A STUDY OF LEACHATE GENERATED FROM CONSTRUCTION AND DEMOLITION LANDFILLS

by

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EXECUTIVE SUMMARY

Construction and demolition (C&D) waste landfills have largely been ignored because they have been viewed as innocuous in comparison to municipal solid waste (MSW) landfills and hazardous waste landfills. Regulators felt that since C&D landfills did not accept large quantities of hazardous waste and the waste was relatively stable in comparison to MSW, these landfills did not pose a threat to the environment. Thus, little is known about leachate generated from C&D landfills because they have not been well studied.

Based on the results of a statistical analysis, the following parameters in C&D leachate could present a risk to human health and the environment because they exceed either primary groundwater standards, secondary groundwater standards, or guidance concentrations for groundwater:

Methylene Chloride	1,2-Dichloroethane	Cadmium	Lead
Iron	Total Dissolved Solids	Manganese	Sulfate

Some degradation of groundwater could occur because of the presence of these contaminants. It cannot be determined how far the contaminants will spread from a disposal site. There is a high probability groundwater monitoring wells will contain iron, manganese, and total dissolved solids in excess of the groundwater standards because of the extremely high levels of these contaminants in C&D leachate. It cannot be determined if the remaining parameters will be found in groundwater monitoring wells above the applicable standards.

Standards for C&D landfills should include financial assurance, groundwater monitoring, corrective action, and location restrictions similar to the standards applicable to MSW landfills. Because of the risk for damage to human health and the environment, C&D landfills should be required to prove that they have the financial resources to mitigate any damage caused by the C&D landfill. Groundwater monitoring should be required to protect the groundwater resources, and if damage occurs, corrective action is needed to mitigate the damage. Location restrictions would protect against release of solid waste in unstable areas.

There is insufficient data concerning volatile organics, semi-volatile organics, and other organics such as pesticides and herbicides, therefore further research is required to determine if these classes of contaminants are present in sufficient amounts to endanger human health and the environment.

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1.0 INTRODUCTION

1.1 Background

The proper design of a solid waste landfill includes the consideration of leachate generation and its potential impact on human health and the environment. Leachate is the liquid that has percolated through the waste in a landfill and has extracted dissolved or suspended solids from the waste (Tchobanoglous et al. 1993). Considerable research has been conducted on leachate generated from municipal solid waste (MSW) landfills, therefore, this leachate is well characterized. MSW landfills generally accept all waste generated in the community with the exception of industrial and agriculture waste (Tchobanoglous et al. 1993). Construction and Demolition (C&D) waste landfills are a special category of solid waste landfills. C&D waste landfills accept a wide variety of waste generated by construction and demolition activities. C&D waste landfills have been largely ignored because they were viewed as innocuous in comparison to MSW landfills and hazardous waste landfills. Regulators felt that since C&D waste landfills did not accept hazardous waste except for hazardous waste that could not be physically separated. and since the waste was relatively stable in comparison to MSW, these landfills posed a minimal threat to the environment. Researchers have largely ignored C&D waste landfills because of this pervasive attitude. Thus, little is known about leachate generated from C&D waste landfills because these landfills have not been well studied.

The 1984 amendments to the Resource Conservation and Recovery Act (RCRA) required the U. S. Environmental Protection Agency (EPA) to revise the existing standards governing management of household hazardous waste and hazardous waste from small quantity generators (EPA 1995). In 1991, regulators at the EPA issued revised criteria for MSW landfills that receive these two classes of hazardous waste. The revised criteria did not apply to non-MSW landfills. The EPA was subsequently sued for ignoring non-MSW landfills. The EPA has since issued proposed standards for non-MSW landfills (EPA 1995). It is anticipated that the new regulations will impact C&D waste landfills the greatest. Concurrent to EPA's proposed rule development, the State of Florida has developed rules to address the management of C&D waste in the state. Despite the new regulatory attention paid to C&D waste disposal operations, the basic question

remains: To what extent does leachate from C&D waste represent a threat to human health and the environment?

1.2 Composition of C&D Waste

This study does not focus on the composition of C&D waste, but a brief introduction is appropriate so that leachate generated from this waste can be better understood. C&D waste is defined as "all waste resulting from the construction, renovation and demolition of buildings, roads, bridges, docks, piers, and all other structures (Spencer 1991)." The definition of C&D waste also shows the many sources of C&D waste. C&D waste comes from residential, commercial, industrial, and governmental activities. The major components of C&D waste are wood products, cardboard and other paper products, concrete and asphalt, plastics, metals, roofing materials, dirt and vegetation from landclearing operations, and other miscellaneous materials including carpeting, drywall, insulation, flashing, tile, and empty containers.

