC50:
CAS# 107-06-2: Inhalation, rat: LC50 =1000 ppm/7H; Oral, mouse: LD50

= 413 mg/kg; Oral, rabbit: LD50 = 860 mg/kg; Oral, rat: LD50 = 670 mg/kg; Skin, rabbit: LD50 = 2800 mg/kg.

Carcinogenicity:

Ethane, 1,2-dichloro- -

ACGIH: A4 - Not Classifiable as a Human Carcinogen
California: carcinogen - initial date 10/1/87
NIOSH: occupational carcinogen
NTP: Suspect carcinogen
OSHA: Possible Select carcinogen
IARC: Group 2B carcinogen

Epidemiology:

No data available.

Teratogenicity:

May cause decreased fertility and other adverse effects in pregnant female rats and the progeny of the first generation, but not of the second, by giving them repeated 4-hr/day exposures to 57 mg/m3. Death, Ihl-rat, TCLo=20100 ug/m3/1H (female 7-14D post); Stunted fetus, Oral-rat, TDLo=1260 mg/kg (6-15D preg) Developmental abnormalities: Craniofacial, Ihl-mouse, TCLo=100 ppm/7H (female 6-15D post); Musculoskeletal, Oral-rat, TDLo=1260 mg/kg (6-15D preg)

Reproductive Effects:

No data available.

Neurotoxicity:

No data available.

Mutagenicity:

This material may have mutagenic potential at high concentrations, but the relationship of mutagenesis and carcinogenic effect is not yet clear because activity for the two responses is not consistent between organs or species.

Other Studies:

None.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:

This chemical is expected to cause little oxygen depletion in aquatic systems. It has a low potential to affect aquatic organisms. Sheepshead minnow: 24-,48-, and 96-hr. LC50=GT130 mg/L,LT320 mg/L; Bluegill sunfish: 96-hr. LC50=550 mg/L/; Water flea: 24-and 48-hr.LC50=250 mg/L and 220mg/L; Brine shrimp: 24-hr.LC50=320 mg/L.

Environmental Fate:

This material is not likely to bioconcentrate.

Physical/Chemical:

Not available.

Other:

None.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.
RCRA D-Series Maximum Concentration of Contaminants:
CAS# 107-06-2: waste number D028; regulatory level = 0.5 mg/L.
RCRA D-Series Chronic Toxicity Reference Levels: CAS# 107-06-2: chronic toxicity reference level = 0.005 mg/L.
RCRA F-Series: None listed.
RCRA P-Series: None listed.
RCRA U-Series: CAS# 107-06-2: waste number U077.
CAS# 107-06-2 is banned from land disposal according to RCRA.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: ETHYLENE DICHLORIDE-POISON
Hazard Class: 3
UN Number: UN1184
Packing Group: II

IMO
No information available.

IATA
No information available.

RID/ADR
No information available.

Canadian TDG
Shipping Name: ETHYLENE DICHLORIDE
Hazard Class: 3(6.1)(9.2)
UN Number: UN1184
Other Information: FLASHPOINT 13 C

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL

TSCA

CAS# 107-06-2 is listed on the TSCA inventory.

FROM :FISHER SCIENTIFIC 412 490 8098 1998,05-20 12:50 #775 P.46/79

Health & Safety Reporting List
CAS# 107-06-2: Effective Date: June 1, 1987; Sunset Date: June 1, 1997
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA
Section 302 (RQ)
final RQ = 100 pounds (45.4 kg)
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 107-06-2: acute, chronic, flammable.
Section 313
This material contains Ethane, 1,2-dichloro- (CAS# 107-06-2, 100%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
CAS# 107-06-2 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 107-06-2 is listed as a Hazardous Substance under the CWA.
CAS# 107-06-2 is listed as a Priority Pollutant under the Clean Water Act.
CAS# 107-06-2 is listed as a Toxic Pollutant under the Clean Water Act.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
Ethane, 1,2-dichloro- can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:
WARNING: This product contains Ethane, 1,2-dichloro-, a chemical known to the state of California to cause cancer.
California No Significant Risk Level:
CAS# 107-06-2: no significant risk level = 10 ug/day
European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: T F

Risk Phrases:

R 11 Highly flammable.
R 22 Harmful if swallowed.
R 36/37/38 Irritating to eyes, respiratory system and skin.
R 45 May cause cancer.

Safety Phrases:

S 45 In case of accident of if you feel unwell, seek medical advice immediately (show the label where possible).
S 53 Avoid exposure - obtain special instructions before use.

WGK (Water Danger/Protection)

CAS# 107-06-2: 3

Canada

CAS# 107-06-2 is listed on Canada's DSL/NDSL List.
This product has a WHMIS classification of B2, D1A, D2A.
CAS# 107-06-2 is not listed on Canada's Ingredient Disclosure List.

Exposure Limits

CAS# 107-06-2:. OEL-ARAB Republic of Egypt:TWA 5 ppm (2 mg/m3). OEL-AUSTRALIA:TWA 10 ppm (40 mg/m3). OEL-AUSTRIA:TWA 20 ppm (80 mg/m3). OEL-BELGIUM:TWA 10 ppm (40 mg/m3). OEL-DENMARK:TWA 1 ppm (4 mg/m3);Skin. OEL-FINLAND:TWA 10 ppm (40 mg/m3);STEL 20 ppm (80 mg/m3);CAR. OEL-FRANCE:TWA 10 ppm (40 mg/m3). OEL-GERMANY;Carcinogen. OEL-HUNGARY:STEL 4 mg/m3;Carcinogen. OEL-JAPAN:TWA 10 ppm (40 mg/m3). OEL-THE NETHERLANDS:TWA 50 ppm (200 mg/m3). OEL-THE PHILIPPINES:TWA 50 ppm (200 mg/m3). OEL-RUSSIA:TWA 10 ppm. OEL-SWEDEN:TWA 1 ppm (4 mg/m3);STEL 5 ppm (20 mg/m3);Skin;CAR. OEL-SWITZERLAND:TWA 10 ppm (40 mg/m3);STEL 20 ppm (80 mg/m3). OEL-TURKEY:TWA 50 ppm (200 mg/m3). OEL-UNITED KINGDOM:TWA 10 ppm (40 mg/m3);STEL 15 ppm (60 mg/m3). OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV. OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 1/10/1995 Revision #11 Date: 12/12/1997

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

**** MATERIAL SAFETY DATA SHEET ****

Acetone
00140

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Acetone
Catalog Numbers:
AC177170200, AC400100025, AC400100040, AC423240040, AC423240200, S70090, S70091-1, S7025, A11 1, A11 20, A11 200, A11 4, A11-1, A11-20, A11-200, A11-4, A111, A11200, A114, A11S 4, A11S-4, A11S4, A16F-1GAL, A16P 4, A16P-4 A16P4, A16S 20, A16S 20 001, A16S 4, A16S-20, A16S-4, A16S20, A16S20001, A16S4, A16S4LC, A18 1, A18 20, A18 200, A18 200 001, A18 4, A18 500, A18-1, A18-20, A18-200, A18-4, A18-500, A181, A1820, A18200, A18200001, A1820LC, A1820LOT003, A184, A184LC, A184LOT001, A18500, A18J500, A18P4, A18RB115, A18RB19, A18RB200, A18RB50, A18RS115, A18RS200, A18RS28, A18RS50, A18S 4, A18S-4, A18S4, A18SK 4, A18SK-4, A18SK4, A18SK4LC, A18SS 200, A18SS 50, A18SS-115, A18SS-200, A18SS-30, A18SS-50, A18SS200, A18SS50, A19 1, A19 4, A19-1, A19-4, A191, A194, A20-1, A40 4, A40-4, A404, A404LOT007, A404LOT008 A404LOT009, A928 4, A9284, A929 4, A929-1, A929-4, A9294, A9294LC, A9294LOT001, A9294LOT012, A9294LOT014, A9294LOT017, A9294LOT018, A9294LOT019, A9294LOT021, A9294LOT022, A9294LOT024, A929J4, A929RS115, A929RS200, A929RS28, A929RS50, A929SS115, A929SS200, A929SS28, A929SS50, A930-4, A946 4, A946-4, A9464, A946FB200, A946RB115, A946RB19, A946RB200, A946RB50, A949 1, A949 4, A949-1, A949-4, A9491, A9494, A9494LOT004, A949CU50, A949J4, A949LC, A949RS115, A949RS200, A949RS28, A949RS50, A949SK-1, A949SK-4, A949SS 115, A949SS 200, A949SS 30, A949SS 50, A949SS-11 A949SS-115, A949SS-20, A949SS-200, A949SS-30, A949SS-50, A949SS115, A949SS200, A949SS30, A949SS50, BPA946RB-115, BPA946RB-19, BPA946RB-200, BPA946RB-50, FLA929RS-115, FLA929RS-200, FLA929RS-28, FLA929RS-50, HC 300 1GAL, HC3001GAL, NC9475452, NC9475553, QUANT00184, S70091, S70091HPLC, S70091SPEC

Synonyms:
Dimethylformaldehyde, dimethyl ketone, 2-propanone, pyroacetic acid, pyroacetic ether

Company Identification: Fisher Scientific
1 Reagent Lane
Fairlawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
67-64-1	2-propanone	99	200-662-2

Hazard Symbols: F
Risk Phrases: 11

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: colourless. Flash Point: -4 deg F.
Danger! Extremely flammable liquid. May cause central nervous system depression. May cause liver and kidney damage. Causes eye and skin irritation. Causes digestive and respiratory tract irritation.
Target Organs: Kidneys, central nervous system, liver, respiratory system.

Potential Health Effects

Eye:
Produces irritation, characterized by a burning sensation, redness, tearing, inflammation, and possible corneal injury.

Skin:
Exposure may cause irritation characterized by redness, dryness, and inflammation.

Ingestion:
May cause irritation of the digestive tract. May cause central nervous system depression, kidney damage, and liver damage. Symptoms may include: headache, excitement, fatigue, nausea, vomiting, stupor, and coma.

Inhalation:
Inhalation of high concentrations may cause central nervous system effects characterized by headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation. May cause liver and kidney damage. May cause motor incoordination and speech abnormalities.

Chronic:
Prolonged or repeated skin contact may cause dermatitis. Chronic inhalation may cause effects similar to those of acute inhalation.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids. Get medical aid immediately.
Skin:
Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.
Ingestion:
If victim is conscious and alert, give 2-4 cupfuls of milk or water. Get medical aid immediately.
Inhalation:
Get medical aid immediately. Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Notes to Physician:
Treat symptomatically and supportively.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
Containers can build up pressure if exposed to heat and/or fire. As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors can travel to a source of ignition and flash back. Use water spray to keep fire-exposed containers cool.
Extinguishing Media:
For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. For large fires, use water spray, fog, or alcohol-resistant foam.
Autoignition Temperature: 869 deg F (465.00 deg C)
Flash Point: -4 deg F (-20.00 deg C)
NFPA Rating: health-1; flammability-3; reactivity-0
Explosion Limits, Lower: 2.5
Upper: 12.8

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks:
Absorb spill with inert material, (e.g., dry sand or earth), then

place into a chemical waste container. Wear appropriate protective clothing to minimize contact with skin. Remove all sources of ignition.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

Storage:
Keep away from sources of ignition. Store in a tightly closed container.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
2-propanone	500 ppm ; 1188 mg/m3; 750 ppm STEL; 1782 mg/m3 STEL	250 ppm TWA; 590 mg/m3 TWA 2500 ppm IDLH (lower explosive level)	1000 ppm TWA; 2400 mg/m3 TWA

OSHA Vacated PELs:
2-propanone:
750 ppm TWA; 1800 mg/m3 TWA

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face

protection regulations in 29 CFR 1910.133.

Skin:
Wear appropriate protective gloves to prevent skin exposure.

Clothing:
Wear appropriate protective clothing to prevent skin exposure.

Respirators:
Follow the OSHA respirator regulations found in 29CFR 1910.134. Always use a NIOSH-approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Liquid
Appearance:	colourless
Odor:	sweetish odor
pH:	7
Vapor Pressure:	180 mm Hg
Vapor Density:	2.0 (Air=1)
Evaporation Rate:	7.7 (n-Butyl acetate=1)
Viscosity:	Not available.
Boiling Point:	133.2 deg F
Freezing/Melting Point:	-139.6 deg F
Decomposition Temperature:	Not available.
Solubility:	Soluble.
Specific Gravity/Density:	0.79 (Water=1)
Molecular Formula:	C3H6O
Molecular Weight:	58.0414

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable.

Conditions to Avoid:
High temperatures, temperatures above 220&C.

Incompatibilities with Other Materials:
Forms explosive mixtures with hydrogen peroxide, acetic acid, nitric acid, nitric acid+sulfuric acid, chromic anhydride, chromyl chloride, nitrosyl chloride, hexachloromelamine, nitrosyl perchlorate, nitryl perchlorate, permonosulfuric acid, thiodiglycol+hydrogen peroxide.

Hazardous Decomposition Products:

Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 67-64-1: AL3150000
LD50/LC50:
CAS# 67-64-1: Inhalation, rat: LC50 =50100 mg/m3/8H; Oral, mouse: LD50 = 3 gm/kg; Oral, rabbit: LD50 = 5340 mg/kg; Oral, rat: LD50 = 5800 mg/kg; Skin, rabbit: LD50 = 20 gm/kg.
Carcinogenicity:
2-propanone -
ACGIH: A4 - Not Classifiable as a Human Carcinogen
Epidemiology:
No information available.
Teratogenicity:
No information available.
Reproductive Effects:
Fertility: post-implantation mortality. Ihl, mam: TCLo=31500 ug/m3/24H (1-130 preg)
Neurotoxicity:
No information available.
Mutagenicity:
Cytogenetic analysis: hamster fibroblast, 40 g/L Sex chromosome loss/non-disjunction: S.cerevisiae, 47600 ppm
Other Studies:
None.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
Rainbow trout LC50=5540 mg/L/96H Sunfish (tap water), death at 14250 ppm/24H Mosquito fish (turbid water) TLm=13000 ppm/48H
Environmental Fate:
Volatilizes, leeches, and biodegrades when released to soil.
Physical/Chemical:
No information available.
Other:
None.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.
RCRA D-Series Maximun Concentration of Contaminants:
None listed.
RCRA D-Series Chronic Toxicity Reference Levels: None listed.
RCRA F-Series: None listed.
RCRA P-Series: None listed.
RCRA U-Series: CAS# 67-64-1: waste number U002 (Ignitable waste).
CAS# 67-64-1 is banned from land disposal according to RCRA.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: ACETONE
Hazard Class: 3
UN Number: UN1090
Packing Group: II
IMO
Shipping Name: ACETONE
Hazard Class: 3.1
UN Number: 1090
Packing Group: 2
IATA
Shipping Name: ACETONE
Hazard Class: 3
UN Number: 1090
Packing Group: 2
RID/ADR
Shipping Name: ACETONE
Dangerous Goods Code: 3(3B)
UN Number: 1090
Canadian TDG
Shipping Name: ACETONE
Hazard Class: 3
UN Number: UN1090
Other Information: FLASHPOINT -20 C

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA

CAS# 67-64-1 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
CAS# 67-64-1: export notification required - Section 4
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA
Section 302 (RQ)
final RQ = 5000 pounds (2270 kg)
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 67-64-1: acute, chronic, flammable, sudden release of pressure.
Section 313
No chemicals are reportable under Section 313.
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
2-propanone can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
California No Significant Risk Level:
None of the chemicals in this product are listed.
European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: F
Risk Phrases:
R 11 Highly flammable.

Safety Phrases:
S 16 Keep away from sources of ignition - No smoking.
S 33 Take precautionary measures against static discharges.
S 9 Keep container in a well-ventilated place.
S 23C Do not breathe vapour.

WGK (Water Danger/Protection)
CAS# 67-64-1: 0

Canada
CAS# 67-64-1 is listed on Canada's DSL/NDSL List.
This product has a WHMIS classification of B2, D2B.
CAS# 67-64-1 is not listed on Canada's Ingredient Disclosure List.

Exposure Limits
CAS# 67-64-1: OEL-AUSTRALIA:TWA 500 ppm (1185 mg/m3);STEL 1000 ppm. OEL-AUSTRIA:TWA 750 ppm (1780 mg/m3). OEL-BELGIUM:TWA 750 ppm (1780 mg/m3);STEL 1000 pp. OEL-CZECHOSLOVAKIA:TWA 800 mg/m3;STEL 4000 mg/m3. OEL-DENMARK:TWA 250 ppm (600 mg/m3). OEL-FINLAND:TWA 500 ppm (1200 mg/m3);STEL 625 ppm (1500 mg/m3). OEL-FRANCE:TWA 750 ppm (1800 mg/m3). OEL-GERMANY:TWA 1000 ppm (2400 mg/m3). OEL-HUNGARY:TWA 600 mg/m3;STEL 1200 mg/m3. OEL-INDIA:TWA 750 ppm (1780 mg/m3);STEL 1000 ppm (2375 mg/m3). OEL-JAPAN:TWA 200 ppm (470 mg/m3). OEL-THE NETHERLANDS:TWA 750 ppm (1780 mg/m3) JAN9. OEL-THE PHILIPPINES:TWA 1000 ppm (2400 mg/m3). OEL-POLAND:TWA 200 mg/m3. OEL-RUSSIA:TWA 200 ppm;STEL 200 mg/m3. OEL-SWEDEN:TWA 250 ppm (600 mg/m3);STEL 500 ppm (1200 mg/m3). OEL-SWITZERLAND:TWA 750 ppm (1780 mg/m3). OEL-TURKEY:TWA 1000 ppm (2400 mg/m3). OEL-UNITED KINGDOM:TWA 1000 ppm (2400 mg/m3);STEL 1250 ppm. OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV. OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 11/30/1994 Revision #40 Date: 12/12/1997

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

FROM :FISHER SCIENTIFIC 412 490 8098 1998,05-20 12:39 #775 P.20/79

**** MATERIAL SAFETY DATA SHEET ****

Methyl Ethyl Ketone
14460

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Methyl Ethyl Ketone
Catalog Numbers:
AC149670200, AC149670250, S80081, BP209RB-115, BP209RB-19, BP209RB-200, BP209RB-50, BP209RS-200, BP209RS-50, BPM209RB-115, BPM209RB-19, BPM209RB-200, BPM209RB-50, BPM209RS-200, BPM209RS-28, BPM209RS-50, DWM2084, H209RB115, H209RB19, H209RB200, M208 1, M208 20, M208 4, M208-1, M208-20, M208-4, M2081, M20820, M2084, M209 1, M209 20, M209 4, M209 500, M209-1, M209-20, M209-200, M209-4, M209-500, M2091, M20920, M209200, M20920LC, M2094, M209500, M209FB115, M209FB19, M209FB200, M209FB50, M209RB115, M209RB19, M209RB200, M209RS115, M209RS200, M209RS50, M209S 4, M209S-4, M209S4, M209SS115, M209SS200, M209SS28, M209SS50
Synonyms:
2-Butanone, ethyl methyl ketone, MEK, methylacetone, 2-oxobutane.
Company Identification: Fisher Scientific
1 Reagent Lane
Fairlawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
78-93-3	Methyl ethyl ketone	>99%	201-159-0

Hazard Symbols: XI F
Risk Phrases: 11 36/37

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW
Appearance: Not available. Flash Point: -7 deg C.
Danger! Extremely flammable liquid. May cause respiratory tract

irritation. May cause central nervous system effects. May cause severe eye and skin irritation with possible burns. May cause digestive tract irritation with nausea, vomiting, and diarrhea. May cause fetal effects.
Target Organs: Central nervous system.

Potential Health Effects

Eye:
Causes eye irritation. May result in corneal injury.

Skin:
May be absorbed through the skin in harmful amounts. Prolonged and/or repeated contact may cause irritation and/or dermatitis.

Ingestion:
May cause irritation of the digestive tract. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure.

Inhalation:
Inhalation of high concentrations may cause central nervous system effects characterized by headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation. Irritation may lead to chemical pneumonitis and pulmonary edema. May cause numbness in the extremities.

Chronic:
Chronic inhalation may cause effects similar to those of acute inhalation. Prolonged or repeated skin contact may cause defatting and dermatitis.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids. Get medical aid immediately. Do NOT allow victim to rub or keep eyes closed.

Skin:
Get medical aid. Rinse area with large amounts of water for at least 15 minutes. Remove contaminated clothing and shoes.

Ingestion:
If victim is conscious and alert, give 2-4 cupfuls of milk or water. Get medical aid immediately.

Inhalation:
Get medical aid immediately. Remove from exposure to fresh air

immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Notes to Physician:
Treat symptomatically and supportively.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors can travel to a source of ignition and flash back. Flammable Liquid. Can release vapors that form explosive mixtures at temperatures above the flashpoint. Water may be ineffective. Material is lighter than water and a fire may be spread by the use of water.
Extinguishing Media:
For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. For large fires, use water spray, fog, or alcohol-resistant foam.
Autoignition Temperature: 404 deg C (759.20 deg F)
Flash Point: -7 deg C (19.40 deg F)
NFPA Rating: health-1; flammability-3; reactivity-0
Explosion Limits, Lower: 1.80 vol %
Upper: 11.50 vol %

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks:
Absorb spill with inert material, (e.g., dry sand or earth), then place into a chemical waste container. Clean up spills immediately, observing precautions in the Protective Equipment section. Use a spark-proof tool.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Use only in a well ventilated area. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Avoid contact with heat, sparks and flame. Avoid ingestion and inhalation. Do not

pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

Storage:
Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Methyl ethyl ketone	200 ppm ; 590 mg/m3; 300 ppm STEL; 885 mg/m3 STEL	200 ppm TWA; 590 mg/m3 TWA 3000 ppm IDLH	200 ppm TWA; 590 mg/m3 TWA

OSHA Vacated PELs:
Methyl ethyl ketone:
200 ppm TWA; 590 mg/m3 TWA

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133.

Skin:
Wear appropriate protective gloves to prevent skin exposure.

Clothing:
Wear appropriate protective clothing to prevent skin exposure.

Respirators:
Follow the OSHA respirator regulations found in 29CFR 1910.134. Always use a NIOSH-approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Liquid
Appearance:	Not available.
Odor:	sweetish odor - alcohol-like
pH:	Not available.
Vapor Pressure:	71.2 mm Hg
Vapor Density:	2.5 (Air=1)
Evaporation Rate:	2.7 (Ether=1)
Viscosity:	0.42 mPas 15 de
Boiling Point:	80 deg C @ 760.00mm Hg
Freezing/Melting Point:	-87 deg C
Decomposition Temperature:	Not available.
Solubility:	miscible with oils
Specific Gravity/Density:	.8050g/cm3
Molecular Formula:	C4H8O
Molecular Weight:	72.11

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable at room temperature in closed containers under normal storage and handling conditions.
Conditions to Avoid:
Incompatible materials, ignition sources, excess heat.
Incompatibilities with Other Materials:
Amines, ammonia, caustics, chloroform + alkali, chlorosulfonic acid, copper, hydrogen peroxide + nitric acid, inorganic acids, isocyanates, potassium-t-butoxide, 2-propanol, pyridines, strong oxidizers, and fuming sulfuric acid.
Hazardous Decomposition Products:
Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 78-93-3: EL6475000
LD50/LC50:
CAS# 78-93-3: Inhalation, mouse: LC50 =40 gm/m3/2H; Inhalation, rat: LC50 =23500 mg/m3/8H; Oral, mouse: LD50 = 4050 mg/kg; Oral, rat: LD50 = 2737 mg/kg; Skin, rabbit: LD50 = 6480 mg/kg.
Carcinogenicity:

Methyl ethyl ketone -
Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.

Epidemiology:
No information available.

Teratogenicity:
Embryo or Fetus: fetotoxicity, ihl-rat TCLo=1000 ppm. Specific Developmental Abnormalities: craniofacial and urogenital, ihl-rat TCLo=3000 ppm/7H; musculoskeletal, ihl-rat TCLo=1000 ppm.

Reproductive Effects:
No information available.

Neurotoxicity:
No information available.

Mutagenicity:
Sex chromosome loss/non-disjunction: S. cerevisiae 33800 ppm.

Other Studies:
None.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
Fathead minnow LC50=3220 mg/L/96H Bluegill TLm=5640 to 1690 mg/L/24 to 96H

Environmental Fate:
Substance evaporates in water with T1/2= 3D (rivers) to 12D (lakes).
Substance is not expected to bioconcentrate in aquatic organisms.

Physical/Chemical:
Substance photodegrades in air with T1/2 = 2.3 days.

Other:
None.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.
RCRA D-Series Maximum Concentration of Contaminants:
CAS# 78-93-3: waste number D035; regulatory level = 200.0 mg/L.
RCRA D-Series Chronic Toxicity Reference Levels: CAS# 78-93-3: chronic toxicity reference level = 2 mg/L.
RCRA F-Series: None listed.
RCRA P-Series: None listed.
RCRA U-Series: CAS# 78-93-3: waste number U159 (Ignitable waste; Toxic waste).
CAS# 78-93-3 is banned from land disposal according

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: ETHYL METHYL KETONE
Hazard Class: 3
UN Number: 1193
Packing Group: II
IMO
Shipping Name: ETHYL METHYL KETONE
Hazard Class: 3.2
UN Number: 1193
Packing Group: II
IATA
Shipping Name: ETHYL METHYL KETONE
Hazard Class: 3
UN Number: 1193
Packing Group: II
RID/ADR
Shipping Name: ETHYL METHYL KETONE
Dangerous Goods Code: 3(3B)
UN Number: 1193
Canadian TDG
Shipping Name: METHYL ETHYL KETONE
Hazard Class: 3
UN Number: UN1193
Other Information: FLASHPOINT -9C

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA
CAS# 78-93-3 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 78-93-3: Effective Date: October 4, 1982; Sunset Date: October 4,
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA

Section 302 (RQ)
final RQ = 5000 pounds (2270 kg)
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 78-93-3: acute, flammable.
Section 313
This material contains Methyl ethyl ketone (CAS# 78-93-3, >99%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:
CAS# 78-93-3 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
Methyl ethyl ketone can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
California No Significant Risk Level:
None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: XI F
Risk Phrases:
R 11 Highly flammable.
R 36/37 Irritating to eyes and respiratory system.
Safety Phrases:
S 16 Keep away from sources of ignition - No smoking.
S 25 Avoid contact with eyes.
S 33 Take precautionary measures against static discharges.
S 9 Keep container in a well-ventilated place.

WGK (Water Danger/Protection)
CAS# 78-93-3: 1
Canada
CAS# 78-93-3 is listed on Canada's DSL/NDSL List.
This product has a WHMIS classification of B2, D2B.
CAS# 78-93-3 is not listed on Canada's Ingredient Disclosure List.
Exposure Limits
CAS# 78-93-3:. OEL-AUSTRALIA:TWA 150 ppm (445 mg/m3);STEL 300 ppm (890 mg/m3). OEL-AUSTRIA:TWA 200 ppm (590 mg/m3). OEL-BELGIUM:TWA 200 ppm (590 mg/m3);STEL 300 ppm (885 mg/m3). OEL-DENMARK:TWA 100 ppm (290 mg/m3);Skin. OEL-FINLAND:TWA 150 ppm (440 mg/m3);STEL 190 ppm;Skin. OEL-FRANCE:TWA 200 ppm (600 mg/m3);Skin. OEL-GERMANY:TWA 200 ppm (590 mg/m3). OEL-HUNGARY:TWA 200 mg/m3;STEL 600 mg/m3. OEL-INDIA:TWA 200 ppm (590 mg/m3);STEL 300 ppm (885 mg/m3). OEL-JAPAN:TWA 200 ppm (590 mg/m3)??OEL-THE NETHERLANDS:TWA 200 ppm (590 mg/m3). OEL-THE PHILIPPINES:TWA 200 ppm (590 mg/m3). OEL-POLAND:TWA 200 mg/m3. OEL-RUSSIA:TWA 200 ppm; STEL 200 mg/m3. OEL-SWEDEN:TWA 50 ppm (150 mg/m3);STEL 100 ppm (300 mg/m3). OEL-SWITZERLAND:TWA 200 ppm (590 mg/m3);STEL 400 ppm. OEL-TURKEY:TWA 200 ppm (590 mg/m3). OEL-UNITED KINGDOM:TWA 200 ppm (590 mg/m3);STEL 300 ppm. OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV??OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 12/28/1994 Revision #5 Date: 12/12/1997

Fisher Scientific

CATALOGS

HELP CATALOGS SEARCH ORDER LIST CONTENTS

Use your web browser's "Back" key to return to previous topic.

Tetrachloroethylene

**** MATERIAL SAFETY DATA SHEET ****

Tetrachloroethylene
22900

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Tetrachloroethylene
Catalog Numbers:
C182 20, C182 4, C182-20, C182-4, C18220, C1824, 04586 4, 04586-4, 045864
Synonyms:
Ethylene tetrachloride; Tetrachlorethylene; Perchloroethylene; Perchlorethylene
Company Identification: Fisher Scientific
1 Reagent Lane
Fairlawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
127-18-4	Tetrachloroethylene	99+	204-825-9

Hazard Symbols: XN N
Risk Phrases: 40 51/53

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: clear, colorless.
Caution! Irritant. May cause central nervous system depression. May cause respiratory and digestive tract irritation. May cause liver and kidney damage. May cause severe eye and skin irritation with possible burns. May cause reproductive and fetal effects. May cause cancer based on animal studies.
Target Organs: Kidneys, central nervous system, liver.

Potential Health Effects

Eye:

Contact with eyes may cause severe irritation, and possible eye burns.

Skin:

May cause severe irritation and possible burns.

Ingestion:

May cause central nervous system depression, kidney damage, and liver damage. Symptoms may include: headache, excitement, fatigue, nausea, vomiting, stupor, and coma. May cause gastrointestinal irritation with nausea, vomiting and diarrhea.

Inhalation:

Inhalation of vapor may cause respiratory tract irritation. May cause central nervous system effects including vertigo, anxiety, depression, muscle incoordination, and emotional instability.

Chronic:

Possible cancer hazard based on tests with laboratory animals. Prolonged or repeated skin contact may cause defatting and dermatitis. May cause respiratory tract cancer. May cause adverse nervous system effects including muscle tremors and incoordination. May cause liver and kidney damage. May cause reproductive and fetal effects.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:

Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids. Get medical aid.

Skin:

Get medical aid if irritation develops or persists. Wash clothing before reuse. Flush skin with plenty of soap and water.

Ingestion:

If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.

Inhalation:

Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician:

Treat symptomatically and supportively.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:

As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Containers may explode in the heat of a fire. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.

Extinguishing Media:

Substance is noncombustible; use agent most appropriate to extinguish surrounding fire. For small fires, use dry chemical, carbon dioxide, or water spray. For large fires, use dry chemical, carbon dioxide, alcohol-resistant foam, or water spray. Cool containers with flooding quantities of water until well after fire is out.

Autoignition Temperature: Not applicable.

Flash Point: Not applicable.

NFPA Rating: health-2; flammability-0; reactivity-0

Explosion Limits, Lower: Not available.

Upper: Not available.

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:
Absorb spill with inert material, (e.g., dry sand or earth), then place into a chemical waste container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Flush down the spill with a large amount of water. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Do not reuse this container. Avoid breathing vapors from heated material. Avoid contact with skin and eyes. Keep container tightly closed. Keep away from flames and other sources of high temperatures that may cause material to form vapors or mists.

Storage:
Keep away from heat and flame. Store in a cool, dry place. Keep containers tightly closed.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Tetrachloroethylene	25 ppm ; 170 mg/m3; 100 ppm STEL; 685 mg/m3 STEL	NIOSH Potential Occupational Carcinogen - see Appendix A; minimize workplace odo r exposure concentrations limit number of workers exposed 150 ppm IDLH (not considering carcinogenic effects)	100 ppm TWA; C 200 ppm; C 200 ppm

OSHA Vacated PELs:
Tetrachloroethylene:
25 ppm TWA; 170 mg/m3 TWA

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133.

Skin:
Wear appropriate protective gloves to prevent skin

exposure.

Clothing:

Wear appropriate protective clothing to prevent skin exposure.

Respirators:

A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Liquid
Appearance:	clear, colorless
Odor:	sweetish odor
pH:	Not available.
Vapor Pressure:	15.8 mm Hg
Vapor Density:	5.2
Evaporation Rate:	9 (ether=100)
Viscosity:	0.89 mPa s 20 d
Boiling Point:	121 deg C
Freezing/Melting Point:	-22.3 deg C
Decomposition Temperature:	150 deg C
Solubility:	Nearly insoluble in water.
Specific Gravity/Density:	1.623
Molecular Formula:	C2Cl4
Molecular Weight:	165.812

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
Incompatible materials, excess heat.
Incompatibilities with Other Materials:
Strong bases, metals, liquid oxygen, dinitrogen tetroxide.
Hazardous Decomposition Products:
Hydrogen chloride, phosgene, carbon monoxide, carbon dioxide.
Hazardous Polymerization: Will not occur.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 127-18-4: KX3850000
LD50/LC50:
CAS# 127-18-4: Inhalation, mouse: LC50 =5200 ppm/4H; Inhalation, rat: LC50 =34200 mg/m3/8H; Oral, mouse: LD50 = 8100 mg/kg; Oral, rat: LD50 = 2629 mg/kg.
Carcinogenicity:
Tetrachloroethylene -
ACGIH: A3-animal carcinogen
California: carcinogen - initial date 4/1/88
NIOSH: occupational carcinogen
NTP: Suspect carcinogen
OSHA: Possible Select carcinogen
IARC: Group 2A carcinogen
Epidemiology:
Epidemiologic studies have given inconsistent results. Studi es have shown that tetrachloroethylene has not caused canc er in exposed workers. The studies have serious weakne sses such as mixed exposures. In tests with rats and mice, i t appeared that tissue destruction or peroxisome prolifera tion rather than genetic mechanisms were the cause of

the observed increases in normally occurring cancers. The oral mouse TDLo that was tumorigenic was 195 gm/kg/50W-I.

Teratogenicity:

Has caused musculoskeletal abnormalities. Has caused morphological transformation at a dose of 97mol/L in a study using rat embryos.

Reproductive Effects:

Has caused behavioral, biochemical, and metabolic effects on newborn rats when the mother was exposed to the TCLo of 900 ppm/7H at 7-13 days after conception. A dose of 300 ppm/7H 6-15 days after conception caused post-implantation mortality.

Neurotoxicity:

No information available.

Mutagenicity:

Not mutagenic in Escherichia coli. No mutagenic effects were seen in rat liver after exposure at 200 ppm for 10 weeks. No chromosome changes were seen in the bone marrow cells of exposed mice.

Other Studies:

A case of 'obstructive jaundice' in a 6-week old infant has been attributed to tetrachloroethylene in breast milk.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:

Not available.

Environmental Fate:

In soil, substance will rapidly evaporate. In water, it will evaporate. In air, it can be expected to exist in the vapor phase.

Physical/Chemical:

Not available.

Other:

Not available.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.
RCRA D-Series Maximum Concentration of Contaminants:
CAS# 127-18-4: waste number D039; regulatory level = 0.7 mg/L.
RCRA D-Series Chronic Toxicity Reference Levels: CAS# 127-18-4: chronic toxicity reference level = 0.007 mg/L.
RCRA F-Series: None listed.
RCRA P-Series: None listed.
RCRA U-Series: CAS# 127-18-4: waste number U210.
CAS# 127-18-4 is banned from land disposal according to RCRA.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT

Shipping Name: TETRACHLOROETHYLENE
Hazard Class: 6.1
UN Number: UN1897
Packing Group: III

IMO

No information available.

IATA

No information available.

RID/ADR

No information available.

Canadian TDG

Shipping Name: TETRACHLOROETHYLENE
Hazard Class: 6.1

UN Number: UN1897

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA
CAS# 127-18-4 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 127-18-4: Effective Date: June 1, 1987; Sunset Date: June 1, 1997
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA
Section 302 (RQ)
final RQ = 100 pounds (45.4 kg)
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 127-18-4: acute.
Section 313
This material contains Tetrachloroethylene (CAS# 127-18-4, 99+%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
CAS# 127-18-4 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 127-18-4 is listed as a Priority Pollutant under the Clean Water Act.
CAS# 127-18-4 is listed as a Toxic Pollutant under the Clean Water Act.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
Tetrachloroethylene can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:
WARNING: This product contains Tetrachloroethylene, a chemical known to the state of California to cause cancer.
California No Significant Risk Level:
CAS# 127-18-4: no significant risk level = 14 ug/day
European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: XN N
Risk Phrases:
R 40 Possible risks of irreversible effects.
R 51/53 Toxic to aquatic organisms; may cause long-term adverse effects in the aquatic environment.
Safety Phrases:
S 23 Do not inhale gas/fumes/vapour/spray.
S 36/37 Wear suitable protective clothing and gloves.
S 61 Avoid release to the environment. Refer to special instructions/Safety data sheets.

WGK (Water Danger/Protection)
CAS# 127-18-4: 3
Canada
CAS# 127-18-4 is listed on Canada's DSL/NDSL List.
This product has a WHMIS classification of D1B, D2A.
CAS# 127-18-4 is not listed on Canada's Ingredient Disclosure List.
Exposure Limits
CAS# 127-18-4:. OEL-ARAB Republic of Egypt:TWA 5 ppm (35 mg/m3);Skin

A 50 ppm (339 mg/m3);STEL 200 ppm (1368 mg/m3). OEL-CZECHOSLOVAKIA:TWA 250 mg/m3;STEL 1250 mg/m3. OEL-DENMARK:TWA 30 ppm (200 mg/m3);Skin. OEL-FINLAND:TWA 50 ppm (335 mg/m3);STEL 75 ppm (520 mg/m3);Skin. OEL-FRANCE:TWA 50 ppm (335 mg/m3). OEL-GERMANY:TWA 50 ppm (345 mg/m3);Carcinogen. OEL-HUNGARY:STEL 50 mg/m3;Skin;Carcinogen. OEL-JAPAN:TWA 50 ppm (340 mg/m3). OEL-THE NETHERLANDS:TWA 35 ppm (240 mg/m3);Skin. OEL-THE PHILIPPINES:TWA 100 ppm (670 mg/m3). OEL-POLAND:TWA 60 mg/m3. OEL-RUSSIA:TWA 50 ppm;STEL 10 mg/m3. OEL-SWEDEN:TWA 10 ppm (70 mg/m3);STEL 25 ppm (170 mg/m3). OEL-SWITZERLAND:TWA 50 ppm (345 mg/m3);STEL 100 ppm;Skin. OEL-THAILAND:TWA 100 ppm;STEL 200 ppm. OEL-UNITED KINGDOM:TWA 50 ppm (335 mg/m3);STEL 15 ppm. OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV. OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 4/07/1995 Revision #11 Date: 12/12/1997

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

MATERIAL SAFETY DATA SHEET

ULTRA Scientific
(401) 294-9400
250 Smith Street
North Kingstown, RI 02852

DATE: 05/27/1998 LAST UPDATED: 09/18/1997 CATALOG NUMBER: PP-340 PAGE: 1

SECTION I PRODUCT IDENTIFICATION

Catalog Number: PP-340 Name: Aroclor 1248 Solution
Solvent: methanol (methyl alcohol)

SECTION II HAZARDOUS INGREDIENTS

Component	CAS #	WT%	LD50	RTECS #	OSHA PEL	ACGIH TLV	Codes
methyl alcohol (methanol)	00067-56-1	99.9874	12,900 mg/kg oral rat	PC1400000	200 ppm	200 ppm	G
Aroclor 1248 (PCB 1248)	12672-29-6	0.0126	11000 mg/kg oral rat	N/A	N/A	N/A	

Codes: A - OSHA regulated carcinogen; B - IARC Group 1 carcinogen; C - IARC Group 2A carcinogen; D - IARC Group 2B carcinogen; E - NTP Group 1 carcinogen; F - NTP Group 2 carcinogen; G - SARA Title III compound; H - California Prop. 65 compound.