Most of the waste is relatively inert, however C&D waste also contains wastes that may be hazardous (EPA 1995). The hazardous waste either cannot be removed from the non-hazardous constituents (paint, sealants), or is mixed with the C&D waste and is not identified by inspectors at the C&D waste landfills (paint cans, caulking tubes). The potentially hazardous materials can be divided into four categories: 1) excess materials and their containers, 2) waste oils, grease, and fluids, 3) other discrete items such as batteries, fluorescent bulbs, and appliances, and 4) inseparable constituents of bulk items (EPA 1995). Excess materials include paint cans with excess paint, caulking compounds, sealants, and fillers. Residual amounts of these items are often left in their containers and discarded into the dumpster. Discrete items like batteries and bulbs contain trace amounts of mercury and other heavy metals that may leach into the ground after disposal. Inseparable constituents of bulk items refer to paints, sealants, and preservatives that are applied to wood and metal surfaces. These paints and sealants cannot be removed from the bulk item once they are applied. Heavy metals and semi-volatile organic compounds are often a major constituent of these paints and sealants. These contaminants are released into water as it flows over the bulk item in a landfill. Leachate which is generated from any of these categories of C&D waste has the potential to contain harmful concentrations of the hazardous constituents found in the waste. Because these small quantities of hazardous waste are found in C&D waste, this waste can no longer be ignored and classified as innocuous.

A study of three C&D waste landfills in the Houston, Texas, area concluded that over half of the total waste stream consists of wood, brush, and grass (Norstrom et al. 1991). These wastes decompose rapidly which can cause the formation of organic acids, high oxygen demand, and high organic content in C&D leachate. Paper and cardboard made up between 2 and 13 percent. These materials will decompose less rapidly than the wood and brush. Concrete, rock, asphalt, and soil made up 15 percent of the waste. Metals made up six percent by volume of the waste. Various metals in the waste cause elevated levels of heavy metals, iron, and manganese. Rubber, plastic, and glass composed between 2 and 9 percent. Miscellaneous items such as roofing materials, carpet, insulation, and drywall composed between 4 and 19 percent of C&D waste.

The materials found at the Houston landfills are typical at C&D waste landfills. However, the percentages expressed in the study by Norstrom et al. cannot be considered to by typical of all C&D waste landfills. C&D waste composition can vary greatly depending on the bans in place, the type of industry in the area, and the dumping fees for the C&D waste landfill. One of the largest effects will be bans on landclearing debris, grass and other materials that degrade easily. When these bans are in place, the oxygen demand and nitrogen loading should decrease (Hamel 1989). Such a ban may also result in an increase in the concentration of heavy metals and other contaminants. As the amount of landclearing debris in the waste is reduced, the other types of material will make up a larger percentage of C&D waste. The increasing percentage of metals, gypsum wall board, cement and other materials will increase the amount of metals, sulfate, sodium, potassium and other contaminants in the leachate. The type of industry in the vicinity of the landfill will also affect the composition of C&D waste. For example, in an area that is rapidly expanding, a greater portion of the waste stream will come from new construction. New construction will tend to have higher concentrations of wood, gypsum board, and containers containing sealants, caulking and chemical products. If an area is fully developed, quite a bit of renovation work is expected. This could include road work. Demolition wastes from renovation can include lead-based paint, asbestos, concrete and asphalt. Demolition debris will be higher in these materials than in new construction. Thus, the type of industry in an area can significantly impact the composition of C&D waste. Finally, the fees that landfills charge can affect the composition of the waste. If two C&D waste landfills operate in the same geographical area, and

one charges significantly lower tipping fees, more of the heavy debris could end up in the landfill with the lower tipping fee. This could shift the composition in both landfills as the landfill with the higher tipping fees gets less heavy materials such as concrete, and the landfill with the lower tipping fees receiving more heavy materials.

In conclusion, the composition of C&D waste is highly variable. The specific composition will depend on the bans in place, industry in the area of the landfill, and the dump or tip fees charged at the landfill.

1.3 Scope of Project

C&D waste is a potential problem because it may contain small quantities of hazardous waste. Because of this, in the past several years C&D waste landfills have received renewed attention from state and local regulators. However, many aspects of C&D waste and C&D waste landfills are still unknown. The University of Florida recently began a project which will investigate some of the unknown aspects of C&D waste. The scope of the project includes characterizing the composition of C&D waste, conducting a full review of C&D waste landfills in the State of Florida, and investigating C&D leachate through a lysimeter study. There is limited data available on the composition of leachate generated from C&D waste landfills. A complete review of the limited data is needed to determine what components will be expected to represent a problem. This project reviews the available data on leachate generated from C&D waste landfills and presents a statistical analysis of the data. This project includes a complete literature review of the major leachate studies, a detailed description of the method taken to analyze the data, a thorough analysis of the statistical results, and conclusions and recommendations.