SECTION III PHYSICAL DATA FOR SOLVENT

Melting Point: -98°C Boiling Point: 64.8°C Density: 0.7910

Vapor Pressure: 100 mmHg @ 21.2°C Vapor Density: 1.1 Water Solubility: soluble

Appearance: colorless liquid Odor: N/A

SECTION IV FIRE AND EXPLOSION HAZARD DATA FOR SOLVENT

Flash Point: 52°F Auto-Ignition Temp: 725°F LEL: 6.7 UEL: 36.0 Fire Hazard: combustible

Extinguishing Media: Carbon Dioxide, dry chemical powder, or water spray.

SECTION V HEALTH HAZARD DATA FOR PRODUCT

Contains carcinogen(s) or cancer suspect agent(s)
Toxic; irritant

All chemicals should be considered hazardous - direct physical contact should be avoided.

FIRST AID: In case of eye or skin contact, flush with copious amounts of water. If inhaled, remove to fresh air - give oxygen, if necessary. Contact physician.

SECTION VI REACTIVITY DATA FOR SOLVENT

Stability: stable
Incompatibilities: strong oxidizers
Hazardous Decomposition Products: N/A
Hazardous Polymerization Products: no

Post-it® Fax Note 7671	Date 5-27	# of pages ▸ 4
To Mike Burkhart	From Lorea	
Co./Dept. fisher	Co. ultra Scientific	
Phone # 412-490-8095	Phone # 401-294-9400	
Fax # 490-8098	Fax #	

MATERIAL SAFETY DATA SHEET

ULTRA Scientific 250 Smith Street
(401) 294-9400 North Kingstown, RI 02852

SECTION VII SPILL OR LEAK PROCEDURES

Spills or leaks: Due to the small quantity involved, spills or leaks should not pose a significant problem. A leaking ampule or bottle may be placed in a plastic bag and normal disposal procedures followed. Liquid samples may be absorbed on vermiculite or sand.

Waste disposal: Burn in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state and local laws concerning disposal.

SECTION VIII PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Use appropriate OHSA/MSHA approved safety equipment. Wear chemical goggles, face shield, gloves and chemical resistant clothing such as a laboratory coat and/or a rubber apron to prevent contact with eyes, skin, and clothing. Keep tightly closed and store in a cool dry place.

SECTION IX SPECIAL PRECAUTIONS AND COMMENTS

This material should only be used by those persons trained in the safe handling of hazardous chemicals.

The above information is believed to be correct, but does not purport to be all inclusive. This data should be used only as a guide in handling the material. ULTRA SCIENTIFIC, INC. shall not be held liable for any damage resulting from handling or from contact with the above product.

MATERIAL SAFETY DATA SHEET

[illegible]LTRA Scientific 250 Smith Street
(401) 294-9400 North Kingstown, RI 02852

DATE: 05/27/1998 LAST UPDATED: 09/18/1997 CATALOG NUMBER: PP-350 PAGE: 1

SECTION I PRODUCT IDENTIFICATION

Catalog Number: PP-350 Name: Aroclor 1254 Solution
Solvent: methanol (methyl alcohol)

SECTION II HAZARDOUS INGREDIENTS

Component	CAS #	WT%	LD50	RTECS #	OSHA PEL	ACGIH TLV	Codes
methyl alcohol (methanol)	00067-56-1	99.9874	12,900 mg/kg oral rat	PC1400000	200 ppm	200 ppm	G
Aroclor 1254 (PCB 1254)	11097-69-1	0.0126	1295 mg/kg oral rat	N/A	0.3 mg/m3	0.5 mg/m3	C,F

Codes: A - OSHA regulated carcinogen; B - IARC Group 1 carcinogen; C - IARC Group 2A carcinogen; D - IARC Group 2B carcinogen;
E - NTP Group 1 carcinogen; F - NTP Group 2 carcinogen; G - SARA Title III compound; H - California Prop. 65 compound.

SECTION III PHYSICAL DATA FOR SOLVENT

Melting Point: -98°C Boiling Point: 64.8°C Density: 0.7910

Vapor Pressure: 100 mmHg @ 21.2°C Vapor Density: 1.1 Water Solubility: soluble

Appearance: colorless liquid Odor: N/A

SECTION IV FIRE AND EXPLOSION HAZARD DATA FOR SOLVENT

Flash Point: 52°F Auto-Ignition Temp: 725°F LEL: 6.7 UEL: 36.0 Fire Hazard: combustible

Extinguishing Media: Carbon Dioxide, dry chemical powder, or water spray.

SECTION V HEALTH HAZARD DATA FOR PRODUCT

Contains carcinogen(s) or cancer suspect agent(s)
Toxic; irritant

All chemicals should be considered hazardous - direct physical contact should be avoided.

FIRST AID: In case of eye or skin contact, flush with copious amounts of water. If inhaled, remove to fresh air - give oxygen, if necessary. Contact physician.

SECTION VI REACTIVITY DATA FOR SOLVENT

Stability: stable
Incompatibilities: strong oxidizers
Hazardous Decomposition Products: N/A
Hazardous Polymerization Products: no

MATERIAL SAFETY DATA SHEET

ULTRA Scientific
(401) 294-9400

250 Smith Street
North Kingstown, RI 028

DATE: 05/27/1998 LAST UPDATED: 09/18/1997 CATALOG NUMBER: PP-350 PAGE: 2

SECTION VII SPILL OR LEAK PROCEDURES

Spills or leaks: Due to the small quantity involved, spills or leaks should not pose a significant problem. A leaking ampul or bottle may be placed in a plastic bag and normal disposal procedures followed. Liquid samples may be absorbed on vermiculite or sand.

Waste disposal: Burn in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state and local laws concerning disposal.

SECTION VIII PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Use appropriate OHSA/MSHA approved safety equipment. Wear chemical goggles, face shield, gloves and chemical resistant clothing such as a laboratory coat and/or a rubber apron to prevent contact with eyes, skin, and clothing. Keep tightly closed and store in a cool dry place.

SECTION IX SPECIAL PRECAUTIONS AND COMMENTS

This material should only be used by those persons trained in the safe handling of hazardous chemicals.

The above information is believed to be correct, but does not purport to be all inclusive. This data should be used only as a guide in handling the material. ULTRA SCIENTIFIC, INC. shall not be held liable for any damage resulting from handling or from contact with the above product.

J T BAKER -- M-CRESOL, F842
MATERIAL SAFETY DATA SHEET
NSN: 681000N041610
Manufacturer's CAGE: 70829
Part No. Indicator: A
Part Number/Trade Name: M-CRESOL, F842

General Information

Company's Name: J T BAKER INC
Company's Street: 222 RED SCHOOL LANE
Company's City: PHILLIPSBURG
Company's State: NJ
Company's Country: US
Company's Zip Code: 08865-2219
Company's Emerg Ph #: 908-859-2151;800-424-9300(CHEMTREC)
Company's Info Ph #: 800-582-2537
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 01MAY89
Safety Data Review Date: 28JUL93
MSDS Serial Number: BRLPK
Hazard Characteristic Code: NK

Ingredients/Identity Information

Proprietary: NO
Ingredient: M-CRESOL (SARA III)
Ingredient Sequence Number: 01
Percent: 90-100
NIOSH (RTECS) Number: GO6125000
CAS Number: 108-39-4
OSHA PEL: 5 PPM, S
ACGIH TLV: N/K (FP N)

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS TO YELLOW LIQUID. PHENOLIC ODOR.
Boiling Point: 395F,202C
Melting Point: 53.0F,11.7C
Vapor Pressure (MM Hg/70 F): 0.1 (20C)
Vapor Density (Air=1): 3.7
Specific Gravity: 1.03 (H*2O=1)
Evaporation Rate And Ref: N/A
Solubility In Water: MODERATE (1-10%)
Percent Volatiles By Volume: N/A
pH: N/A

Fire and Explosion Hazard Data

Flash Point: 187F,86C
Flash Point Method: CC
Lower Explosive Limit: 1.1%
Upper Explosive Limit: 1.4%
Extinguishing Media: USE WATER SPRAY, CARBON DIOXIDE, DRY CHEMICAL OR ORDINARY FOAM.
Special Fire Fighting Proc: USE NIOSH/MSHA APPRVD SCBA AND FULL PROTECTIVE EQUIP (FP N). MOVE CONTRS FROM FIRE AREA IF IT CAN BE DONE W/OUT RISK. USE WATER TO KEEP FIRE-EXPOS CNTRS COOL.
Unusual Fire And Expl Hazrds: VAPS MAY FLOW ALONG SURFACES TO DISTANT IGNITION SOURCES & FLASH BACK. CLOSED CONTRS EXPOSED TO HEAT MAY EXPLODE. CONTACT W/STRONG OXIDIZERS MAY CAUSE FIRE.

==

Reactivity Data

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Stability: YES
Cond To Avoid (Stability): HEAT, FLAME, OTHER SOURCES OF IGNITION, LIGHT.
Materials To Avoid: STRONG OXIDIZING AGENTS.
Hazardous Decomp Products: CARBON MONOXIDE AND CARBON DIOXIDE
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT.

==

Health Hazard Data

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LD50-LC50 Mixture: LD50: (ORAL, RAT): 242 MG/KG
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: TARGET ORGANS:NASAL SEPTUM, RESP SYS, LIVER, KIDNEYS, EYES, SKIN. ACUTE:INHAL:HDCH, NAUS, VOMIT, DIZZ, DROW, IRRIT OF SEV IRRIT/BURNS. SKIN ABSORPTION:DERM. INGEST:HARMFUL & MAY BE FATAL, NAUS, VOMIT, GI IRRIT, BURNS TO MOUTH (EFTS OF OVEREXP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT.
Signs/Symptoms Of Overexp: HLTH HAZ:& THROAT. CHRONIC EFTS:DAMAGE TO LIVER, KIDNEYS, LUNGS, BLOOD, CENTRAL NERVOUS SYSTEM.
Med Cond Aggravated By Exp: NONE IDENTIFIED.
Emergency/First Aid Proc: INGEST:CALL MD. IF SWALLOWED, DO NOT INDUCE VOMIT. IF CONSCIOUS GIVE WATER, MILK/MILK OF MAGNESIA. INHAL:REMOVE TO IN CASE OF CNTCT, IMMED FLUSH SKIN W/PLENTY OF WATER (DELUGE SHOWER) FOR @ LEAST 15 MINS WHILE REMOVING CONTAMD CLTHNG & SHOES. WASH CLTHG BEFORE RE-USE. EYES:IMMED FLUSH W/PLENTY OF WATER FOR @ LEAST 15 MINS.

==

Precautions for Safe Handling and Use

==

Steps If Matl Released/Spill: WEAR NIOSH/MSHA APPRVD SCBA & FULL PROT CLTHG. SHUT OFF IGNIT SOURCES; NO FLARES, SMKG/FLAMES IN AREA. STOP LEAK IF CAN DO W/OUT RISK. USE WATER SPRAY TO REDUCE VAPS. TAKE UP W/SAND/OTHER NON-COMBUST ABSORB MATL & PLACE INTO CONTR FOR LATER (SUPDAT)
Neutralizing Agent: J T BAKER SOLUSORB(R) SOLVENT ABSORBENT RECOMMENDED FOR SPILLS OF THIS PRODUCT.
Waste Disposal Method: DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.
Precautions-Handling/Storing: KEEP CONTR TIGHTLY CLOSED. STORE IN COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA/CABINET. STORE IN LIGHT-RESISTANT CONTAINERS.
Other Precautions: PRODUCT MAY SOLIDIFY AT ROOM TEMPERATURE. KEEP AWAY FROM HEAT, SPARKS, FLAME. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN.

==

Control Measures

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Respiratory Protection: NIOSH/MSHA APPRVD RESP PROT REQ IF AIRBORNE CONC EXCEEDS TLV. AT CONCS UP TO 250 PPM, CHEM CARTRIDGE RESP W/ ORGANIC VAP CARTRIDGE & DUST/MIST FILTER IS RECOMMENDED. ABOVE THIS LEVEL, A NIOSH/MSHA APPRVD SCBA IS RECOMMENDED.
Ventilation: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.
Protective Gloves: RUBBER GLOVES.
Eye Protection: CHEM WORK GOGG W/FULL LGTH FSHLD (FP N)
Other Protective Equipment: EMER EYE BATH & DELUGE SHOWER (FP N). UNIFORM, PROTECTIVE SUIT RECOMMENDED.
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.

Suppl. Safety & Health Data: SPILL PROC: DISP. FLUSH AREA W/WATER.

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 28JUL93
Label Date: 19APR93
Label Status: G
Common Name: M-CRESOL, F842
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Severe: X
Contact Hazard-Severe: X
Fire Hazard-Moderate: X
Reactivity Hazard-Slight: X
Special Hazard Precautions: CORROSIVE! COMBUSTIBLE! KEEP AWAY FROM HEAT, SPARKS & FLAME. TARGET ORGANS:NASAL SEPTUM, RESP SYS, LIVER, KIDNEYS, EYES, SKIN. ACUTE:INHAL:HDCH, NAUS, VOMIT, DIZZ, DROW, IRRIT OF UPPER RESP TRACT, UNCON, MAY CAUSE PULM EDEMA. SKIN:SEV IRRIT/BURNS. EYES:SEV IRRIT/BURNS. SKIN ABSORPTION:DERMAT. INGEST:HARMFUL & MAY BE FATAL, NAUS, VOMIT, GI IRRIT, BURNS TO MOUTH & THROAT. CHRONIC: DMG TO LIVER, KIDNEYS, LUNGS, BLOOD & CNS.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: J T BAKER INC
Label Street: 222 RED SCHOOL LANE
Label City: PHILLIPSBURG
Label State: NJ
Label Zip Code: 08865-2219
Label Country: US
Label Emergency Number: 201-859-2151;800-424-9300(CHEMTREC)

**** MATERIAL SAFETY DATA SHEET ****

Lead
12510

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Lead
Catalog Numbers:
S71957, S71957-1, S75257, S80049, L18 500, L18-500, L18500, L246 500, L246-500, L246500, L27 1LB, L27-1LB, L271LB, S719571
Synonyms:
Lead metal
Company Identification: Fisher Scientific
1 Reagent Lane
Fairlawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
7439-92-1	LEAD	99.8	231-100-4

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: bluish white, silvery gray.
Caution! May cause central nervous system depression. May be absorbed through the skin. May cause kidney damage. May cause respiratory and digestive tract irritation. Can cause reproductive effects. Causes eye and skin irritation. May cause fetal effects.
Target Organs: Kidneys, central nervous system, blood forming organs.

Potential Health Effects
Eye:
Causes eye irritation.
Skin:

Causes skin irritation.

Ingestion:

Causes gastrointestinal irritation with nausea, vomiting and diarrhea.
Many lead compounds can cause toxic effects in the blood-forming organs, kidneys, and central nervous system. May cause metal taste, muscle pain/weakness, and convulsions.

Inhalation:

May cause respiratory tract irritation. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptons with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count. May cause effects similar to those described for ingestion.

Chronic:

Chronic exposure to lead may result in plumbism which is characterized by lead line in gum, headache, muscle weakness, mental changes,

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:

Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids. Get medical aid.

Skin:

Get medical aid. Immediately flush skin with plenty of soap and ~~water for at least 15 minutes while removing contaminated clothing~~ and shoes. Discard contaminated clothing in a manner which limits further exposure.

Ingestion:

If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. Do NOT induce vomiting. Allow the victim to rinse his mouth and then to drink 2-4 cupfuls of water, and seek medical advice.

Inhalation:

Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician:

Treat symptomatically and supportively.

Antidote:

The use of Dimercaprol or BAL (British Anti-Lewisite) as a chelating agent should be determined by qualified medical personnel. The use of d-Penicillamine as a chelating agent should be determined by qualified medical personnel. The use of Calcium disodium EDTA as a chelating agent should be determined by qualified medical personnel.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Dust can be an explosion hazard when exposed to heat or flame.
Extinguishing Media:
For small fires, use water spray, dry chemical, carbon dioxide or chemical foam.
Autoignition Temperature: Not available.
Flash Point: Not available.
NFPA Rating: Not published.
Explosion Limits, Lower: Not available.
Upper: Not available.

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks:
Vacuum or sweep up material and place into a suitable disposal container. Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation.
Storage:
Store in a cool, dry place. Keep from contact with oxidizing materials.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:

Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
LEAD	0.05 mg/m3	as Pb: 0.100 mg/m3 TWA; see Appendix C for supplementary exposure limits as Pb: 100 mg/m3 IDLH	as Pb: 50 ug/m3 TWA PEL; 30 ug/m3 action level; Poison (see 29 CFR 1910.1025)

OSHA Vacated PELs:
LEAD:
No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133.

Skin:
Wear appropriate protective gloves and clothing to prevent skin exposure.

Clothing:
Wear appropriate protective clothing to prevent skin exposure.

Respirators:
Follow the OSHA respirator regulations found in 29CFR 1910.134. Always use a NIOSH-approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Solid
Appearance:	bluish white, silvery gray
Odor:	None reported
pH:	Not applicable.

Vapor Pressure: 1.3 mm Hg @ 970C
Vapor Density: Not available.
Evaporation Rate: Not applicable.
Viscosity: Not applicable.
Boiling Point: 1740 deg C
Freezing/Melting Point: 327.4 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble in water.
Specific Gravity/Density: 11.3
Molecular Formula: Pb
Molecular Weight: 207.2

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
Strong oxidants.
Incompatibilities with Other Materials:
Strong oxidizing agents.
Hazardous Decomposition Products:
Lead/lead oxides.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 7439-92-1: OF7525000
LD50/LC50:
Not available.
Carcinogenicity:
LEAD -
ACGIH: elemental, as Pb; A3 - animal carcinogen
California: carcinogen - initial date 10/1/92
OSHA: Possible Select carcinogen
IARC: Group 2B carcinogen
Epidemiology:
There are several reports that certain lead compounds admini stered to animals in high doses are carcinogenic, primarily producing renal tumors. Salts demonstrating carcinogenic ity in animals are usually soluble salts. Epidemiologica l studies have not shown a relationship between lead exposur e and the incidence of cancer in lead workers. However,

The study of lead-exposed workers demonstrated a statistically significant elevation in the standardized mortality ratio for gastric and lung cancer in battery plant workers only.

Teratogenicity:
Lead penetrates the placental barrier and has caused fetal abnormalities in animals. Excesssive exposure to lead during pregnancy has caused neurological disorders in infants.

Reproductive Effects:
Reproductive effects from lead have been documented in animals and human beings of both sexes. In battery workmen with a mean exposure of 8.5 years to lead, there was an increased frequency of sperm abnormalities as compared with a control group.

Neurotoxicity:
Subtle neurologic effects have been demonstrated with relatively low blood levels of lead. The performance of lead workers on various neurophysiological tests was mildly reduced when compared with a control group. Anxiety, depression, poor concentration, forgetfulness, mild reductions in motor and sensory nerve conduction velociities have been documented in lead-exposed workers.

Mutagenicity:
No data available.

Other Studies:
No data available.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
Not available.

Environmental Fate:
Not available.

Physical/Chemical:
Not available.

Other:
Not available.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.
RCRA D-Series Maximum Concentration of Contaminants:
CAS# 7439-92-1: waste number D008; regulatory level = 5.0 mg/L.

RCRA U-Series Chronic Toxicity Reference Levels: CAS# 7439-92-1: chronic toxicity reference level = 0.05 mg/L.
RCRA F-Series: None listed.
RCRA P-Series: None listed.
RCRA U-Series: None listed.
CAS# 7439-92-1 is banned from land disposal according to RCRA.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: RQ, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (CONTAINS LEAD SHOT)
Hazard Class: 9
UN Number: UN3077
Packing Group: III
IMO
No information available.
IATA
No information available.
RID/ADR
No information available.
Canadian TDG
No information available.

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA
CAS# 7439-92-1 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA
Section 302 (RQ)
final RQ = 10 pounds (4.54 kg)
Section 302 (TPQ)

None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 7439-92-1: acute, chronic.
Section 313
This material contains LEAD (CAS# 7439-92-1, 99.8%) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
CAS# 7439-92-1 listed as LEAD COMPOUNDS is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 7439-92-1 is listed as a Priority Pollutant under the Clean Water Act.
CAS# 7439-92-1 is listed as a Toxic Pollutant under the Clean Water Act.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
LEAD can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:
WARNING: This product contains LEAD, a chemical known to the state of California to cause cancer.
WARNING: This product contains LEAD, a chemical known to the state of California to cause birth defects or other reproductive harm.
California No Significant Risk Level:
CAS# 7439-92-1: NOEL = 0.5 ug/day
European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: Not available.
Risk Phrases:
Safety Phrases:
WGK (Water Danger/Protection)
CAS# 7439-92-1:
Canada
CAS# 7439-92-1 is listed on Canada's DSL/NDSL List.

This product has a WHMIS classification of D2A.
CAS# 7439-92-1 is not listed on Canada's Ingredient Disclosure List.

Exposure Limits
CAS# 7439-92-1:. OEL-FRANCE:TWA 150 mg/m3. OEL-GERMANY:TWA 0.1 mg/m3?
?OEL-POLAND:TWA 0.05 mg/m3

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 9/28/1995 Revision #16 Date: 12/12/1997

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

APPENDIX C

GUIDANCE ON HEAT STRESS CONTROL

C&S ENGINEERS, INC.

HEALTH & SAFETY GUIDELINE #15

HEAT STRESS CONTROL

TABLE OF CONTENTS

1.0 PURPOSE

To establish procedures for the implementation and operation of a heat stress prevention, evaluation, and response program.

2.0 SCOPE

Applies to all activity where employees may be exposed to environments exceeding 71 degrees Fahrenheit (WBGT) performing Levels C and B work, and environments exceeding 77 degrees Fahrenheit (WBGT) for Level D work.

3.0 DEFINITIONS

Acclimatization — Acclimatization is the process of the body becoming accustomed to extremes in temperature.

ACGIH TLV 1997 — Heat Stress Threshold Limit Values (TLVs) are intended to protect workers from the severest effects of heat stress and heat injury and to describe exposures to hot working conditions under which it is believed that nearly all workers can be repeatedly exposed without adverse health effects. The TLV objective is to prevent the deep body core temperature from exceeding 38°C (100.4°F).

Wet-Bulb Globe Temperature (WBGT) — This is the simplest and most suitable technique to measure the environmental factors associated with heat stress. The value is calculated by using the equations shown in Appendix A.

Work/Rest Regimen — This is a ratio of time spent working versus time spent resting. The ratio applies to one (1) hour periods. For example, a work/rest regiment of 75% work, 25% rest corresponds to 45 minutes work, 15 minutes rest each hour.

4.0 RESPONSIBILITIES

Employees — All employees must be alert to signs of development of symptoms of heat stress in themselves and in those working with them. They must also be aware of emergency corrective action.

Health and Safety Coordinator (HSC) — The HSC is responsible for establishing and enforcing the work/rest regimen to control heat stress.

5.0 GUIDELINES

Acclimatization to heat involves a series of physiological and psychological adjustments that occur in an individual during his/her first week of exposure to hot environmental conditions. The work-rest regimen in this procedure is valid for acclimated workers who are physically fit.

5.1 Effects of Heat Stress

Hot weather can cause physical discomfort, loss of efficiency, and personal injury. Wearing personal protective equipment puts a worker at considerable risk of developing heat stress because protective clothing decreases natural body ventilation. Heat stress is probably one of the most common (and potentially serious) illnesses at hazardous waste sites. Regular monitoring and preventive measures are essential to the health and safety of personnel conducting field work.

Early symptoms of heat stress may include fatigue, irritability, anxiety, and decreased concentration, dexterity, or movement. If not recognized or treated, heat stress may be serious, even fatal.

Heat-related problems include:

1. **Heat Rash** — caused by continuous exposure to hot and humid air and aggravation of the skin by chafing clothes. As well as being a nuisance, this decreases the ability to tolerate heat.
2. **Heat Cramps** — caused by profuse perspiration with inadequate fluid intake and chemical replacement (especially salts). Signs: muscle spasm and pain in the extremities and abdomen.
3. **Heat Exhaustion** — caused by increased stress on various organs to meet increased demands for body cooling. Signs: shallow breathing; pale, cool, moist skin; profuse sweating; dizziness; fatigue.
4. **Heat Stroke** — the most severe form of heat stress. Heat stroke is considered an Immediately Dangerous to Life or Health (IDLH) condition and as such must be treated as an emergency. Any person suffering from heat stroke must be cooled down immediately and brought to a hospital. Decontamination procedures should not be implemented. Signs and symptoms are: red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma.

   It is important to note that individuals vary in their susceptibility and their reactions to heat-related conditions. Factors that may predispose someone to a heat condition include:

   - Lack of physical fitness
   - Lack of acclimatization
   - Age
   - Dehydration
   - Obesity
   - Alcohol and drug use
   - Infection
   - Sunburn
   - Diarrhea
   - Chronic disease

5.2 First Aid/Medical Treatment

The following first aid and medical treatments are recommended. First aid training is recommended.

1. **Heat Rash** — Apply mild drying lotions and use cool, dry sleeping quarters to allow skin to dry between heat exposures.
2. **Heat Cramps** — Administer commercially-available electrolyte-balanced liquids. Seek medical attention if serious.
3. **Heat Exhaustion** — Remove to cooler environment; rest in reclining position. Drink plenty of fluids.
4. **Heat Stroke** — Immediate and rapid cooling by immersion in chilled water with massage, or wrapping in wet sheet and fanning. These steps are to be taken while waiting for emergency response to arrive, or while transporting the victim to an emergency medical facility. This is a **life-threatening** situation.

5.3 Heat Stress Prevention

One or more of the following will help prevent or reduce heat stress:

1. Drinking water shall be available to employees to encourage frequent small drinks (i.e., one cup every 15-20 minutes {about 150 ml or 1/4 pint}). The water shall be kept reasonably cool (55-60°F) and shall be placed outside the contaminated areas. Employees shall be encouraged to salt their foods and maintain well-balanced diets. If employees are unacclimatized, a commercially available product such as Gatorade or Exceed may be used for electrolyte replacement.
2. Cooling devices may be used to aid natural body ventilation. These devices, however, add weight, and their use should be balanced against worker efficiency.
3. Long cotton underwear should be worn. It acts as a wick to help absorb moisture and protect the skin from direct contact with heat-absorbing protective clothing.
4. Provide air-conditioned shelter or shaded areas to protect employees during rest periods.
5. Install mobile showers and/or hose-down facilities to reduce body temperature and cool protective clothing.
6. Conduct operations in the early morning or evening.
7. Rotate shifts of workers.
8. Add additional employees to work teams.
9. Mandate work slowdowns.
10. Good hygienic standards must be maintained by frequent change of clothing and daily showering. Clothing should be permitted to dry during rest periods.

11. Employees shall be instructed in hot weather procedures. The training program shall include, as a minimum, instruction in:

   a. Proper cooling procedures and appropriate first aid treatment.

   b. Proper clothing practices.

   c. Proper eating and drinking habits.

   d. Recognition of impending heat exhaustion.

   e. Recognition of signs and symptoms of impending heat stroke.

   f. Safe work practices.

5.4 Heat Stress Monitoring

Specific procedures will be established by the HSC and/or in the site specific HASP. Appendices A and B discuss the use of WBGT values.

5.5 Work-Rest Regimen

A work-rest regimen will be established for field work where personnel may be exposed to environments exceeding 77 degrees Fahrenheit (WBGT) for Level D work and environments exceeding 71 degrees Fahrenheit (WBGT) for Levels C and B work. The American Conference of Governmental Industrial Hygienists' TLV Heat Stress Threshold Limit Values will be used as a guideline.

If any heat stress symptoms are identified by the employee or buddy, the HSC should be notified immediately and all work activity should cease until the situation is corrected.

5.6 Biological Monitoring

Always monitor signs and symptoms of heat-stressed employees. When WBGT-TLV criteria are exceeded or water vapor impermeable clothing is worn, discontinue any environmentally-induced or activity-induced heat stress for a person when:

- Sustained heart rate is greater than 160 beats per minute for those under age 35; 140 beats for 35 years of age and older.
- Deep body temperature is more than 100°F.
- Blood pressure falls more than 40 torr in about 3.5 minutes.
- There are complaints of sudden and severe fatigue, nausea, dizziness, lightheadedness, or fainting.
- There are periods of inexplicable irritability, malaise, or flu-like symptoms.
- Sweating stops and the skin becomes hot and dry.
- Daily urinary sodium ion excretion is less than 50 mmoles.

6.0 REFERENCES

ACGIH TLV Booklet, 1997

7.0 ATTACHMENTS

TABLE 1	—	Permissible Heat Exposure Threshold Limit Values
APPENDIX A	—	Wet-Bulb Globe Temperature Index
APPENDIX B	—	Manual Measurement of WBGT Factors

TABLE 1

PERMISSIBLE HEAT EXPOSURE THRESHOLD LIMIT VALUES

INTENDED CHANGES LISTED

(values are given in °F WBGT)

	WORK LOAD		
Work-Rest Regimen	**Light**	**Moderate**	**Heavy**
Continuous Work	86	80	77
75% Work 25% Rest, Each Hour	87	82.5	79
50% Work 50% Rest, Each Hour	89	85	82.5
25% Work 75% Rest, Each Hour	89.5	88	86

Water vapor impermeable or thermally insulating clothing, encapsulating suits, and similar convective and evaporative barriers can severely restrict heat loss and produce life-threatening heat strain, even when the ambient air temperature, radiant heat, and humidity are low. Whenever employees wear such restrictive clothing, it is essential that extra caution be exercised. Project managers and supervisors must evaluate heat stress conditions at each job site, taking into account specific job activities, protective clothing being used, and WBGT readings.

Appendix A

Wet-Bulb Globe Temperature Index

A baseline work-rest regimen is selected using the WBGT procedure. The WBGT in conjunction with the work load required to perform each task is used to determine work-rest regimen. **Light** work examples include such tasks as sitting or standing to control machines or performing light hand or arm work. **Moderate** work includes walking about in coated coveralls and respirators doing moderate lifting and pushing. **Heavy** work corresponds to pick and shovel-type work or the use of full body protective clothing. *It must be assumed that any activity involving this type of clothing will be considered heavy work.*

In order to determine the WBGT the following equations are used:

- Outdoors with solar load:
  WBGT = 0.7 NWB + 0.2 GT + 0.1 DB

- Indoors or outdoors with no solar load:
  WBGT = 0.7 NWB + 0.3 GT

  NWB = Natural Wet-Bulb Temperature
  DB = Dry-Bulb Temperature
  GT = Globe Thermometer Temperature

The factors involved in the above equations can be measured using a direct reading instrument or manually measuring each factor.

- An example of a direct-reading heat stress monitor is the Reuter-Stokes Wibget No. RSS-214 heat stress monitor.

- Measurement of the individual factors requires the following equipment:

  ~ Dry-bulb thermometer

  ~ Natural wet-bulb thermometer

  ~ Globe thermometer

  ~ Stand

APPENDIX B

MANUAL MEASUREMENT OF WBGT FACTORS

The range of the dry and the natural wet-bulb thermometers shall be -5°C to 50°C with an accuracy of 0.5° C. The dry-bulb thermometer must be shielded from the sun and the other radiant surfaces of the environment without restricting the airflow around the bulb. The wick of the natural wet-bulb thermometer shall be kept wet with distilled water for at least 1/2 hour before the temperature reading is made. It is not enough to immerse the other end of the wick into a reservoir of distilled water and wait until the whole wick becomes wet by capillary action. The wick shall be wetted by direct application of water from a syringe 1/2 hour before each reading. The wick shall extend over the bulb of the thermometer, covering the stem about one additional bulb length. The wick should always be clean and new wicks shall be washed before using.

A globe thermometer, consisting of a 15 cm (6-inch) diameter hollow copper sphere painted on the outside with a matted black finish or equivalent, shall be used. The bulb or sensor of a thermometer (range -5°C to 100 C with an accuracy of 0.5°C) must be fixed in the center of the sphere. The globe thermometer shall be exposed at least 25 minutes before it is read.

A stand shall be used to suspend the three thermometers so that they do not restrict free airflow around the bulbs.

It is permissible to use any other type of temperature sensor that gives a reading identical to that of a mercury thermometer under the same conditions.

The thermometers must be placed so that the readings are representative of the condition where the employees work or rest, respectively. All readings shall be recorded on the site log.

In many cases WBGT is the simplest and most suitable technique to measure heat. However, this system is only valid for light summer clothing. When special personal protective clothing is required for performing a particular job, the worker's heat tolerance is reduced and the permissible heat exposure limits are not applicable because this clothing is heavier, impedes sweat evaporation, and/or has higher insulation value.

APPENDIX D

GUIDANCE ON SITE COMMUNICATIONS

C&S ENGINEERS, INC.
HEALTH & SAFETY GUIDELINE #13
SITE COMMUNICATIONS

TABLE OF CONTENTS

1.0 PURPOSE

This guideline contains information and requirements necessary to make sure field activities are conducted with adequate provision for communications among field personnel and to emergency agencies.

2.0 SCOPE

The guideline applies to all field activities conducted by C&S. Additional provisions for communications will be addressed in each Site-Specific Health and Safety Plan (HASP), as needed. Field communications must be provided not only to make sure field personnel can communicate with one another, but also to contact off-site technical and emergency assistance.

3.0 DEFINITIONS

None

4.0 RESPONSIBILITIES

Employees — All employees are responsible for knowing and using the specified communications to make sure field work is safely completed and/or to respond to emergencies.

Health and Safety Coordinator (HSC) — The HSC is responsible for determining the proper methods of communication required at a particular site; for training site personnel in the use of these communications; and for providing and maintaining the communications as specified.

5.0 GUIDELINES

5.1 On-Site Communications

Each person shall be able to communicate with other personnel at all times. This communication may be via sound (air horn), electronic (two-way radio, bullhorn, etc.), or visual means.

A set of hand signals shall be designated and agreed upon by all personnel at each site activity, for use in case electronic communications fail. The site-specific training shall include explanation of the following standard hand signals:

Signal	Meaning
Hand gripping throat	Out of air; can't breath
Grip partner's wrist or place both hands around waist	Leave area immediately
Hands on top of head	Need assistance
Thumbs up	OK; I'm all right; I understand
Thumbs down	No; negative

Whichever communication system is selected as a primary system, a backup system must be provided. For example, hand signals may be used as a backup if radio communications fail. All internal systems should be:

- Clearly understood by all personnel
- Checked and practiced daily
- Intrinsically safe (spark-free)

A special set of emergency signals should be set up. These should be:

- Different from ordinary signals
- Brief and exact
- Limited in number so that they are easily remembered

When designing and practicing communication systems, remember that:

- Background noise on site will interfere with talking and listening
- Wearing personal protective equipment will impede hearing and limit vision (i.e., the ability to recognize hand and body signals)
- Inexperienced radio users may need practice in speaking clearly

5.2 Off-Site Communications

Every field task shall provide for off-site communications to be able to contact local emergency agencies. Acceptable methods include mobile telephone, radio (CB, other) on a frequency monitored by emergency agencies; on-site telephone (portable or land-line); or a phone (booth or private home) within one-mile of the site. Where a private home phone is to be used, personnel shall make sure access to the home is guaranteed by the owner. Explicit directions and a map shall be prominently displayed. Adequate change shall be conveniently provided where a phone booth is specified for off-site communications.

6.0 References

None

7.0 Attachments

None

APPENDIX E

GUIDANCE ON EXCAVATION/TRENCHING OPERATIONS

C&S Engineers, Inc.
Health & Safety Guideline No. 14
Excavation/Trenching Operations

TABLE OF CONTENTS

C&S ENGINEERS, INC.
EXCAVATION/TRENCHING OPERATIONS

1.0 PURPOSE

To establish safe operating procedures for excavation/trenching operations at C&S work sites.

2.0 SCOPE

Applies to all C&S activity where excavation or trenching operations take place.

3.0 DEFINITIONS

Excavation — Any manmade cavity or depression in the earth's surface, including its sides, walls, or faces, formed by earth removal and producing unsupported earth conditions by reasons of the excavation.

Trench — A narrow excavation made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench is not greater than 15 feet.

4.0 RESPONSIBILITY

Employees — All employees must understand and follow the procedures outlined in this guideline during all excavation and trenching operations.

Health and Safety Coordinator (HSC) — The HSC is responsible for ensuring that these procedures are implemented at each work site.

5.0 GUIDELINES

5.1 Hazards Associated With Excavation/Trenching

The principal hazards associated with excavation/trenching are:

- Suffocation, crushing, or other injury from falling material.
- Damage/failure of installed underground services and consequent hazards.
- Tripping, slipping, or falling.
- Possibility of explosive, flammable, toxic, or oxygen-deficient atmosphere in excavation.

5.2 Procedures Prior to Excavation

1. Underground utilities
    - Determine the presence and location of any underground chemical or utility pipes, electrical, telephone, or instrument wire or cables.
    - Identify the location of underground services by stakes or markers.

- De-energize or isolate underground services during excavation. If not possible, or if location is not definite, method of excavation shall be established to minimize hazards by such means as:

    1) Use of hand tools in area of underground services.

    2) Insulating personnel and equipment from possible electrical contact.

    3) Use of tools or equipment that will reduce possibility of damage to underground services and hazard to worker.

2. Identify Excavation Area

    - Areas to be excavated shall be identified and segregated by means of barricades, ropes, and/or signs to prevent access of unauthorized personnel and equipment. Suitable means shall be provided to make barriers visible at all times.

3. Surface Water

    - Provide means of diverting surface water from excavation.

4. Shoring/ Bracing

    - Shoring or bracing that may be required for installed equipment adjacent to the excavation shall be designed by a competent person.

5. Structural Ramps

    - Structural ramps that are used solely by employees as a means of access to or egress from the excavation shall be designed by a competent person.

5.3 Procedures For Doing The Excavation

1. **Determine the need for shoring/sloping** — the type of soil will establish the need for shoring, slope of the excavation, support systems, and equipment to be used. The soil condition may change as the excavation proceeds. Appendices A, B, C, D, E, and F of the OSHA Excavation Regulation, 29 CFR 1926 Subpart P (Attachment 1), are to be used in defining shoring and sloping requirements.

2. **Mobile equipment** — For safe use of mobile industrial equipment in or near the excavation, the load carrying capacity of soil shall be established and suitable protection against collapse of soil provided by the use of mats, barricades, restricting the location of equipment, or shoring.

3. Excavated material (spoil) shall be stored at least two (2) feet from the edge of the excavation.

4. All trench (vertical sides) excavations greater than five (5) feet deep shall be shored.

5. Ladders or other means of access to or egress from excavations shall be provided at a maximum spacing of:

   1) 100 feet on the perimeter of open excavations, and

   2) 25 feet for trench excavations greater than four (4) feet in depth.

6. The excavation shall be inspected daily for changes in conditions, including the presence of ground water, change in soil condition, or effects of weather such as rain or freeze. A safe means of continuing the work shall be established based on changes in condition.

7. Appropriate monitoring for gas, toxic, or flammable materials will be conducted to establish the need for respiratory equipment, ventilation, or other measures required to continue the excavation safely.

8. Adequate means of dewatering the excavation shall be provided as required.

9. A signal person shall be provided to direct powered equipment if working in the excavation with other personnel.

10. A signal person shall be provided when backfilling excavations to direct powered equipment working in the excavation with other personnel.

11. Warning vests will be worn when employees are exposed to public vehicular traffic.

12. Employees shall stand away from vehicles being loaded or unloaded, and shall not be permitted underneath loads handled by lifting or dragging equipment.

13. Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, shall be readily available if hazardous atmospheric conditions exist or may be expected to develop. The specifics will be determined by the HSC/HSM.

14. Walkways or bridges with standard guardrail shall be provided where employees or equipment are required or permitted to cross over excavations.

5.4 Entering the Excavation
No C&S Engineers employee shall enter an excavation which fails to meet the requirements of Section 5.3 of this guideline.

6.0 REFERENCES

29 CFR 1926, Subpart P - Excavations

7.0 ATTACHMENTS

29 CFR 1926, Subpart P, Appendices A, B, C, D, E, and F

APPENDIX F

GUIDANCE ON
INCIDENT INVESTIGATION AND REPORTING

C&S ENGINEERS, INC.
HEALTH & SAFETY GUIDELINE #2
INCIDENT INVESTIGATION & REPORTING

TABLE OF CONTENTS

C&S ENGINEERS, INC.
INCIDENT INVESTIGATION AND REPORTING

1.0 PURPOSE

To prevent the occurrence or reoccurrence of accidents on C&S Engineers work sites and to establish a procedure for investigation and reporting of incidents occurring in, or related to C&S Engineers' work activities.