2.0 LITERATURE REVIEW

2.1 Introduction

There are a small number of reports and other documents that have addressed the composition of leachate from C&D waste landfills. The following sections summarize these reports and documents. The largest amount of information came from the report produced for the National Association of Demolition Contractors. However, this report only gathered, not analyzed, the data. The report produced for Waste Management Incorporated contains the most extensive round of sampling and a complete analysis of the data. As part of its rulemaking process, the EPA prepared a report that summarizes the existing database of leachate from C&D waste landfills, including the reports mentioned above.

The work presented here summarizes available leachate data from C&D waste landfills. Since many of the sources of data have been presented in many different reports, the data presented here are referenced to the original source report when possible. The data are from sources believed to be leachate, not groundwater contaminated with leachate. Such sources include leachate collection systems from lined landfills, leachate seeps, and wells within the C&D waste. The data are analyzed in a later chapter. The sampling results for all of the reports discussed in the following sections are located in Appendix A. The depth of analysis presented in this report is greater than any previous study.

2.2 The National Association of Demolition Contractors Study

The National Association of Demolition Contractors (NADC) hired the consultant firm of Gershman, Bricker & Bratton (GBB) to examine the appropriate management and/or disposal techniques for C&D waste. Because leachate quality from C&D waste landfills has never been adequately researched, GBB decided to investigate the environmental history of rubble fills or C&D waste landfills around the country. GBB sent letters to each State requesting information and data on any leachate test results submitted to the state as part of operational monitoring activities. The responses to these letters make up Volume I of the NADC report, which is entitled "Specific State-by-State Responses" (NADC 1994). The following states sent leachate data from operational C&D landfills: Colorado, Connecticut, Iowa, New York, South Carolina, and Washington. Minnesota, North Dakota, and Delaware sent groundwater monitoring results only.

The groundwater monitoring results were not included in this investigation because contaminants in the groundwater are greatly diluted from raw leachate. The diluted concentrations could skew the results of the raw leachate data, making the mean and median values for the contaminants smaller and, therefore, not representative of leachate quality. The landfills that were included in Volume I of the NADC report and had leachate quality data are given in Table 2.1. The results of these surveys are included in Appendix A.

NAME OF LANDFILL	LOCATION	NO. OF LEACHATE SAMPLES
Construction Disposal Inc. Landfill	Adams County, Colorado	1
Mt. Olivet Landfill	King County, Washington	2
110 Sand Co. C&D Debris Landfill	Melville, New York	20
Blydenburg Cleanfill	Islip, New York	4
Unknown Site	South Carolina	1

Table 2.1: Landfills from Volume I of NADC Report

Volume II of the NADC report is entitled "Copies of Reports, Articles, and Other Related Data" (NADC 1994). There are five reports not written by GBB that are included in Volume II. Because four of the five reports were written by other groups or individuals, they are reported as separate literature sources in this paper. Only the response provided by Brandywine Enterprises, Inc. is discussed in this section. Brandywine Enterprises Inc. reported leachate quality data from their C&D landfill, the Cross Trails Rubble Landfill in Maryland. They did not include any information concerning the characteristics of the landfill. Because Brandywine Enterprises reported volume of leachate collected and disposed, it is reasonable to assume that the landfill has a leachate collection system. Since landfills with leachate collection systems normally have liners, it can also be assumed that the landfill is lined. This second assumption is less certain than the first. No other information was provided by Brandywine Enterprises.

The NADC report concluded that a "vast majority of waste received by demolition landfills is relatively inert" (NADC 1994). The investigators were convinced that leachate from state-of-the-art demolition landfills and MSW landfills are not similar in concentration or composition, therefore, they should not be regulated in a similar manner. They recommend that all C&D landfills should have: 1) trained personnel who inspect all incoming waste loads for unsuitable

waste, 2) leachate containment system consisting of either suitable soil conditions, compaction of suitable soil, or other containment system, 3) groundwater monitoring system, and 4) financial assurance. The authors conclude that C&D landfills that follow these guidelines will not pose a significant threat to the environment.

2.3 Waste Management Incorporated Study

This is the report from the third year of an ongoing study conducted by Waste Management of North America (WMI) (Waste Management Inc. 1993). The purpose of the study is to characterize the composition of leachate from C&D waste landfills. WMI planned to use the results of this study to determine the type of liner needed for C&D waste landfills. The study began in 1991 and initially included four landfills: 1) an Ohio landfill owned by WMI, 2) a Kentucky landfill owned by WMI, 3) a Michigan landfill not owned by WMI, and 4) a Massachusetts landfill not owned by WMI. After the first year of sampling was completed, the investigators discovered that the Ohio landfill used steel mill slag as a granular bed within its leachate collection system. The steel mill slag significantly impacted the analytical results, therefore, the Ohio landfill was removed from the study. The investigators replaced the Ohio site with a Wisconsin landfill not owned by WMI in 1992. Sampling results from the Wisconsin site are only available for 1993.