2.0 SCOPE

Applies to all incidents related to C&S Engineers' work activities.

3.0 DEFINITIONS

Accident - An undesired event resulting in personal injury and/or property damage, and/or equipment failure.

Fatality - An injury resulting in death of the individual.

Incident - Any occurrence which results in, or could potentially result in, the need for medical care or property damage. Such incidents shall include lost time accidents or illness, medical treatment cases, unplanned exposure to toxic materials or any other significant occurrence resulting in property damage or in "near misses."

Incidence Rate - the number of injuries, illnesses, or lost workdays related to a common exposure base of 100 full-time workers. The rate is calculated as:

$$N/EH \times 200{,}000$$

N = number of injuries and illnesses or lost workday cases; EH = total hours worked by all associates during calendar year. 200,000 = base for 100 full-time equivalent workers (working 40 hours per week, 50 weeks per year).

Injury - An injury such as a cut, fracture, sprain, amputation, etc. which results from a work accident or from a single instantaneous event in the work environment.

Lost Workday Case - A lost workday case occurs when an injured or ill employee experiences days away from work beginning with the next scheduled work day. Lost workday cases do not occur unless the employee is effected beyond the day of injury or onset of illness.

Recordable Illness - An illness that results from the course of employment and must be entered on the OSHA 200 Log and Summary of Occupational Injuries and Illnesses. These illnesses require medical treatment and evaluation of work related injury. For example, dermatitis, bronchitis, irritation of eyes, nose, and throat can result from work and non-work related incidents.

Recordable Injury - An injury that results from the course of employment must be entered on the OSHA 200 Log and Summary of Occupational Injuries and Illnesses(the "OSHA 200 Log"). These injuries require medical treatment; may involve loss of consciousness; may result in restriction of work or motion or transfer to another job; or result in a fatality.

Near Miss - An incident which, if occurring at a different time or in a different personnel or equipment configuration, would have resulted in an incident.

4.0 RESPONSIBILITIES

Employees - It shall be the responsibility of all C&S Engineers employees to report all incidents as soon as possible to the HSC, regardless of the severity.

Human Resources - Has overall responsibility for maintaining accident/incident reporting and investigations according to current regulations and recording injuries/ illness on the OSHA 200 Log and Summary of Occupational Injuries and Illnesses and posting the OSHA 200 Log.

Health and Safety Coordinator (HSC) - It is the responsibility of the HSC to investigate and prepare an appropriate report of all accidents, illnesses, and incidents occurring on or related to C&S work.. The HSC shall complete Attachment A within 24 hours of the incident occurrence.

Health and Safety Manager (HSM) - It is the responsibility of the HSM to investigate and prepare an appropriate report of all lost time injuries and illnesses and significant incidents occurring on C&S's property or related to C&S. The HSM shall maintain the OSHA 200 Log.

Project Managers (PM) - It shall be the PM's responsibility to promptly correct any deficiencies in personnel, training, actions, or any site or equipment deficiencies that were determined to cause or contribute to the incident investigated.

5.0 GUIDELINES

5.1 Incident Investigation

The HSC will immediately investigate the circumstances surrounding the incident and will make recommendations to prevent reoccurrence. The HSM shall be immediately notified by telephone if a serious accident/incident occurs. The incident shall be evaluated to determine whether it is OSHA recordable. If the incident is determined to be OSHA 200 recordable, it shall be entered on the OSHA 200 Log.

The following minimum information should be gathered in an accident investigation.

- Where and when the accident occurred
- Who and what were involved, operating personnel and witnesses
- How the accident or illness exposure occurred
- List of objects or substances involved
- The nature of the injury or illness and the part(s) of the body affected
- Discussion of the causes, and recommendations for prevention of recurrence.

5.2 Incident Report

The completed incident report must be completed by the HSC within 24 hours of the incident and distributed to the PM, HSM, and Human Resources. This form shall be maintained by Human Resources for at least five years for all OSHA recordable cases. This form serves as an equivalent to the OSHA 101 Supplementary Record of Occupational Injuries and Illnesses.

5.3 Incident Follow-up Report

The Incident Follow-up Report (Attachment B) shall be distributed with the Incident Report within one week of the incident. Delay in filing this report shall be explained in a brief memorandum.

5.4 Reporting of Fatalities or Multiple Hospitalization Accidents

Fatalities or accidents resulting in the hospitalization of five or more employees must be reported to OSHA verbally or in writing within 48 hours. The report must contain: 1) circumstances surrounding the accident(s); 2) the number of fatalities; and 3) the extent of any injuries.

5.5 OSHA 200 Summary Form

Recordable cases must be entered on the log within six workdays of receipt of the information that a recordable case has occurred. The OSHA log must be kept updated to within 45 calendar days.

OSHA 200 forms must be updated during the 5 year retention period, if there is a change in the extent or outcome of an injury or illness which affects an entry on a log. If a change is necessary, the original entry should be lined out and a corrected entry made on that log. New entries should be made for previously unrecorded cases that are discovered or for cases that initially weren't recorded but were found to be recordable after the end of the year. Log totals should also be modified to reflect these changes.

5.5.1 Posting

The log must be summarized at the end of the calendar year and the summary must be posted from February 1 through March 1.

5.6 OSHA 200S

Facilities selected by the Bureau of Labor Statistics (BLS) to participate in surveys of occupational injuries and illnesses will receive the OSHA 200S. The data from the annual summary on the OSHA 200 Log should be transferred to the OSHA 200S, other requested information provided and the form returned as instructed by the BLS.

5.7 Access to OSHA Records

All OSHA records (accident reporting forms and OSHA 200) shall be available for inspection and copying by authorized federal and state government officials.

Employees, former employees, and their representatives must be given access for inspection and copying to only the log, OSHA 200 Log, for the establishment in which the employee currently works or formerly worked.

6.0 REFERENCES

29 CFR Part 1904

7.0 ATTACHMENTS

Attachment A - Incident Investigation Form
Attachment B - Incident Follow-up Report
Attachment C - Establishing Recordability

ATTACHMENT A

INCIDENT INVESTIGATION FORM

Accident investigation should include:

Location

Time of Day

Accident Type

Victim

Nature of Injury

Released Injury

Hazardous Material

Unsafe Acts

Unsafe Conditions

Policies, Decisions

Personal Factors

Environmental Factors

ATTACHMENT B

INCIDENT FOLLOW-UP REPORT

Date ______________________________

Date of Incident: ____

Site: ____

Brief description of incident: ____

____

Outcome of incident: ____

____

____

____

____

____

Physician's recommendations: ____

____

____

____

Date the injured employee returned to work:_____________________________________

ATTACH ANY ADDITIONAL INFORMATION TO THIS FORM

ATTACHMENT C

ESTABLISHING RECORDABILITY

1. **Deciding whether to record a case and how to classify the case.**

Determine whether a fatality, injury, or illness is recordable.

A fatality is recordable if it:

- results from employment

An injury is recordable if it:

- results from employment and
- requires medical treatment beyond first aid, or
- results in restricted work activity, or
- results in a lost workday

An illness is recordable if it:

- results from employment

2. **Definition of "Resulting from Employment"**

For recordability purposes, "resulting from employment" means the injury or illness results from an event or exposure in the work environment. The work environment is primarily composed of the employer's premises and other locations where employees are engaged in work-related activities or are present as a condition of their employment.

The employer's premises include company rest rooms, hallways, and cafeterias. Injuries occurring in these places are generally considered work-related.

The employer's premises EXCLUDE employer-controlled ball fields, tennis courts, golf courses, parks, swimming pools, gyms, and other similar recreational facilities used by employees on a voluntary basis for their own benefit, primarily during off-work hours.

Company parking facilities are generally not considered part of the employer's premises for OSHA recordkeeping purposes. Therefore, injuries to employee's occurring on these parking lots are not presumed to be work-related, and are not recordable unless the employee was engaged in some work-related activity when he/she was injured.

Employees who travel on company business are considered to be engaged in work-related activities all the time they spend in the interest of the company. This includes travel to and from customer contacts, and entertaining or being entertained for purposes of promoting or discussing business. Incidents occurring during normal living activities (eating, sleeping, recreation) or if the employee deviates from a reasonably direct route of travel are not considered OSHA recordable.

3. **Distinction between Medical Treatment and First Aid.**
"First aid" means any one-time treatment, and any follow-up visit for the purpose of observation, of minor scratches, cuts, burns, splinters, etc., which do not ordinarily require medical care. Such one time treatment and follow-up visit for the purpose of observation are considered first aid even though provided by a physician or other licensed professional medical care provider.

Injuries are not minor if:

a) They must be treated only by a physician or other licensed medical personnel;

b) They impair bodily function (i.e., normal use of senses, limbs, etc.);

c) They result in damage to physical structure of a nonsuperficial nature (e.g., fractures); or

d) They involve complications requiring follow-up medical treatment.

APPENDIX - B

Suggested Report Forms

LINDLEY SOUTH
CLOSED LANDFILL
MONITORING WELL DATA SHEET

WELL #	DATE	TIME	GROUND ELEV.	TOP OF PVC ELEV.	WELL DEPTH	WATER DEPTH	WATER ELEV.
MW-1							
MW-2S							
MW-3							
MW-4							
GW-1							
GW-4							
MW-2D							

LINDLEY SOUTH LANDFILL
LANDFILL GAS MONITORING RECORD SHEET
DATE: ___________

Gas Vent	%LEL	$\%O_2$	CO (ppm)	H_2S (ppm)	Observations/ Vent Integrity
Background					
G-1					
G-2					
G-3					
G-4					
G-5					
G-6					
G-7					
G-8					
G-9					
G-10					
G-11					
G-12					
G-13					
G-14					
G-15					
Background					

Weather Conditions:

LINDLEY SOUTH LANDFILL - STEUBEN COUNTY
POST-CLOSURE FIELD INSPECTION REPORT FORM

DATE: ____________________

INSPECTOR: ____________________

ENTRANCE AND PERIMETER				
Entrance Driveway & Service Road Conditions	good	fair	poor	
Culverts	good	fair	poor	
Trespass Sign Conditions	good	fair	poor	
Fence/Gate Conditions	good	fair	poor	locked
Drainage Channels	clear	sediment	plugged	
Perimeter Drains	clear	sediment	plugged	
Evidence of Trespass	yes	no		
Evidence of Vehicle Use	yes	no		
Other				

LANDFILL CAP AREA			
Unauthorized Materials Present	yes	no	where
Uncovered Areas	yes	no	where
Vegetative Cover Conditions	good	fair	poor
Evidence of Vectors	yes	no	where
Evidence of Erosion	yes	no	where
Evidence of Ponded Water	yes	no	where
Evidence of Leachate Seepage	yes	no	where
Other			

MONITORING LOCATIONS			
Gas Vents	secure	damaged	
Monitoring Wells/Piezometer	secure	damaged	
Surface Water Monitoring Locations	flowing	blocked	
Other			

COMMENTS

CORRECTIVE MEASURES

LINDLEY SOUTH
CLOSED LANDFILL

Fire Prevention Control & Countermeasure Program
Fire Investigation Report

Location of Fire ______________________________

Date Fire Occurred ____________ Time ______________________________

Material Involved ______________________________

What Work Was Being Performed When Fire Occurred ______________________________

____

What Happened ______________________________

____

____

____

Employees Involved Others Involved

____________ ______________________________

____________ ______________________________

What Action Was Taken To Control The Fire And Prevent Personal Injury Or Environmental Damage? ______________________________

____

____

____

Were Proper Operating Procedures And Safety Requirements Being Followed When The Fire Occurred? ________ If Not, Explain ______________________________

____

What Other Factors Contributed to Cause This Incident ______________________________

____

Recommendations To Prevent a Recurrence or Similar Fire ______________________________

____

Investigated By ____________ Date ______________________________

LINDLEY SOUTH
CLOSED LANDFILL

Spill Prevention Control & Countermeasure Program
Spill Investigation Report

Location of Spill ________________________________

Date Spill Occurred ______________ Time ______________________

Material Involved ________________________________

What Work Was Being Performed When Spill Occurred ________________

____

What Happened ________________________________

____

____

____

Employees Involved Others Involved

____________ ________________________

____________ ________________________

What Action Was Taken To Control The Spill And Prevent Personal Injury Or

Environmental ________________________________

____

____

____

Were Proper Operating Procedures And Safety Requirements Being Followed When

The Spill Occurred? ______ If Not, Explain ______________________

____

What Other Factors Contributed to Cause This Incident ________________

____

Recommendations To Prevent a Recurrence or Similar Spill ______________

____

Investigated By ____________ Date ______________________

LINDLEY SOUTH
CLOSED LANDFILL

Personal Injury or Property Damage
Investigation Report

Location ______________________________

Date Occurred ______________ Time ______________

Material/Equipment Involved ______________________________

What Work Was Being Performed ______________________________

____

What Happened ______________________________

____

____

____

Employees Involved Others Involved

______________ ______________________________

______________ ______________________________

What Action Was Taken To Prevent Environmental Damage ______________________________

____

____

____

Were Proper Operating Procedures And Safety Requirements Being Followed When The Accident Occurred? ______ If Not, Explain ______________________________

____

What Other Factors Contributed to Cause This Incident ______________________________

____

Recommendations To Prevent a Recurrence or Similar Incident ______________________________

____

Investigated By ______________ Date ______________

LINDLEY SOUTH
CLOSED LANDFILL

Fire Prevention Control & Countermeasure Program
Emergency Organization Drill Report

Date Drill Held ________ Scheduled Time ________________________________

Location of Drill ____

Objective of Drill ____

Structure of Drill ____

____

Response Time ________ Duration of Drill ________________________________

Number of Participants Scheduled ____________________________________

Names of Participants Leader ____

__________ ____

__________ ____

__________ ____

Evaluation of Drill

Response Time __________

Objective Met __________

Elapsed Time
to Achieve Goal __________

Attitude of
Participants __________

Suggestions for Improvement of Future Drills

____

____

____

____

____

____

Report Prepared By ____

Date Prepared ____

APPENDIX

PAGE ______ OF ______

GROUNDWATER SAMPLING LOG SHEET

DATE

SAMPLE LOCATION ID

LOCATION ACTIVITY: START ______ END ______

FIELD QC DATA: ☐ FIELD DUPLICATE COLLECTED DUP ID ______

WATER LEVEL / WELL DATA

WELL DEPTH ______ FT ☐ MEASURED ☐ HISTORICAL ☐ TOP OF WELL ☐ TOP OF CASING ☐ ______

PROTECTIVE CASING STICK-UP (FROM GROUND) ______ FT

PROTECTIVE CASING/WELL DIFF. ______ FT

WELL DIA. ☐ 2 INCH ☐ 4 INCH ☐ 6 INCH ☐ ______

WELL INTEGRITY:	YES	NO	N/A
PROT. CASING SECURE	☐	☐	☐
CONCRETE COLLAR INTACT	☐	☐	☐
WELL LOCKED	☐	☐	☐
OTHER: ______	☐	☐	☐

DEPTH TO WATER ______ FT

HISTORICAL WELL DEPTH ______ FT

WELL MATERIAL: ☐ PVC ☐ SS ☐ ______

HEIGHT OF WATER COLUMN ______ FT X ☐ .16 GAL/FT (2 IN) ☐ .65 GAL/FT (4 IN) ☐ 1.5 GAL/FT (6 IN) ☐ ___ GAL/FT (__ IN)

______ GAL/VOL

______ TOTAL GAL PURGED

AMBIENT AIR VOA ______ PPM

WELL MOUTH ______ PPM

PURGE DATA

PURGE VOLUME	@____GAL	@____GAL	@____GAL	@____GAL	@____GAL
TEMP, DEG C					
pH, UNITS					
SPECIFIC CONDUCTIVITY umhos/cm					
______					

SAMPLE OBSERVATIONS
- ☐ CLEAR
- ☐ COLORED ______
- ☐ CLOUDY ______
- ☐ TURBID ______
- ☐ ODOR ______
- ☐ OTHER (SEE NOTES)

EQUIPMENT DOCUMENTATION

PURGING	SAMPLING		EQUIPMENT ID
☐	☐	PERISTALTIC PUMP	ISCO #______
☐	☐	SUBMERSIBLE PUMP	KECK #______
☐	☐	BAILER	☐ 2" ☐ 1" #______
☐	☐	PVC/SILICON TUBING	
☐	☐	TEFLON/SILICON TUBING	
☐	☐	AIR LIFT	
☐	☐	WATERRA	
	☐	IN-LINE FILTER	☐ QED
	☐	PRESS/VAC FILTER	
☐	☐	______	______

DECON FLUIDS USED
- ☐ LIQUI-NOX
- ☐ DEIONIZED WATER
- ☐ HNO3/D.I. WATER
- ☐ POTABLE WATER
- ☐ TSP SOLUTION
- ☐ NONE
- ☐ ______

WATER LEVEL EQUIP. USED
- ☐ ELECTRIC COND. PROBE
- ☐ FLOAT ACTIVATED
- ☐ KECK INTERFACE PROBE
- ☐ OTHER

NUMBER OF FILTERS USED ______

ANALYTICAL PARAMETERS

	METHOD NUMBER	FILTERED	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS
☐					☐	____/____/____/____
☐					☐	____/____/____/____
☐					☐	____/____/____/____
☐					☐	____/____/____/____
☐					☐	____/____/____/____
☐					☐	____/____/____/____
☐					☐	____/____/____/____
☐					☐	____/____/____/____
☐					☐	____/____/____/____
☐					☐	____/____/____/____
☐					☐	____/____/____/____
☐					☐	____/____/____/____

NOTES

SIGNATURE: ______

SURFACE WATER/AIR SAMPLING LOG SHEET

SAMPLER (print): ______________________

SAMPLER (signature): ______________________

SAMPLE DATE: ______________________

1. Surface Runoff Water Sampling

Sample Location Number	Sample Time	pH	Temp.	Physical Observations

2. Ambient Air Sampling

Wind Direction: ______________

Sample Location Number	Sample Time	Upwind (U) or Downwind (D)	10.2 eV Lamp Reading (ppm)	11.7 eV Lamp Reading (ppm)	Comments

Chain of Custody Record

Phone # Telefax #

Client: Phone #		Contact Person:	Project #:
Address: Telefax #			Client's Site I.D.:
	Authorization:		Client's Project I.D.:

Sample Number	Client's Sample Identifications	Sample Date	Sample Time	Type grab	Type comp.	Matrix	Preserv. Added	Containers #	Containers size/type	Analyses	Preserv. Check

Notes and Hazard identifications:

Custody Transfers		Date	Time
Containers Sent By:	Date:		
Containers Received by:			
Sampled By:	Received By:		
Relinquished By:	Received By:		
Relinquished By:	Received for Lab By:		
Shipment Method:	Samples Received Intact:		

Project :

Client:

Well ID

Sampled for: Routine ☐ Baseline ☐ Other ☐

Diameter

Well Depth

Static H2O Level

H2O Column

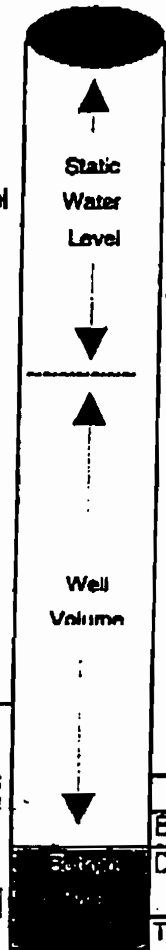
Conversion

Wel Volume

# of Volumes to Evacuate

Amt. to Evac.

Actual Amount Evacuated



Cap: outside ☐ inside ☐

Well Locked yes ☐ no ☐

Key Type (ID) ____________

Type of Well:

Standpipe ☐ Flush Mount ☐

Additional Observations:

____

____

Date/Time Evacuated: ____________

Date/Time Sampled: ____________

Date/Time VOC's Sampled: ____________

Bottom Type:

Hard ☐ Soft ☐

Semi-hard ☐ Semi-soft ☐

Weather Conditions:

____

____

Sampled by:

Print ____________

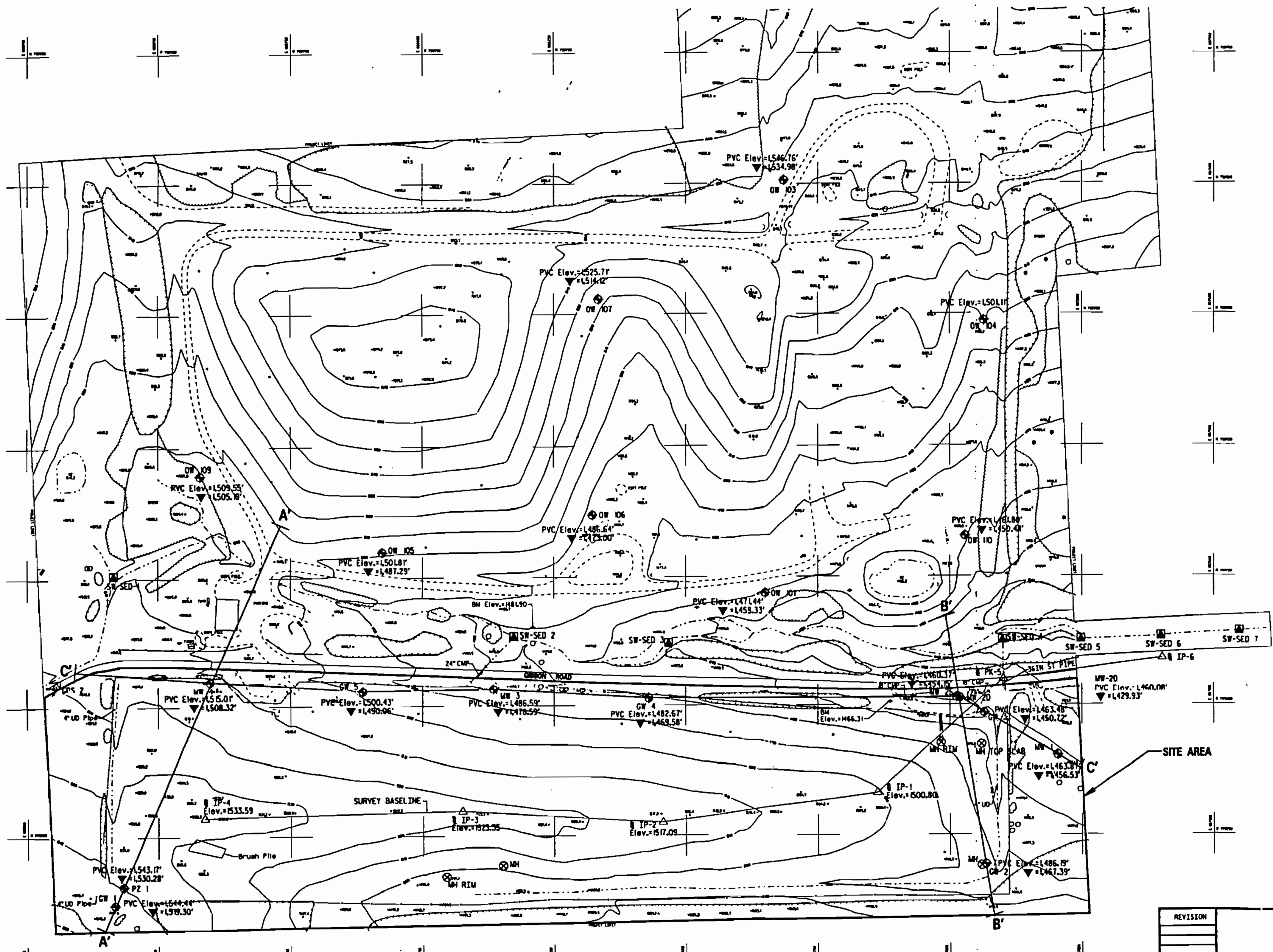
Sign ____________

Comments:

Field Readings

Before Sampling	After Sampling
Date	Date
Time	Time
ch	eh
Temp	Temp
pH	pH
Cond.	Cond.
Turb.	Turb.
D.O.	D.O.
Appearance	Appearance

SHEET NO.	TOTAL SHEETS



LEGEND

- MW/GW — MONITORING WELLS
- SW-SED — SURFACE WATER/SEDIMENT SAMPLING LOCATIONS

100' 0 100 200 FT.

NO ALTERATION PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW

REVISION

LINDLEY SOUTH LANDFILL
REMEDIAL INVESTIGATION

GROUND WATER, SURFACE WATER, AND SEDIMENT MONITORING LOCATIONS
(INCLUDING CROSS-SECTION TRANSECTS)

TOWN OF LINDLEY NEW YORK

C&S Engineers, Inc. Copyright ©

DATE: MAY 1996

SCALE:

FILE NO.: 537.001.001

SHEET

IN CHARGE OF: JOHN KANOZA
MADE BY: S. SAWICKI II
CHECKED BY: ANDREW CALDERWOOD

CADD FILE: a:\dgn\965\pp03.dgn Thu May 16 15:49:48 1996

REFERENCE FILES LIST: ...\965bord.dgn, a:\dgn\965\base02.dgn

APPENDIX - C

Sampling, Preservation, and Holding Time Criteria

ENVIRONMENTAL LABORATORY APPROVAL PROGRAM
CERTIFICATION MANUAL

SUBJECT	DATE	PAGE	ITEM NO.
Sample Collection: Requirements for Environmental Analyses/Water	11/3/97	1 of 7	242

ANALYTE	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME
Bacteriological Tests:			
Coliform, Total and Fecal	P,G	Cool, 4°C	6 hours
Coliform, Total and Fecal in chlorinated samples	P,G	Cool 4°C, 0.008% $Na_2S_2O_3$	6 hours
Standard Plate Counts	P,G	Cool 4°C, 0.008% $Na_2S_2O_3$	6 hours
Inorganic Tests:			
Acidity	P,G	Separate bottle completely filled to the exclusion of air, Cool, 4°C	14 days
Alkalinity	P,G	Separate bottle completely filled to the exclusion of air, Cool, 4°C	14 days
Ammonia	P,G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Biochemical oxygen demand	P,G	Cool, 4°C	48 hours
Bromide	P,G	None	28 days
Biochemical oxygen demand, carbonaceous	P,G	Cool, 4°C	48 hours
Chemical oxygen demand	P,G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Chloride	P,G	None	28 days
Color	P,G	Cool, 4°C	48 hours

ENVIRONMENTAL LABORATORY APPROVAL PROGRAM CERTIFICATION MANUAL

SUBJECT	DATE	PAGE	ITEM NO.
Sample Collection: Requirements for Environmental Analyses/Water	11/1/95	2 of 7	242

ANALYTE	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME
Cyanide, total and amenable to chlorination	P,G	Cool, 4°C, NaOH to pH>12, 0.6g ascorbic acid	14 days
Fluoride	P	None	28 days
Hardness	P,G	HNO_3 to pH<2 H_2SO_4 to pH<2	6 months
Hydrogen ion (pH)	P,G	None	Analyze immediately
Kjeldahl and organic nitrogen	P,G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Metals, except boron, chromium VI and mercury	P,G	HNO_3 to pH<2	6 months
Boron	P, Quartz	HNO_3 to pH<2	6 months
Chromium VI	P,G	Cool, 4°C	24 hours
Mercury	P,G	HNO_3 to pH<2	28 days
Nitrate	P,G	Cool, 4°C	48 hours
Nitrate-nitrite	P,G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Nitrite	P,G	Cool, 4°C	48 hours
Oil and Grease	G	Cool, 4°C, Hcl or H_2SO_4 to pH<2	28 days
Organic carbon	P,G	Cool, 4°C, Hcl or H_3PO_4, or H_2SO_4 to pH<2	28 days
Orthophosphate	P,G	Filter immediately, Cool, 4°C	48 hours

ENVIRONMENTAL LABORATORY APPROVAL PROGRAM CERTIFICATION MANUAL

SUBJECT	DATE	PAGE	ITEM NO.
Sample Collection: Requirements for Environmental Analyses/Water	11/1/95	3 of 7	242

ANALYTE	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME
Phenols	G	Cool, 4°C H_2SO_4 to pH<2	28 days
Phosphorus (elemental)	G	Cool, 4°C	48 hours
Phosphorus, total	P,G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Residue, Total	P,G	Cool, 4°C	7 days
Residue, Filterable	P,G	Cool, 4°C	7 days
Residue, Nonfilterable	P,G	Cool, 4°C	7 days
Residue, Volatile	P,G	Cool, 4°C	7 days
Silica	P, Quartz	Cool, 4°C	28 days
Specific Conductance	P,G	Cool, 4°C	28 days
Sulfate	P,G	Cool, 4°C	28 days
Sulfide	P,G	Cool, 4°C, add zinc acetate plus sodium hydroxide to pH>9	7 days
Surfactants	P,G	Cool, 4°C	48 hours
Temperature	P,G	None	Analyze Immediately
Organic Tests:			
Purgeable Halocarbons plus Benzyl Chloride and Epichlorohydrin	G, Teflon-lined septum	Cool, 4°C, Ascorbic Acid (25 mg/40 ml) for residual chlorine	14 days

SUBJECT	DATE	PAGE	ITEM NO.
Sample Collection: Requirements for Environmental Analyses/Water	6/1/95	4 of 7	242

ANALYTE	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME
Purgeable Aromatics	G, Teflon-lined septum	Cool, 4°C, 0.008% $Na_2S_2O_3$ for residual chlorine	14 days
		Preserve as above and HCl to pH<2	14 days
Acrolein and Acrylonitrile	G, Teflon-lined septum	Cool, 4°C, 0.008% $Na_2S_2O_3$ for residual chlorine	14 days for acrylonitrile, 3 days for acrolein
		Preserve as above and pH to 4-5	14 days
Phenols	G, Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$ for residual chlorine	7 days until extraction 40 days after extraction
Benzidines	G, Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$ for residual chlorine	7 days until extraction 7 days after extraction if stored under inert gas
Phthalate Esters	G, Teflon-lined cap	Cool, 4°C	7 days until extraction 40 days after extraction

ENVIRONMENTAL LABORATORY APPROVAL PROGRAM CERTIFICATION MANUAL

SUBJECT	DATE	PAGE	ITEM NO.
Sample Collection: Requirements for Environmental Analyses/Water	6/1/95	5 of 7	242

ANALYTE	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME
Nitrosamines	G, Teflon-lined cap	Cool, 4°C, store in dark, 0.008% $Na_2S_2O_3$ for residual chlorine. For diphenylnitrosamine add 0.008% $Na_2S_2O_3$ and adjust pH 7-10 with NaOH within 24 hours of sampling	7 days until extraction 40 days after extraction
Nitroaromatics and Isophorone	G, Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$ for residual chlorine, store in dark	7 days until extraction 40 days after extraction
PCBs	G, Teflon-lined cap	Cool, 4°C	7 days until extraction 40 days after extraction
Pesticides	G, Teflon-lined cap	Cool, 4°C	72 hours
		Cool, 4°C, pH 5-9, 0.008% $Na_2S_2O_3$ for residual chlorine if aldrin is to be determined	7 days until extraction 40 days after extraction
Polynuclear Aromatic Hydrocarbons	G, Teflon-lined cap	Cool, 4°C, 0.08% $Na_2S_2O_3$ for residual chlorine only, store in dark	7 days until extraction 40 days after extraction

ENVIRONMENTAL LABORATORY APPROVAL PROGRAM CERTIFICATION MANUAL

SUBJECT	DATE	PAGE	ITEM NO.
Sample Collection: Requirements for Environmental Analyses/Water	6/1/95	6 of 7	242

ANALYTE	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME
Haloethers	G, Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$ for residual chlorine only	7 days until extraction 40 days after extraction
Chlorinated Hydrocarbons	G, Teflon-lined cap	Cool, 4°C	7 days until extraction 40 days after extraction
2,3,7,8-Tetrachlorodibenzo-p-Dioxin	G, Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$ for residual chlorine only	7 days until extraction 40 days after extraction
Radiological Tests:			
Gross Alpha	P,G	HCL or HNO_3 to pH<2	6 months
Gross Beta	P,G	HCL or HNO_3 to pH<2	6 months
Strontium-89	P,G	HCL or HNO_3 to pH<2	6 months
Strontium-90	P,G	HCL or HNO_3 to pH<2	6 months
Radium-226	P,G	HCL or HNO_3 to pH<2	6 months
Radium-228	P,G	HCL or HNO_3 to pH<2	6 months
Radon-222	glass with teflon-lined septum	Cool, 4°C	4 days

ENVIRONMENTAL LABORATORY APPROVAL PROGRAM CERTIFICATION MANUAL

SUBJECT	DATE	PAGE	ITEM NO.
Sample Collection: Requirements for Environmental Analyses/Water	6/1/95	7 of 7	242

ANALYTE	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME
Radioactive Cesium	P,G	HCL to pH<2	6 months
Iodine-131	P,G	None	7 days
Tritium	G	None	6 months
Uranium	P,G	HCL or HNO_3 to pH<2	6 months
Photon Emitters	P,G	HCL or HNO_3 to pH<2	6 months
Microscopical Tests:			
Asbestos	P	Cool to 4°C	48 hours
		20 mg/l Hg as $HgCl_2$	6 months

OAKTON™ Model 35650-00

ORPTestr™

Microprocessor Based Pocket Size ORP Tester

BEFORE FIRST USE: Remove plastic strips between batteries and contacts if present (see box side panels). Do not be alarmed if white crystals form around the cap. They are normal and will dissolve during CONDITIONING.

CAUTION: TO AVOID CROSS CONTAMINATION BETWEEN SAMPLES, NEVER IMMERSE THE ELECTRODE ABOVE THE COLOR BAND!

CONDITIONING: Before first use, remove cap and rinse the electrode in water to dissolve any crystals and activate the electrode.

CALIBRATION: Calibration is not necessary unless exact readout agreement with a work standard and at a specific ORP value is needed. To achieve this, use the following procedure:

Select a solution sample from the actual process as near the critical ORP value as possible. Dip the electrode from the work standard and the conditioned ORPTestr into this solution for 2 to 5 minutes until the readings stabilize. Note the reading of the standard.

Press the ORPTestr CAL/CON button. Display will flash "CA", then the ORP reading. If work standard reading is higher, press the HOLD/INC button until the display reads the same value as the work standard. If work standard reads lower, continue pressing the HOLD/INC button until the value displayed scrolls around to the standard's value. Press CAL/CON. "CO" is displayed and offset adjustment is complete. This offset adjustment defaults to factory calibration when batteries are removed/replaced.

ORP TESTING

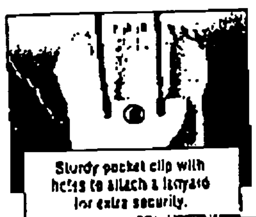
- Remove cap. Press ON/OFF button to turn on.
- Dip the electrode ½" to 1" into test solution and stir once.
- Allow the reading to stabilize 2 to 5 min.
- Press "HOLD" button if you wish to hold the reading ("HO" will be displayed momentarily). Press it again to release it ("HC" will be displayed momentarily).
- Press the ON/OFF button to shut off.
- THERE IS AN AUTOMATIC SHUT-OFF AFTER 8.5 MINUTES TO CONSERVE BATTERIES!

CHANGING BATTERIES: Flip up battery compartment lid (see box side panels). Replace batteries with fresh ones noting polarity as shown in battery compartment.

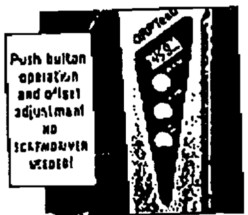
SPECIFICATIONS

Range	-50 to +1050 mV
Resolution	5 mV
Accuracy	±5 mV repeatability
Offset Adjust.	±150 mV—brings ORP into agreement with your work standard.
Operating Temp.	32 to 122°F, 0 to 50°C
Battery/Life	3pcs. 1.4V Eveready EP675HP/ 100 hrs (Silver Oxide battery may be substituted; use model 303. Typical life=70 hrs.)
Wetted Materials	glass, platinum, glass reinforced thermoplastic polyester
Size (meter only)	5.9"L x 1.65"W x 0.94"H
Wt. (meter only)	3.25 oz. (92 gm)

SEE SIDE PANEL FOR ERROR MESSAGE EXPLANATIONS!

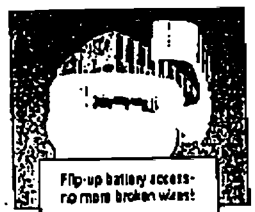


Sturdy pocket clip with holes to attach a lanyard for extra security.



Push button operation and offset adjustment no screwdriver needed!

Clog resistant reference junction recessed for protection.



Flip-up battery access– no more broken wires!

Error messages for self-diagnosis. Reduces guesswork!

ER 1: Means the batteries are low and should be replaced.

OR: Means the ORP signal is out of range or the electrode is damaged.

APPENDIX - D

-PART 360 Expanded, Baseline, and Routine Parameter Lists;
-Class GA and Class C Water Quality Standards; and
-Historical Analytical Data

WATER QUALITY ANALYSIS TABLES

ROUTINE PARAMETERS[1]

Common Name[2]	CAS RN[3]	Suggested Methods	PQL[4] (µg/l)
Field Parameters:			
Static water level........ (in wells and sumps)			
Specific Conductance......		9050	
Temperature...............			
Floaters or Sinkers[5]......			
pH........................		9040	
		9041	
Eh........................			
Dissolved Oxygen[6].........			
Field Observations[7].......			
Turbidity.................		180.1	
Leachate Indicators:			
Total Kjeldahl Nitrogen...		351.1	60
		351.2	
		351.3	
		351.4	200
Ammonia..................	7664-41-7	350.1	60
		350.2	
		350.3	100
Nitrate..................		9200	
Chemical Oxygen Demand....		410.1	50000
		410.2	50000
		410.3	50000
		410.4	80000
Biochemical Oxygen Demand (BOD_5)................		405.1	2000
Total Organic Carbon......		9060	
Total Dissolved Solids....		160.1	40000
Sulfate..................		9035	
		9036	
		9038	
Alkalinity...............		310.1	20000
		310.2	6000
Phenols..................	108-95-2	8040	
Chloride.................		9250	
		9251	
		9252	
Bromide..................		320.1	2000
Total hardness as $CaCO_3$...		130.1	20000
		130.2	30000

ROUTINE PARAMETERS[1]

Common Name[2]	CAS RN[3]	Suggested Methods	PQL[4] (μg/l)
Inorganic Parameters:			
Cadmium..................	(Total)	6010	40
		7130	50
		7131	1
Calcium..................	(Total)	7140	40
Iron......................	(Total)	7380	100
		7381	4
Lead......................	(Total)	6010	400
		7420	1000
		7421	10
Magnesium.................	(Total)	7450	4
Manganese.................	(Total)	7460	40
		7461	0.8
Potassium.................	(Total)	7610	40
Sodium....................	(Total)	7770	8

The department may modify this list as necessary.

Notes

[1]This list contains parameters for which possible analytical procedures are provided in EPA Report SW-846 Test Methods for Evaluating Solid Waste, third edition, November 1986, as revised December 1987, and Methods for Chemical Analysis of Water and Wastes, USEPA-600/4-79-020, March, 1979. The regulatory requirements pertain only to the list of parameters; the right hand columns (Methods and PQL) are given for informational purposes only. See also footnote 4.

[2]Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

[3]Chemical Abstracts Service Registry Number. Where "Total" is entered, all species in the groundwater that contain this element are included.

[4]Practical Quantitation Limits (PQLs) are the lowest concentrations of analytes in groundwaters that can be reliably determined within specified limits of precision and accuracy by the indicated methods under routine laboratory operating conditions. The PQLs listed are generally stated to one significant figure. PQLs are based on 5 ml samples for volatile organics and 1 L samples for semivolatile organics. CAUTION: The PQL values in many cases are based only on a general estimate for the method and not on a determination for individual compounds; PQLs are not a part of the regulation.

[5]Any floaters or sinkers found must be analyzed separately for baseline parameters.