The leachate samples from the various landfills were analyzed for Priority Pollutants, TCLP parameters, Appendix IX parameters identified in the Resource Conservation and Recovery Act (RCRA) and located in Title 40 of the Code of Federal Regulations, Part 261, and conventional parameters. The document states that the samples were analyzed for parameters identified under Appendix II of 40 CFR Part 261, however, Appendix II of Part 261 simply refers to TCLP test procedures. There is not an Appendix II list of chemicals. It is uncertain what the report was referring to as the Appendix II list. The chemicals included in Appendix IX can exist in wastes and are considered to be health hazards. According to the authors, regulatory agencies often require Appendix IX testing to determine if groundwater contamination is occurring. The Appendix II list given in the report consists of 219 chemicals. A majority of the chemicals included in Appendix II are also included in the Appendix IX list. The Priority Pollutant list was developed as part of the Clean Water Act Industrial Pretreatment Program. The investigators included these parameters in this study because they can cause problems for wastewater treatment

plants that process leachate. The Toxicity Characteristic Leaching Procedure (TCLP) replaced the EP toxicity procedure under Subtitle C of RCRA. The TCLP test is designed to more accurately predict the leaching potential of solid waste and to determine if the leachate is hazardous. The TCLP test is currently used for 39 parameters, however, the EPA is considering expanding the list to a total of 200 parameters. Although RCRA has not been changed, the investigators felt it was prudent to test for all of the parameters included on the expanded list. In total, the samples were analyzed for 253 parameters. This is by far the largest number of parameters that were sampled for in one study. The sampling results are included in Appendix A. Parameters that were detected in at least one sample from any of the landfills are included in Appendix A. If the samples were tested for a particular parameter, but the parameter was not detected in any sample, the parameter was not included in Appendix A.

Because this is an ongoing study, the investigators analyzed the data by comparing the results of the 1993 sampling rounds with the results from the previous two years. The following conclusions were presented in the Waste Management Inc. report. The investigators concluded that none of the leachate from the five C&D waste landfills would be classified as hazardous waste because all of the samples passed the current TCLP test. The number of volatile organic compounds detected increased from 3 compounds in 1992 to 8 compounds in 1993. Likewise, the number of semi-volatile compounds detected increased from 6 in 1992 to 11 in 1993. There was no trend among the pesticides, herbicides, and insecticides. The number of metals detected in 1993 remained approximately the same with arsenic, barium, chromium, lead, nickel, and zinc being detected the most frequently. The compounds detected in 1993 never exceeded the maximum contaminant levels established by the National Primary Drinking Water Standards. However, the amount of iron, zinc, total dissolved solids, and sulfates exceeded the National Drinking Water Secondary Standards at least once in 1993. Because the leachate can contain elevated levels of some contaminants, the investigators concluded that engineering controls, such as liners, leachate collection systems, and groundwater monitoring wells, should be installed at landfills which accept C&D waste.

2.4 SKB Rich Valley Demolition Waste Management Facility Study

The SKB Rich Valley Demolition Waste Management Facility is located in Inver Grove Heights, Minnesota. The Minnesota Pollution Control Agency issued a permit for landfill

operations to the facility in August 1989. As part of its closure and post closure plans, the facility was required to assess the potential damage to the environment resulting from facility operations. As a result, SKB Demolition Waste Disposal contracted Nova Environmental Services Inc. to assess the potential for environmental damage. Interpoll Laboratories was contracted to update this original study in 1992 (Interpoll Laboratories 1992).

The facility was constructed with a liner and leachate collection system. The liner was constructed of a two foot compacted clay base overlaid with a three foot protective drainage layer consisting of medium sand. The bottom layer had a maximum permeability of 1×10^{-7} cm/sec. The top layer had a minimum permeability of 5×10^{-3} cm/sec. Six inch in diameter PVC collection pipes were installed between the two layers to collect leachate. The leachate flows by gravity to collection pipes and a lift station. Leachate is collected at the lift station and transported off site for treatment at an industrial/domestic wastewater treatment plant.

The landfill has accepted only construction waste and demolition debris since opening in 1989. The waste includes concrete, brick, asphalt, stucco, rock/gravel, metal, roofing, wood and other miscellaneous materials. The facility does not accept yard wastes, liquids, septic tank pumping, vehicles, tires, machinery, appliances, fertilizers or hazardous wastes.

Eight leachate samples were obtained during the period 1990 through 1992. The results of the sampling are included in Appendix A. The first leachate sample was analyzed for both routine and extended parameters. Routine parameters included common heavy metals, other metals, and conventional parameters. Extended parameters included carcinogenic polynuclear aromatic hydrocarbons (PAH's) such as benzo(g)pyrene and noncarcinogenic PAH's such as acenaphthene and pyrene. The remaining seven leachate samples were analyzed for routine parameters only. Table 2.2 contains a list of all parameters included in this study. Appendix A contains the complete results of these eight sampling rounds. The samples were compared to the either the recommended allowable limits (RAL's) for drinking water, maximum contaminant levels (MCL's) under the Safe Drinking Water Act, secondary maximum contaminant levels (SMCL's) under the Safe Drinking Water Act, or intervention limits. RAL's apply to private drinking water standards in Minnesota.

Chloride, total dissolved solids, iron, manganese, nitrate, and nitrite exceeded an SMCL during one or more the sampling events. The investigators believe that the high level of nitrate,

nitrite and dissolved iron contained in the Fall 1990 results are erroneous. They performed one additional sampling event in January 1991 to validate these results. The January 1991 sample indicated levels of nitrate, nitrite and dissolved iron that were much more in line with the other sampling events. Arsenic exceeded the RAL in the summer 1990 sample, but did not exceed the MCL. Methylene chloride, 1,1,1-trichloroethane, and trichlorofluoromethane were identified in the spring 1990 sample, however, they did not exceed the applicable standards. The study reported the carcinogenic and noncarcinogenic PAH's as cumulative totals only. The cumulative totals were compared to the RAL for Minnesota. The reported values for the carcinogenic and noncarcinogenic, it cannot be determined if any MCL was exceeded. **Table 2.2: Parameters Included in Study for SKB Rich Valley Waste Management Facility**

ROUTINE PARAMETERS		EXTENDED PARAMETERS			
Alkalinity Manganese		CARCINOGENIC PAH'S	CARCINOGENIC PAH'S NONCARCINOGE		
Ammonia Nitrogen	Magnesium	Benzo(a)anthracene	Acenaphthene	2,3-Dihydroindene	
Arsenic	Mercury	Benzo(b)fluoranthene	Acenaphthylene	Fluoranthene	
Cadmium	Nitrate	Benzo(k)fluoranthene	Acridine	Fluorene	
Chromium	Potassium	Benzo(g)pyrene	Anthracene	Indene	
Copper	Sodium	Benzo(g,h,i)perylene	Benzo(b)thiophene	Indole	
Dissolved Solids	Sulfate	Chrysene	Benzo(e)pyrene	1-Methylnaphthalene	
Suspended Solids	Zinc	Dibenzo(a,h)anthrancene	Benzo(h)fluoranthene	2-Methylnaphthalene	
Lead	Iron	Indeno(1,2,3-cd)pyrene	Biphenyl	Naphthalene	
COD*	Barium*	Quinolene	2,3-Benzofuran	Perylene	
Calcium*	Chloride*		Carbazole	Phenanthrene	
			Dibenzothiophene	Pyrene	

*Sampled only after Spring Quarter 1992.

2.5 Sanifill C&D Waste Landfill Study

This paper presents a composition study of construction and demolition waste and analytical results from leachate collected at three Houston C&D waste landfills (Norstrom et al. 1991). The researchers' primary goal related to leachate was to identify elevated chemical constituents for tracking in a groundwater monitoring program. The researchers chose three C&D waste landfills

owned and operated by Sanifill Inc. of Houston, Texas. The landfills have liners, however the composition of the liners is unknown. The study did not indicate whether or not the landfills had leachate collection systems. The landfills accepted C&D waste composed of wood, brush, grass, concrete, rock, asphalt, metal, rubber, glass, roofing materials, carpet and drywall.

Two leachate wells were installed at each of the landfills. The leachate wells were installed by a drill rig with an 8-inch hollow stem auger. Sampling was accomplished by bailing. Samples were transported to the laboratory within two hours of sampling. Table 2.3 summarizes the salient characteristics of the landfills and leachate wells.

Well #	Site	Final Cover El., Ft.	Well Bottom El., Ft.	Top of Liner El., Ft.	Waste Thickness	Approx. Waste Age	Sampled/ Dry
A-L1	Landfill A	105	50	45	60	9/84	Sample
A-L2	Landfill A	110	55	52	58	12/88	Dry
B-L1	Landfill B	120	60	51	69	4/86	Sample
B-L2	Landfill B	129	50	42	67	1/89	Sample
C-L1	Landfill C	41	23	-10	51	10/87	Dry
C-L2	Landfill C	39	-1	-8	49	8/89	Dry

 Table 2.3:
 Leachate Well Schedule

The study reported a range of values for each constituent. The results of this study are included in Appendix A. The study sampled for conventional parameters, heavy metals and other metals. Table 2.4 summarizes the parameters included in this study. Because the study reported a range of values, only a minimum and maximum concentration for each constituent can be determined.