[6]Surface water only.

[7]Any unusual conditions (colors, odors, surface sheens, etc.) noticed during well development, purging, or sampling must be reported.

BASELINE PARAMETERS[1]

Common Name[2]	CAS RN[3]	Suggested Methods	PQL[4] (μg/l)
Field Parameters:			
Static water level........ (in wells and sumps)			
Specific Conductance......		9050	
Temperature...............			
Floaters or Sinkers[5]......			
pH........................		9040	
		9041	
Eh........................			
Dissolved Oxygen[6].........			
Field Observations[7].......			
Turbidity.................		180.1	
Leachate Indicators:			
Total Kjeldahl Nitrogen...		351.1	60
		351.2	
		351.3	
		351.4	200
Ammonia..................	7664-41-7	350.1	60
		350.2	
		350.3	100
Nitrate..................		9200	
Chemical Oxygen Demand....		410.1	50000
		410.2	50000
		410.3	50000
		410.4	80000
Biochemical Oxygen Demand (BOD_5).................		405.1	2000
Total Organic Carbon......		9060	
Total Dissolved Solids....		160.1	40000
Sulfate..................		9035	
		9036	
		9038	
Alkalinity...............		310.1	20000
		310.2	6000
Phenols..................	108-95-2	8040	
Chloride.................		9250	
		9251	
		9252	
Bromide..................	24959-67-9	320.1	2000
Total hardness as $CaCO_3$...		130.1	20000
		130.2	30000
Color....................		110.1	
		110.2	
		110.3	80

BASELINE PARAMETERS[1]

Common Name[2]	CAS RN[3]	Suggested Methods	PQL[4] (μg/l)
Boron......................	7440-42-8		
Inorganic Parameters:			
Aluminum..................	(Total)	7020	10
Antimony..................	(Total)	6010	300
		7040	2000
		7041	30
Arsenic...................	(Total)	6010	500
		7060	10
		7061	20
Barium....................	(Total)	6010	20
		7080	1000
Beryllium.................	(Total)	6010	3
		7090	50
		7091	2
Cadmium...................	(Total)	6010	40
		7130	50
		7131	1
Calcium...................	(Total)	7140	40
Chromium..................	(Total)	6010	70
		7190	500
		7191	10
Chromium (Hexavalent)*....	18540-29-9	7195	
		7196	600
		7197	30
		7198	
Cobalt....................	(Total)	6010	70
		7200	500
		7201	10
Copper....................	(Total)	6010	60
		7210	200
		7211	10
Cyanide...................	(Total)	9010	200
Iron......................	(Total)	7380	100
		7381	4
Lead......................	(Total)	6010	400
		7420	1000
		7421	10
Magnesium.................	(Total)	7450	4
Manganese.................	(Total)	7460	40
		7461	0.8
Mercury...................	(Total)	7470	2
Nickel....................	(Total)	6010	150
		7520	400
Potassium.................	(Total)	7610	40

BASELINE PARAMETERS[1]

Common Name[2]	CAS RN[3]	Suggested Methods	PQL[4] (µg/l)
Selenium..................	(Total)	6010	750
		7740	20
		7741	20
Silver....................	(Total)	6010	70
		7760	100
		7761	10
Sodium....................	(Total)	7770	8
Thallium..................	(Total)	6010	400
		7840	1000
		7841	10
Vanadium..................	(Total)	6010	80
		7910	2000
		7911	40
Zinc......................	(Total)	6010	20
		7950	50
		7951	0.5
Organic Parameters:			
Acetone...................	67-64-1	8260	100
Acrylonitrile.............	107-13-1	8030	5
		8260	200
Benzene...................	71-43-2	8020	2
		8021	0.1
		8260	5
Bromochloromethane........	74-97-5	8021	0.1
		8260	5
Bromodichloromethane......	75-27-4	8010	1
		8021	0.2
		8260	5
Bromoform; Tribromomethane	75-25-2	8010	2
		8021	15
		8260	5
Carbon disulfide..........	75-15-0	8260	100
Carbon tetrachloride......	56-23-5	8010	1
		8021	0.1
		8260	10
Chlorobenzene.............	108-90-7	8010	2
		8020	2
		8021	0.1
		8260	5
Chloroethane; Ethyl chloride.........	75-00-3	8010	5
		8021	1

BASELINE PARAMETERS[1]

Common Name[2]	CAS RN[3]	Suggested Methods	PQL[4] (µg/l)
Chloroform; Trichloromethane........	67-66-3	8010	0.5
		8021	0.2
		8260	5
Dibromochloromethane; Chlorodibromomethane....	124-48-1	8010	1
		8021	0.3
		8260	5
1,2-Dibromo-3-chloropropane; DBCP.............	96-12-8	8011	0.1
		8021	30
		8260	25
1,2-Dibromoethane; Ethylene dibromide; EDB.......	106-93-4	8011	0.1
		8021	10
		8260	5
o-Dichlorobenzene; 1,2-Dichlorobenzene.....	95-50-1	8010	2
		8020	5
		8021	0.5
		8120	10
		8260	5
		8270	10
p-Dichlorobenzene; 1,4-Dichlorobenzene.....	106-46-7	8010	2
		8020	5
		8021	0.1
		8120	15
		8260	5
		8270	10
trans-1,4-Dichloro-2-butene....................	110-57-6	8260	100
1,1-Dichloroethane; Ethylidene chloride.....	75-34-3	8010	1
		8021	0.5
		8260	5
1,2-Dichloroethane; Ethylene dichloride.....	107-06-2	8010	0.5
		8021	0.3
		8260	5
1,1-Dichloroethylene; 1,1-Dichloroethene; Vinylidene chloride.....	75-35-4	8010	1
		8021	0.5
		8260	5
cis-1,2-Dichloroethylene; cis-1,2-Dichloroethene..	156-59-2	8021	0.2
		8260	5
trans-1,2-Dichloroethylene; trans-1,2-Dichloroethene.................	156-60-5	8010	1
		8021	0.5
		8260	5
1,2-Dichloropropane; Propylene dichloride........	78-87-5	8010	0.5
		8021	0.05
		8260	5
cis-1,3-Dichloropropene...	10061-01-5	8010	20
		8260	10
trans-1,3-Dichloropropene.	10061-02-6	8010	5
		8260	10

BASELINE PARAMETERS[1]

Common Name[2]	CAS RN[3]	Suggested Methods	PQL[4] (µg/l)
Ethylbenzene.............	100-41-4	8020	2
		8221	0.05
		8260	5
2-Hexanone; Methyl butyl ketone................	591-78-6	8260	50
Methyl bromide; Bromomethane................	74-83-9	8010	20
		8021	10
Methyl chloride; Chloromethane.................	74-87-3	8010	1
		8021	0.3
Methylene bromide; Dibromomethane..............	74-95-3	8010	15
		8021	20
		8260	10
Methylene chloride; Dichloromethane.........	75-09-2	8010	5
		8021	0.2
		8260	10
Methyl ethyl ketone; MEK; 2-Butanone.............	78-93-3	8015	10
		8260	100
Methyl iodide; Iodomethane	74-88-4	8010	40
		8260	10
4-Methyl-2-pentanone; Methyl isobutyl ketone..	108-10-1	8015	5
		8260	100
Styrene..................	100-42-5	8020	1
		8021	0.1
		8260	10
1,1,1,2-Tetrachloroethane.	630-20-6	8010	5
		8021	0.05
		8260	5
1,1,2,2-Tetrachloroethane.	79-34-5	8010	0.5
		8021	0.1
		8260	5
Tetrachloroethylene; Tetrachloroethene; Perchloroethylene..........	127-18-4	8010	0.5
		8021	0.5
		8260	5
Toluene..................	108-88-3	8020	2
		8021	0.1
		8260	5
1,1,1-Trichloroethane; Methylchloroform........	71-55-6	8010	0.3
		8021	0.3
		8260	5
1,1,2-Trichloroethane.....	79-00-5	8010	0.2
		8260	5
Trichloroethylene; Trichloroethene...........	79-01-6	8010	1
		8021	0.2
		8260	5
Trichlorofluoromethane; CFC-11.................	75-69-4	8010	10
		8021	0.3
		8260	5

BASELINE PARAMETERS[1]

Common Name[2]	CAS RN[3]	Suggested Methods	PQL[4] (μg/l)
1,2,3-Trichloropropane....	96-18-4	8010	10
		8021	5
		8260	15
Vinyl acetate.............	108-05-4	8260	50
Vinyl chloride; Chloroethene..................	75-01-4	8010	2
		8021	0.4
		8260	10
Xylenes...................	1330-20-7	8020	5
		8021	0.2
		8260	5

The department may modify this list as necessary.

Notes

[1]This list contains 47 volatile organics for which possible analytical procedures provided in EPA Report SW-846 Test Methods for Evaluating Solid Waste, third edition, November 1986, as revised December 1987, includes Method 8260; 25 metals for which SW-846 provides either Method 6010 or a method from the 7000 series of methods; and additional parameters for which possible procedures are provided in Methods for Chemical Analysis of Water and Wastes, USEPA-600/4-79-020, March, 1979. The regulatory requirements pertain only to the list of parameters; the right hand columns (Methods and PQL) are given for informational purposes only. See also footnote 4.

[2]Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

[3]Chemical Abstracts Service Registry Number. Where "Total" is entered, all species in the groundwater that contain this element are included.

[4]Practical Quantitation Limits (PQLs) are the lowest concentrations of analytes in groundwaters that can be reliably determined within specified limits of precision and accuracy by the indicated methods under routine laboratory operating conditions. The PQLs listed are generally stated to one significant figure. PQLs are based on 5 ml samples for volatile organics and 1 L samples for semivolatile organics. CAUTION: The PQL values in many cases are based only on a general estimate for the method and not on a determination for individual compounds; PQLs are not a part of the regulation.

[5]Any floaters or sinkers found must be analyzed separately for baseline parameters.

[6]Surface water only.

[7]Any unusual conditions (colors, odors, surface sheens, etc.) noticed during well development, purging, or sampling must be reported.

[8]The department may waive the requirement to analyze Hexavalent Chromium provided that Total and Hexavalent and Trivalent Chromium values do not exceed 0.05 mg/l.

EXPANDED PARAMETERS[1]

Common Name[2]	CAS RN[3]	Suggested Methods[4]	PQL[5] (µg/l)
Field Parameters:			
Static water level........			
(in wells and sumps)			
Specific			
Conductance......		9050	
Temperature...............			
Floaters or Sinkers[6]......			
pH......................			
		9040	
Eh......................		9041	
Dissolved Oxygen[7].........			
Field Observations[8].......			
Turbidity................		180.1	
Leachate Indicators:			
Total Kjeldahl Nitrogen...			
			60
		351.1	
		351.2	
Ammonia..................		351.3	200
	7664-41-7	351.4	60
Nitrate..................		350.1	100
Chemical Oxygen Demand....		350.2	
			50000
		350.3	50000
		9200	50000
		410.1	80000
Biochemical Oxygen Demand		410.2	2000
(BOD_5).................		410.3	
Total Organic Carbon......		410.4	
Total Dissolved Solids....		405.1	
Sulfate..................			40000
		9060	
Alkalinity...............		160.1	
		9035	20000
Phenols..................		9036	6000
Chloride.................	108-95-2	9038	
		310.1	
		310.2	
Bromide..................		8040	
Total hardness as $CaCO_3$...	24959-67-9	9250	2000
		9251	20000
		9252	30000
		320.1	
		130.1	
		130.2	

EXPANDED PARAMETERS[1]

Common Name[2]	CAS RN[3]	Suggested Methods[4]	PQL[5] (µg/l)
Color		110.1	
		110.2	
		110.3	80
Boron	7440-42-8		
Inorganic Parameters:			
Aluminum	(Total)	7020	10
Antimony	(Total)	6010	300
		7040	2000
		7041	30
Arsenic	(Total)	6010	500
		7060	10
		7061	20
Barium	(Total)	6010	20
Beryllium		7080	1000
	(Total)	6010	3
		7090	50
Cadmium		7091	2
	(Total)	6010	40
		7130	50
Calcium		7131	1
Chromium	(Total)	7140	40
	(Total)	6010	70
		7190	500
Chromium (Hexavalent)*		7191	10
	18540-29-9	7195	
		7196	600
		7197	30
Cobalt		7198	
	(Total)	6010	70
		7200	500
Copper		7201	10
	(Total)	6010	60
		7210	200
Cyanide		7211	10
Iron	(Total)	9010	200
	(Total)	7380	100
Lead		7381	4
	(Total)	6010	400
		7420	1000
Magnesium		7421	10
Manganese	(Total)	7450	4
	(Total)	7460	40
Mercury		7461	0.8
	(Total)	7470	2

EXPANDED PARAMETERS[1]

Common Name[2]	CAS RN[3]	Suggested Methods[4]	PQL[5] (µg/l)
Nickel....................	(Total)	6010	150
		7520	400
Potassium................	(Total)	7610	40
Selenium.................		6010	750
	(Total)	7740	20
		7741	20
Silver....................		6010	70
	(Total)		100
		7760	10
Sodium....................		7761	8
Sulfide...................	(Total)	7770	4000
Thallium.................	18496-25-	9030	400
	8	6010	1000
	(Total)	7840	10
Tin.......................		7841	40
Vanadium.................		6010	80
	(Total)	6010	2000
		7910	40
Zinc......................	(Total)	7911	20
		6010	50
		7950	0.5
	(Total)	7951	
Organic Parameters:			
Acenaphthene.............	83-32-9	8100	200
		8270	10
Acenaphthylene...........	208-96-8	8100	200
		8270	10
Acetone..................	67-64-1	8260	100
Acetonitrile; Methyl			
	75-05-8	8015	100
cyanide.................	98-86-2	8270	10
Acetophenone.............			
2-Acetylaminofluorene;	53-96-3	8270	20
2-AAF..................	107-02-8	8030	5
Acrolein.................		8260	100
	107-13-1	8030	5
Acrylonitrile............		8260	200
	309-00-2	8080	0.05
Aldrin...................		8270	10
	107-05-1	8010	5
Allyl chloride...........		8260	10
	92-67-1	8270	20
4-Aminobiphenyl..........	120-12-7	8100	200
Anthracene...............		8270	10

EXPANDED PARAMETERS[1]

Common Name[2]	CAS RN[3]	Suggested Methods[4]	PQL[5] (µg/l)
Benzene..........	71-43-2	8020	2
		8021	0.1
		8260	5
Benzo[a]anthracene;	56-55-3	8100	200
Benzanthracene..........		8270	10
Benzo[b]fluoranthene......	205-99-2	8100	200
		8270	10
Benzo[k]fluoranthene......	207-08-9	8100	200
		8270	10
Benzo[ghi]perylene	191-24-2	8100	200
		8270	10
Benzo[a]pyrene............	50-32-8	8100	200
		8270	10
Benzyl alcohol............	100-51-6	8270	20
alpha-BHC.................	319-84-6	8080	0.05
		8270	10
beta-BHC..................	319-85-7	8080	0.05
		8270	20
delta-BHC.........	319-86-8	8080	0.1
		8270	20
gamma-BHC; Lindane	58-89-9	8080	0.05
		8270	20
Bis(2-chloroethoxy)methane	111-91-1	8110	5
		8270	10
Bis(2-chloroethyl) ether;	111-44-4	8110	3
Dichloroethyl ether.....		8270	10
Bis-(2-chloro-1-methyl-ethyl) ether; 2,2'-Di-	108-60-1	8110	10
		8270	10
chlorodiisopropyl ether; DCIP, See note 9........	117-81-7	8060	20
Bis(2-ethylhexyl)phthalate	74-97-5	8021	0.1
Bromochloromethane;		8260	5
Chlorobromomethane......	75-27-4	8010	1
Bromodichloromethane;		8021	0.2
		8260	5
Dibromochloromethane....	75-25-2	8010	2
Bromoform; Tribromomethane		8021	15
		8260	5
	101-55-3	8110	25
4-Bromophenyl phenyl ether		8270	10
	85-68-7	8060	5
Butyl benzyl phthalate;		8270	10
Benzyl butyl phthalate..	75-15-0	8260	100
Carbon disulfide..........	56-23-5	8010	1
Carbon tetrachloride......		8021	0.1
		8260	10

EXPANDED PARAMETERS[1]

Common Name[2]	CAS RN[3]	Suggested Methods[4]	PQL[5] (µg/l)
Chlordane.................	See Note 10	8080	0.1
		8270	50
p-Chloroaniline...........	106-47-8	8270	20
Chlorobenzene.............	108-90-	8010	2
	7		2
		8020	0.1
		8021	5
Chlorobenzilate...........	510-15-6	8260	10
p-Chloro-m-cresol;	59-50-7	8270	5
		8040	20
4-Chloro-3-methylphenol.	75-00-3	8270	5
Chloroethane;		8010	1
Ethyl chloride..........		8021	10
	67-66-3	8260	0.5
Chloroform;		8010	0.2
Trichloromethane........		8021	5
	91-58-7	8260	10
2-Chloronaphthalene.......		8120	10
	95-57-8	8270	5
2-Chlorophenol............		8040	10
	7005-72-3	8270	40
4-Chlorophenyl		8110	10
phenyl ether............	126-99-8	8270	50
Chloroprene...............		8010	20
	218-01-9	8260	200
Chrysene..................		8100	10
	108-39-4	8270	10
m-Cresol; 3-methylphenol..	95-48-7	8270	10
o-Cresol; 2-methylphenol..	106-44-5	8270	10
p-Cresol; 4-methylphenol..		8270	
2,4-D; 2,4-Dichlorophen-	94-75-7		10
oxyacetic	72-54-8		0.1
acid.........		8150	10
$4,4^1$-DDD..................	72-55-9	8080	0.05
$4,4^1$-DDE..................		8270	10
	50-29-3	8080	0.1
$4,4^1$-DDT..................		8270	10
	2303-16-4	8080	10
Diallate..................	53-70-3	8270	200
Dibenz[a,h]anthracene.....		8270	10
	132-64-9	8100	10
Dibenzofuran..............	124-48-1	8270	1
Dibromochloromethane;		8270	0.3
		8010	5
Chlorodibromomethane....		8021	
		8260	

EXPANDED PARAMETERS[1]

Common Name[2]	CAS RN[3]	Suggested Methods[4]	PQL[5] (µg/l)
1,2-Dibromo-3-chloro-	96-12-8	8011	0.1
propane; DBCP..........		8021	30
		8260	25
1,2-Dibromoethane;	106-93-4	8011	0.1
Ethylene dibromide; EDB.		8021	10
		8260	5
Di-n-butyl phthalate.....	84-74-2	8060	5
o-Dichlorobenzene;			10
1,2-Dichlorobenzene....	95-50-1	8270	2
		8010	5
		8020	0.5
		8021	10
		8120	5
m-Dichlorobenzene;		8260	10
1,3-Dichlorobenzene....	541-73-1	8270	5
		8010	5
		8020	0.2
		8021	10
		8120	5
p-Dichlorobenzene;		8260	10
1,4-dichlorobenzene.....	106-46-7	8270	2
		8010	5
		8020	0.1
		8021	15
		8120	5
3,3[1]-Dichlorobenzidine....		8260	10
trans-1,4-Dichloro-	91-94-1	8270	20
2-butene.................		8270	
Dichlorodifluoromethane;	110-57-6		100
CFC	75-71-8	8260	0.5
12..................		8021	5
1,1-Dichloroethane;	75-34-3	8260	1
Ethyldidene chloride....		8010	0.5
1,2-Dichloroethane;		8021	5
Ethylene dichloride.....	107-06-2	8260	0.5
		8010	0.3
1,1-Dichloroethylene;		8021	5
1,1-Dichloroethene;	75-35-4	8260	1
Vinylidene		8010	0.5
chloride.....		8021	5
cis-1,2-Dichloroethylene;	156-59-2	8260	0.2
cis-1,2-Dichloroethene..		8021	5
trans-1,2-Dichloroethylene	156-60-5	8260	1
trans-1,2-Dichloroethene		8010	0.5
		8021	5
2,4-Dichlorophenol........	120-83-2	8260	5
		8040	10
		8270	

EXPANDED PARAMETERS[1]

Common Name[2]	CAS RN[3]	Suggested Methods[4]	PQL[5] (µg/l)
2,6-Dichlorophenol........	87-65-0	8270	10
1,2-Dichloropropane;	78-87-5	8010	0.5
Propylene		8021	0.05
dichloride....		8260	5
1,3-Dichloropropane;	142-28-9	8021	0.3
Trimethylene dichloride.		8260	5
2,2-Dichloropropane;	594-20-7	8021	0.5
Isopropylidene		8260	15
chloride.	563-58-6	8021	0.2
1,1-Dichloropropene		8260	5
cis-1,3-Dichloropropene...	10061-01-5	8010	20
		8260	10
trans-1,3-Dichloropropene.	10061-02-6	8010	5
		8260	10
Dieldrin..................	60-57-1	8080	0.05
		8270	10
Diethyl phthalate.........	84-66-2	8060	5
		8270	10
O,O-Diethyl O-2-pyrazinyl	297-97-2	8141	5
phosphorothioate;		8270	20
Thionazin...............	60-51-5	8141	3
Dimethoate................		8270	20
p-(Dimethylamino)azo-			
benzene.................	60-11-7	8270	10
7,12-Dimethylbenz[a]-			
	57-97-6	8270	10
anthracene..............	119-93-7	8270	10
3,3^1-Dimethylbenzidine....	105-67-9	8040	5
2,4-Dimethylphenol;		8270	10
m-Xylenol...............	131-11-3	8060	5
Dimethyl phthalate........		8270	10
m-Dinitrobenzene..........	99-65-0	8270	20
4,6-Dinitro-o-cresol 4,6-	534-52-1	8040	150
Dinitro-2-		8270	50
methylphenol..	51-28-5	8040	150
2,4-Dinitrophenol.........		8270	50
2,4-Dinitrotoluene........	121-14-2	8090	0.2
		8270	10
2,6-Dinitrotoluene........	606-20-2	8090	0.1
		8270	10
Dinoseb; DNBP; 2-sec-	88-85-7	8150	1
Butyl-4,6-dinitrophenol.		8270	20
Di-n-octyl phthalate......	117-84-0	8060	30
		8270	10

EXPANDED PARAMETERS[1]

Common Name[2]	CAS RN[3]	Suggested Methods[4]	PQL[5] (µg/l)
Diphenylamine.....	122-39-4	8270	10
Disulfoton...............	298-04-4	8140	2
		8141	0.5
Endosulfan I.............		8270	10
	959-98-8	8080	0.1
Endosulfan II............		8270	20
	33213-65-9	8080	0.05
Endosulfan sulfate........		8270	20
Endrin....................	1031-07-8	8080	0.5
		8270	10
Endrin aldehyde...........	72-20-8	8080	0.1
Ethylbenzene..............		8270	20
	7421-93-4		0.2
		8080	10
Ethyl methacrylate........	100-41-4	8270	2
		8020	0.05
Ethyl methanesulfonate....		8221	5
Famphur..................	97-63-2	8260	5
Fluoranthene.............		8015	10
		8260	10
Fluorene.................	62-50-0	8270	20
	52-85-	8270	20
Heptachlor...............	7		200
	206-44-0	8270	10
Heptachlor epoxide........		8100	200
	86-73-7	8270	10
Hexachlorobenzene.........		8100	0.05
	76-44-8	8270	10
Hexachlorobutadiene.......		8080	1
	1024-57-3	8270	10
		8080	0.5
Hexachlorocyclopentadiene.	118-74-1	8270	10
		8120	0.5
	87-68-3	8270	5
Hexachloroethane..........		8021	10
		8120	10
	77-47-4	8260	5
Hexachloropropene.........		8270	10
2-Hexanone; Methyl butyl		8120	0.5
	67-72-1	8270	10
ketone.............		8120	10
Indeno(1,2,3-cd)pyrene....		8260	10
	1888-71-7	8270	
		8270	50
	591-78-6		200
	193-39-5	8260	10
		8100	
		8270	

EXPANDED PARAMETERS[1]

Common Name[2]	CAS RN[3]	Suggested Methods[4]	PQL[5] (µg/l)
Isobutyl alcohol..........	78-83-1	8015	50
		8240	100
Isodrin..................	465-73-6	8270	20
		8260	10
Isophorone...............	78-59-1	8090	60
		8270	10
Isosafrole...............	120-58-1	8270	10
Kepone...................	143-50-0	8270	20
Methacrylonitrile.........	126-98-	8015	5
	7	8260	100
Methapyrilene.............		8270	100
Methoxychlor..............	91-80-5	8080	2
	72-43-5	8270	10
Methyl bromide;		8010	20
Bromomethane............	74-83-9	8021	10
Methyl chloride;		8010	1
	74-87-3	8021	0.3
Chloromethane...........		8270	10
3-Methylcholanthrene......	56-49-5	8015	10
Methyl ethyl ketone; MEK;	78-93-3	8260	100
2-Butanone..............		8010	40
Methyl iodide; Iodomethane	74-88-4	8260	10
		8015	2
Methyl methacrylate.......	80-62-6	8260	30
		8270	10
Methyl methanesulfonate...	66-27-3	8270	10
2-Methylnaphthalene.......	91-57-6	8140	0.5
Methyl parathion;	298-00-0	8141	1
Parathion		8270	10
methyl........		8015	5
4-Methyl-2-pentanone;	108-10-1	8260	100
Methyl isobutyl ketone..		8010	15
Methylene bromide;	74-95-3	8021	20
		8260	10
Dibromomethane..........		8010	5
Methylene chloride;	75-09-2	8021	0.2
Dichloromethane.........		8260	10
		8021	0.5
Naphthalene...............	91-20-3	8100	200
		8260	5
		8270	10
		8270	10
1,4-Naphthoquinone........	130-15-4		10
1-Naphthylamine...........	134-32-	8270	10
2-Naphthylamine...........	7	8270	
o-Nitroaniline;	91-59-8		50
		8270	
2-Nitroaniline..........	88-74-4		

EXPANDED PARAMETERS[1]

Common Name[2]	CAS RN[3]	Suggested Methods[4]	PQL[5] (μg/l)
m-Nitroaniline;			
3-Nitroanile...........	99-09-2	8270	50
p-Nitroaniline;			
	100-01-6	8270	20
4-Nitroaniline..........	98-95-	8090	40
Nitrobenzene.............	3	8270	10
	88-75-5	8040	5
o-Nitrophenol;		8270	10
2-Nitrophenol...........	100-02-7	8040	10
p-Nitrophenol;		8270	50
4-	924-16-3	8270	10
Nitrophenol...........	55-18-	8270	20
N-Nitrosodi-n-butylamine..	5	8070	2
N-Nitrosodiethylamine.....	62-75-9	8070	5
N-Nitrosodimethylamine....	86-30-6		
N-Nitrosodiphenylamine....			
N-Nitrosodipropylamine;			
N-Nitroso-N-dipropyl-		8070	10
amine; Di-n-propylni-	621-64-7	8270	10
	10595-95-6	8270	20
trosamine..............	100-75-4	8270	40
N-Nitrosomethylethalamine.	930-55-2	8270	10
N-Nitrosopiperidine.......	99-55-	8141	0.5
N-Nitrosopyrrolidine......	8	8270	10
5-Nitro-o-toluidine.......	56-38-2	8270	10
Parathion................		8270	20
	608-93-5	8040	5
Pentachlorobenzene........	82-68-8	8270	50
Pentachloronitrobenzene...	87-86-	8270	20
Pentachlorophenol.........	5	8100	200
		8270	10
Phenacetin................	62-44-2	8040	1
Phenanthrene.............	85-01-8	8270	10
		8140	2
Phenol...................	108-95-2	8141	0.5
p-Phenylenediamine........	106-50-3	8270	10
Phorate..................	298-02-2	8080	50
		8270	200
		8280	0.01
Polychlorinated biphenyls;	See Note 11		
PCB's; Aroclors.........		8280	0.01
Polychlorinated dibenzo-p-	See Note 12		
dioxins; PCDD's.........		8270	10
Polychlorinated dibenzo-	See Note 13	8015	60
furans; PCDF's..........		8260	150
Pronamide................	23950-58-5	8100	200
Propionitrile;	107-12-	8270	10
Ethyl	0		
cyanide...........			
Pyrene...................	129-00-0		

EXPANDED PARAMETERS[1]

Common Name[2]	CAS RN[3]	Suggested Methods[4]	PQL[5] (µg/l)
Safrole..................	94-59-7	8270	10
Silvex; 2,4,5-TP..........	93-72-1	8150	2
Styrene..................	100-42-	8020	1
	5	8021	0.1
		8260	10
2,4,5-T; 2,4,5-trichloro-			
phenoxyacetic acid......		8150	2
1,2,4,5-Tetrachlorobenzene	93-76-5	8270	10
2,3,7,8-Tetrachlorodi-	95-94-3		
benzo-p-dioxin;			
2,3,7,8-TCDD............		8280	0.005
1,1,1,2-Tetrachloroethane.	1746-01-6	8010	5
	630-20-	8021	0.05
	6	8260	5
1,1,2,2-Tetrachloroethane.		8010	0.5
		8021	0.1
	79-34-5	8260	5
Tetrachloroethylene;		8010	0.5
Tetrachloroethene;		8021	0.5
	127-18-4	8260	5
Perchloroethylene.......		8270	10
2,3,4,6-Tetrachlorophenol.		8020	2
Toluene..................	58-90-2	8021	0.1
	108-88-	8260	5
	3	8270	10
o-Toluidine..............		8080	2
Toxaphene................		8021	0.3
1,2,4-Trichlorobenzene....	95-53-4	8120	0.5
	See Note 14	8260	10
	120-82-	8270	10
	1	8010	0.3
1,1,1-Trichloroethane;		8021	0.3
Methylchloroform........		8260	5
	71-55-6	8010	0.2
1,1,2-Trichloroethane.....		8260	5
		8010	1
Trichloroethylene;	79-00-5	8021	0.2
Trichloroethene.........		8260	5
	79-01-6	8010	10
Trichlorofluoromethane;		8021	0.3
CFC-11.................		8260	5
	75-69-4	8270	10
2,4,5-Trichlorophenol.....		8040	5
2,4,6-Trichlorophenol.....		8270	10
	95-95-4	8010	10
1,2,3-Trichloropropane....	88-06-2	8021	5
		8260	15
	96-18-4		

EXPANDED PARAMETERS[1]

Common Name[2]	CAS RN[3]	Suggested Methods[4]	PQL[5] (μg/l)
0,0,0-Triethyl phosphorothioate.................	126-68-1	8270	10
sym-Trinitrobenzene.......	99-35-4	8270	10
Vinyl acetate.............	108-05-4	8260	50
Vinyl chloride;	75-01-4	8010	2
		8021	0.4
Chloroethene............		8260	10
Xylene (total)...........		8020	5
	See Note 15	8021	0.2
		8260	5

The department may modify this list as necessary.

EXPANDED PARAMETERS

Notes

[1]The regulatory requirements pertain only to the list of substances; the right hand columns (Methods and PQL) are given for informational purposes only. See also footnotes 5 and 6.

[2]Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

[3]Chemical Abstracts Service registry number. Where "Total" is entered, all species in the groundwater that contain this element are included.

[4]Suggested Methods refer to analytical procedure numbers used in EPA Report SW-846 *Test Methods for Evaluating Solid Waste*, third edition, November 1986, as revised, December 1987 and *Methods for Chemical Analysis of Water and Wastes*, USEPA-600-4/79-020, March, 1979. CAUTION: The methods listed are representative procedures and may not always be the most suitable method(s) for monitoring an analyte under the regulations.

[5]Practical Quantitation Limits (PQLs) are the lowest concentrations of analytes in groundwaters that can be reliably determined within specified limits of precision and accuracy by the indicated methods under routine laboratory operating conditions. The PQLs listed are generally stated to one significant figure. PQLs are based on 5 ml samples for volatile organics and 1 L samples for semivolatile organics. CAUTION: The PQL values in many cases are based only on a general estimate for the method and not on a determination for individual compounds; PQLs are not a part of the regulation.

[6]Any floaters or sinkers found must be analyzed separately for baseline parameters.

[7]Surface water only.

[8]Any unusual conditions (colors, odors, surface sheens, etc.) noticed during well development, purging, or sampling must be reported.

[9]This substance is often called Bis(2-chloroisopropyl) ether, the name Chemical Abstracts Service applies to its noncommercial isomer, Propane, 2,2"-oxybis[2-chloro- (CAS RN 39638-32-9).

[10]Chlordane: This entry includes alpha-chlordane (CAS RN 5103-71-9), beta-chlordane (CAS RN 5103-74-2), gamma-chlordane (CAS RN 5566-34-7), and constituents of chlordane (CAS RN 57-74-9 and CAS RN 12789-03-6). PQL shown is for technical chlordane. PQLs of specific isomers are about 20 µg/l by method 8270.

[11]Polychlorinated biphenyls (CAS RN 1336-36-3): This category contains congener chemicals, including constituents of Aroclor 1016 (CAS RN 12674-11-2), Aroclor 1221 (CAS RN 11104-28-2), Aroclor 1232 (CAS RN 11141-16-5), Aroclor 1242 (CAS RN 53469-21-9), Aroclor 1248 (CAS RN 12672-29-6), Aroclor 1254 (CAS RN 11097-69-1), and Aroclor 1260 (CAS RN 11096-82-5). The PQL shown is an average value for PCB congeners.

[12]Polychlorinated dibenzo-p-dioxins: This category contains congener chemicals, including tetrachlorodibenzo-p-dioxins (see also 2,3,7,8-TCDD), pentachlorodibenzo-p-dioxins, and hexachlorodibenzo-p-dioxins. The PQL shown is an average value for PCDD congeners. Upon request of the applicant, the department may waive the requirement to analyze for dioxins, where appropriate.

[13]Polychlorinated dibenzofurans: This category contains congener chemicals, including tetrachlrodibenzofurans, pentachlorodibenzofurans, and hexachlorodibenzofurans. The PQL shown is an average value for PCDF congeners. Upon request of the applicant, the department may waive the requirement to analyze for furans, where appropriate.

[14]Toxaphene: This entry includes congener chemicals contained in technical toxaphene (CAS RN 8001-35-2), i.e., chlorinated camphene.

[15]Xylene (total): This entry includes o-xylene (CAS RN 96-47-6), m-xylene (CAS RN 108-38-3), p-xylene (CAS RN 106-42-3), and unspecified xylenes (dimethylbenzenes) (CAS RN 1330-20-7). PQLs for method 8021 are 0.2 for o-xylene and 0.1 for m- or p-xylene. The PQL for m-xylene is 2.0 µg/L by method 8020 or 8260.