One or more samples exceeded the MCL for arsenic, barium, cadmium, chromium, lead and mercury. One or more samples exceeded the SMCL for zinc, nitrate, iron, total dissolved solids, manganese, and sodium. Since leachate is often treated by an industrial wastewater treatment plant, the researchers compared the analytical results to the limits for various constituents presented in the wastewater treatment plant ordinance for the City of Houston. The levels of barium, lead, manganese, and zinc in the leachate exceeded these wastewater limits at least once. The researchers concluded that C&D leachate posed a threat to groundwater quality if not

properly contained. Also, pretreatment may be necessary if the leachate is being transported to an industrial wastewater treatment plant.

Specific Conductance	Alkalinity	Boron	Potassium
BOD 5 Days	Chloride	Phosphorous	Magnesium
Organic Nitrogen	Sodium	Cadmium	Barium
Ammonia Nitrogen	Dissolved Solids	Chromium	Selenium
Nitrate	Suspended Solids	Copper	Silver
Nitrite	Cyanide	Nickel	Mercury
COD	Calcium	Lead	Iron
Total Organic Carbon	Oil and Grease	Zinc	Manganese
Hardness	Phenol	Arsenic	Sulfates
рН			

Table 2.4: Parameters Included in Sanifill C&D Waste Landfill Study

2.6 Connecticut Bulky Waste Leachate Characterization Survey

The purpose of this study was to characterize the leachate from bulky waste landfills. The State of Connecticut used the information to assess the impacts from proposed bulky waste landfill sites (Hamel 1989). The State of Connecticut defines bulky waste as demolition debris and landclearing debris. The investigators initiated a six month study of five different landfills in 1988. Between two and four sampling events occurred during the sixth month study. Appendix A contains the results from this study.

The following five landfills were included in this report: 1) Deep River Bulky Waste Landfill, 2) Guilford Bulky Waste Landfill, 3) Glastonbury Bulky Waste Landfill, 4) Former ITI Trucking Terminal at South Windsor, and 5) Groton Bulky Waste Landfill. The study did not include a detailed description of these sites. It is unknown whether the sites have liners and leachate collection systems. The sites accept only demolition debris and landclearing debris. The samples were taken mostly from seeps at the base of the landfills. The investigators sampled for conventional parameters and heavy metals. Table 2.5 summarizes the parameters that were sampled.

There were a total of 15 samples from the five landfills. One sample exceeded the MCL for cyanide. Two samples were outside the range required for pH. Thirteen samples exceeded the

SMCL for iron. Ten samples exceeded the SMCL for total dissolved solids. All samples exceeded the SMCL for manganese. Eight samples exceeded the MCL for cadmium and thirteen samples exceeded the MCL for lead. The investigators felt that these results should be used with caution. Because the sites are relatively young and small with waste piled thinly over the site, the leachate strength could be lower than that of leachate generated at older and larger facilities. Also, the trend toward processing and recycling C&D waste could change the composition of leachate from C&D waste sites in the future. The investigators believe that reducing the decomposable portion of the waste stream should reduce the oxygen demand and nitrogen loading on surface waters. This would proportionally increase the presence of painted and processed building materials and metals from demolition waste, which could increase metal loading in the leachate.

Specific Conductance	pH	Cadmium	Barium
BOD 5 Days	Alkalinity	Chromium	Selenium
Organic Nitrogen	Chloride	Copper	Silver
Ammonia Nitrogen	Sodium	Nickel	Mercury
Nitrate	Dissolved Solids	Lead	Iron
Nitrite	Suspended Solids	Zinc	Manganese
COD	Cyanide	Arsenic	Sulfates
Hardness			

Table 2.5: Parameters Included in State of Connecticut Leachate Study

2.7 U.S. Environmental Protection Agency Summary

At the time of publication of this report, the U.S. EPA was in the process of developing a rule addressing non-municipal facilities that may receive hazardous wastes from conditionally exempt small quantity generators (CESQGs). The rule has since been promulgated as a draft by the EPA. One of the largest categories of non-municipal facilities that could accept hazardous waste from CESQGs is C&D landfills. This report was prepared in support of the EPA's rulemaking (EPA 1995).

The information used to prepare the EPA report came from literature by the National Association of Demolition Contractors (NADC) and a small number of readily available reports. The landfills included in the EPA report are identical to the landfills included in this study with two exceptions. The EPA included the D&M site and Armetta property in Connecticut. The EPA report indicates that the data for these sites were included in the NADC leachate quality data report published in 1994. However, the copy of the NADC leachate quality data report used by this investigator did not include the D&M site or the Armetta property. The data from these sites were taken directly from the EPA report and is included in this report and are summarized in Appendix A. Because the EPA report did not include a summary of the landfill characteristics, no information is known about these two sites.

The EPA report used parameter-specific regulatory and health-based benchmarks as a basis for screening potential risks. The Safe Drinking Water Act National Primary and Secondary Drinking Water Standards were used for comparison when available. When the primary and secondary standards were not available, the EPA report used health-based benchmarks for a leachate ingestion scenario. Reference-doses were used for non-carcinogenic parameters and risk-specific doses were used for known carcinogens. No benchmark was established if sufficient studies had not been conducted on a parameter. The EPA report screened out parameters that never exceeded the benchmarks. A median concentration was calculated for each parameter that exceeded the benchmark at least once. The median value was calculated by first taking the median value of each landfill, than computing the median value for all landfills. Because of this methodology, each landfill was represented only once and each landfill was weighted exactly the same. The median value calculated in this manner was compared to the applicable benchmark.

Based on the number of landfills at which the benchmark was exceeded, and a comparison between the median and the benchmark, the EPA report felt that seven parameters were "potentially problematic." The following list shows the seven parameters of concern:

<u>Organics</u>	<u>Inorganics</u>	Conventional Parameters
1,2-dichloroethane	cadmium	manganese
methylene chloride	lead	iron
		total dissolved solids

For iron, manganese, and total dissolved solids, the benchmarks are secondary MCL's that are set to protect water supplies for aesthetic reasons (e.g., taste) rather than for health-based reasons. None of the remaining four parameters exceed the health-based benchmarks by a factor of ten or more. This fact is significant. The investigators at the EPA believed that leachate would be

diluted by a factor of ten by the time it reached any groundwater monitoring wells or drinking water wells downgradient of a C&D waste landfill. If the leachate was not at least ten times greater than the applicable groundwater standard, the groundwater resulting from the leachate would not exceed the applicable standards. Thus, the EPA did not believe that any of the seven parameters listed above would pose a problem at C&D waste landfills.

2.8 Conclusions

The data from each of these reports will be used to assess which chemical constituents found in C&D leachate could pose health and environmental problems. Appendix A contains two tables for each landfill identified in the literature sources discussed in the preceding section. The first table summarizes the landfill characteristics as reported in the literature source. The second table summarizes the analytical data gathered for the landfill. The parameters included in this table were detected at least once out of all of the data collected from the various literature sources. Eighty-two parameters were detected at least once. Table 2.6 on the following page summarizes the parameters that were analyzed for, but never detected in any sample. There were 197 parameters that were never detected in any sample.

The literature reviewed in the preceding sections indicate that parameters included in Table 2.7 have been detected at levels which could pose a threat to human health and the environment. The analysis performed in the next section will identify the chemical parameters that seem to <u>consistently</u> pose a threat to health and the environment.