[*]The department may waive the requirement to analyze Hexavalent Chromium provided that Total and Hexavalent and

Methods, Detection Limits, and Chemical Abstract Service Numbers

Parameter	Method	Det. Limit	CAS#
Static Water Level			
pH	E(150.1)	2.0-12.5SU	
Temperature	E(170.1)		
Field Specific Conductivity	E(120.1)	1umhos/cm	
Field Turbidity	E(180.1)	0.02NTU	
Field Eh			
Field Dissolved Oxygen	E(360.1)	1mg/l	
BOD5	E(405.1)	2mg/l	
Nitrate-Nitrogen	E(353.1)	0.2mg/l	
Hexavalent Chromium	SM14(307B)	0.10mg/l	
Turbidity	E(180.1)	0.02NTU	
Total Alkalinity	E(310.2)	10mg/lCaCO3	
Color	E(110.2)	1Unit	
Total Dissolved Solids	E(160)	1mg/l	
Sulfate	E(375.4)	5mg/l	
Chloride	E(325.3)	1mg/l	
Total Kjeldahl Nitrogen	E(351.2)	0.5mg/l	
Ammonia-Nitrogen	E(350.1)	0.5mg/l	
TOC	E(415.1)	1mg/l	
COD	Hach(8000)	20mg/l	
Calculated Hardness	EPA(200.7)		
Total Cyanide	E(335.2)	0.01mg/l	57-12-5
Total Phenols	E(420.1)	0.005mg/l	108-95-2
Total Boron	EPA(212.3)	0.1mg/l	7440-42-8
Total Aluminum	EPA(200.7)	0.5mg/l	7429-90-
Dissolved Aluminum	EPA(200.7)	0.5mg/l	
Total Antimony by furnace method	E(204.2)	0.003mg/l	7440-36-0
Dissolved Antimony by furnace method	E(204.2)	0.003mg/l	
Total Arsenic by furnace method	E(206.2)	0.001mg/l	7440-38-2
Dissolved Arsenic by furnace method	E(206.2)	0.001mg/l	
Total Barium	EPA(200.7)	0.3mg/l	7440-39-3
Dissolved Barium	EPA(200.7)	0.3mg/l	
Total Beryllium	EPA(200.7)	0.005mg/l	7440-41-7
Dissolved Beryllium	EPA(200.7)	0.005mg/l	
Total Cadmium	EPA(200.7)	0.005mg/l	7440-43-9
Dissolved Cadmium	EPA(200.7)	0.005mg/l	
Total Calcium	EPA(200.7)	0.05mg/l	7440-70-2
Dissolved Calcium	EPA(200.7)	0.05mg/l	
Total Chromium	EPA(200.7)	0.05mg/l	7440-47-3
Dissolved Chromium	EPA(200.7)	0.05mg/l	
Total Copper	EPA(200.7)	0.02mg/l	7440-50-8
Dissolved Copper	EPA(200.7)	0.02mg/l	
Total Iron	EPA(200.7)	0.03mg/l	7439-89-6
Dissolved Iron	EPA(200.7)	0.03mg/l	
Total Lead by furnace method	E(239.2)	0.001mg/l	7439-92-1
Dissolved Lead by furnace method	E(239.2)	0.001mg/l	
Total Magnesium	EPA(200.7)	0.05mg/l	7439-95-4
Dissolved Magnesium	EPA(200.7)	0.05mg/l	
Total Manganese	EPA(200.7)	0.02mg/l	7439-96-5
Dissolved Manganese	EPA(200.7)	0.02mg/l	
Total Mercury	E(245.1)	0.0004mg/l	7439-97-6
Dissolved Mercury	E(245.1)	0.0004mg/l	

Total Nickel	EPA(200.7)	0.03mg/l	7440-02-0
Dissolved Nickel	EPA(200.7)	0.03mg/l	
Total Potassium	E(258.1)	0.05mg/l	7440-09-7
Dissolved Potassium	E(258.1)	0.05mg/l	
Total Selenium by furnace method	E(270.2)	0.001mg/l	7782-49-2
Dissolved Selenium by furnace method	E(270.2)	0.001mg/l	
Total Silver	EPA(200.7)	0.05mg/l	7440-22-4
Dissolved Silver	EPA(200.7)	0.05mg/l	
Total Sodium	E(273.1)	0.5mg/l	7440-23-5
Dissolved Sodium	E(273.1)	0.5mg/l	
Total Thallium by furnace method	E(279.2)	0.003mg/l	7440-28-0
Dissolved Thallium by furnace method	E(279.2)	0.003mg/l	
Total Zinc	EPA(200.7)	0.01mg/l	7440-66-6
Dissolved Zinc	EPA(200.7)	0.01mg/l	
EPA 601			
Bromodichloromethane	E(601)	1ug/l	75-27-4
Bromoform	E(601)	1ug/l	75-25-2
Bromomethane	E(601)	1ug/l	74-83-9
Carbon Tetrachloride	E(601)	1ug/l	56-23-5
Chlorobenzene	E(601)	1ug/l	108-90-7
Chloroethane	E(601)	1ug/l	75-00-3
2-Chloroethylvinyl Ether	E(601)	1ug/l	100-75-8
Chloroform	E(601)	1ug/l	67-66-3
Chloromethane	E(601)	1ug/l	74-87-3
Dibromochloromethane	E(601)	1ug/l	124-48-1
1,2-Dichlorobenzene	E(601)	1ug/l	95-50-1
1,3-Dichlorobenzene	E(601)	1ug/l	541-73-1
1,4-Dichlorobenzene	E(601)	1ug/l	106-46-7
Dichlorodifluoromethane	E(601)	1ug/l	75-71-8
1,1-Dichloroethane	E(601)	1ug/l	75-34-3
1,2-Dichloroethane	E(601)	1ug/l	107-06-2
1,1-Dichloroethene	E(601)	1ug/l	75-35-4
trans-1,2-Dichloroethene	E(601)	1ug/l	156-60-5
1,2-Dichloropropane	E(601)	1ug/l	78-87-5
cis-1,3-Dichloropropene	E(601)	1ug/l	10061-01-5
trans-1,3-Dichloropropene	E(601)	1ug/l	10061-02-6
Methylene Chloride	E(601)	1ug/l	75-09-02
1,1,2,2-Tetrachloroethane	E(601)	1ug/l	79-34-5
Tetrachloroethene	E(601)	1ug/l	127-18-4
1,1,1-Trichloroethane	E(601)	1ug/l	71-55-6
1,1,2-Trichloroethane	E(601)	1ug/l	79-00-5
Trichloroethene	E(601)	1ug/l	79-01-6
Trichlorofluoromethane	E(601)	1ug/l	79-69-4
Vinyl Chloride	E(601)	1ug/l	75-01-4

EPA 602			
Benzene	E(602)	1ug/l	71-43-2
Chlorobenzene	E(602)	1ug/l	108-90-7
1,2-Dichlorobenzene	E(602)	1ug/l	95-50-1
1,3-Dichlorobenzene	E(602)	1ug/l	541-73-1
1,4-Dichlorobenzene	E(602)	1ug/l	106-46-7
Ethylbenzene	E(602)	1ug/l	100-41-4
Toluene	E(602)	1ug/l	108-88-3
m-Xylene	E(602)	1ug/l	108-38-3
p-Xylene	E(602)	1ug/l	106-42-3
o-Xylene	E(602)	1ug/l	95-47-6
EPA 624			
Chloromethane	E(624)	3ug/l	74-87-3
Bromomethane	E(624)	3ug/l	74-83-9
Vinyl Chloride	E(624)	3ug/l	75-01-4
Chloroethane	E(624)	3ug/l	75-00-3
Methylene Chloride	E(624)	3ug/l	75-09-2
Trichlorofluoromethane	E(624)	3ug/l	75-69-4
1,1-Dichloroethylene	E(624)	3ug/l	75-35-4
t-1,2-Dichloroethylene	E(624)	3ug/l	156-60-5
1,1-Dichloroethane	E(624)	3ug/l	75-34-3
Chloroform	E(624)	3ug/l	67-66-3
1,2-Dichloroethane	E(624)	3ug/l	107-06-2
1,1,1-Trichloroethane	E(624)	3ug/l	71-55-6
Benzene	E(624)	3ug/l	71-43-2
Carbon Tetrachloride	E(624)	3ug/l	56-23-5
1,2-Dichloropropane	E(624)	3ug/l	78-87-5
Bromodichloromethane	E(624)	3ug/l	75-27-4
Trichloroethylene	E(624)	3ug/l	79-01-6
c-1,3-Dichloroproprpene	E(624)	3ug/l	10061-01-5
t-1,3-Dichloroproprpene	E(624)	3ug/l	10061-02-6
1,1,2-Trichloroethane	E(624)	3ug/l	79-00-5
Toluene	E(624)	3ug/l	108-88-3
Dibromochloromethane	E(624)	3ug/l	124-48-1
Tetrachloroethylene	E(624)	3ug/l	127-18-4
2-Chloroethylvinyl Ether	E(624)	3ug/l	110-75-8
Chlorobenzene	E(624)	3ug/l	108-90-7
Ethylbenzene	E(624)	3ug/l	100-41-4
Bromoform	E(624)	3ug/l	75-25-2
1,1,2,2-Tetrachloroethane	E(624)	3ug/l	79-34-5
1,2-Dichlorobenzene	E(624)	3ug/l	95-50-1
1,3-Dichlorobenzene	E(624)	3ug/l	541-73-1
1,4-Dichlorobenzene	E(624)	3ug/l	106-46-7
Total Xylenes	E(624)	3ug/l	1330-20-7

EPA 625			
Phenol	E(625)	5ug/l	108-95-2
2-Chlorophenol	E(625)	5ug/l	95-57-8
2-Nitrophenol	E(625)	5ug/l	88-75-5
2,4-Dimethylphenol	E(625)	5ug/l	105-67-9
2,4-Dichlorophenol	E(625)	5ug/l	120-83-2
4-Chloro-3-Methylphenol	E(625)	5ug/l	59-50-7
2,4,6-Trichlorophenol	E(625)	5ug/l	88-06-2
2,4-Dinitrophenol	E(625)	50ug/l	51-28-5
4-Nitrophenol	E(625)	50ug/l	100-02-7
2-Methyl-4,6-Dinitrophenol	E(625)	50ug/l	534-52-1
Pentachlorophenol	E(625)	10ug/l	87-86-5
Bis(2-chloroethyl)Ether	E(625)	5ug/l	111-44-4
1,3-Dichlorobenzene	E(625)	5ug/l	541-73-1
1,4-Dichlorobenzene	E(625)	5ug/l	106-46-7
1,2-Dichlorobenzene	E(625)	5ug/l	95-50-1
Bis(2-chloroisopropyl)Ether	E(625)	5ug/l	108-60-1
Hexachloroethane	E(625)	5ug/l	67-72-1
Nitrobenzene	E(625)	5ug/l	98-95-3
N-Nitrosodipropylamine	E(625)	5ug/l	621-64-7
Isophorone	E(625)	5ug/l	78-59-1
Bis(2-chloroethoxy)Methane	E(625)	5ug/l	111-91-1
1,2,4-Trichlorobenzene	E(625)	5ug/l	120-82-1
Naphthalene	E(625)	5ug/l	91-20-3
Hexachlorobutadiene	E(625)	5ug/l	87-68-3
Hexachlorocyclopentadiene	E(625)	5ug/l	77-47-4
2-Chloronaphthalene	E(625)	5ug/l	91-58-7
Dimethylphthalate	E(625)	5ug/l	131-11-3
Acenaphthylene	E(625)	5ug/l	208-96-8
2,6-Dinitrotoluene	E(625)	5ug/l	606-20-2
Acenaphthene	E(625)	5ug/l	83-32-9
2,4-Dinitrotoluene	E(625)	5ug/l	121-14-2
Fluorene	E(625)	5ug/l	86-73-7
Diethyl Phthalate	E(625)	5ug/l	84-66-2
4-Chlorophenylphenyl Ether	E(625)	5ug/l	7005-72-3
N-Nitrosodiphenylamine	E(625)	5ug/l	86-30-6
4-Bromophenylphenyl Ether	E(625)	5ug/l	101-55-3
Hexachlorobenzene	E(625)	5ug/l	118-74-1
Phenanthrene	E(625)	5ug/l	85-01-8
Anthracene	E(625)	5ug/l	120-12-7
Di-n-butyl Phthalate	E(625)	5ug/l	84-74-2
Fluoranthene	E(625)	5ug/l	206-44-0
Benzidine	E(625)	5ug/l	92-87-5
Pyrene	E(625)	5ug/l	129-00-0
Butyl Benzyl Phthalate	E(625)	5ug/l	85-68-7
3,3'-Dichlorobenzidine	E(625)	5ug/l	91-94-1
Chrysene	E(625)	5ug/l	218-01-9
Benzo(a)Anthracene	E(625)	5ug/l	56-55-3
Bis(2-ethylhexyl)Phthalate	E(625)	5ug/l	117-81-7
Di-n-octyl Phthalate	E(625)	5ug/l	117-84-0
Benzo(b)Fluoranthene	E(625)	5ug/l	205-99-2
Benzo(k)Fluoranthene	E(625)	5ug/l	207-08-9
Benzo(a)Pyrene	E(625)	5ug/l	50-32-8
Indeno(1,2,3-cd)Pyrene	E(625)	10ug/l	193-39-5
Dibenzo(a,h)Anthracene	E(625)	10ug/l	53-70-3
Benzo(ghi)Perylene	E(625)	10ug/l	191-24-2

EPA 608			
BHC (a-isomer)	E(608)	1ug/l	319-84-6
BHC (g-isomer)	E(608)	1ug/l	58-89-9
BHC (b-isomer)	E(608)	1ug/l	319-85-7
Heptachlor	E(608)	1ug/l	76-44-8
BHC (d-isomer)	E(608)	1ug/l	319-86-8
Aldrin	E(608)	1ug/l	309-00-2
Heptachlor Epoxide	E(608)	10ug/l	1024-57-3
Endosulfan (a-isomer)	E(608)	1ug/l	959-98-8
Dieldrin	E(608)	1ug/l	60-57-1
4,4´-DDE	E(608)	1ug/l	72-55-9
4,4´-DDD	E(608)	1ug/l	72-54-8
Endrin	E(608)	1ug/l	72-20-8
Endosulfan (b-isomer)	E(608)	1ug/l	33213-65-9
4,4´-DDT	E(608)	1ug/l	50-29-3
Endrin Aldehyde	E(608)	3ug/l	7421-93-4
Endosulfan Sulfate	E(608)	10ug/l	1031-07-8
Chlordane	E(608)	3ug/l	57-74-9
Toxaphene	E(608)	5ug/l	8001-35-2
Aroclor 1016	E(608)	1ug/l	12674-11-2
Aroclor 1221	E(608)	1ug/l	11104-28-2
Aroclor 1232	E(608)	1ug/l	11141-16-5
Aroclor 1242	E(608)	1ug/l	53469-2
Aroclor 1248	E(608)	1ug/l	12672-29-6
Aroclor 1254	E(608)	1ug/l	11097-69-1
Aroclor 1260	E(608)	1ug/l	11096-82-5
1,2-Diphenylhydrazine	E(625)	5ug/l	
N-Nitrosodimethylamine	E(625)	5ug/l	
Benzidine	E(625)	50ug/l	
2,3,7,8-TCDD	E(625) Section 17	10ug/l	
Bis(chloromethyl)Ether	E(624)	100ug/l	
TCLP Arsenic	EPA(200.7)	0.5mg/l	
TCLP Barium	EPA(200.7)	0.3mg/l	
TCLP Cadmium	EPA(200.7)	0.005mg/l	
TCLP Chromium	EPA(200.7)	0.05mg/l	
TCLP Lead	EPA(200.7)	0.1mg/l	
TCLP Mercury	E(245.1)	0.0004mg/l	
TCLP Selenium	EPA(200.7)	0.5mg/l	
TCLP Silver	EPA(200.7)	0.05mg/l	
EPA 8270 (TCLP Semi-Volatiles)			
o-Cresol	E(8270)	50ug/l	
m-Cresol	E(8270)	50ug/l	
p-Cresol	E(8270)	50ug/l	
Nitrobenzene	E(8270)	50ug/l	
Pentachlorophenol	E(8270)	100ug/l	
Pyridine	E(8270)	50ug/l	

2,4,5-Trichlorophenol	E(8270)	50ug/l
2,4,6-Trichlorophenol	E(8270)	50ug/l
2,4-Dinitrotoluene	E(8270)	50ug/l
Hexachlorobenzene	E(8270)	50ug/l
Hexachlorobutadiene	E(8270)	50ug/l
Hexachloroethane	E(8270)	50ug/l
EPA 8240 (TCLP Volatiles)		
Carbon Tetrachloride	E(8240)	30ug/l
Chlorobenzene	E(8240)	30ug/l
Methyl Ethyl Ketone	E(8240)	100ug/l
Tetrachloroethylene	E(8240)	30ug/l
Trichloroethylene	E(8240)	30ug/l
Benzene	E(8240)	30ug/l
Chloroform	E(8240)	30ug/l
1,2-Dichloroethane	E(8240)	30ug/l
1,1-Dichloroethylene	E(8240)	30ug/l
1,4-Dichlorobenzene	E(8240)	30ug/l
Vinyl Chloride	E(8240)	30ug/l
EPA 8150 (TCLP Herbicides)		
2,4-D	E(8150)	100ug/l
2,4,5-TP	E(8150)	10ug/l
EPA 8080 (TCLP Pesticides)		
Chlordane	E(8080)	20ug/l
Endrin	E(8080)	15ug/l
Heptachlor	E(8080)	6ug/l
Lindane	E(8080)	15ug/l
Methoxychlor	E(8080)	15ug/l
Toxaphene	E(8080)	50ug/l
Heptachlor Epoxide	E(8080)	6ug/l

The QA/QC protocols were followed according to the methods documented above.

<u>Method Reference Key</u>:

SM14 = "Standard Methods for the Examination of Water and Wastewater," 14th Edition, 1976.

E = "Methods for Chemical Analysis of Water and Wastes," U.S. Environmental Protecti Agency, EPA-600/4-79-020, March 1979.

EPA = "Part VIII Environmental Protection Agency 40 CFR, Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean W Act; Final Rule and Interim Final Rule and Proposed Rule, October 26, 1984."

Hach = Hach Handbook of Water Analysis, 1979, Hach Chemical Corp.

GROUNDWATER ANALYTICAL DATA - INORGANIC AND METAL PARAMETERS

Parameter	Units	Class GA Standard	Class GA Guidance	
Sample Collection Date				
pH	S.U.	6.5-8.5		
Eh	m.volts			
Specific Conductivity	umho/cm			
Dissolved Oxygen	mg/l			
TKN	mg/l			
Ammonia	mg/l	2		
Nitrate	mg/l	10		
COD	mg/l			
BOD-5	mg/l			
TOC	mg/l			
Total Dissolved Soilds	mg/l	500		
Sulfate	mg/l	250		
Alkalinity	mg/l			
Phenols	mg/l	0.001		
Chloride	mg/l	250		
Hardness	mg/l			
Turbidity	NTU			
Color	Color Units			
Boron	mg/l	1		
Total Cyanide	mg/l	0.1		
Potassium	mg/l			
Sodium	mg/l	20		
Iron	mg/l	0.3		
Iron (soluble)	mg/l	0.3		
Manganese	mg/l	0.3		
Manganese (soluble)	mg/l	0.3		
Magnesium	mg/l		35	
Lead	mg/l	0.025		
Cadmium	mg/l	0.01		
Aluminum	mg/l			
Calcium	mg/l			
Antimony	mg/l		0.003	
Arsenic	mg/l	0.025		
Beryllium	mg/l	0.003		
Barium	mg/l	1		
Total Chromium	mg/l	0.05		
Hexavalent Chromium	mg/l	0.05		
Copper	mg/l	0.2		
Mercury	mg/l	0.002		
Nickel	mg/l			
Selenium	mg/l	0.01		
Silver	mg/l	0.05		
Thallium	mg/l	0.004		
Zinc	mg/l	0.3		

GROUNDWATER ANALYTICAL DATA - VOLATILE ORGANIC PARAMETERS

Parameter	Units	Class GA Standard	Class GA Guidance	
Sample Collection Date				
EPA 601/602				
Benzene	ug/l	0.7		
Bromodichloromethane	ug/l	50		
Bromoform	ug/l		50	
Bromomethane	ug/l	5		
Carbon Tetrachloride	ug/l	5		
Chlorobenzene	ug/l	5		
Chloroethane	ug/l	5		
2-Chloroethylvinylether	ug/l	5		
Chloroform	ug/l	7		
Chloromethane	ug/l	5		
Dibromochloromethane	ug/l		50	
1,2-Dichlorobenzene	ug/l	5		
1,3-Dichlorobenzene	ug/l	5		
1,4-Dichlorobenzene	ug/l	4.7		
Dichlorofluoromethane	ug/l			
1,1-Dichloroethane	ug/l	5		
1,2-Dichloroethane	ug/l	5		
1,1-Dichloroethene	ug/l			
trans1,2-dichloroethene	ug/l			
1,2-Dichloropropane	ug/l		50	
cis-1,3-Dichloropropene	ug/l	5		
trans-1,3-Dichloropropene	ug/l	5		
Ethylbenzene	ug/l	5		
Methylene Chloride	ug/l	5		
1,1,2,2-Tetrachloroethane	ug/l	5		
Tetrachloroethene	ug/l	5		
Toluene	ug/l	5		
1,1,1-Trichloroethane	ug/l	5		
1,1,2-Trichloroethane	ug/l	5		
Trichloroethene	ug/l	5		
Trichlorofluoromethane	ug/l			
Vinyl Chloride	ug/l			
Total-Xylene	ug/l	5		

Surface Water Analytical Data - Baseline Parameters

Parameter *Sample Collection Date*	Units	Class C Standard	Class C Guidance	
Specific Conductance	umhos/cm			
Temperature	deg C			
pH	SU	6.5-8.5		
Eh	mV			
Turbidity	NTU			
TKN	mg/l			
Ammonia	mg/l			
Nitrate	mg/l			
COD	mg/l			
BOD	mg/l			
TOC	mg/l			
TDS	mg/l	500		
Sulfate	mg/l			
Alkalinity	mg/l			
Chloride	mg/l			
Phenols	mg/l	0.005		
Hardness	mg/l			
Color	CU			
Total Cyanide	mg/l	0.0052		
Boron	mg/l	10		
Antimony	mg/l			
Arsenic	mg/l			
Beryllium	mg/l	1		
Barium	mg/l			
Cadmium	mg/l	*		
Chromium	mg/l	**		
Hexavalent Chromium	mg/l	0.011		
Copper	mg/l	***		
Lead	mg/l	****		
Mercury	mg/l		0.0002	
Nickel	mg/l	*****		
Selenium	mg/l	0.001		
Silver	mg/l	0.0001		
Thallium	mg/l	0.008		
Zinc	mg/l	0.3		
Potassium	mg/l			
Sodium	mg/l			
Iron	mg/l	0.3		
Manganese	mg/l			
Magnesium	mg/l			
Aluminum	mg/l			
Calcium	mg/l			

* exp(0.7852 {ln (hardness)}-3.490
** exp(0.819 {ln (hardness)}+1.561
*** exp(0.8545 {ln (hardness)}-1.465
**** exp(1.266 {ln (hardness)}-4.661
***** exp(0.76 {ln (hardness)+1.06

Surface Water Analytical Data - Organic Parameters

Parameter	Units	Class C Standard	Class C Guidance	
Sample Collection Date				
Acetone	ug/l			
Acrylonitrile	ug/l	5		
Benzene	ug/l	0.7		
Bromochloromethane	ug/l		50	
Bromodichloromethane	ug/l			
Bromoform	ug/l		50	
Bromomethane	ug/l			
2-Butanone	ug/l			
Carbon Disulfide	ug/l			
Carbon Tetrachloride	ug/l	5		
Chlorobenzene	ug/l	5		
Chloroethane	ug/l			
Chloromethane	ug/l			
Chloroform	ug/l	7		
Dibromochloromethane	ug/l		50	
1,2-Dibromo-3-chloropropane	ug/l			
1,2-Dibromoethane	ug/l			
Dibromomethane	ug/l			
1,2-Dichlorobenzene	ug/l	4.7		
1,4-Dichlorobenzene	ug/l	4.7		
Trans-1,4-Dichloro-2-Butene	ug/l			
1,1-Dichloroethane	ug/l	5		
1,2-Dichloroethane	ug/l	5		
1,1-Dichloroethene	ug/l	5		
cis-1,2-Dichloroethene	ug/l	5		
trans-1,2-Dichloroethene	ug/l	5		
1,2-Dichloropropane	ug/l	5		
cis-1,3-Dichloropropene	ug/l			
t-1,3-Dichloropropene	ug/l			
Ethylbenzene	ug/l	5		
2-Hexanone	ug/l		50	
Iodomethane	ug/l			
Methylene Chloride	ug/l			
4-Methyl-2-Pentanone	ug/l			
Styrene	ug/l	5		
1,1,1,2-Tetrachloroethane	ug/l	5		
1,1,2,2-Tetrachloroethane	ug/l	5		
Tetrachloroethene	ug/l	5		
Toluene	ug/l	5		
1,1,1-Trichloroethane	ug/l	5		
1,1,2-Trichloroethane	ug/l	5		
Trichloroethene	ug/l	5		
Trichlorofluoromethane	ug/l	5		
1,2,3-Trichloropropane	ug/l			
Vinyl Acetate	ug/l			
Vinyl Chloride	ug/l	2		
Total-Xylene	ug/l	5		

Table A. Lindley South Landfill RI/FS
Volatile Organic Compounds
Sediment Samples

Parameter	Criterion Aquatic (Chronic Toxicity)	Criterion Health	Criterion Wildlife	Units	SED-1	SED-2	SED-3	dupe SED-3	SED-4	SED-5	SED-6	SED-7
Date Received					*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*
Date Analyzed					*12/19/95*	*12/19/95*	*12/19/95*	*12/20/95*	*12/20/95*	*12/20/95*	*12/20/95*	*12/20/95*
Chloromethane				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
Bromomethane				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
Vinyl Chloride				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
Chloroethane				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
Methylene Chloride	*1			ug/kg	6 (J)	10 (J)	7 (J)	9 (J)	6 (J)	<11	7 (J)	6 (J)
Acetone	*2			ug/kg	10 (J)	73	36	<16	<12	<11	<12	<11
Carbon Disulfide				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
1,1-Dichloroethene				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
1,1-Dichloroethane				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
1,2-Dichloroethene - trans				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
Chloroform				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
1,2-Dichloroethane				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
2-Butanone				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
1,1,1-Trichloroethane				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
Carbon Tetrachloride				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
Bromodichloromethane				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
1,2-Dichloropropane				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
cis-1,3-Dichloropropene				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
Trichloroethene				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
Dibromochloromethane				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
1,1,2-Trichloroethane				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
Benzene				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
trans-1,3-Dichloropropene				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
Bromoform				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
4-Methyl-2-Pentanone				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
2-Hexanone				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
Tetrachloroethane				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
1,1,2,2-Tetrachloroethane				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
Toluene				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
Chlorobenzene				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
Ethylbenzene				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
Styrene				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
Xylenes (Total)				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
1,2-Dichloroethene-cis				ug/kg	<12	<20	<15	<16	<12	<11	<12	<11
Number of TICS Identified*					*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*

* - Tentatively Identified Compounds

J = Result is an Estimated Result Below the Reporting Limit or a Tentatively Identified Compound

*1 - Presence Generally a result of Laboratory Contamination, Sediment Criterion does not Exist.

*2 - Presence Generally a result of Laboratory Contamination., Sediment Criterion does not Exist

Table B. Lindley South Landfill RI/FS
Semivolatile Organic Compounds
Sediment Samples

Parameter	Units	Criterion Human Health	Criterion Aquatic (Chronic Toxicity)	Criterion Wildlife	SED-1	SED-2	SED-3	dupe SED-3	SED-4	SED-5	SED-6	SED-7
Date Received					*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*
Date Extracted					*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*
Date Analyzed					*01/15/96*	*01/16/96*	*01/15/96*	*01/16/96*	*01/15/96*	*01/15/96*	*01/15/96*	*01/15/96*
Phenol	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
bis(2-chloroethyl)ether	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
2-chlorophenol	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
1,3-Dichlorobenzene	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
1,4-Dichlorobenzene	ug/kg		12000		84 (J)	130 (J)	<510	100 (J)	130 (J)	120 (J)	88 (J)	87 (J)
1,2-Dichlorobenzene	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
2-methylphenol	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
2,2-oxybis(1-chloropropane)	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
4-methylphenol	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
N-nitroso-di-n-proplyamine	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
hexachloroethane	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
nitrobenzene	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
isophorone	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
2-nitrophenol	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
2,4-Dimethylphenol	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
bis(2-chloroethoxy)methane	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
2,4-dichlorophenol	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
1,2,4-trichlorobenzene	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
naphthalene	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
4-chloroaniline	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
hexachlorobutadiene	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
4-chloro-3-methylphenol	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
2-methylnaphthalene	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
Hexachlorocyclopentadiene	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
2,4,6-trichlorophenol	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
2,4,5-trichlorophenol	ug/kg				<1000	<1700	<1300	<1300	<1000	<960	<990	<910
2-chloronaphthalene	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
2-nitroaniline	ug/kg				<1000	<1700	<1300	<1300	<1000	<960	<990	<910
dimethyl phthalate	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
acenaphthylene	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
2,6-dinitrotoluene	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
3-nitroaniline	ug/kg				<1000	<1700	<1300	<1300	<1000	<960	<990	<910
acenaphthene	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360

Table B. Lindley South Landfill RI/FS
Semivolatile Organic Compounds
Sediment Samples

Parameter	Units	Criterion Human Health	Criterion Aquatic (Chronic Toxicity)	Criterion Wildlife	SED-1	SED-2	SED-3	dupe SED-3	SED-4	SED-5	SED-6	SED-7
Date Received					*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*
Date Extracted					*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*
Date Analyzed					*01/15/96*	*01/16/96*	*01/15/96*	*01/16/96*	*01/15/96*	*01/15/96*	*01/15/96*	*01/15/96*
2,4-dinitrophenol	ug/kg				<1000	<1700	<1300	<1300	<1000	<960	<990	<910
4-nitrophenol	ug/kg				<1000	<1700	<1300	<1300	<1000	<960	<990	<910
dibenzofuran	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
2,4-dinitrotoluene	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
diethylphthalate	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
4-chlorophenyl-phenylether	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
fluorene	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
4-nitroaniline	ug/kg				<1000	<1700	<1300	<1300	<1000	<960	<990	<910
4,6-dinitro-2-methylphenol	ug/kg				<1000	<1700	<1300	<1300	<1000	<960	<990	<910
N-Nitrosodiphenylamine	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
4-bromophenyl-phenylether	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
hexachlorobenzene	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
pentachlorophenol	ug/kg				<1000	<1700	<1300	<1300	<1000	<960	<990	<910
phenanthrene	ug/kg		120000		<410	86 (J)	34 (J)	<530	<420	<380	<400	<360
anthracene	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
carbozole	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
Di-n-butylphthalate	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
Fluoranthene	ug/kg		1020000		<410	74 (J)	<510	<530	<420	<380	<400	<360
pyrene	ug/kg				<410	130 (J)	<510	<530	<420	<380	<400	<360
butylbenzylphthalate	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
3,3-dichlorobenzidine	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
benzo(a)anthracene	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
chrysene	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
bis(2-ethylhexyl)phthalate	ug/kg		199500		79 (J)	360 (J)	210 (J)	150 (J)	170 (J)	170 (J)	180 (J)	87 (J)
Di-n-octyl phthalate	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
benzo(b)fluoranthene	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
benzo(k)fluoranthene	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
benzo(a)pyrene	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
Indeno(1,2,3-cd)pyrene	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
dibenzo(a,h)anthracene	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
benzo(g,h,i)perylene	ug/kg				<410	<670	<510	<530	<420	<380	<400	<360
Number of TICS Identified*					*9*	*20*	*15*	*14*	*15*	*13*	*13*	*9*

* - Tentatively Identified Compounds

J = Result is an Estimated Result Below the Reporting Limit or a Tentatively Identified Compound

Table C. Lindley South Landfill RI/FS
PCB/Pesticide Compounds
Sediment Samples

Parameter	Units	Criterion Human Health	Criterion Aquatic (Chronic Toxicity)	Criterion Wildlife	SED-1	SED-2	SED-3	dupe SED-3	SED-4	SED-5	SED-6	SED-7
Date Received					*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*
Date Extracted					*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*
Date Analyzed					*12/27/95*	*12/27/95*	*12/27/95*	*12/27/95*	*12/27/95*	*12/27/95*	*12/27/95*	*12/27/95*
alpha -BHC	ug/kg				<2.1	<3.3	<2.5	<2.6	<2.1	<1.9	<2.0	<1.8
beta-BHC	ug/kg				<2.1	<3.3	<2.5	<2.6	<2.1	<1.9	<2.0	<1.8
delta-BHC	ug/kg				<2.1	<3.3	<2.5	<2.6	<2.1	<1.9	<2.0	<1.8
gamma-BHC(Lindane)	ug/kg				<2.1	<3.3	<2.5	<2.6	<2.1	<1.9	<2.0	<1.8
Heptachlor	ug/kg				<2.1	<3.3	<2.5	<2.6	<2.1	<1.9	<2.0	<1.8
Aldrin	ug/kg	100		770	<2.1	0.15 (J)	<2.5	<2.6	<2.1	<1.9	<2.0	<1.8
Heptachlor epoxide	ug/kg	0.8	100	30	<2.1	0.25 (J)	<2.5	<2.6	<2.1	<1.9	<2.0	<1.8
Endosulfan I	ug/kg		30		<2.1	<3.3	<2.5	<2.6	0.062 (J)	<1.9	<2.0	<1.8
Dieldrin	ug/kg	100		770	<4.1	0.19 (J)	0.13 (J)	0.14 (J)	0.13 (J)	0.097 (J)	<4.0	<3.6
4,4'-DDE	ug/kg	10		1000	<4.1	<6.7	0.19 (J)	0.22 (J)	0.15 (J)	<3.8	<2.0	<3.6
Endrin	ug/kg	800	4000	800	<4.1	<6.7	<5.1	<5.3	0.091 (J)	0.46 (J)	<2.0	<3.6
Endosulfan II	ug/kg				<4.1	<6.7	<5.1	<5.3	<4.2	<3.8	<2.0	<3.6
4,4'-DDD	ug/kg	10		1000	<4.1	<6.7	<5.1	<5.3	0.066 (J)	0.27 (J)	<2.0	<3.6
Endosulfan Sulfate	ug/kg				<4.1	<6.7	0.17 (J)	0.17 (J)	0.41 (J)	0.58 (J)	<2.0	<3.6
4,4'-DDT	ug/kg	10	1000	1000	<4.1	0.16 (J)	<5.1	0.23 (J)	<4.2	<3.8	<2.0	<3.6
Methoxychlor	ug/kg		600		<21	3.7 (J)	<25	26	<21	<19	<20	<18
Endrin Ketone	ug/kg				<4.1	0.29 (J)	<5.1	<5.3	<4.2	<3.8	<4.0	<3.6
Endrin Aldehyde	ug/kg				<4.1	<6.7	<5.1	<5.3	<4.2	<3.8	<4.0	<3.6
alpha-chlordane	ug/kg	1	30	6	<2.1	<3.3	<2.5	0.22 (J)	<2.1	<1.9	<2.0	<1.8
gamma-chlordane	ug/kg	1	30	6	<2.1	<3.3	<2.5	<2.6	<2.1	<1.9	<2.0	<1.8
Toxaphene	ug/kg				<210	<330	<250	<260	<210	<190	<200	<180
Aroclor 1016	ug/kg				<41	<67	<51	<53	<42	<38	<40	<36
Aroclor 1221	ug/kg				<82	<130	<100	<110	<83	<77	<79	<72
Aroclor 1232	ug/kg				<41	<67	<51	<53	<42	<38	<40	<36
Aroclor 1242	ug/kg				<41	<67	<51	<53	<42	<38	<40	<36
Aroclor 1248	ug/kg				<41	<67	<51	<53	<42	<38	<40	<36
Aroclor 1254	ug/kg				<41	<67	<51	<53	<42	<38	<40	<36
Aroclor 1260	ug/kg				<41	<67	<51	<53	<42	<38	<40	<36

J = Result is an Estimated Result Below the Reporting Limit or a Tentatively Identified Compound

Table D. Lindley South Landfill RI/FS
Inorganic Parameters
Sediment Samples

Parameter	Units	Metals Criterion	SED-1	SED-2	SED-3	dupe SED-3	SED-4	SED-5	SED-6	SED-7
Date Received			*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*
Aluminum	mg/kg		11500	2290	6260	3830	7360	7210	4060	8460
Antimony	mg/kg	2	<7.2	<11.6	<8.8	<9.2	<7.2	<6.7	<6.9	<6.3
Arsenic	mg/kg	6	7.6	5.2	5.7	5.9	6	6.2	4	10.3
Barium	mg/kg		97.4	16.8	68.5	38.3	63.4	52	30.7	54.9
Beryllium	mg/kg		0.73	<0.36	0.45	<0.29	0.49	0.53	0.31	0.68
Cadmium	mg/kg	0.6	<0.52	<0.84	<0.64	<0.67	<0.52	<0.48	<0.50	<0.46
Calcium	mg/kg		2580	1850	1870	1390	1880	3050	4310	5310
Chromium	mg/kg	26	17.2	4.2	9.4	7.3	10.1	11.7	6.7	13.8
Cobalt	mg/kg		11.9	<4.6	7.6	5	7.9	9.4	5.7	11.3
Copper	mg/kg	16	14.3	5	8.1	9.1	7.6	7.7	4.9	10.4
Iron	mg/kg	2.0 %	27700	5140	14800	9320	15800	21100	13200	26900
Lead	mg/kg	31	47.7	164	31.2	1.8	61.5	64.4	35.2	29.7
Magnesium	mg/kg		4010	896	2040	1340	2360	3660	1700	4830
Manganese	mg/kg	460	485	115	851	176	504	383	367	320
Mercury	mg/kg	0.15	<0.12	<0.20	<0.15	<0.16	<0.12	<0.11	<0.12	
Nickel	mg/kg	16	28.4	<5.8	14.7	10.7	16.7	19.5	9.6	22.1
Potassium	mg/kg		1250	<182	229	<145	612	191	<109	243
Selenium	mg/kg		<0.69	<1.1	<0.85	<0.89	<0.70	<0.64	<0.67	<0.61
Silver	mg/kg	1	<1.4	<2.3	<1.7	<1.8	<1.4	<1.3	<1.4	<1.2
Sodium	mg/kg		217	348	248	221	210	202	<140	142
Thallium	mg/kg		<0.99	<1.6	<1.2	6.9	<1.0	<0.92	<0.95	<0.87
Vanadium	mg/kg		8.2	<3.3	3.9	3	5.6	4.1	2.8	3.1
Zinc	mg/kg	120	59.1	40.1	65.8	46.9	38.6	45.7	24.3	55.9
Molybdenum	mg/kg		NR	NR	NR	NR	NR	NR	NR	NR
Total Cyanide	mg/kg		<1.2	<2.0	<1.5	<1.6	<1.2	<1.1	<1.2	<1.1

NR - Not Required

Lindley South Landfill RI/FS
Semivolatile Organic Analysis
Tentatively Identified Compounds (TICs)

Parameter	Units	SED-1	SED-2	SED-3	SED-3Dupe	SED-4	SED-5	SED-6	SED-7
Date Received		*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*
Date Extracted		*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*	*12/14/95*
Date Analyzed		*01/15/96*	*01/16/95*	*01/15/96*	*01/16/95*	*01/15/96*	*01/15/96*	*01/15/96*	*01/15/96*
Aldol Condensate	ug/kg	1000 J	30000 J	10000 J	20000 J	20000 J	2 Cmpds	20000 J	20000
Unknown	ug/kg	4 Cmpds	4 Cmpds	2 Cmpds	5 Cmpds	4 Cmpds	4 Cmpds	7 Cmpds	3 Cmpds
Unknown Oxygenated Compound	ug/kg	1 Cmpd	2 Cmpds	2 Cmpds	2 Cmpds	3 Cmpds	2 Cmpds	3 Cmpds	2 Cmpds
Unknown Oxyenated Aromatic	ug/kg	1 Cmpd				1 Cmpd	1 Cmpd	1 Cmpd	1 Cmpd
Unknown Alkane	ug/kg	2 Cmpds	3 Cmpds	5 Cmpds	3 Cmpds	2 Cmpds			2 Cmpds
Unknown Carboxylic Acid	ug/kg		4 Cmpds	1 Cmpd		1 Cmpd			
Unknown Hydrocarbon	ug/kg		1 Cmpd			2 Cmpds	1 Cmpd		
Unknown Sterol	ug/kg		3 Cmpds	2 Cmpds	1 Cmpd				
Ergost-5-en-3-ol (beta)	ug/kg		3000 J						
Column Bleed	ug/kg		1 Cmpd		1 Cmpd	1 Cmpd	1 Cmpd		
Unknown Aromatic	ug/kg			1 Cmpd					
Hexadecanoic Acid (9CI)	ug/kg			900 J	600 J				
Unknown Phthalate	ug/kg						1 Cmpd	1 Cmpd	
Sulfur, mol. (s8)	ug/kg						1 Cmpd		
Total Number of TICs		9	20	15	14	15	13	13	9

Unknown compounds are denoted by the number of different unknowns identified from samples collected at the specific locations

Table A. Lindley South Landfill RI/FS
Volatile Organic Compounds
Surface Water Samples

Parameter	Units	SW-1	SW-2	SW-3	Dupe SW-3	SW-4	SW-5	SW-6	SW-7
Date Received		*12/16/95*	*12/16/95*	*12/16/95*	*12/16/95*	*12/16/95*	*12/16/95*	*12/16/95*	*12/16/95*
Date Analyzed		*12/22/95*	*12/22/95*	*12/22/95*	*12/22/95*	*12/22/95*	*12/20/95*	*12/22/95*	*12/22/95*
Chloromethane	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
Bromomethane	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
Vinyl Chloride	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
Chloroethane	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
Methylene Chloride	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
Acetone	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
Carbon Disulfide	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethene	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethane	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
1,2-Dichloroethene - trans	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
Chloroform	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
1,2-Dichloroethane	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
2-Butanone	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
1,1,1-Trichloroethane	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
Carbon Tetrachloride	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
Bromodichloromethane	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
1,2-Dichloropropane	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
cis-1,3-Dichloropropene	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
Trichloroethene	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
Dibromochloromethane	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
1,1,2-Trichloroethane	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
Benzene	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
trans-1,3-Dichloropropene	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
Bromoform	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
4-Methyl-2-Pentanone	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
2-Hexanone	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
Tetrachloroethane	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
1,1,2,2-Tetrachloroethane	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
Toluene	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
Chlorobenzene	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
Ethylbenzene	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
Styrene	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
Xylenes (Total)	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
1,2-Dichloroethene-cis	ug/l	<10	<10	<10	<10	<10	<10	<10	<10
Number of TICS Identified*		0	0	0	0	0	0	0	0

* - Tentatively Identified Compounds

Table B. Lindley South Landfill RI/FS
Semivolatile Organic Compounds
Surface Water Samples

Parameter	Units	Class C Standard/Guidance	SW-1	SW-2	SW-3	Dupe SW-3	SW-4	SW-5	SW-6	SW-7
Date Received			12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95
Date Extracted			12/17/95	12/17/95	12/18/95	12/18/95	12/16/95	12/18/95	12/18/95	12/16/95
Date Analyzed			01/11/96	01/11/96	01/12/96	01/12/96	01/11/96	01/12/96	01/12/96	01/11/96
Phenol	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
bis(2-chloroethyl)ether	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2-chlorophenol	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
1,3-Dichlorobenzene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
1,4-Dichlorobenzene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
1,2-Dichlorobenzene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2-methylphenol	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2,2-oxybis(1-chloropropane)	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
4-methylphenol	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
N-nitroso-di-n-proplyamine	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
hexachloroethane	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
nitrobenzene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
isophorone	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2-nitrophenol	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2,4-Dimethylphenol	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
bis(2-chloroethoxy)methane	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2,4-dichlorophenol	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
1,2,4-trichlorobenzene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
naphthalene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
4-chloroaniline	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
hexachlorobutadiene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
4-chloro-3-methylphenol	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2-methylnaphthalene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Hexachlorocyclopentadiene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2,4,6-trichlorophenol	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2,4,5-trichlorophenol	ug/l		<25	<25	<25	<25	<25	<25	<25	<25
2-chloronaphthalene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2-nitroaniline	ug/l		<25	<25	<25	<25	<25	<25	<25	<25
dimethyl phthalate	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
acenaphthylene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2,6-dinitrotoluene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
3-nitroaniline	ug/l		<25	<25	<25	<25	<25	<25	<25	<25
acenaphthene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10

Table B. Lindley S[illegible]h Landfill RI/FS
Semivolatile Organic Compounds
Surface Water Samples

Parameter	Units	Class C Standard/Guidance	SW-1	SW-2	SW-3	Dupe SW-3	SW-4	SW-5	SW-6	SW-7
Date Received			12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95
Date Extracted			12/17/95	12/17/95	12/18/95	12/18/95	12/16/95	12/18/95	12/18/95	12/16/95
Date Analyzed			01/11/96	01/11/96	01/12/96	01/12/96	01/11/96	01/12/96	01/12/96	01/11/96
2,4-dinitrophenol	ug/l		<25	<25	<25	<25	<25	<25	<25	<25
4-nitrophenol	ug/l		<25	<25	<25	<25	<25	<25	<25	<25
dibenzofuran	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2,4-dinitrotoluene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
diethylphthalate	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
4-chlorophenyl-phenylether	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
fluorene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
4-nitroaniline	ug/l		<25	<25	<25	<25	<25	<25	<25	<25
4,6-dinitro-2-methylphenol	ug/l		<25	<25	<25	<25	<25	<25	<25	<25
N-Nitrosodiphenylamine	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
4-bromophenyl-phenylether	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
hexachlorobenzene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
pentachlorophenol	ug/l		<25	<25	<25	<25	<25	<25	<25	<25
phenanthrene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
anthracene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
carbozole	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Di-n-butylphthalate	ug/l	50	<10	<10	<10	<10	9 (J)	<10	<10	<10
Fluoranthene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
pyrene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
butylbenzylphthalate	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
3,3-dichlorobenzidine	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
benzo(a)anthracene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
chrysene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
bis(2-ethylhexyl)phthalate	ug/l	50	3 (J)	1 (J)	8 (J)	7 (J)	2 (J)	8 (J)	<10	1 (J)
Di-n-octyl phthalate	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
benzo(b)fluoranthene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
benzo(k)fluoranthene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
benzo(a)pyrene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
dibenzo(a,h)anthracene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
benzo(g,h,i)perylene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Number of TICS Identified*			4	1	1	0	4	0	2	1

* - Tentatively Identified Compounds

J = Result is an Estimated Result Below the Reporting Limit or a Tentatively Identified Compound

Table C. Lindley South Landfill RI/FS
PCB/Pesticide Compounds
Surface Water Samples

Parameter	Units	SW-1	SW-2	SW-3	Dupe SW-3	SW-4	SW-5	SW-6	SW-7
Date Received		12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95
Date Extracted		12/18/95	12/18/95	12/18/95	12/18/95	12/18/95	12/18/95	12/18/95	12/18/95
Date Analyzed		12/27/95	12/27/95	12/27/95	12/27/95	12/27/95	12/27/95	12/28/95	12/28/95
alpha -BHC	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC(Lindane)	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan I	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4' -DDE	ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endrin	ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan II	ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDD	ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan Sulfate	ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDT	ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Methoxychlor	ug/l	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin Ketone	ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endrin Aldehyde	ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
alpha-chlordane	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-chlordane	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Toxaphene	ug/l	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Aroclor 1016	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Aroclor 1221	ug/l	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Aroclor 1232	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Aroclor 1242	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Aroclor 1248	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Aroclor 1254	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Aroclor 1260	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Table D. Lindley South Landfill RI/FS
Inorganic Parameters
Surface Water Samples

Parameter	Units	Class C Standard/Guidance	SW-1	SW-2	SW-3	Dupe SW-3	SW-4	SW-5	SW-6	SW-7
Hardness	mg CaCO3/l		221	189	178	192	144	176	178	226
Turbidity	NTU		29	>1000	14	14	42	2.3	6	290
TDS	ug/l	500000	330000	328000	280000	288000	163000	233000	243000	265000
Alkalinity	ug/l		120000	110000	112000	116000	105000	120000	120000	120000
Chloride	ug/l		45000	100000	60000	61000	5000	3000	28000	4000
Sulfate	ug/l		80000	30000	40000	40000	25000	3000	30000	100000
Total Cyanide	ug/l	5.2	<10	<10	<10	<10	<10	<10	<10	<10
Ammonia - N	ug/l	*1	<100	<100	<100	<100	<100	<100	<100	<100
COD	ug/l		26700	29100	<5000	<5000	<5000	5300	10200	<5000
TOC	ug/l		11800	5800	3700	3400	3100	4500	4600	2000
Aluminum	ug/l		1170	7710	495	577	1870	172	235	2550
Antimony	ug/l		<29.0	<29.0	<29.0	<29.0	<29.0	<29.0	<29.0	<29.0
Arsenic	ug/l	190	<6.5	18.1	<6.5	<6.5	<6.5	<6.5	<6.5	<6.5
Barium	ug/l		112	177	49.7	55.1	46.8	42.4	42.4	58.4
Beryllium	ug/l	*2	<0.90	<0.90	<0.90	<0.90	<0.90	<0.90	<0.90	<0.90
Cadmium	ug/l	*3	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Calcium	ug/l		61800	51300	50300	53700	42400	50100	50500	53700
Chromium	ug/l	*4	<5.3	6.6	<5.3	<5.3	<5.3	<5.3	<5.3	<5.3
Cobalt	ug/l	5	<11.3	<11.3	<11.3	<11.3	<11.3	<11.3	<11.3	<11.3
Copper	ug/l	*5	30.4	35.4	22.8	19.8	18.1	15.2	11.4	11.4
Iron	ug/l	300	2450	24200	1220	1410	4080	294	391	5320
Lead	ug/l	*6	51.2	47.2	3.7	3.6	4.4	<2.1	<2.1	4.8
Magnesium	ug/l		16100	14700	12800	14100	9170	12300	12500	22400
Manganese	ug/l		643	1570	148	160	132	79.4	45.2	227
Mercury	ug/l	0.2	0.2	0.2	0.2	<0.2	0.2	0.2	0.2	0.2
Nickel	ug/l	*7	<14.3	17.9	<14.3	<14.3	<14.3	<14.3	<14.3	<14.3
Potassium	ug/l		13700	2520	1830	1960	988	1330	1290	1020
Selenium	ug/l	1	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8
Silver	ug/l	0.1	<5.6	<5.6	<5.6	<5.6	<5.6	<5.6	<5.6	<5.6
Sodium	ug/l		19800	70500	35800	40300	5680	21000	21500	11400
Thallium	ug/l	8	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Vanadium	ug/l	14	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2
Zinc	ug/l	30	36.4	102	35.4	36.7	36.7	35	24.8	26.4
Boron	ug/l	10000	NR	NR	NR	NR	NR	NR	NR	NR

**1 - Dependent upon sample temperature and pH (see reg)*
**2 - 0.011 mg/l when hardness < 75 mg/l; 1.10 mg/l when hardness > 75 mg/l*
**3 - exp(0.7852[ln(hardness)]-3.490)*
**4 - exp(0.819[ln(hardness)]+1.561)*
**5 - exp(0.8545[ln(hardness)]-1.465)*
**6 - exp(1.266[ln(hardness)]-4.661)*
**7 - exp(0.76[ln(hardness)]+1.06*

Lindley South Landfill RI/FS
Semivolatile Organic Analysis
Tentatively Identified Compounds (TICs)

Parameter	Units	GW-1	GW-4	MW-2D	MW-2S	MW-3	MW-4	RW-1	SW-1	SW-2	SW-3	SW-4	SW-6	SW-7
Date Received		12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95
Date Extracted		12/18/95	12/17/95	12/18/95	12/17/95	12/17/95	12/17/95	12/18/95	12/17/95	12/17/95	12/18/95	12/16/95	12/18/95	12/16/95
Date Analyzed		01/12/96	01/12/96	01/12/96	01/12/96	01/12/96	01/12/96	01/12/96	01/11/96	01/11/96	01/12/96	01/11/96	01/12/96	01/11/96
Unknown Concentration Range (1 ug/l - 10 ug/l)	ug/l	2 cmpds	1 cmpd		6 cmpds		1 cmpd		1 cmpd		1 cmpd	1 cmpd		
Unknown Concentration Range (11 ug/l - 20 ug/l)	ug/l				2 cmpds									
Unknown Concentration Range (21 ug/l - 30 ug/l)	ug/l													
Unknown Concentration Range (31 ug/l - 40 ug/l)	ug/l													
Unknown Concentration Range (41 ug/l - 50 ug/l)	ug/l													
Unknown Oxygenated Compounds (1 ug/l - 10 ug/l)	ug/l	2 cmpds		1 cmpd	4 cmpds		1 cmpd	1 cmpd				1 cmpd	2 cmpd	1 cmpd
Unknown Oxygenated Compounds (11 ug/l - 20 ug/l)	ug/l				1 cmpd									
Unknown Oxygenated Compounds (21 ug/l - 30 ug/l)	ug/l				1 cmpd									
Unknown Oxygenated Compounds (31 ug/l - 40 ug/l)	ug/l				1 cmpd									
Unknown Oxygenated Compounds (41 ug/l - 50 ug/l)	ug/l													
Unknown Aromatic	ug/l				8 J									
Bicyclo(2.2.1)heptan-2-one	ug/l				50 J									
Sulfur, mol (s8) (8CI9CI)	ug/l					7 J								
Unknown Alkane, Concentration Range (1 - 10 ug/l)	ug/l								1 cmpd	1 cmpd		2 cmpd		
Unknown Alkane, Concentration Range (11 - 20 ug/l)	ug/l								1 cmpd					
Unknown Alkane, Concentration Range (21 - 30 ug/l)	ug/l													
Unknown Alkane, Concentration Range (31 - 40 ug/l)	ug/l								1 cmpd					
Unknown Alkane, Concentration Range (41 - 50 ug/l)	ug/l													
Total Number of TICs		4	1	1	17	1	2	1	4	1	1	4	2	1

Unknown compounds are denoted by the number of different unknowns identified from samples collected at the specific locations

LINDLEY SOUTH LANDFILL: REMDIAL INVESTIGATION – GROUNDWATER ELEVATIONS

DECEMBER 1995

Well	Top of Cap Elevation	Top of PVC Elevation	Depth to Water 12/13/95	Water Elevation 12/13/95
MW–1	1464.11	1463.97	7.44	1456.53
MW–2D	1460.21	1460.08	30.15	1429.93
MW–2S	1460.51	1460.37	6.22	1454.15
MW–3	1486.80	1486.59	8.00	1478.59
MW–4	1515.16	1515.01	6.69	1508.32
PZ–1	1543.66	1543.17	12.89	1530.28
GW–1	1544.64	1544.44	25.14	1519.30
GW–2	1486.59	1486.19	18.80	1467.39
GW–3	1463.87	1463.48	12.76	1450.72
GW–4	1482.77	1482.67	13.09	1469.58
GW–5	1500.64	1500.43	10.37	1490.06
OW–101	1471.64	1471.44	12.11	1459.33
OW–103	1547.25	1546.76	11.78	1534.98
OW–104	1502.09	1501.11		
OW–105	1503.11	1501.81	14.52	1487.29
OW–106	1487.28	1486.64	13.64	1473.00
OW–107	1525.80	1525.71	11.59	1514.12
OW–109	1509.82	1509.55	4.36	1505.19
OW–110	1462.20	1461.80	11.36	1450.44

APRIL 18, 1996

Well	Top of Cap Elevation	Top of PVC Elevation	Depth to Water	Water Elevation	Elev. Change Since 12/95
MW–1	1464.11	1463.97	4.69	1459.28	–2.75
MW–2D	1460.21	1460.08	29.25	1430.83	–0.9
MW–2S	1460.51	1460.37	5.05	1455.32	–1.17
MW–3	1486.80	1486.59	7.66	1478.93	–0.34
MW–4	1515.16	1515.01	5.08	1509.93	–1.61
PZ–1	1543.66	1543.17	7.94	1535.23	–4.95
GW–1	1544.64	1544.44	obstruction		
GW–2	1486.59	1486.19	14.73	1471.46	–4.07
GW–3	1463.87	1463.48			
GW–4	1482.77	1482.67	15.12	1467.55	2.03
GW–5	1500.64	1500.43	8.94	1491.49	–1.43
OW–101	1471.64	1471.44	7.67	1463.77	–4.44
OW–103	1547.25	1546.76	7.75	1539.01	–4.03
OW–104	1502.09	1501.11	9.06	1492.05	
OW–105	1503.11	1501.81	13.64	1488.17	–0.88
OW–106	1487.28	1486.64	12.26	1474.38	–1.38
OW–107	1525.80	1525.71	8.73	1516.98	–2.86
OW–109	1509.82	1509.55	4.63	1504.92	0.27
OW–110	1462.20	1461.80	5.64	1456.16	–5.72

Table A. Lindley South Landfill RI/FS
Volatile Organic Compounds
Groundwater Samples

Parameter	Units	Class GA Standards	GW-1	GW-4	Dupe GW-4	MW-1	MW-2D	MW-2S	MW-3	MW-4
Date Received			12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95
Date Analyzed			12/22/95	12/22/95	12/22/95	12/22/95	12/22/95	12/20/95	12/22/95	12/22/95
Chloromethane	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Bromomethane	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Vinyl Chloride	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Chloroethane	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Methylene Chloride	ug/l	5	<10	<10	<10	<10	<10	4 (J)	<10	<10
Acetone	ug/l		<10	<10	<10	<10	<10	7 (J)	<10	<10
Carbon Disulfide	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethane	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
1,2-Dichloroethene - trans	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
~~Chloroform~~	~~ug/l~~		~~<10~~	~~<10~~	~~<10~~	~~<10~~	~~<10~~	~~<10~~	~~<10~~	~~<10~~
1,2-Dichloroethane	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2-Butanone	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
1,1,1-Trichloroethane	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Carbon Tetrachloride	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Bromodichloromethane	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
1,2-Dichloropropane	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
cis-1,3-Dichloropropene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Trichloroethene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Dibromochloromethane	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
1,1,2-Trichloroethane	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Benzene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
trans-1,3-Dichloropropene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Bromoform	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
4-Methyl-2-Pentanone	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2-Hexanone	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Tetrachloroethane	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
1,1,2,2-Tetrachloroethane	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Toluene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Chlorobenzene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Ethylbenzene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Styrene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Xylenes (Total)	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
1,2-Dichloroethene-cis	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Number of TICS Identified*			0	0	0	0	0	0	0	0

* - Tentati[illegible] Identified Compounds
J = Result [illegible]n Estimated Result Below the Reporting Limit or a Tentatively Identified [illegible]ompound

Table B. Lindley South Landfill RI/FS
Semivolatile Organic Compounds
Groundwater Samples

Parameter	Units	Class GA Standard/Guidance	GW-1	GW-4	Dupe GW-4	MW-1	MW-2D	MW-2S	MW-3	MW-4
Date Received			12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95
Date Extracted			12/18/95	12/17/95	12/16/95	12/17/95	12/18/95	12/17/95	12/17/95	12/17/95
Date Analyzed			01/12/96	01/12/96	01/12/96	01/11/96	01/12/96	01/12/96	01/12/96	01/12/96
Phenol	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
bis(2-chloroethyl)ether	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2-chlorophenol	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
1,3-Dichlorobenzene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
1,4-Dichlorobenzene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
1,2-Dichlorobenzene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2-methylphenol	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2,2-oxybis(1-chloropropane)	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
4-methylphenol	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
N-nitroso-di-n-proplyamine	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
hexachloroethane	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
nitrobenzene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
isophorone	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2-nitrophenol	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2,4-Dimethylphenol	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
bis(2-chloroethoxy)methane	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2,4-dichlorophenol	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
1,2,4-trichlorobenzene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
naphthalene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
4-chloroaniline	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
hexachlorobutadiene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
4-chloro-3-methylphenol	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2-methylnaphthalene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Hexachlorocyclopentadiene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2,4,6-trichlorophenol	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2,4,5-trichlorophenol	ug/l		<25	<25	<25	<25	<25	<25	<25	<25
2-chloronaphthalene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2-nitroaniline	ug/l		<25	<25	<25	<25	<25	<25	<25	<25
dimethyl phthalate	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
acenaphthylene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2,6-dinitrotoluene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
3-nitroaniline	ug/l		<25	<25	<25	<25	<25	<25	<25	<25
acenaphthene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10

Table B. Lindley South Landfill RI/FS
Semivolatile Organic Compounds
Groundwater Samples

Parameter	Units	Class GA Standard/Guidance	GW-1	GW-4	Dupe GW-4	MW-1	MW-2D	MW-2S	MW-3	MW-4
Date Received			12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95
Date Extracted			12/18/95	12/17/95	12/16/95	12/17/95	12/18/95	12/17/95	12/17/95	12/17/95
Date Analyzed			01/12/96	01/12/96	01/12/96	01/11/96	01/12/96	01/12/96	01/12/96	01/12/96
2,4-dinitrophenol	ug/l		<25	<25	<25	<25	<25	<25	<25	<25
4-nitrophenol	ug/l		<25	<25	<25	<25	<25	<25	<25	<25
dibenzofuran	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
2,4-dinitrotoluene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
diethylphthalate	ug/l	50	<10	<10	<10	<10	<10	16	<10	<10
4-chlorophenyl-phenylether	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
fluorene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
4-nitroaniline	ug/l		<25	<25	<25	<25	<25	<25	<25	<25
4,6-dinitro-2-methylphenol	ug/l		<25	<25	<25	<25	<25	<25	<25	<25
N-Nitrosodiphenylamine	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
4-bromophenyl-phenylether	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
hexachlorobenzene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
pentachlorophenol	ug/l		<25	<25	<25	<25	<25	<25	<25	<25
phenanthrene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
anthracene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
carbozole	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Di-n-butylphthalate	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Fluoranthene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
pyrene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
butylbenzylphthalate	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
3,3-dichlorobenzidine	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
benzo(a)anthracene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
chrysene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
bis(2-ethylhexyl)phthalate	ug/l	50	2 (J)	<10	3 (J)	<10	1 (J)	2 (J)	6 (J)	2 (J)
Di-n-octyl phthalate	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
benzo(b)fluoranthene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
benzo(k)fluoranthene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
benzo(a)pyrene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
dibenzo(a,h)anthracene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
benzo(g,h,i)perylene	ug/l		<10	<10	<10	<10	<10	<10	<10	<10
Number of TICS Identified*			4	1	0	0	1	17	1	2

* - Tentatively Identified Compounds
J = Result is an Estimated Result Below the Reporting Limit or a Tentatively Identified Compound

Table C. Lindley South Landfill RI/FS
PCB/Pesticide Compounds
Groundwater Samples

Parameter	Units	GW-1	GW-4	Dupe GW-4	MW-1	MW-2D	MW-2S	MW-3	MW-4
Date Received		12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95	12/16/95
Date Extracted		12/18/95	12/18/95	12/18/95	12/18/95	12/18/95	12/18/95	12/18/95	12/18/95
Date Analyzed		12/28/95	12/28/95	12/28/95	12/28/95	12/28/95	12/28/95	12/28/95	12/28/95
alpha -BHC	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC(Lindane)	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan I	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4' -DDE	ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endrin	ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan II	ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDD	ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan Sulfate	ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDT	ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Methoxychlor	ug/l	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin Ketone	ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endrin Aldehyde	ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
alpha-chlordane	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-chlordane	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Toxaphene	ug/l	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Aroclor 1016	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Aroclor 1221	ug/l	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Aroclor 1232	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Aroclor 1242	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Aroclor 1248	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Aroclor 1254	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Aroclor 1260	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Table D. Lindley South Landfill RI/FS
Inorganic Parameters
Groundwater Samples

Parameter	Units	Class GA Standard/Guidance	GW-1	GW-4	Dupe GW-4	MW-1	MW-2D	MW-2S	MW-3	MW-4
Hardness	mg CaCO3/l		388	1265	1143	261	294	918	613	497
Turbidity	NTU		140	>1000		>1000	14	670	>1000	>1000
TDS	ug/l	500000	425000	1600000		235000	485000	1390000	443000	483000
Alkalinity	ug/l		385000	290000		190000	268000	610000	310000	390000
Chloride	ug/l	250000	1000	4000		3700	6000	500000	20000	10000
Sulfate	ug/l	250000	44000	1170000		23000	174000	20000	35000	22000
Total Cyanide	ug/l	100	<10	<10	<10	<10	<10	<10	<10	<10
Ammonia - N	ug/l	2000	152	238		<100	<100	<100	<100	<100
COD	ug/l		<5000	6300		<5000	<5000	8100	<5000	<5000
TOC	ug/l		2200	2200		2600	4700	6700	5700	2700
Aluminum	ug/l		2280	34700	31400	9100	285	2720	46900	10800
~~Antimony~~	~~ug/l~~	~~3~~	~~<29.0~~	~~<29.0~~	~~<29.0~~	~~<29.0~~	~~<29.0~~	~~<29.0~~	~~<29.0~~	~~<29.0~~
Arsenic	ug/l	25	<6.5	35	23.3	<6.5	26.1	<6.5	12.7	26.5
Barium	ug/l	1000	61.6	402	319	184	101	320	1230	250
Beryllium	ug/l	3	<0.90	4	3	1.2	<0.90	<0.90	4.9	1.5
Cadmium	ug/l	10	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Calcium	ug/l		94000	317000	283000	66500	71000	224000	139000	132000
Chromium	ug/l	50	<5.3	53.7	45	23.5	<5.3	<5.3	69.5	15.8
Cobalt	ug/l		<11.3	58	45.2	<11.3	<11.3	<11.3	67.8	11.7
Copper	ug/l	200	14.3	86.8	96.5	33.7	11	15.1	106	34.2
Iron	ug/l	300	5710	99300	82800	21800	485	7020	97500	24500
Lead	ug/l	25	122	102	112	17.7	<2.1	3.9	132	18.8
Magnesium	ug/l	35000	37200	115000	106000	23000	28300	87100	64500	40700
Manganese	ug/l	300	1250	6280	5160	639	538	3320	4700	694
Mercury	ug/l	2	0.2	0.2	0.2	<0.20	<0.20	0.2	0.2	<0.20
Nickel	ug/l		<14.3	106	85.6	24.9	<14.3	28	127	17.3
Potassium	ug/l		2580	5750	5370	2490	1170	2650	8120	2900
Selenium	ug/l	10	<2.8	<14.0	<14.0	<2.8	<14.0	<2.8	<2.8	<2.8
Silver	ug/l	50	<5.6	<5.6	<5.6	<5.6	<5.6	<5.6	<5.6	<5.6
Sodium	ug/l	20000	31900	102000	99200	8780	76600	178000	24600	14100
Thallium	ug/l	4	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Vanadium	ug/l		<8.2	12.4	12.4	<8.2	<8.2	<8.2	36	<8.2
Zinc	ug/l	300	56	264	223	67.7	14.8	29.7	616	87.4
Boron	ug/l	1000	NR	NR	NR	NR	NR	NR	NR	NR

NR - Not Required

LINDLEY SOUTH LANDFILL REMEDIAL INVESTIGATION: HYDROGEOCHEMICAL COMPARISON

MONITORING WELLS		CATIONS				ANIONS			
		Na + K	Mg	Ca	Total + mequiv/l	Cl-	SO4	CO3 + HCO3	Total - mequiv/l
Well GW-1	mg/l	34.48	37.20	94.00		1.00	44.00	425.00	
	mequiv/l	1.44	3.07	4.69		0.03	0.92	7.63	
	%	15.65%	33.40%	50.96%	9.20	0.33%	10.69%	88.98%	8.58
Well GW-4	mg/l	107.75	115.00	317.00		4.00	1170.00	290.00	
	mequiv/l	4.50	9.50	15.82		0.11	24.37	5.21	
	%	15.09%	31.87%	53.04%	29.82	0.38%	82.08%	17.54%	29.69
Well MW-1	mg/l	11.27	23.00	66.50		3.70	23.00	190.00	
	mequiv/l	0.47	1.90	3.32		0.10	0.48	3.41	
	%	8.28%	33.40%	58.32%	5.69	2.61%	11.99%	85.40%	3.99
Well MW-2S	mg/l	180.65	87.10	224.00		500.00	20.00	610.00	
	mequiv/l	7.55	7.20	11.18		14.11	0.42	10.95	
	%	29.12%	27.77%	43.12%	25.92	55.38%	1.63%	42.99%	25.48
Well MW-3	mg/l	32.72	64.50	139.00		20.00	35.00	310.00	
	mequiv/l	1.37	5.33	6.93		0.56	0.73	5.57	
	%	10.03%	39.10%	50.88%	13.63	8.23%	10.63%	81.15%	6.86
Well MW-4	mg/l	17.00	40.70	132.00		10.00	22.00	390.00	
	mequiv/l	0.71	3.36	6.59		0.28	0.46	7.00	
	%	6.66%	31.55%	61.79%	10.66	3.64%	5.92%	90.44%	7.74
Well MW-2D	mg/l	77.77	28.30	71.00		6.00	174.00	268.00	
	mequiv/l	3.25	2.34	3.54		0.17	3.62	4.81	
	%	35.59%	25.61%	38.80%	9.13	1.97%	42.11%	55.92%	8.60

Table A. Lindley South Landfill RI/FS
Volatile Organic Compounds
Residential Well Water Samples

Parameter	Units	RW-1	RW-2
Date Received		*12/16/95*	*12/16/95*
Date Analyzed		*12/22/95*	*12/22/95*
Chloromethane	ug/l	<10	<10
Bromomethane	ug/l	<10	<10
Vinyl Chloride	ug/l	<10	<10
Chloroethane	ug/l	<10	<10
Methylene Chloride	ug/l	<10	<10
Acetone	ug/l	<10	<10
Carbon Disulfide	ug/l	<10	<10
1,1-Dichloroethene	ug/l	<10	<10
1,1-Dichloroethane	ug/l	<10	<10
1,2-Dichloroethene - trans	ug/l	<10	<10
Chloroform	ug/l	<10	<10
1,2-Dichloroethane	ug/l	<10	<10
2-Butanone	ug/l	<10	<10
1,1,1-Trichloroethane	ug/l	<10	<10
Carbon Tetrachloride	ug/l	<10	<10
Bromodichloromethane	ug/l	<10	<10
1,2-Dichloropropane	ug/l	<10	<10
cis-1,3-Dichloropropene	ug/l	<10	<10
Trichloroethene	ug/l	<10	<10
Dibromochloromethane	ug/l	<10	<10
1,1,2-Trichloroethane	ug/l	<10	<10
Benzene	ug/l	<10	<10
trans-1,3-Dichloropropene	ug/l	<10	<10
Bromoform	ug/l	<10	<10
4-Methyl-2-Pentanone	ug/l	<10	<10
2-Hexanone	ug/l	<10	<10
Tetrachloroethane	ug/l	<10	<10
1,1,2,2-Tetrachloroethane	ug/l	<10	<10
Toluene	ug/l	<10	<10
Chlorobenzene	ug/l	<10	<10
Ethylbenzene	ug/l	<10	<10
Styrene	ug/l	<10	<10
Xylenes (Total)	ug/l	<10	<10
1,2-Dichloroethene-cis	ug/l	<10	<10
Number of TICS Identified*		0	0

* - Tentatively Identified Compounds

Table B. Lindley South Landfill RI/FS
Semivolatile Organic Compounds
Residential Well Water Samples

Parameter	Units	Class GA Standard/Guidance	RW-1	RW-2
Date Received			12/16/95	12/16/95
Date Extracted			12/18/95	12/16/95
Date Analyzed			01/12/96	01/12/96
Phenol	ug/l		<10	<10
bis(2-chloroethyl)ether	ug/l		<10	<10
2-chlorophenol	ug/l		<10	<10
1,3-Dichlorobenzene	ug/l		<10	<10
1,4-Dichlorobenzene	ug/l		<10	<10
1,2-Dichlorobenzene	ug/l		<10	<10
2-methylphenol	ug/l		<10	<10
2,2-oxybis(1-chloropropane)	ug/l		<10	<10
4-methylphenol	ug/l		<10	<10
N-nitroso-di-n-proplyamine	ug/l		<10	<10
hexachloroethane	ug/l		<10	<10
nitrobenzene	ug/l		<10	<10
isophorone	ug/l		<10	<10
2-nitrophenol	ug/l		<10	<10
2,4-Dimethylphenol	ug/l		<10	<10
bis(2-chloroethoxy)methane	ug/l		<10	<10
2,4-dichlorophenol	ug/l		<10	<10
1,2,4-trichlorobenzene	ug/l		<10	<10
naphthalene	ug/l		<10	<10
4-chloroaniline	ug/l		<10	<10
hexachlorobutadiene	ug/l		<10	<10
4-chloro-3-methylphenol	ug/l		<10	<10
2-methylnaphthalene	ug/l		<10	<10
Hexachlorocyclopentadiene	ug/l		<10	<10
2,4,6-trichlorophenol	ug/l		<10	<10
2,4,5-trichlorophenol	ug/l		<25	<25
2-chloronaphthalene	ug/l		<10	<10
2-nitroaniline	ug/l		<25	<25
dimethyl phthalate	ug/l		<10	<10
acenaphthylene	ug/l		<10	<10
2,6-dinitrotoluene	ug/l		<10	<10
3-nitroaniline	ug/l		<25	<25
acenaphthene	ug/l		<10	<10

Table B. Lindley South Landfill RI/FS
Semivolatile Organic Compounds
Residential Well Water Samples

Parameter	Units	Class GA Standard/Guidance	RW-1	RW-2
Date Received			12/16/95	12/16/95
Date Extracted			12/18/95	12/16/95
Date Analyzed			01/12/96	01/12/96
2,4-dinitrophenol	ug/l		<25	<25
4-nitrophenol	ug/l		<25	<25
dibenzofuran	ug/l		<10	<10
2,4-dinitrotoluene	ug/l		<10	<10
diethylphthalate	ug/l	50	<10	<10
4-chlorophenyl-phenylether	ug/l		<10	<10
fluorene	ug/l		<10	<10
4-nitroaniline	ug/l		<25	<25
4,6-dinitro-2-methylphenol	ug/l		<25	<25
N-Nitrosodiphenylamine	ug/l		<10	<10
4-bromophenyl-phenylether	ug/l		<10	<10
hexachlorobenzene	ug/l		<10	<10
pentachlorophenol	ug/l		<25	<25
phenanthrene	ug/l		<10	<10
anthracene	ug/l		<10	<10
carbozole	ug/l		<10	<10
Di-n-butylphthalate	ug/l		<10	<10
Fluoranthene	ug/l		<10	<10
pyrene	ug/l		<10	<10
butylbenzylphthalate	ug/l		<10	<10
3,3-dichlorobenzidine	ug/l		<10	<10
benzo(a)anthracene	ug/l		<10	<10
chrysene	ug/l		<10	<10
bis(2-ethylhexyl)phthalate	ug/l	50	2 (J)	3 (J)
Di-n-octyl phthalate	ug/l		<10	<10
benzo(b)fluoranthene	ug/l		<10	<10
benzo(k)fluoranthene	ug/l		<10	<10
benzo(a)pyrene	ug/l		<10	<10
Indeno(1,2,3-cd)pyrene	ug/l		<10	<10
dibenzo(a,h)anthracene	ug/l		<10	<10
benzo(g,h,i)perylene	ug/l		<10	<10
Number of TICS Identified*			1	0

* - Tentatively Identified Compounds
J = Result is an Estimated Result Below the Reporting Limit or a Tentatively Identified Compound

Table C. Lindley South Landfill RI/FS
PCB/Pesticide Compounds
Residential Well Water Samples

Parameter	Units	RW-1	RW-2
Date Received		12/16/95	12/16/95
Date Extracted		12/18/95	12/18/95
Date Analyzed		12/28/95	12/28/95
alpha -BHC	ug/l	<0.05	<0.05
beta-BHC	ug/l	<0.05	<0.05
delta-BHC	ug/l	<0.05	<0.05
gamma-BHC(Lindane)	ug/l	<0.05	<0.05
Heptachlor	ug/l	<0.05	<0.05
Aldrin	ug/l	<0.05	<0.05
Heptachlor epoxide	ug/l	<0.05	<0.05
Endosulfan I	ug/l	<0.05	<0.05
Dieldrin	ug/l	<0.10	<0.10
4,4' -DDE	ug/l	<0.10	<0.10
Endrin	ug/l	<0.10	<0.10
Endosulfan II	ug/l	<0.10	<0.10
4,4'-DDD	ug/l	<0.10	<0.10
Endosulfan Sulfate	ug/l	<0.10	<0.10
4,4'-DDT	ug/l	<0.10	<0.10
Methoxychlor	ug/l	<0.50	<0.50
Endrin Ketone	ug/l	<0.10	<0.10
Endrin Aldehyde	ug/l	<0.10	<0.10
alpha-chlordane	ug/l	<0.05	<0.05
gamma-chlordane	ug/l	<0.05	<0.05
Toxaphene	ug/l	<5.0	<5.0
Aroclor 1016	ug/l	<1.0	<1.0
Aroclor 1221	ug/l	<2.0	<2.0
Aroclor 1232	ug/l	<1.0	<1.0
Aroclor 1242	ug/l	<1.0	<1.0
Aroclor 1248	ug/l	<1.0	<1.0
Aroclor 1254	ug/l	<1.0	<1.0
Aroclor 1260	ug/l	<1.0	<1.0

Table D. Lindley South Landfill RI/FS
Inorganic Parameters
Residential Well Water Samples

Parameter	Units	Class GA Standard/Guidance	RW-1	RW-2
Hardness	mg CaCO3/l		9	<5
Total Cyanide	ug/l	100	<10	<10
Aluminum	ug/l		<80.9	<80.9
Antimony	ug/l	3	<29.0	57.5
Arsenic	ug/l	25	<6.5	<6.5
Barium	ug/l	1000	25	<3.9
Beryllium	ug/l	3	<0.90	<0.90
Cadmium	ug/l	10	<2.0	<2.0
Calcium	ug/l		2460	688
Chromium	ug/l	50	<5.3	<5.3
Cobalt	ug/l		<11.3	<11.3
Copper	ug/l	200	13.1	15.6
Iron	ug/l	300	62.3	24.1
Lead	ug/l	25	<2.1	<2.1
Magnesium	ug/l	35000	731	<312
Manganese	ug/l	300	4.5	<2.9
Mercury	ug/l	2	0.2	0.2
Nickel	ug/l		<14.3	<14.3
Potassium	ug/l		<456	<456
Selenium	ug/l	10	<2.8	<2
Silver	ug/l	50	<5.6	<5.6
Sodium	ug/l	20000	245000	257000
Thallium	ug/l	4	<4.0	<4.0
Vanadium	ug/l		<8.2	<8.2
Zinc	ug/l	300	15.8	12.6
Boron	ug/l	1000	NR	NR

Table A. Lindley South Landfill RI/FS
Volatile Organic Analysis
Trip Blank Samples

Parameter	Units	Trip Blank SDG-1	Trip Blank SDG-2
Date Received		*12/16/95*	*12/16/95*
Date Analyzed		*12/22/95*	*12/22/95*
Chloromethane	ug/l	<10	<10
Bromomethane	ug/l	<10	<10
Vinyl Chloride	ug/l	<10	<10
Chloroethane	ug/l	<10	<10
Methylene Chloride	ug/l	<10	<10
Acetone	ug/l	<10	<10
Carbon Disulfide	ug/l	<10	<10
1,1-Dichloroethene	ug/l	<10	<10
1,1-Dichloroethane	ug/l	<10	<10
1,2-Dichloroethene - trans	ug/l	<10	<10
Chloroform	ug/l	<10	<10
1,2-Dichloroethane	ug/l	<10	<10
2-Butanone	ug/l	<10	<10
1,1,1-Trichloroethane	ug/l	<10	<10
Carbon Tetrachloride	ug/l	<10	<10
Bromodichloromethane	ug/l	<10	<10
1,2-Dichloropropane	ug/l	<10	<10
cis-1,3-Dichloropropene	ug/l	<10	<10
Trichloroethene	ug/l	<10	<10
Dibromochloromethane	ug/l	<10	<10
1,1,2-Trichloroethane	ug/l	<10	<10
Benzene	ug/l	<10	<10
trans-1,3-Dichloropropene	ug/l	<10	<10
Bromoform	ug/l	<10	<10
4-Methyl-2-Pentanone	ug/l	<10	<10
2-Hexanone	ug/l	<10	<10
Tetrachloroethane	ug/l	<10	<10
1,1,2,2-Tetrachloroethane	ug/l	<10	<10
Toluene	ug/l	<10	<10
Chlorobenzene	ug/l	<10	<10
Ethylbenzene	ug/l	<10	<10
Styrene	ug/l	<10	<10
Xylenes (Total)	ug/l	<10	<10
1,2-Dichloroethene-cis	ug/l	<10	<10
Number of TICS Identified*		0	0

* - Tentatively Identified Compounds

Lindley South Landfill - RI/FS
Sediment Sampling Point SED-3
Field Duplicate Comparison

Parameter	Units	SED-3	dupe SED-3	%RPD
Aluminum	mg/kg	6260	3830	24.08
Antimony	mg/kg	<8.8	<9.2	NA
Arsenic	mg/kg	5.7	5.9	1.72
Barium	mg/kg	68.5	38.3	28.28
Beryllium	mg/kg	0.45	<0.29	NA
Cadmium	mg/kg	<0.64	<0.67	NA
Calcium	mg/kg	1870	1390	14.72
Chromium	mg/kg	9.4	7.3	12.57
Cobalt	mg/kg	7.6	5	20.63
Copper	mg/kg	8.1	9.1	5.81
Iron	mg/kg	14800	9320	22.72
Lead	mg/kg	31.2	1.8	89.09
Magnesium	mg/kg	2040	1340	20.71
Manganese	mg/kg	851	176	65.73
Mercury	mg/kg	<0.15	<0.16	NA
Nickel	mg/kg	14.7	10.7	15.75
Potassium	mg/kg	229	<145	NA
Selenium	mg/kg	<0.85	<0.89	NA
Silver	mg/kg	<1.7	<1.8	NA
Sodium	mg/kg	248	221	5.76
Thallium	mg/kg	<1.2	6.9	NA
Vanadium	mg/kg	3.9	3	13.04
Zinc	mg/kg	65.8	46.9	16.77
Total Cyanide	mg/kg	<1.5	<1.6	NA

Lindley South Landfill - RI/FS
Sediment Sampling Point SED-3
Field Duplicate Comparison

Parameter	Units	SED-3	dupe SED-3	%RPD
Chloromethane	ug/kg	<15	<16	NA
Bromomethane	ug/kg	<15	<16	NA
Vinyl Chloride	ug/kg	<15	<16	NA
Chloroethane	ug/kg	<15	<16	NA
Methylene Chloride	ug/kg	7 (J)	9 (J)	12.5
Acetone	ug/kg	36	<16	NA
Carbon Disulfide	ug/kg	<15	<16	NA
1,1-Dichloroethene	ug/kg	<15	<16	NA
1,1-Dichloroethane	ug/kg	<15	<16	NA
1,2-Dichloroethene - trans	ug/kg	<15	<16	NA
Chloroform	ug/kg	<15	<16	NA
1,2-Dichloroethane	ug/kg	<15	<16	NA
2-Butanone	ug/kg	<15	<16	NA
1,1,1-Trichloroethane	ug/kg	<15	<16	NA
Carbon Tetrachloride	ug/kg	<15	<16	NA
Bromodichloromethane	ug/kg	<15	<16	NA
1,2-Dichloropropane	ug/kg	<15	<16	NA
cis-1,3-Dichloropropene	ug/kg	<15	<16	NA
Trichloroethene	ug/kg	<15	<16	NA
Dibromochloromethane	ug/kg	<15	<16	NA
1,1,2-Trichloroethane	ug/kg	<15	<16	NA
Benzene	ug/kg	<15	<16	NA
trans-1,3-Dichloropropene	ug/kg	<15	<16	NA
Bromoform	ug/kg	<15	<16	NA
4-Methyl-2-Pentanone	ug/kg	<15	<16	NA
2-Hexanone	ug/kg	<15	<16	NA
Tetrachloroethane	ug/kg	<15	<16	NA
1,1,2,2-Tetrachloroethane	ug/kg	<15	<16	NA
Toluene	ug/kg	<15	<16	NA
Chlorobenzene	ug/kg	<15	<16	NA
Ethylbenzene	ug/kg	<15	<16	NA
Styrene	ug/kg	<15	<16	NA
Xylenes (Total)	ug/kg	<15	<16	NA
1,2-Dichloroethene-cis	ug/kg	<15	<16	NA

Lindley South Landfill - RI/FS
Sediment Sampling Point SED-3
Field Duplicate Comparison

Parameter	Units	SED-3	dupe SED-3	%RPD
Phenol	ug/kg	<510	<530	NA
bis(2-chloroethyl)ether	ug/kg	<510	<530	NA
2-chlorophenol	ug/kg	<510	<530	NA
1,3-Dichlorobenzene	ug/kg	<510	<530	NA
1,4-Dichlorobenzene	ug/kg	<510	100 (J)	NA
1,2-Dichlorobenzene	ug/kg	<510	<530	NA
2-methylphenol	ug/kg	<510	<530	NA
2,2-oxybis(1-chloropropane)	ug/kg	<510	<530	NA
4-methylphenol	ug/kg	<510	<530	NA
N-nitroso-di-n-proplyamine	ug/kg	<510	<530	NA
hexachloroethane	ug/kg	<510	<530	NA
nitrobenzene	ug/kg	<510	<530	NA
isophorone	ug/kg	<510	<530	NA
2-nitrophenol	ug/kg	<510	<530	NA
2,4-Dimethylphenol	ug/kg	<510	<530	NA
bis(2-chloroethoxy)methane	ug/kg	<510	<530	NA
2,4-dichlorophenol	ug/kg	<510	<530	NA
1,2,4-trichlorobenzene	ug/kg	<510	<530	NA
naphthalene	ug/kg	<510	<530	NA
4-chloroaniline	ug/kg	<510	<530	NA
hexachlorobutadiene	ug/kg	<510	<530	NA
4-chloro-3-methylphenol	ug/kg	<510	<530	NA
2-methylnaphthalene	ug/kg	<510	<530	NA
Hexachlorocyclopentadiene	ug/kg	<510	<530	NA
2,4,6-trichlorophenol	ug/kg	<510	<530	NA
2,4,5-trichlorophenol	ug/kg	<1300	<1300	NA
2-chloronaphthalene	ug/kg	<510	<530	NA
2-nitroaniline	ug/kg	<1300	<1300	NA
dimethyl phthalate	ug/kg	<510	<530	NA
acenaphthylene	ug/kg	<510	<530	NA
2,6-dinitrotoluene	ug/kg	<510	<530	NA
3-nitroaniline	ug/kg	<1300	<1300	NA
acenaphthene	ug/kg	<510	<530	NA

Lindley South Landfill - RI/FS
Sediment Sampling Point SED-3
Field Duplicate Comparison

Parameter	Units	SED-3	dupe SED-3	%RPD
2,4-dinitrophenol	ug/kg	<1300	<1300	NA
4-nitrophenol	ug/kg	<1300	<1300	NA
dibenzofuran	ug/kg	<510	<530	NA
2,4-dinitrotoluene	ug/kg	<510	<530	NA
diethylphthalate	ug/kg	<510	<530	NA
4-chlorophenyl-phenylether	ug/kg	<510	<530	NA
fluorene	ug/kg	<510	<530	NA
4-nitroaniline	ug/kg	<1300	<1300	NA
4,6-dinitro-2-methylphenol	ug/kg	<1300	<1300	NA
N-Nitrosodiphenylamine	ug/kg	<510	<530	NA
4-bromophenyl-phenylether	ug/kg	<510	<530	NA
hexachlorobenzene	ug/kg	<510	<530	NA
pentachlorophenol	ug/kg	<1300	<1300	NA
phenanthrene	ug/kg	34 (J)	<530	NA
anthracene	ug/kg	<510	<530	NA
carbozole	ug/kg	<510	<530	NA
Di-n-butylphthalate	ug/kg	<510	<530	NA
Fluoranthene	ug/kg	<510	<530	NA
pyrene	ug/kg	<510	<530	NA
butylbenzylphthalate	ug/kg	<510	<530	NA
3,3-dichlorobenzidine	ug/kg	<510	<530	NA
benzo(a)anthracene	ug/kg	<510	<530	NA
chrysene	ug/kg	<510	<530	NA
bis(2-ethylhexyl)phthalate	ug/kg	210 (J)	150 (J)	16.67
Di-n-octyl phthalate	ug/kg	<510	<530	NA
benzo(b)fluoranthene	ug/kg	<510	<530	NA

Lindley South Landfill - RI/FS
Sediment Sampling Point SED-3
Field Duplicate Comparison

Parameter	Units	SED-3	dupe SED-3	%RPD
benzo(k)fluoranthene	ug/kg	<510	<530	NA
benzo(a)pyrene	ug/kg	<510	<530	NA
Indeno(1,2,3-cd)pyrene	ug/kg	<510	<530	NA
dibenzo(a,h)anthracene	ug/kg	<510	<530	NA
benzo(g,h,i)perylene	ug/kg	<510	<530	NA
alpha -BHC	ug/kg	<2.5	<2.6	NA
beta-BHC	ug/kg	<2.5	<2.6	NA
delta-BHC	ug/kg	<2.5	<2.6	NA
gamma-BHC(Lindane)	ug/kg	<2.5	<2.6	NA
Heptachlor	ug/kg	<2.5	<2.6	NA
Aldrin	ug/kg	<2.5	<2.6	NA
Heptachlor epoxide	ug/kg	<2.5	<2.6	NA
Endosulfan I	ug/kg	<2.5	<2.6	NA
Dieldrin	ug/kg	0.13 (J)	0.14 (J)	3.70
4,4' -DDE	ug/kg	0.19 (J)	0.22 (J)	7.32
Endrin	ug/kg	<5.1	<5.3	NA
Endosulfan II	ug/kg	<5.1	<5.3	NA
4,4'-DDD	ug/kg	<5.1	<5.3	NA
Endosulfan Sulfate	ug/kg	0.17 (J)	0.17 (J)	0.00
4,4'-DDT	ug/kg	<5.1	0.23 (J)	NA
Methoxychlor	ug/kg	<25	26	NA
Endrin Ketone	ug/kg	<5.1	<5.3	NA
Endrin Aldehyde	ug/kg	<5.1	<5.3	NA
alpha-chlordane	ug/kg	<2.5	0.22 (J)	NA
gamma-chlordane	ug/kg	<2.5	<2.6	NA
Toxaphene	ug/kg	<250	<260	NA
Aroclor 1016	ug/kg	<51	<53	NA
Aroclor 1221	ug/kg	<100	<110	NA
Aroclor 1232	ug/kg	<51	<53	NA
Aroclor 1242	ug/kg	<51	<53	NA
Aroclor 1248	ug/kg	<51	<53	NA
Aroclor 1254	ug/kg	<51	<53	NA
Aroclor 1260	ug/kg	<51	<53	NA

NA - Cannot perform a relative percent difference on values who are below method detection limits

Laboratory Duplicate Results
SED-3

Parameter	Sample Concentration	Duplicate Concentration	RPD
Units	mg/kg	mg/kg	
Aluminum	6260.60	6293.94	0.5
Antimony	<8.79	<8.79	NA
Arsenic	5.67	6.15	8.2
Barium	68.52	68.52	0.0
Beryllium	0.45	0.35	25.0
Cadmium	<0.64	<0.64	NA
Calcium	1873.64	1867.88	0.3
Chromium	9.45	9.20	2.6
Cobalt	7.60	7.95	4.5
Copper	8.09	7.81	3.5
Iron	14796.97	14869.70	0.5
Lead	31.18	13.39	79.8
Magnesium	2044.85	2059.70	0.7
Manganese	850.61	854.85	0.5
Mercury	<0.15	<0.15	NA
Nickel	14.73	15.12	2.6
Potassium	228.91	239.30	4.4
Selenium	<0.85	<0.85	NA
Silver	<1.73	<1.73	NA
Sodium	247.82	247.67	0.1
Thallium	<1.21	<1.21	NA
Vanadium	3.87	4.52	15.4
Zinc	65.82	64.61	1.9

NA - Cannot perform a relative percent difference on values which are below method detection limits.

Lindley South Landfill - RI/FS
Groundwater Monitoring Well GW-4
Field Duplicate Comparison

Parameter	Units	GW-4	Dupe GW-4	%RPD
Hardness	mg CaCO3/l	1265	1143	5.07
Turbidity	NTU	>1000		
TDS	ug/l	1600000		
Alkalinity	ug/l	290000		
Chloride	ug/l	4000		
Sulfate	ug/l	1170000		
Total Cyanide	ug/l	<10	<10	NA
Ammonia - N	ug/l	238		
COD	ug/l	6300		
TOC	ug/l	2200		
Aluminum	ug/l	34700	31400	4.99
Antimony	ug/l	<29.0	<29.0	NA
Arsenic	ug/l	35	23.3	20
Barium	ug/l	402	319	11.51
Beryllium	ug/l	4	3	14.29
Cadmium	ug/l	<2.0	<2.0	NA
Calcium	ug/l	317000	283000	5.67
Chromium	ug/l	53.7	45	8.81
Cobalt	ug/l	58	45.2	12.40
Copper	ug/l	86.8	96.5	5.29
Iron	ug/l	99300	82800	9.06
Lead	ug/l	102	112	4.67
Magnesium	ug/l	115000	106000	4.07
Manganese	ug/l	6280	5160	9.79
Mercury	ug/l	0.2	0.2	0.00
Nickel	ug/l	106	85.6	10.65
Potassium	ug/l	5750	5370	3.42
Selenium	ug/l	<14.0	<14.0	NA
Silver	ug/l	<5.6	<5.6	NA
Sodium	ug/l	102000	99200	1.39
Thallium	ug/l	<4.0	<4.0	NA
Vanadium	ug/l	12.4	12.4	0.00
Zinc	ug/l	264	223	8.42

Lindley South Landfill - RI/FS
Surface Water Sampling Point SW-3
Field Duplicate Comparison

Parameter	Units	SW-3	Dupe SW-3	%RPD
Hardness	mg CaCO3/l	178	192	3.78
Turbidity	NTU	14	14	0.00
TDS	ug/l	280000	288000	1.41
Alkalinity	ug/l	112000	116000	1.75
Chloride	ug/l	60000	61000	0.83
Sulfate	ug/l	40000	40000	0.00
Total Cyanide	ug/l	<10	<10	NA
Ammonia - N	ug/l	<100	<100	NA
COD	ug/l	<5000	<5000	NA
TOC	ug/l	3700	3400	4.23
Aluminum	ug/l	495	577	7.65
Antimony	ug/l	<29.0	<29.0	NA
Arsenic	ug/l	<6.5	<6.5	NA
Barium	ug/l	49.7	55.1	5.15
Beryllium	ug/l	<0.90	<0.90	NA
Cadmium	ug/l	<2.0	<2.0	NA
Calcium	ug/l	50300	53700	3.27
Chromium	ug/l	<5.3	<5.3	NA
Cobalt	ug/l	<11.3	<11.3	NA
Copper	ug/l	22.8	19.8	7.04
Iron	ug/l	1220	1410	7.22
Lead	ug/l	3.7	3.6	1.37
Magnesium	ug/l	12800	14100	4.83
Manganese	ug/l	148	160	3.90
Mercury	ug/l	0.2	<0.2	NA
Nickel	ug/l	<14.3	<14.3	NA
Potassium	ug/l	1830	1960	3.43
Selenium	ug/l	<2.8	<2.8	NA
Silver	ug/l	<5.6	<5.6	NA
Sodium	ug/l	35800	40300	5.91
Thallium	ug/l	<4.0	<4.0	NA
Vanadium	ug/l	<8.2	<8.2	NA
Zinc	ug/l	35.4	36.7	1.80

Lindley South Landfill - RI/FS
Groundwater Monitoring Well GW-4
Field Duplicate Comparison

Parameter	Units	GW-4	Dupe GW-4	%RPD
[illegible]romethane	ug/l	<10	<10	NA
Bromomethane	ug/l	<10	<10	NA
Vinyl Chloride	ug/l	<10	<10	NA
Chloroethane	ug/l	<10	<10	NA
Methylene Chloride	ug/l	<10	<10	NA
Acetone	ug/l	<10	<10	NA
Carbon Disulfide	ug/l	<10	<10	NA
1,1-Dichloroethene	ug/l	<10	<10	NA
1,1-Dichloroethane	ug/l	<10	<10	NA
1,2-Dichloroethene - trans	ug/l	<10	<10	NA
Chloroform	ug/l	<10	<10	NA
1,2-Dichloroethane	ug/l	<10	<10	NA
2-Butanone	ug/l	<10	<10	NA
1,1,1-Trichloroethane	ug/l	<10	<10	NA
Carbon Tetrachloride	ug/l	<10	<10	NA
Bromodichloromethane	ug/l	<10	<10	NA
1,2-Dichloropropane	ug/l	<10	<10	NA
cis-1,3-Dichloropropene	ug/l	<10	<10	NA
Trichloroethene	ug/l	<10	<10	NA
Dibromochloromethane	ug/l	<10	<10	NA
1,1,2-Trichloroethane	ug/l	<10	<10	NA
Benzene	ug/l	<10	<10	NA
trans-1,3-Dichloropropene	ug/l	<10	<10	NA
Bromoform	ug/l	<10	<10	NA
4-Methyl-2-Pentanone	ug/l	<10	<10	NA
2-Hexanone	ug/l	<10	<10	NA
Tetrachloroethane	ug/l	<10	<10	NA
1,1,2,2-Tetrachloroethane	ug/l	<10	<10	NA
Toluene	ug/l	<10	<10	NA
Chlorobenzene	ug/l	<10	<10	NA
Ethylbenzene	ug/l	<10	<10	NA
Styrene	ug/l	<10	<10	NA
Xylenes (Total)	ug/l	<10	<10	NA
1,2-Dichloroethene-cis	ug/l	<10	<10	NA

NA - Cannot perform a relative percent difference on values who are below method detection limits

Lindley South Landfill - RI/FS
Surface Water Sampling Point SW-3
Field Duplicate Comparison

Parameter	Units	SW-3	Dupe SW-3	%RPD
Chloromethane	ug/l	<10	<10	NA
Bromomethane	ug/l	<10	<10	NA
Vinyl Chloride	ug/l	<10	<10	NA
Chloroethane	ug/l	<10	<10	NA
Methylene Chloride	ug/l	<10	<10	NA
Acetone	ug/l	<10	<10	NA
Carbon Disulfide	ug/l	<10	<10	NA
1,1-Dichloroethene	ug/l	<10	<10	NA
1,1-Dichloroethane	ug/l	<10	<10	NA
1,2-Dichloroethene - trans	ug/l	<10	<10	NA
Chloroform	ug/l	<10	<10	NA
1,2-Dichloroethane	ug/l	<10	<10	NA
2-Butanone	ug/l	<10	<10	NA
1,1,1-Trichloroethane	ug/l	<10	<10	NA
Carbon Tetrachloride	ug/l	<10	<10	NA
Bromodichloromethane	ug/l	<10	<10	NA
1,2-Dichloropropane	ug/l	<10	<10	NA
cis-1,3-Dichloropropene	ug/l	<10	<10	NA
Trichloroethene	ug/l	<10	<10	NA
Dibromochloromethane	ug/l	<10	<10	NA
1,1,2-Trichloroethane	ug/l	<10	<10	NA
Benzene	ug/l	<10	<10	NA
trans-1,3-Dichloropropene	ug/l	<10	<10	NA
Bromoform	ug/l	<10	<10	NA
4-Methyl-2-Pentanone	ug/l	<10	<10	NA
2-Hexanone	ug/l	<10	<10	NA
Tetrachloroethane	ug/l	<10	<10	NA
1,1,2,2-Tetrachloroethane	ug/l	<10	<10	NA
Toluene	ug/l	<10	<10	NA
Chlorobenzene	ug/l	<10	<10	NA
Ethylbenzene	ug/l	<10	<10	NA
Styrene	ug/l	<10	<10	NA
Xylenes (Total)	ug/l	<10	<10	NA
1,2-Dichloroethene-cis	ug/l	<10	<10	NA

Lindley South Landfill - RI/FS
Groundwater Monitoring Well GW-4
Field Duplicate Comparison

Parameter	Units	GW-4	Dupe GW-4	%RPD
Phenol	ug/l	<10	<10	NA
bis(2-chloroethyl)ether	ug/l	<10	<10	NA
2-chlorophenol	ug/l	<10	<10	NA
1,3-Dichlorobenzene	ug/l	<10	<10	NA
1,4-Dichlorobenzene	ug/l	<10	<10	NA
1,2-Dichlorobenzene	ug/l	<10	<10	NA
2-methylphenol	ug/l	<10	<10	NA
2,2-oxybis(1-chloropropane	ug/l	<10	<10	NA
4-methylphenol	ug/l	<10	<10	NA
N-nitroso-di-n-proplyamine	ug/l	<10	<10	NA
hexachloroethane	ug/l	<10	<10	NA
nitrobenzene	ug/l	<10	<10	NA
isophorone	ug/l	<10	<10	NA
2-nitrophenol	ug/l	<10	<10	NA
2,4-Dimethylphenol	ug/l	<10	<10	NA
bis(2-chloroethoxy)methane	ug/l	<10	<10	NA
2,4-dichlorophenol	ug/l	<10	<10	NA
1,2,4-trichlorobenzene	ug/l	<10	<10	NA
naphthalene	ug/l	<10	<10	NA
4-chloroaniline	ug/l	<10	<10	NA
hexachlorobutadiene	ug/l	<10	<10	NA
4-chloro-3-methylphenol	ug/l	<10	<10	NA
2-methylnaphthalene	ug/l	<10	<10	NA
Hexachlorocyclopentadiene	ug/l	<10	<10	NA
2,4,6-trichlorophenol	ug/l	<10	<10	NA
2,4,5-trichlorophenol	ug/l	<25	<25	NA
2-chloronaphthalene	ug/l	<10	<10	NA
2-nitroaniline	ug/l	<25	<25	NA
dimethyl phthalate	ug/l	<10	<10	NA
acenaphthylene	ug/l	<10	<10	NA
2,6-dinitrotoluene	ug/l	<10	<10	NA
3-nitroaniline	ug/l	<25	<25	NA
acenaphthene	ug/l	<10	<10	NA

Lindley South Landfill - RI/FS
Surface Water Sampling Point SW-3
Field Duplicate Comparison

Parameter	Units	SW-3	Dupe SW-3	%RPD
Phenol	ug/l	<10	<10	NA
bis(2-chloroethyl)ether	ug/l	<10	<10	NA
2-chlorophenol	ug/l	<10	<10	NA
1,3-Dichlorobenzene	ug/l	<10	<10	NA
1,4-Dichlorobenzene	ug/l	<10	<10	NA
1,2-Dichlorobenzene	ug/l	<10	<10	NA
2-methylphenol	ug/l	<10	<10	NA
2,2-oxybis(1-chloropropane)	ug/l	<10	<10	NA
4-methylphenol	ug/l	<10	<10	NA
N-nitroso-di-n-proplyamine	ug/l	<10	<10	NA
hexachloroethane	ug/l	<10	<10	NA
nitrobenzene	ug/l	<10	<10	NA
isophorone	ug/l	<10	<10	NA
2-nitrophenol	ug/l	<10	<10	NA
2,4-Dimethylphenol	ug/l	<10	<10	NA
bis(2-chloroethoxy)methane	ug/l	<10	<10	NA
2,4-dichlorophenol	ug/l	<10	<10	NA
1,2,4-trichlorobenzene	ug/l	<10	<10	NA
naphthalene	ug/l	<10	<10	NA
4-chloroaniline	ug/l	<10	<10	NA
hexachlorobutadiene	ug/l	<10	<10	NA
4-chloro-3-methylphenol	ug/l	<10	<10	NA
2-methylnaphthalene	ug/l	<10	<10	NA
Hexachlorocyclopentadiene	ug/l	<10	<10	NA
2,4,6-trichlorophenol	ug/l	<10	<10	NA
2,4,5-trichlorophenol	ug/l	<25	<25	NA
2-chloronaphthalene	ug/l	<10	<10	NA
2-nitroaniline	ug/l	<25	<25	NA
dimethyl phthalate	ug/l	<10	<10	NA
acenaphthylene	ug/l	<10	<10	NA
2,6-dinitrotoluene	ug/l	<10	<10	NA
3-nitroaniline	ug/l	<25	<25	NA
acenaphthene	ug/l	<10	<10	NA

Lindley South Landfill - RI/FS
Groundwater Monitoring Well GW-4
Field Duplicate Comparison

Parameter	Units	GW-4	Dupe GW-4	%RPD
2,4-dinitrophenol	ug/l	<25	<25	NA
4-nitrophenol	ug/l	<25	<25	NA
dibenzofuran	ug/l	<10	<10	NA
2,4-dinitrotoluene	ug/l	<10	<10	NA
diethylphthalate	ug/l	<10	<10	NA
4-chlorophenyl-phenylether	ug/l	<10	<10	NA
fluorene	ug/l	<10	<10	NA
4-nitroaniline	ug/l	<25	<25	NA
4,6-dinitro-2-methylphenol	ug/l	<25	<25	NA
N-Nitrosodiphenylamine	ug/l	<10	<10	NA
4-bromophenyl-phenylether	ug/l	<10	<10	NA
hexachlorobenzene	ug/l	<10	<10	NA
pentachlorophenol	ug/l	<25	<25	NA
phenanthrene	ug/l	<10	<10	NA
anthracene	ug/l	<10	<10	NA
carbozole	ug/l	<10	<10	NA
Di-n-butylphthalate	ug/l	<10	<10	NA
Fluoranthene	ug/l	<10	<10	NA
pyrene	ug/l	<10	<10	NA
butylbenzylphthalate	ug/l	<10	<10	NA
3,3-dichlorobenzidine	ug/l	<10	<10	NA
benzo(a)anthracene	ug/l	<10	<10	NA
chrysene	ug/l	<10	<10	NA
bis(2-ethylhexyl)phthalate	ug/l	<10	3 (J)	NA
Di-n-octyl phthalate	ug/l	<10	<10	NA
benzo(b)fluoranthene	ug/l	<10	<10	NA
benzo(k)fluoranthene	ug/l	<10	<10	NA
benzo(a)pyrene	ug/l	<10	<10	NA
Indeno(1,2,3-cd)pyrene	ug/l	<10	<10	NA
dibenzo(a,h)anthracene	ug/l	<10	<10	NA
benzo(g,h,i)perylene	ug/l	<10	<10	NA

Lindley South Landfill - RI/FS
Surface Water Sampling Point SW-3
Field Duplicate Comparison

Parameter	Units	SW-3	Dupe SW-3	%RPD
2,4-dinitrophenol	ug/l	<25	<25	NA
4-nitrophenol	ug/l	<25	<25	NA
dibenzofuran	ug/l	<10	<10	NA
2,4-dinitrotoluene	ug/l	<10	<10	NA
diethylphthalate	ug/l	<10	<10	NA
4-chlorophenyl-phenylether	ug/l	<10	<10	NA
fluorene	ug/l	<10	<10	NA
4-nitroaniline	ug/l	<25	<25	NA
4,6-dinitro-2-methylphenol	ug/l	<25	<25	NA
N-Nitrosodiphenylamine	ug/l	<10	<10	NA
4-bromophenyl-phenylether	ug/l	<10	<10	NA
hexachlorobenzene	ug/l	<10	<10	NA
pentachlorophenol	ug/l	<25	<25	NA
phenanthrene	ug/l	<10	<10	NA
anthracene	ug/l	<10	<10	NA
carbozole	ug/l	<10	<10	NA
Di-n-butylphthalate	ug/l	<10	<10	NA
Fluoranthene	ug/l	<10	<10	NA
pyrene	ug/l	<10	<10	NA
butylbenzylphthalate	ug/l	<10	<10	NA
3,3-dichlorobenzidine	ug/l	<10	<10	NA
benzo(a)anthracene	ug/l	<10	<10	NA
chrysene	ug/l	<10	<10	NA
bis(2-ethylhexyl)phthalate	ug/l	8 (J)	7 (J)	6.67
Di-n-octyl phthalate	ug/l	<10	<10	NA
benzo(b)fluoranthene	ug/l	<10	<10	NA

Lindley South Landfill - RI/FS
Surface Water Sampling Point SW-3
Field Duplicate Comparison

Parameter	Units	SW-3	Dupe SW-3	%RPD
benzo(k)fluoranthene	ug/l	<10	<10	NA
benzo(a)pyrene	ug/l	<10	<10	NA
Indeno(1,2,3-cd)pyrene	ug/l	<10	<10	NA
dibenzo(a,h)anthracene	ug/l	<10	<10	NA
benzo(g,h,i)perylene	ug/l	<10	<10	NA
alpha -BHC	ug/l	<0.05	<0.05	NA
beta-BHC	ug/l	<0.05	<0.05	NA
delta-BHC	ug/l	<0.05	<0.05	NA
gamma-BHC(Lindane)	ug/l	<0.05	<0.05	NA
Heptachlor	ug/l	<0.05	<0.05	NA
Aldrin	ug/l	<0.05	<0.05	NA
Heptachlor epoxide	ug/l	<0.05	<0.05	NA
Endosulfan I	ug/l	<0.05	<0.05	NA
Dieldrin	ug/l	<0.10	<0.10	NA
4,4' -DDE	ug/l	<0.10	<0.10	NA
Endrin	ug/l	<0.10	<0.10	NA
Endosulfan II	ug/l	<0.10	<0.10	NA
4,4'-DDD	ug/l	<0.10	<0.10	NA
Endosulfan Sulfate	ug/l	<0.10	<0.10	NA
4,4'-DDT	ug/l	<0.10	<0.10	NA
Methoxychlor	ug/l	<0.50	<0.50	NA
Endrin Ketone	ug/l	<0.10	<0.10	NA
Endrin Aldehyde	ug/l	<0.10	<0.10	NA
alpha-chlordane	ug/l	<0.05	<0.05	NA
gamma-chlordane	ug/l	<0.05	<0.05	NA
Toxaphene	ug/l	<5.0	<5.0	NA
Aroclor 1016	ug/l	<1.0	<1.0	NA
Aroclor 1221	ug/l	<2.0	<2.0	NA
Aroclor 1232	ug/l	<1.0	<1.0	NA
Aroclor 1242	ug/l	<1.0	<1.0	NA
Aroclor 1248	ug/l	<1.0	<1.0	NA
Aroclor 1254	ug/l	<1.0	<1.0	NA
Aroclor 1260	ug/l	<1.0	<1.0	NA

NA - Cannot perform a relative percent difference on values who are below method detection limits

Lindley South Landfill - RI/FS
Groundwater Monitoring Well GW-4
Field Duplicate Comparison

Parameter	Units	GW-4	Dupe GW-4	%RPD
alpha -BHC	ug/l	<0.05	<0.05	NA
beta-BHC	ug/l	<0.05	<0.05	NA
delta-BHC	ug/l	<0.05	<0.05	NA
gamma-BHC(Lindane)	ug/l	<0.05	<0.05	NA
Heptachlor	ug/l	<0.05	<0.05	NA
Aldrin	ug/l	<0.05	<0.05	NA
Heptachlor epoxide	ug/l	<0.05	<0.05	NA
Endosulfan I	ug/l	<0.05	<0.05	NA
Dieldrin	ug/l	<0.10	<0.10	NA
4,4' -DDE	ug/l	<0.10	<0.10	NA
Endrin	ug/l	<0.10	<0.10	NA
Endosulfan II	ug/l	<0.10	<0.10	NA
4,4'-DDD	ug/l	<0.10	<0.10	NA
Endosulfan Sulfate	ug/l	<0.10	<0.10	NA
4,4'-DDT	ug/l	<0.10	<0.10	NA
Methoxychlor	ug/l	<0.50	<0.50	NA
Endrin Ketone	ug/l	<0.10	<0.10	NA
Endrin Aldehyde	ug/l	<0.10	<0.10	NA
alpha-chlordane	ug/l	<0.05	<0.05	NA
gamma-chlordane	ug/l	<0.05	<0.05	NA
Toxaphene	ug/l	<5.0	<5.0	NA
Aroclor 1016	ug/l	<1.0	<1.0	NA
Aroclor 1221	ug/l	<2.0	<2.0	NA
Aroclor 1232	ug/l	<1.0	<1.0	NA
Aroclor 1242	ug/l	<1.0	<1.0	NA
Aroclor 1248	ug/l	<1.0	<1.0	NA
Aroclor 1254	ug/l	<1.0	<1.0	NA
Aroclor 1260	ug/l	<1.0	<1.0	NA

Laboratory Duplicate Results
GW-4

Parameter	Sample Concentration	Duplicate Concentration	RPD
Units	ug/l	ug/l	
Aluminum	31450	30940	1.6
Antimony	<29	<29	NA
Arsenic	23.3	13.7	51.9
Barium	319.1	312.5	2.1
Beryllium	3.049	3.049	0.0
Cadmium	<2	<2	NA
Calcium	282900	282800	0.0
Chromium	44.99	48.06	6.6
Cobalt	45.16	43.56	3.6
Copper	96.51	92.72	4.0
Iron	82850	82400	0.5
Lead	112	48.6	79.0
Magnesium	105600	104800	0.8
Manganese	5157	5150	0.1
Mercury	0.2	0.2	0.0
Nickel	85.58	85.12	0.5
Potassium	5370	4714	13.0
Selenium	<14	<2.8	NA
Silver	<5.6	<5.6	NA
Sodium	99150	90680	8.9
Thallium	<4	<4	NA
Vanadium	12.42	11.76	5.5
Zinc	222.8	221.6	0.5
Boron			NA

NA - Cannot perform a relative percent difference on values which are below method detection limits.

Duplicate Results/Matrix Spike Recoveries

Location	Parameter	Control Limit	Sample Concentration	Duplicate Concentration	RPD
			mg/kg	mg/kg	%
SED-3	Cyanide	20	< 1.5	< 1.5	< 1

Location	Parameter	Control Limit	Spiked Sample Recovery	Sample Result	Spike Added	% R
			%	mg/kg		
SED-3	Cyanide	75-125	330	10	250	132

Volatile Matrix Spike/Matrix Spike Duplicate Recovery
SED-3

Compound	Spike Added	Sample Concentration	MS Concentration	MS % Recovery	QC Limits Rec.
Units		ug/kg	ug/kg	%	%
1,1 Dichloroethene	79	0	74	93	59-172
Trichloroethene	79	0	80	101	62-137
Benzene	79	0	75	95	66-142
Toluene	79	0	78	98	59-139
Chlorobenzene	79	0	86	108	60-133

Compound	Spike Added	MSD Concentration	MSD % Recovery	% RPD	QC Limits	
					RPD	REC
Units		ug/kg	%	%		
1,1 Dichloroethene	76	72	95	2	22	59-172
Trichloroethene	76	75	99	2	24	62-137
Benzene	76	73	96	1	21	66-142
Toluene	76	76	100	2	21	59-139
Chlorobenzene	76	85	112	4	21	60-133

Semi-Volatile Matrix Spike/Matrix Spike Duplicate Recovery
SED-1

Compound	Spike Added	Sample Concentration	MS Concentration	MS % Recovery	QC Limits Rec.
Units		ug/kg	ug/kg	%	%
Phenol	2500	0	1000	40	26-90
2-Chlorophenol	2500	0	1200	48	25-102
1,4-Dichlorobenzene	1667	0	750	45	28-104
N-nitroso-Di-n-propylamine	1667	0	820	49	41-126
1,2,4-Trichlorobenzene	1667	0	890	53	38-107
4-Chloro-3-methylphenol	2500	0	1400	56	26-103
Acenaphthene	1667	0	1000	60	31-137
4-Nitrophenol	2500	0	950	38	11-114
2,4-Dinitrotoluene	1667	0	940	56	28-89
Pentachlorophenol	2500	0	270	11	17-109
Pyrene	1667	0	1700	102	35-142

Compound	Spike Added	MSD Concentration	MSD % Recovery	% RPD	QC Limits RPD	QC Limits REC
Units		ug/kg	%	%	%	%
Phenol	3788	1600	42	5	35	26-90
2-Chlorophenol	3788	1700	45	6	50	25-102
1,4-Dichlorobenzene	2525	1200	48	6	27	28-104
N-nitroso-Di-n-propylamine	2525	1200	48	2	38	41-126
1,2,4-Trichlorobenzene	2525	1300	51	4	23	38-107
4-Chloro-3-methylphenol	3788	2100	55	2	33	26-103
Acenaphthene	2525	1600	63	5	19	31-137
4-Nitrophenol	3788	1500	40	5	50	11-114
2,4-Dinitrotoluene	2525	1500	59	5	47	28-89
Pentachlorophenol	3788	440	12	9	47	17-109
Pyrene	2525	1900	75	31	36	35-142

Pesticide Matrix Spike/Matrix Spike Duplicate
SED-1

Compound Units	Spike Added ug/kg	Sample Concentration ug/kg	MS Concentration ug/kg	MS % Rec. %	QC Limits Rec. %
gamma-BHC (Lindane)	16.0	0.0	10	62	46-127
Heptachlor	25.0	0.0	17	68	35-130
Aldrin	25.0	0.0	19	76	34-132
Dieldrin	50.0	0.13	34	68	31-134
Endrin	50.0	0.0	30	60	42-139
4,4'-DDT	50.0	0.0	24	48	23-134

Compound Units	Spike Added ug/kg	MSD Concentration ug/kg	MSD % Rec. %	% RPD %	QC Limits RPD %	QC Limits REC. %
gamma-BHC (Lindane)	16.0	10.0	62	0	50	46-127
Heptachlor	25.0	18.0	72	6	31	35-130
Aldrin	25.0	20.0	80	5	43	34-132
Dieldrin	50.0	35.0	70	3	38	31-134
Endrin	50.0	32.0	64	7	45	42-139
4,4'-DDT	50.0	24.0	48	0	50	23-134

Duplicate Results/Matrix Spike Recoveries

Location	Parameter	Units	Control Limit	Sample Concentration	Duplicate Concentration	RPD
GW-4	Alkalinity	ug/l	20	330000	310000	6.2

Location	Parameter	Units	Control Limit	Spiked Sample Recovery	Sample Result	Spike Added	% R
GW-4	Ammonia	ug/l	75-125	1040	238	1000	80
GW-4	COD	ug/l	75-125	25600	6300	20000	96
GW-4	Cyanide	ug/l	75-125	86	<10	100	86
GW-4	Chloride	ug/l	75-125	22800	4000	20000	94
GW-4	Sulfate	ug/l	75-125	1270000	1170000	100000	100
GW-4	TOC	ug/l	75-125	45000	2200	40000	107
MW-3	Alkalinity	ug/l	75-125	930000	330000	500000	120

Volatile Matrix Spike/Matrix Spike Duplicate Recovery
GW-4

Compound	Spike Added	Sample Concentration	MS Concentration	MS % Recovery	QC Limits Rec.
Units		ug/l	ug/l	%	%
1,1 Dichloroethene	50	0	45	90	61-145
Trichloroethene	50	0	60	120	71-120
Benzene	50	0	48	96	76-127
Toluene	50	0	49	98	76-125
Chlorobenzene	50	0	58	116	75-130

Compound	Spike Added	MSD Concentration	MSD % Recovery	% RPD	QC Limits RPD	QC Limits REC
Units		ug/l	%	%		
1,1 Dichloroethene	50	45	90	0	14	61-145
Trichloroethene	50	59	118	2	14	71-120
Benzene	50	47	94	2	11	76-127
Toluene	50	50	100	2	13	76-125
Chlorobenzene	50	60	120	3	13	75-130

Semi-Volatile Matrix Spike/Matrix Spike Duplicate Recovery
GW-4

Compound	Spike Added	Sample Concentration	MS Concentration	MS % Recovery	QC Limits Rec.
Units		ug/l	ug/l	%	%
Phenol	75	0	24	32	12-110
2-Chlorophenol	75	0	27	36	27-123
1,4-Dichlorobenzene	50	0	15	30	36-97
N-nitroso-Di-n-propylamine	50	0	18	36	41-116
1,2,4-Trichlorobenzene	50	0	17	34	39-98
4-Chloro-3-methylphenol	75	0	35	47	23-97
Acenaphthene	50	0	26	52	46-118
4-Nitrophenol	75	0	45	60	10-80
2,4-Dinitrotoluene	50	0	27	54	24-96
Pentachlorophenol	75	0	55	73	9-103
Pyrene	50	0	34	68	26-127

Compound	Spike Added	MSD Concentration	MSD % Recovery	% RPD	QC Limits RPD	QC Limits REC
Units		ug/l	%	%	%	%
Phenol	75	25	33	3	42	12-110
2-Chlorophenol	75	30	40	11	40	27-123
1,4-Dichlorobenzene	50	21	42	33	28	36-97
N-nitroso-Di-n-propylamine	50	18	36	0	38	41-116
1,2,4-Trichlorobenzene	50	23	46	30	28	39-98
4-Chloro-3-methylphenol	75	36	48	2	42	23-97
Acenaphthene	50	29	58	11	31	46-118
4-Nitrophenol	75	42	56	7	50	10-80
2,4-Dinitrotoluene	50	29	58	7	38	24-96
Pentachlorophenol	75	48	64	13	50	9-103
Pyrene	50	43	86	23	31	26-127

Pesticide Matrix Spike/Matrix Spike Duplicate
GW-4

Compound	Spike Added	Sample Concentration	MS Concentration	MS % Rec.	QC Limits Rec.
Units	ug/l	ug/l	ug/l	%	%
gamma-BHC (Lindane)	0.3	0.0	0.22	69	56-123
Heptachlor	0.5	0.0	0.35	70	40-131
Aldrin	0.5	0.0	0.39	78	40-120
Dieldrin	1.0	0.0	0.71	71	52-126
Endrin	1.0	0.0	0.67	67	56-121
4,4'-DDT	1.0	0.0	0.58	58	38-127

Compound	Spike Added	MSD Concentration	MSD % Rec.	% RPD	QC Limits RPD	QC Limits REC.
Units	ug/l	ug/l	%	%	%	%
gamma-BHC (Lindane)	0.3	0.2	69	0	15	56-123
Heptachlor	0.5	0.4	70	0	20	40-131
Aldrin	0.5	0.4	80	3	22	40-120
Dieldrin	1.0	0.8	75	5	18	52-126
Endrin	1.0	0.7	70	4	21	56-121
4,4'-DDT	1.0	0.6	60	3	27	38-127

Table A. Lindley South Landfill RI/FS
Inorganic Parameters
Sediment Samples

Parameter	Units	Metals Criterion	SED-1	SED-7	Dupe SED-7
Date Received			*11/15/96*	*11/15/96*	*11/15/96*
Aluminum	mg/kg		18000	8190	13670
Antimony	mg/kg	2	<8.2	<6.8	<6.8
Arsenic	mg/kg	6	29.1	7.9	13
Barium	mg/kg		172	45.8	72.7
Beryllium	mg/kg		1.4	0.46	0.85
Cadmium	mg/kg	0.6	<0.65	<0.54	<0.54
Calcium	mg/kg		3250	3400	13850
Chromium	mg/kg	26	20.8	12.3	20.1
Cobalt	mg/kg		15.7	8.4	15
Copper	mg/kg	16	116	108	121
Iron	mg/kg	2.0 %	46700	25900	41790
Lead	mg/kg	31	36	19.6	26.9
Magnesium	mg/kg		3710	3410	5334
Manganese	mg/kg	460	1920	305	625
Mercury	mg/kg	0.15	<0.14	<0.11	<0.11
Nickel	mg/kg	16	25.5	21.2	35.6
Sodium	mg/kg		<397	<330	<330
Selenium	mg/kg		<0.92	<0.76	<0.76
Silver	mg/kg	1	<1.2	<0.97	<0.97
Potassium	mg/kg		1390	<413	867
Thallium	mg/kg		<2.4	<2.0	<2.0
Vanadium	mg/kg		19.5	2.9	9.3
Zinc	mg/kg	120	67.9	40.8	71.1
Molybdenum	mg/kg		NR	NR	NR

TOC	ug/g		38000	2750	

NR - Not Required

Table A. Lindley South Landfill RI/FS
Volatile Organic Compounds
Surface Water Samples

Parameter	Units	SW-1	SW-2	SW-4	SW-7
Date Received		*11/16/96*	*11/16/96*	*11/16/96*	*11/16/96*
Date Analyzed		*11/18/96*	*11/18/96*	*11/18/96*	*11/20/96*
Chloromethane	ug/l	<10	<10	<10	<10
Bromomethane	ug/l	<10	<10	<10	<10
Vinyl Chloride	ug/l	<10	<10	<10	<10
Chloroethane	ug/l	<10	<10	<10	<10
Methylene Chloride	ug/l	<10	<10	<10	<10
Acetone	ug/l	<10	<10	<10	<10
Carbon Disulfide	ug/l	<10	<10	<10	<10
1,1-Dichloroethene	ug/l	<10	<10	<10	<10
1,1-Dichloroethane	ug/l	<10	<10	<10	<10
1,2-Dichloroethene - trans	ug/l	<10	<10	<10	<10
Chloroform	ug/l	<10	<10	<10	<10
1,2-Dichloroethane	ug/l	<10	<10	<10	<10
2-Butanone	ug/l	<10	<10	<10	<10
1,1,1-Trichloroethane	ug/l	<10	<10	<10	<10
Carbon Tetrachloride	ug/l	<10	<10	<10	<10
Bromodichloromethane	ug/l	<10	<10	<10	<10
1,2-Dichloropropane	ug/l	<10	<10	<10	<10
cis-1,3-Dichloropropene	ug/l	<10	<10	<10	<10
Trichloroethene	ug/l	<10	<10	<10	<10
Dibromochloromethane	ug/l	<10	<10	<10	<10
1,1,2-Trichloroethane	ug/l	<10	<10	<10	<10
Benzene	ug/l	<10	<10	<10	<10
trans-1,3-Dichloropropene	ug/l	<10	<10	<10	<10
Bromoform	ug/l	<10	<10	<10	<10
4-Methyl-2-Pentanone	ug/l	<10	<10	<10	<10
2-Hexanone	ug/l	<10	<10	<10	<10
Tetrachloroethane	ug/l	<10	<10	<10	<10
1,1,2,2-Tetrachloroethane	ug/l	<10	<10	<10	<10
Toluene	ug/l	<10	<10	<10	<10
Chlorobenzene	ug/l	<10	<10	<10	<10
Ethylbenzene	ug/l	<10	<10	<10	<10
Styrene	ug/l	<10	<10	<10	<10
Xylenes (Total)	ug/l	<10	<10	<10	<10
1,2-Dichloroethene-cis	ug/l	<10	<10	<10	<10
Number of TICS Identified*		0	0	0	0

* - Tentat[illegible] Identified Compounds

Table B. Lindley South Landfill RI/FS
Inorganic Parameters
Surface Water Samples

Parameter	Units	Class C Standard/Guidance	SW-1	SW-2	SW-4	SW-7
pH			7.3	7.4	7.5	7.5
TDS	ug/l	500000	145000	105000	115000	123000
Aluminum	ug/l		405	131	230	167
Antimony	ug/l		<30.4	<30.4	<30.4	<30.4
Arsenic	ug/l	190	<5.2	<5.2	<5.2	<5.2
Barium	ug/l		24	21.1	30.8	22.6
Beryllium	ug/l	*2	<0.70	<0.70	<0.70	<0.70
Cadmium	ug/l	*3	<2.4	<2.4	<2.4	<2.4
Calcium	ug/l		31800	30000	34900	33500
Chromium	ug/l	*4	<5.7	<5.7	<5.7	<5.7
Cobalt	ug/l	5	<8.7	<8.7	<8.7	<8.7
Copper	ug/l	*5	11.3	8.8	<5.8	<5.8
Iron	ug/l	300	613	172	359	204
Lead	ug/l	*6	<2.3	<2.3	<2.3	<2.3
Magnesium	ug/l		8910	7340	8100	8110
Manganese	ug/l		29	39.5	95	18.6
Mercury	ug/l	0.2	<0.08	<0.08	<0.08	<0.08
Nickel	ug/l	*7	18.6	<11.8	14.4	16
Potassium	ug/l		17900	14000	14600	13500
Selenium	ug/l	1	<3.4	<3.4	<3.4	<3.4
Silver	ug/l	0.1	<4.3	<4.3	<4.3	<4.3
Sodium	ug/l		<1840	<1840	<1840	<1840
Thallium	ug/l	8	<5.8	<5.8	<5.8	<5.8
Vanadium	ug/l	14	<8.1	<8.1	<8.1	<8.1
Zinc	ug/l	30	3.5	<2.0	2.8	<2.0
Boron	ug/l	10000				

**1 - Dependent upon sample temperature and pH (see reg)*
**2 - 0.011 mg/l when hardness < 75 mg/l; 1.10 mg/l when hardness > 75 mg/l*
**3 - exp(0.7852[ln(hardness)]-3.490)*
**4 - exp(0.819[ln(hardness)]+1.561)*
**5 - exp(0.8545[ln(hardness)]-1.465)*
**6 - exp(1.266[ln(hardness)]-4.661)*
**7 - exp(0.76[ln(hardness)]+1.06*

Table A. Lindley South Landfill RI/FS
Volatile Organic Compounds
Groundwater Samples

Parameter	Units	Class GA Standards	GW-1	MW-1	MW-2D	MW-2S	MW-3	Dupe MW-3	MW-4
Date Received			11/16/96	11/16/96	11/16/96	11/16/96	11/16/96	11/16/96	11/16/96
Date Analyzed			11/18/96	11/18/96	11/18/96	11/18/96	11/18/96	11/18/96	11/18/96
Chloromethane	ug/l		<10	<10	<10	<10	<10	<10	<10
Bromomethane	ug/l		<10	<10	<10	<10	<10	<10	<10
Vinyl Chloride	ug/l		<10	<10	<10	<10	<10	<10	<10
Chloroethane	ug/l		<10	<10	<10	<10	<10	<10	<10
Methylene Chloride	ug/l	5	<10	<10	<10	<10	<10	<10	<10
Acetone	ug/l		<10	<10	<10	<10	<10	<10	<10
Carbon Disulfide	ug/l		<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethene	ug/l		<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethane	ug/l		<10	<10	<10	5 (J)	<10	<10	<10
1,2-Dichloroethene - trans	ug/l		<10	<10	<10	<10	<10	<10	<10
Chloroform	ug/l		<10	<10	<10	<10	<10	<10	<10
1,2-Dichloroethane	ug/l		<10	<10	<10	<10	<10	<10	<10
2-Butanone	ug/l		<10	<10	<10	<10	<10	<10	<10
1,1,1-Trichloroethane	ug/l		<10	<10	<10	<10	<10	<10	<10
Carbon Tetrachloride	ug/l		<10	<10	<10	<10	<10	<10	<10
Bromodichloromethane	ug/l		<10	<10	<10	<10	<10	<10	<10
1,2-Dichloropropane	ug/l		<10	<10	<10	<10	<10	<10	<10
cis-1,3-Dichloropropene	ug/l		<10	<10	<10	<10	<10	<10	<10
Trichloroethene	ug/l		<10	<10	<10	<10	<10	<10	<10
Dibromochloromethane	ug/l		<10	<10	<10	<10	<10	<10	<10
1,1,2-Trichloroethane	ug/l		<10	<10	<10	<10	<10	<10	<10
Benzene	ug/l		<10	<10	<10	<10	<10	<10	<10
trans-1,3-Dichloropropene	ug/l		<10	<10	<10	<10	<10	<10	<10
Bromoform	ug/l		<10	<10	<10	<10	<10	<10	<10
4-Methyl-2-Pentanone	ug/l		<10	<10	<10	<10	<10	<10	<10
2-Hexanone	ug/l		<10	<10	<10	<10	<10	<10	<10
Tetrachloroethane	ug/l		<10	<10	<10	<10	<10	<10	<10
1,1,2,2-Tetrachloroethane	ug/l		<10	<10	<10	<10	<10	<10	<10
Toluene	ug/l		<10	<10	<10	<10	<10	<10	<10
Chlorobenzene	ug/l		<10	<10	<10	<10	<10	<10	<10
Ethylbenzene	ug/l		<10	<10	<10	<10	<10	<10	<10
Styrene	ug/l		<10	<10	<10	<10	<10	<10	<10
Xylenes (Total)	ug/l		<10	<10	<10	<10	<10	<10	<10
1,2-Dichloroethene-cis	ug/l		<10	<10	<10	<10	<10	<10	<10
Number of TICS Identified*			0	0	0	0	0	0	0

* - Tentatively Identified Compounds
J = Result is an Estimated Result Below the Reporting Limit or a Tentatively Identified Compound

Table B. Lindley South Landfill RI/FS
Inorganic Parameters
Groundwater Samples

Parameter	Units	Class GA Standard/Guidance	GW-1	MW-1	MW-2D	MW-2S	MW-3	Dupe MW-3	MW-4
TDS	ug/l	500000	395000	198000	523000	1170000	465000		465000
Aluminum	ug/l		466	14300	391	441	24200	40800	310
Antimony	ug/l	3	<30.4	<30.4	<30.4	<30.4	<30.4	<30.4	<30.4
Arsenic	ug/l	25	<5.2	<5.2	31.8	8	24.7	29.4	<5.2
Barium	ug/l	1000	57.7	1410	221	285	2610	4090	99.5
Beryllium	ug/l	3	<0.70	3.1	<0.70	<0.70	6.9	9.7	<0.70
Cadmium	ug/l	10	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4
Calcium	ug/l		108000	199000	93500	241000	241000	390000	168000
Chromium	ug/l	50	<5.7	34.7	<5.7	<5.7	14.4	23.7	<5.7
Cobalt	ug/l		8.8	51.5	<8.7	<8.7	68.7	110	<8.7
Copper	ug/l	200	13.8	120	8.1	<5.8	159	177	22
Iron	ug/l	300	964	42100	1000	4980	24600	41500	106
Lead	ug/l	25	16	2.5	4.5	2.8	87.1	163	2.7
Magnesium	ug/l	35000	37900	36400	32600	98000	103000	119000	41800
Manganese	ug/l	300	1260	3890	815	3680	5480	9150	89
Mercury	ug/l	2	<0.08	<0.08	<0.08	<0.08	<0.08	0.41	<0.08
Nickel	ug/l		16.5	97.7	12.1	41.8	51.7	74.5	13.4
Potassium	ug/l		28300	9850	69300	91800	28300	26500	11500
Selenium	ug/l	10	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4
Silver	ug/l	50	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3
Sodium	ug/l	20000	<1840	<1840	<1840	<1840	4280	5690	<1840
Thallium	ug/l	4	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8
Vanadium	ug/l		<8.1	11.6	<8.1	<8.1	48.9	70.4	<8.1
Zinc	ug/l	300	6.5	114	13.2	<2.0	385	613	7.8
Boron	ug/l	1000							

NR - Not Required

Table A. Lindley South Landfill RI/FS
Volatile Organic Compounds
Residential Well Water Samples

Parameter	Units	RW-1	RW-3	RW-4	Dupe RW-4
Date Received		*11/16/96*	*11/16/96*	*11/16/96*	*11/16/96*
Date Analyzed		*11/20/96*	*11/20/96*	*11/18/96*	*11/18/96*
Chloromethane	ug/l	<10	<10	<10	<10
Bromomethane	ug/l	<10	<10	<10	<10
Vinyl Chloride	ug/l	<10	<10	<10	<10
Chloroethane	ug/l	<10	<10	<10	<10
Methylene Chloride	ug/l	<10	<10	<10	<10
Acetone	ug/l	<10	<10	<10	<10
Carbon Disulfide	ug/l	<10	<10	<10	<10
1,1-Dichloroethene	ug/l	<10	<10	<10	<10
1,1-Dichloroethane	ug/l	<10	<10	<10	<10
1,2-Dichloroethene - trans	ug/l	<10	<10	<10	<10
Chloroform	ug/l	<10	<10	<10	<10
1,2-Dichloroethane	ug/l	<10	<10	<10	<10
2-Butanone	ug/l	<10	<10	<10	<10
1,1,1-Trichloroethane	ug/l	<10	<10	<10	<10
Carbon Tetrachloride	ug/l	<10	<10	<10	<10
Bromodichloromethane	ug/l	<10	<10	<10	<10
1,2-Dichloropropane	ug/l	<10	<10	<10	<10
cis-1,3-Dichloropropene	ug/l	<10	<10	<10	<10
Trichloroethene	ug/l	<10	<10	<10	<10
Dibromochloromethane	ug/l	<10	<10	<10	<10
1,1,2-Trichloroethane	ug/l	<10	<10	<10	<10
Benzene	ug/l	<10	<10	<10	<10
trans-1,3-Dichloropropene	ug/l	<10	<10	<10	<10
Bromoform	ug/l	<10	<10	<10	<10
4-Methyl-2-Pentanone	ug/l	<10	<10	<10	<10
2-Hexanone	ug/l	<10	<10	<10	<10
Tetrachloroethane	ug/l	<10	<10	<10	<10
1,1,2,2-Tetrachloroethane	ug/l	<10	<10	<10	<10
Toluene	ug/l	<10	<10	<10	<10
Chlorobenzene	ug/l	<10	<10	<10	<10
Ethylbenzene	ug/l	<10	<10	<10	<10
Styrene	ug/l	<10	<10	<10	<10
Xylenes (Total)	ug/l	<10	<10	<10	<10
1,2-Dichloroethene-cis	ug/l	<10	<10	<10	<10
Number of TICS Identified*		0	0	0	0

* - Tentatively Identified Compounds

Table B. Lindley South Landfill RI/FS
Semivolatile Organic Compounds
Residential Well Water Samples

Parameter	Units	Class GA Standard/Guidance	RW-1	RW-3	Dupe RW-4	SIY RW-4
Date Received			11/16/96	11/16/96	11/16/96	11/16/96
Date Extracted			11/19/96	11/19/96	11/19/96	11/19/96
Date Analyzed			12/03/96	12/03/96	12/03/96	12/03/96
Phenol	ug/l		<10	<10	<10	<10
bis(2-chloroethyl)ether	ug/l		<10	<10	<10	<10
2-chlorophenol	ug/l		<10	<10	<10	<10
1,3-Dichlorobenzene	ug/l		<10	<10	<10	<10
1,4-Dichlorobenzene	ug/l		<10	<10	<10	<10
1,2-Dichlorobenzene	ug/l		<10	<10	<10	<10
2-methylphenol	ug/l		<10	<10	<10	<10
2,2-oxybis(1-chloropropane)	ug/l		<10	<10	<10	<10
4-methylphenol	ug/l		<10	<10	<10	<10
N-nitroso-di-n-proplyamine	ug/l		<10	<10	<10	<10
hexachloroethane	ug/l		<10	<10	<10	<10
nitrobenzene	ug/l		<10	<10	<10	<10
isophorone	ug/l		<10	<10	<10	<10
2-nitrophenol	ug/l		<10	<10	<10	<10
2,4-Dimethylphenol	ug/l		<10	<10	<10	<10
bis(2-chloroethoxy)methane	ug/l		<10	<10	<10	<10
2,4-dichlorophenol	ug/l		<10	<10	<10	<10
1,2,4-trichlorobenzene	ug/l		<10	<10	<10	<10
naphthalene	ug/l		<10	<10	<10	<10
4-chloroaniline	ug/l		<10	<10	<10	<10
hexachlorobutadiene	ug/l		<10	<10	<10	<10
4-chloro-3-methylphenol	ug/l		<10	<10	<10	<10
2-methylnaphthalene	ug/l		<10	<10	<10	<10
Hexachlorocyclopentadiene	ug/l		<10	<10	<10	<10
2,4,6-trichlorophenol	ug/l		<10	<10	<10	<10
2,4,5-trichlorophenol	ug/l		<25	<25	<25	<25
2-chloronaphthalene	ug/l		<10	<10	<10	<10
2-nitroaniline	ug/l		<25	<25	<25	<25
dimethyl phthalate	ug/l		<10	<10	<10	<10
acenaphthylene	ug/l		<10	<10	<10	<10
2,6-dinitrotoluene	ug/l		<10	<10	<10	<10
3-nitroaniline	ug/l		<25	<25	<25	<25
acenaphthene	ug/l		<10	<10	<10	<10

Table B. Lindley South Landfill RI/FS
Semivolatile Organic Compounds
Residential Well Water Samples

Parameter	Units	Class GA Standard/Guidance	RW-1	RW-3	Dupe RW-4	SIY RW-4
Date Received			11/16/96	11/16/96	11/16/96	11/16/96
Date Extracted			11/19/96	11/19/96	11/19/96	11/19/96
Date Analyzed			12/03/96	12/03/96	12/03/96	12/03/96
2,4-dinitrophenol	ug/l		<25	<25	<25	<25
4-nitrophenol	ug/l		<25	<25	<25	<25
dibenzofuran	ug/l		<10	<10	<10	<10
2,4-dinitrotoluene	ug/l		<10	<10	<10	<10
diethylphthalate	ug/l	50	<10	<10	<10	<10
4-chlorophenyl-phenylether	ug/l		<10	<10	<10	<10
fluorene	ug/l		<10	<10	<10	<10
4-nitroaniline	ug/l		<25	<25	<25	<25
4,6-dinitro-2-methylphenol	ug/l		<25	<25	<25	<25
N-Nitrosodiphenylamine	ug/l		<10	<10	<10	<10
4-bromophenyl-phenylether	ug/l		<10	<10	<10	<10
hexachlorobenzene	ug/l		<10	<10	<10	<10
pentachlorophenol	ug/l		<25	<25	<25	<25
phenanthrene	ug/l		<10	<10	<10	<10
anthracene	ug/l		<10	<10	<10	<10
carbozole	ug/l		<10	<10	<10	<10
Di-n-butylphthalate	ug/l		<10	<10	<10	7 (J)
Fluoranthene	ug/l		<10	<10	<10	<10
pyrene	ug/l		<10	<10	<10	<10
butylbenzylphthalate	ug/l		<10	<10	<10	<10
3,3-dichlorobenzidine	ug/l		<10	<10	<10	<10
benzo(a)anthracene	ug/l		<10	<10	<10	<10
chrysene	ug/l		<10	<10	<10	<10
bis(2-ethylhexyl)phthalate	ug/l	50	<10	2 (B, J)	6 (B, J)	3 (B, [illegible]
Di-n-octyl phthalate	ug/l		<10	<10	<10	<10
benzo(b)fluoranthene	ug/l		<10	<10	<10	<10
benzo(k)fluoranthene	ug/l		<10	<10	<10	<10
benzo(a)pyrene	ug/l		<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene	ug/l		<10	<10	<10	<10
dibenzo(a,h)anthracene	ug/l		<10	<10	<10	<10
benzo(g,h,i)perylene	ug/l		<10	<10	<10	<10
Number of TICS* Identified			1	0	1	0

* - Tentatively Identified Compounds
J = Result is an Estimated Result Below the Reporting Limit or a Tentatively Identified Compound

Table C. Lindley South Landfill RI/FS
PCB/Pesticide Compounds
Residential Well Water Samples

Parameter	Units	RW-1	RW-3	RW-4	Dupe RW-4
Date Received		11/16/96	11/16/96	11/16/96	11/16/96
Date Extracted		11/20/96	11/20/96	11/20/96	11/20/96
Date Analyzed		12/12/96	12/12/96	12/12/96	12/12/96
alpha -BHC	ug/l	<0.051	<0.051	<0.051	<0.054
beta-BHC	ug/l	<0.051	<0.051	<0.051	<0.054
delta-BHC	ug/l	<0.051	<0.051	<0.051	<0.054
gamma-BHC(Lindane)	ug/l	<0.051	<0.051	<0.051	<0.054
Heptachlor	ug/l	<0.051	<0.051	<0.051	<0.054
Aldrin	ug/l	<0.051	<0.051	<0.051	<0.054
Heptachlor epoxide	ug/l	<0.051	<0.051	<0.051	<0.054
Endosulfan I	ug/l	<0.051	<0.051	<0.051	<0.054
Dieldrin	ug/l	<0.10	<0.10	<0.10	<0.10
4,4' -DDE	ug/l	<0.10	<0.10	<0.10	<0.10
Endrin	ug/l	<0.10	<0.10	<0.10	<0.10
Endosulfan II	ug/l	<0.10	<0.10	<0.10	<0.10
4,4'-DDD	ug/l	<0.10	<0.10	<0.10	<0.10
Endosulfan Sulfate	ug/l	<0.10	<0.10	<0.10	<0.10
4,4'-DDT	ug/l	<0.10	<0.10	<0.10	<0.10
Methoxychlor	ug/l	<0.51	<0.51	<0.51	<0.54
Endrin Ketone	ug/l	<0.10	<0.10	<0.10	<0.10
Endrin Aldehyde	ug/l	<0.10	<0.10	<0.10	<0.10
alpha-chlordane	ug/l	<0.051	<0.051	<0.051	<0.054
gamma-chlordane	ug/l	<0.051	<0.051	<0.051	<0.054
Toxaphene	ug/l	<5.1	<5.1	<5.1	<5.4
Aroclor 1016	ug/l	<1.0	<1.0	<1.0	<1.0
Aroclor 1221	ug/l	<2.0	<2.0	<2.0	<2.0
Aroclor 1232	ug/l	<1.0	<1.0	<1.0	<1.0
Aroclor 1242	ug/l	<1.0	<1.0	<1.0	<1.0
Aroclor 1248	ug/l	<1.0	<1.0	<1.0	<1.0
Aroclor 1254	ug/l	<1.0	<1.0	<1.0	<1.0
Aroclor 1260	ug/l	<1.0	<1.0	<1.0	<1.0

Table D. Lindley South Landfill RI/FS
Inorganic Parameters
Residential Well Water Samples

Parameter	Units	Class GA Standard/Guidance	RW-1	RW-3	RW-4	Dup RW-4
Hardness	mg $CaCO_3$/l					
Total Cyanide	ug/l	100	<10	<10	<10	<10
Aluminum	ug/l		122	239	239	215
Antimony	ug/l	3	<30.4	<30.4	<30.4	<30.4
Arsenic	ug/l	25	<5.2	<5.2	<5.2	<5.2
Barium	ug/l	1000	847	11.5	2180	2110
Beryllium	ug/l	3	<0.70	<0.70	<0.70	<0.70
Cadmium	ug/l	10	<2.4	<2.4	<2.4	<2.4
Calcium	ug/l		57200	125000	90600	87900
Chromium	ug/l	50	<5.7	<5.7	<5.7	<5.7
Cobalt	ug/l		<8.7	<8.7	<8.7	<8.7
Copper	ug/l	200	14.4	6.9	13.2	6.3
Iron	ug/l	300	543	122	994	968
Lead	ug/l	25	4.6	3.4	3.7	3.2
Magnesium	ug/l	35000	17700	35800	29500	28500
Manganese	ug/l	300	44.5	147	227	220
Mercury	ug/l	2	0.44	<0.08	0.12	<0.08
Nickel	ug/l		<11.8	12.3	14	<11.8
Potassium	ug/l		120000	61500	54200	53000
Selenium	ug/l	10	<3.4	<3.4	<3.4	<3.4
Silver	ug/l	50	<4.3	<4.3	<4.3	<4.3
Sodium	ug/l	20000	4020	<1840	<1840	<1840
Thallium	ug/l	4	<5.8	<5.8	<5.8	<5.8
Vanadium	ug/l		12.4	<8.1	<8.1	<8.1
Zinc	ug/l	300	95.8	6.4	35.1	23.6
Boron	ug/l	1000				

Table A. Lindley South Landfill RI/FS
Volatile Organic Analysis
Trip Blank Samples

Parameter	Units	Trip Blank
Date Received		*11/16/96*
Date Analyzed		*11/18/96*
Chloromethane	ug/l	<10
Bromomethane	ug/l	<10
Vinyl Chloride	ug/l	<10
Chloroethane	ug/l	<10
Methylene Chloride	ug/l	<10
Acetone	ug/l	<10
Carbon Disulfide	ug/l	<10
1,1-Dichloroethene	ug/l	<10
1,1-Dichloroethane	ug/l	<10
1,2-Dichloroethene - trans	ug/l	<10
Chloroform	ug/l	<10
1,2-Dichloroethane	ug/l	<10
2-Butanone	ug/l	<10
1,1,1-Trichloroethane	ug/l	<10
Carbon Tetrachloride	ug/l	<10
Bromodichloromethane	ug/l	<10
1,2-Dichloropropane	ug/l	<10
cis-1,3-Dichloropropene	ug/l	<10
Trichloroethene	ug/l	<10
Dibromochloromethane	ug/l	<10
1,1,2-Trichloroethane	ug/l	<10
Benzene	ug/l	<10
trans-1,3-Dichloropropene	ug/l	<10
Bromoform	ug/l	<10
4-Methyl-2-Pentanone	ug/l	<10
2-Hexanone	ug/l	<10
Tetrachloroethane	ug/l	<10
1,1,2,2-Tetrachloroethane	ug/l	<10
Toluene	ug/l	<10
Chlorobenzene	ug/l	<10
Ethylbenzene	ug/l	<10
Styrene	ug/l	<10
Xylenes (Total)	ug/l	<10
1,2-Dichloroethene-cis	ug/l	<10
Number of TICS Identified*		0

* - Tentatively Identified Compounds

Lindley South Landfill RI/FS
Groundwater Sampling Point MW-3
Field Duplicate Comparison

Parameter	Units	MW-3	Dupe MW-3	%RPD
TDS	ug/l	465000		NA
Aluminum	ug/l	24200	40800	25.54
Antimony	ug/l	<30.4	<30.4	NA
Arsenic	ug/l	24.7	29.4	8.69
Barium	ug/l	2610	4090	22.09
Beryllium	ug/l	6.9	9.7	16.87
Cadmium	ug/l	<2.4	<2.4	NA
Calcium	ug/l	241000	390000	23.61
Chromium	ug/l	14.4	23.7	24.41
Cobalt	ug/l	68.7	110	23.11
Copper	ug/l	159	177	5.36
Iron	ug/l	24600	41500	25.57
Lead	ug/l	87.1	163	30.35
Magnesium	ug/l	103000	119000	7.21
Manganese	ug/l	5480	9150	25.09
Mercury	ug/l	<0.08	0.41	100.00
Nickel	ug/l	51.7	74.5	18.07
Potassium	ug/l	28300	26500	3.28
Selenium	ug/l	<3.4	<3.4	NA
Silver	ug/l	<4.3	<4.3	NA
Sodium	ug/l	4280	5690	14.14
Thallium	ug/l	<5.8	<5.8	NA
Vanadium	ug/l	48.9	70.4	18.02
Zinc	ug/l	385	613	22.85
Boron	ug/l			NA
Volatile Organic Compounds (1)	ug/l	<10	<10	NA

(1) Note: All of the volatile organic compounds were identified below their respective method detection limits for both the original sample and field duplicate sample.

Lindley South Landfill - RI/FS
Sediment Sampling Point SED-7
Field Duplicate Comparison

Parameter	Units	SED-7	dupe SED-7	%RPD
Aluminum	mg/kg	8190	13670	50.10
Antimony	mg/kg	<6.8	<6.8	NA
Arsenic	mg/kg	7.9	13	49.20
Barium	mg/kg	45.8	72.7	45.50
Beryllium	mg/kg	0.46	0.85	59.50
Cadmium	mg/kg	<0.54	<0.54	NA
Calcium	mg/kg	3400	13850	121.20
Chromium	mg/kg	12.3	20.1	48.30
Cobalt	mg/kg	8.4	15	56.90
Copper	mg/kg	108	121	11.30
Iron	mg/kg	25900	41790	47.10
Lead	mg/kg	19.6	26.9	31.30
Magnesium	mg/kg	3410	5334	44.00
Manganese	mg/kg	305	625	68.90
Mercury	mg/kg	<0.11	<0.11	NA
Nickel	mg/kg	21.2	35.6	50.60
Sodium	mg/kg	<330	<330	NA
Selenium	mg/kg	<0.76	<0.76	NA
Silver	mg/kg	<0.97	<0.97	NA
Postassium	mg/kg	<413	867	200.00
Thallium	mg/kg	<2.0	<2.0	NA
Vanadium	mg/kg	2.9	9.3	104.80
Zinc	mg/kg	40.8	71.1	54.20
TOC	ug/g	2750	2784	1.20

Lindley South Landfill RI/FS
Residential Sampling Point RW-4
Field Duplicate Comparison

Parameter	Units	RW-4	Dupe RW-4	% RPD
Hardness	mg CaCO3/l			
Total Cyanide	ug/l	<10	<10	NA
Aluminum	ug/l	239	215	5.29
Antimony	ug/l	<30.4	<30.4	NA
Arsenic	ug/l	<5.2	<5.2	NA
Barium	ug/l	2180	2110	1.63
Beryllium	ug/l	<0.70	<0.70	NA
Cadmium	ug/l	<2.4	<2.4	NA
Calcium	ug/l	90600	87900	1.51
Chromium	ug/l	<5.7	<5.7	NA
Cobalt	ug/l	<8.7	<8.7	NA
Copper	ug/l	13.2	6.3	35.38
Iron	ug/l	994	968	1.33
Lead	ug/l	3.7	3.2	7.25
Magnesium	ug/l	29500	28500	1.72
Manganese	ug/l	227	220	1.57
Mercury	ug/l	0.12	<0.08	33.33
Nickel	ug/l	14	<11.8	15.71
Potassium	ug/l	54200	53000	1.12
Selenium	ug/l	<3.4	<3.4	NA
Silver	ug/l	<4.3	<4.3	NA
Sodium	ug/l	<1840	<1840	NA
Thallium	ug/l	<5.8	<5.8	NA
Vanadium	ug/l	<8.1	<8.1	NA
Zinc	ug/l	35.1	23.6	19.59
Boron	ug/l			NA
PCBs	ug/l	*	*	NA
Volatile Organic Compounds	ug/l	*	*	NA
Di-n-butylphthalate	ug/l	<10	7 (J)	17.65
bis(2-ethylhexyl)phthalate	ug/l	6 (B, J)	3 (B, J)	33.33

* Note all of the samples analyzed for PCBs and Volatile Organic Compounds were identified below their respective method detection limits for the both the original and field duplicate samples

Laboratory Duplicate Results
MW-1

Parameter	Control Limit	RPD
Units		%
Aluminum		0.1
Antimony		NA
Arsenic		200.0
Barium		0.4
Beryllium		0.0
Cadmium		NA
Calcium		0.3
Chromium	10.0	15.4
Cobalt	50.0	8.2
Copper	25.0	3.2
Iron		0.4
Lead	3.0	189.5
Magnesium		0.3
Manganese		0.3
Mercury		NA
Nickel	40.0	3.0
Sodium	5000.0	0.3
Selenium		NA
Silver		NA
Potassium		NA
Thallium		NA
Vanadium		30.3
Zinc		4.9

NA - Cannot perform a relative percent difference on values which are below method detection limits.

Laboratory Duplicate Results
RW-3

Parameter	Control Limit	RPD
Units		%
Aluminum	200	1.6
Antimony		NA
Arsenic		NA
Barium		0.0
Beryllium		NA
Cadmium		NA
Calcium		1.4
Chromium		NA
Cobalt		NA
Copper	25.0	124.5
Iron	100.0	7.4
Lead	3.0	200.0
Magnesium		0.5
Manganese		6.4
Mercury		NA
Nickel		200.0
Sodium		0.3
Selenium		NA
Silver		NA
Potassium		NA
Thallium		NA
Vanadium		NA
Zinc		23.2

NA - Cannot perform a relative percent difference on values which are below method detection limits.

Matrix Spike Recoveries
SED-7

Location	Parameter	Units	Spiked Sample Recovery	Sample Result	% R
SED-7	Aluminum	mg/kg	1040		
SED-7	Antimony	mg/kg	<6.8	<6.8	0
SED-7	Arsenic	mg/kg	24.2	7.9	182.3
SED-7	Barium	mg/kg	520	45.8	105.6
SED-7	Beryllium	mg/kg	12.1	0.46	103.3
SED-7	Cadmium	mg/kg	12.7	<0.54	112.7
SED-7	Calcium	mg/kg			
SED-7	Chromium	mg/kg	63.6	12.3	114.2
SED-7	Cobalt	mg/kg	128	8.4	106.4
SED-7	Copper	mg/kg	154	108	80.8
SED-7	Iron	mg/kg	37028	25900	4973
SED-7	Lead	mg/kg	159	19.6	124
SED-7	Magnesium	mg/kg			
SED-7	Manganese	mg/kg	660	305	316.2
SED-7	Mercury	mg/kg	0.71	<0.11	127.4
SED-7	Nickel	mg/kg	145	21.2	109.9
SED-7	Sodium	mg/kg			
SED-7	Selenium	mg/kg	2.3	<0.76	101.9
SED-7	Silver	mg/kg	<0.97	<0.97	0
SED-7	Potassium	mg/kg			
SED-7	Thallium	mg/kg	11.4	<2.0	126.7
SED-7	Vanadium	mg/kg	122	2.9	105.7
SED-7	Zinc	mg/kg	167	40.8	112.7
SED-7	Molybdenum	mg/kg	NR	NR	NR
SED-7	TOC	ug/g	10452	2750	128

Duplicate Results/Matrix Spike Recoveries

Location	Parameter	Units	Control Limit	RPD
RW-3	Cyanide	ug/l	20	
MW-1	TDS	ug/l	20	5.2
SW-7	pH	ug/l	20	<1

Location	Parameter	Units	Control Limit	Spike Added	% R
RW-3	Cyanide	ug/l	75-125	100	89
MW-1	Aluminum	ug/l	75-125	2000	45.7
MW-1	Antimony	ug/l	75-125	500	57.5
MW-1	Arsenic	ug/l	75-125	40	107.2
MW-1	Barium	ug/l	75-125	2000	90.9
MW-1	Beryllium	ug/l	75-125	50	106.4
MW-1	Cadmium	ug/l	75-125	50	106.9
MW-1	Calcium	ug/l	75-125		
MW-1	Chromium	ug/l	75-125	200	105.5
MW-1	Cobalt	ug/l	75-125	500	104.3
MW-1	Copper	ug/l	75-125	250	91.2
MW-1	Iron	ug/l	75-125	1000	-238.3
MW-1	Lead	ug/l	75-125	20	668.8
MW-1	Magnesium	ug/l	75-125		
MW-1	Manganese	ug/l	75-125	500	27.6
MW-1	Mercury	ug/l	75-125	1	33.2
MW-1	Nickel	ug/l	75-125	500	102.8
MW-1	Sodium	ug/l	75-125		
MW-1	Selenium	ug/l	75-125	10	96
MW-1	Silver	ug/l	75-125	50	57.6
MW-1	Potassium	ug/l	75-125		
MW-1	Thallium	ug/l	75-125	50	96
MW-1	Vanadium	ug/l	75-125	500	96.8
MW-1	Zinc	ug/l	75-125	500	94.3
RW-3	Aluminum	ug/l	75-125	2000	98.9
RW-3	Antimony	ug/l	75-125	500	108.3
RW-3	Arsenic	ug/l	75-125	40	103
RW-3	Barium	ug/l	75-125	2000	101.8
RW-3	Beryllium	ug/l	75-125	50	116.7
RW-3	Cadmium	ug/l	75-125	50	140.4
RW-3	Calcium	ug/l	75-125		
RW-3	Chromium	ug/l	75-125	200	113.5
RW-3	Cobalt	ug/l	75-125	500	111.8
RW-3	Copper	ug/l	75-125	250	111.9
RW-3	Iron	ug/l	75-125	1000	110
RW-3	Lead	ug/l	75-125	20	79.4
RW-3	Magnesium	ug/l	75-125		
RW-3	Manganese	ug/l	75-125	500	108.4
RW-3	Mercury	ug/l	75-125	1	91.8
RW-3	Nickel	ug/l	75-125	500	113.4
RW-3	Sodium	ug/l	75-125		
RW-3	Selenium	ug/l	75-125	10	70
RW-3	Silver	ug/l	75-125	50	97.3
RW-3	Potassium	ug/l	75-125		
RW-3	Thallium	ug/l	75-125	50	90.4
RW-3	Vanadium	ug/l	75-125	500	114
RW-3	Zinc	ug/l	75-125	500	111.3

Volatile Matrix Spike/Matrix Spike Duplicate Recovery
MW-1

Compound	Spike Added	Sample Concentration	MS Concentration	MS % Recovery	QC Limits Rec.
Units		ug/l	ug/l	%	%
1,1 Dichloroethene	50	0	57	114	61-145
Trichloroethene	50	0	51	102	71-120
Benzene	50	0	53	106	76-127
Toluene	50	0	50	100	76-125
Chlorobenzene	50	0	52	104	75-130

Compound	Spike Added	MSD Concentration	MSD % Recovery	% RPD	QC Limits RPD	QC Limits REC
Units		ug/l	%	%		
1,1 Dichloroethene	50	57	114	0	14	61-145
Trichloroethene	50	52	104	2	14	71-120
Benzene	50	55	110	4	11	76-127
Toluene	50	51	102	2	13	76-125
Chlorobenzene	50	54	108	4	13	75-130

Volatile Matrix Spike/Matrix Spike Duplicate Recovery
RW-3

Compound	Spike Added	Sample Concentration	MS Concentration	MS % Recovery	QC Limits Rec.
Units		ug/l	ug/l	%	%
1,1 Dichloroethene	50	0	62	124	61-145
Trichloroethene	50	0	53	106	71-120
Benzene	50	0	56	112	76-127
Toluene	50	0	52	104	76-125
Chlorobenzene	50	0	55	110	75-130

Compound	Spike Added	MSD Concentration	MSD % Recovery	% RPD	QC Limits RPD	QC Limits REC
Units		ug/l	%	%		
1,1 Dichloroethene	50	64	128	3.2	14	61-145
Trichloroethene	50	56	112	5.5	14	71-120
Benzene	50	58	116	3.5	11	76-127
Toluene	50	55	110	5.6	13	76-125
Chlorobenzene	50	57	114	3.6	13	75-130

Semi-Volatile Matrix Spike/Matrix Spike Duplicate Recovery
RW-3

Compound	Spike Added	Sample Concentration	MS Concentration	MS % Recovery	QC Limits Rec.
Units		ug/l	ug/l	%	%
Phenol	75	0	47	63	12-110
2-Chlorophenol	75	0	47	63	27-123
1,4-Dichlorobenzene	50	0	27	54	36-97
N-nitroso-Di-n-propylamine	50	0	26	52	41-116
1,2,4-Trichlorobenzene	50	0	33	66	39-98
4-Chloro-3-methylphenol	75	0	60	80	23-97
Acenaphthene	50	0	35	70	46-118
4-Nitrophenol	75	0	57	76	10-80
2,4-Dinitrotoluene	50	0	49	98	24-96
Pentachlorophenol	75	0	65	87	9-103
Pyrene	50	0	50	100	26-127

Compound	Spike Added	MSD Concentration	MSD % Recovery	% RPD	QC Limits RPD	QC Limits REC
Units		ug/l	%	%	%	%
Phenol	75	45	60	5	42	12-110
2-Chlorophenol	75	50	67	6	40	27-123
1,4-Dichlorobenzene	50	32	64	17	28	36-97
N-nitroso-Di-n-propylamine	50	25	50	4	38	41-116
1,2,4-Trichlorobenzene	50	38	76	14	28	39-98
4-Chloro-3-methylphenol	75	54	72	11	42	23-97
Acenaphthene	50	35	70	0	31	46-118
4-Nitrophenol	75	63	83	9	50	10-80
2,4-Dinitrotoluene	50	46	92	6	38	24-96
Pentachlorophenol	75	61	81	7	50	9-103
Pyrene	50	51	102	2	31	26-127

Pesticide Matrix Spike/Matrix Spike Duplicate
RW-3

Compound	Spike Added	Sample Concentration	MS Concentration	MS % Rec.	QC Limits Rec.
Units	ug/l	ug/l	ug/l	%	%
gamma-BHC (Lindane)	0.5	0.0	0.42	84	56-123
Heptachlor	0.5	0.0	0.43	86	40-131
Aldrin	0.5	0.0	0.41	82	40-120
Dieldrin	1.0	0.0	0.86	86	52-126
Endrin	1.0	0.0	0.88	88	56-121
4,4'-DDT	1.0	0.0	0.88	88	38-127

Compound	Spike Added	MSD Concentration	MSD % Rec.	% RPD	QC Limits	
					RPD	REC.
Units	ug/l	ug/l	%	%	%	%
gamma-BHC (Lindane)	0.5	0.41	82	2	15	56-123
Heptachlor	0.5	0.38	76	12	20	40-131
Aldrin	0.5	0.41	82	0	22	40-120
Dieldrin	1.0	0.89	89	3	18	52-126
Endrin	1.0	0.99	99	12	21	56-121
4,4'-DDT	1.0	0.85	85	3	27	38-127