ORGANICS	Chlorobenzene	trans-1,3-Dichloropropene	Hexachloropropene	Pentachloroethane
Acetonitrile	Chlorobenzilate	1,1-Dichloropropene	Indeno(1,2,3-cd)pyrene	Phenacetin
Acetophenone	2-Chloro-1,3-butadiene	2,3-Dichloro-1-propene	Iodomethane	Phenanthrene
2-Acetylaminofluorene	Chlorodibromomethane	cis-1,3-Dichloropropene	Isobutanol	Phenolphthalein Alkalinity
Acrolein	2-Chloroethyl Vinyl Ether	p-(Dimethylamino)azobenzene	Isodrin	p-Phenylemediamine
Acrylonitrile	4-Chloro-3-methylphenol	Dimethaote	Isophorone	Phorate
Aldrin	4-Chlorophenyl phenyl ether	7/12-Dimethylbenz(a)anthracene	2-Isophorone	2-Picoline
alpha-Chlordane	2-Chloronaphthalene	3,3-Dimethylbenzidine	Isosafrole	Pronamide
alpha-Endosulfan	2-Chlorphenol	Dimethylphenethylamine	Kepone	Propionitrile
4-Aminobiphenyl	3-Chloropropene	2,4-Dimethylphenol	Lindane	Pyrene
Aniline	Chrysene	Dimethyl phthalate	Methacryonitrile	Pyridine
Anthracene	Cumene	1,3-Dinitrobenzene	Methapyrilene	Safrole
Aramite	2,4-D	4,6-Dinitro-2-methylphenol	Methoxychlor	Silvex; 2,4,5-TP
Aroclor/PCB 1016	4,4-DDD	2,4-Dinitrophenol	3-Methychloranthrene	Sulfotepp
Aroclor/PCB 1221	4,4,4-DDT	2,4-Dinitrotoluene	Methyl methacrylate	TCDD
Aroclor/PCB 1232	delta-BHC	2,6-Dinitrotoluene	(3&4)-Methylphenol	2,3,7,8-TCDD
Aroclor/PCB 1242	Diallate	Dinoseb, DNBP	1,4-Naphthpquinone	TCDF
Aroclor/PCB 1248	Dibenzo(a,h)anthracene	Di-a-octyl phthalate	1-Naphthylamine	1,2,4,5-Tetrachlorobenzene
Aroclor/PCB 1254	Dibenzofuran	Di-n-octyl phthalate	2-Naphthylamine	1,1,1,2-Tetrachlorethane
Aroclor/PCB 1260	Dibromochloromethane	1,4-Dimene	3-Nitroaniline	1,1,2,2-Tetrachlorethane
Benzo-a-anthracene	1,2-Dibromo-d-chloropropane	Diphenylamine	4-Nitroaniline	2,3,4,6-Tetrachlorophenol
Benzo-a-pyrene	Dibromomethane	Endosulfan sulfate	Nitrobenzene	Tetrahydrofuran
Benzo-b-fluoranthene	1,2-Dibromoethane	Endosulfan I	o-Nitrophenol	Thionazin
Benzo(k)fluoranthene	Di-a-butyl phthalate	Endosulfan II	p-Nitrophenol	o-Toluidine
Benzo-g,h-perylene	Dichloroacetonitrile	Endrin aldehyde	4-Nitroquininoline-1-oxide	Toxaphene
Benzyl alcohol	1,2-Dichlorobenzene	Endrin ketone	N-Nitrosodi-a-butylamine	1,2,4-Trichlorobenzene
beta-BHC	1,3-Dichlorobenzene	Ethyl ether	N-Nitrosodiethylamine	1,1,1-Trichloroethane
beta-Endosulfan	1,4-Dichlorobenzene	Ethylmethacrylate	N-Nitrosodimethylamine	1,1,2-Trichloroethane
Bis(2-cholorethoxy)methane	3-3-Dichlorobenzidine	Ethyl methane sulfonate	N-Nitrosodimethylethylamine	2,4,5-Trichlorophenol
Bis(2-chloroethyl)ether	trans-1,4-Dichloro-2-butene	Ethyl parathion	N-Nitrosodiphenylamine	2,4,6-Trichlorophenol
Bis(2-chloro-1-methyl)ether	Dichlorodifluoromethane	Famphur	N-Nitrodo-di-n-propylamine	1,2,3-Trichloropropane
Bromodichloromethane	1,2-Dichloroethene	Fluoranthene	N-Nitrosomorpholine	1,1,2-Trichlorotrifluorethane
Bromoform	1,1-Dichlooethene	Fluorene	N-Nitrosopiperidine	o,o,o-Triethyl phosphorothiole
Bromomethane	Dichlorofluoromethane	Heptachlor	N-Nitrosopyrolidine	sym-Trinitrobenzene
4-Bromophenyl-phenylether	2,4-Dichlorphenol	Heptachlor epoxide	5-Nitro-o-toluidine	Vinyl acetate
Butyl benzyl phthalate	2,6-Dichlorphenol	Hexachlorobenzene	PeCDD	Vinyl chloride
Carbon tetrachloride	trans-1,3-Dichloropropane	Hexachlorobutadiene	PeCDF	
Carbonate	1,2-Dichloropropane	Hexachlorocyclopentadiene	Pentachlorobenzene	INORGANICS
Chlorodane	1,3-Dichloropropane	Hexachloroethane	Pentachloronitrobenzene	Thallium
4-Chloroaniline	2,2-Dichloropropane	Hexachlorophene	Pentachlorophenol	Tin

Table 2.6 Parameters That Were Never Detected in Leachate Samples

ORGANICS	HEAVY	METALS	CONVENTIO	DNAL PARAMETERS
1,2-Dichloroethane	Arsenic	Lead	Boron	Nitrite
Methylene Chloride	Barium	Mercury	Chloride	pH
	Cadmium	Zinc	Cyanide	Sodium
	Chromium		Iron	Sulfate
			Manganese	Total Dissolved Solids
			Nitrate	

Table 2.7: Parameters Identified as Problematic in the Literature

3.0 Methodology for Statistical Analysis

3.1 Introduction

The literature sources that have been reviewed employed a variety of methods to analyze leachate data. The most frequent method used by the investigators was a simple comparison between the leachate data and a regulatory limit (primary maximum contaminant levels (MCL's), secondary MCL's, or other guidance concentrations). The authors of the Waste Management report compared the leachate data gathered in 1993 to data gathered in 1991 and 1992. The authors looked for trends to determine if the leachate would be classified as a hazardous waste. and compared the data to the applicable groundwater standards. The EPA report of 1995 was the only study that attempted to statistically analyze leachate data. Investigators at the EPA determined a median value for each parameter at each landfill. These median values were then analyzed and compared to the applicable groundwater standard. The investigators at the EPA chose to use the median value of the combined data as the statistic to compare with the groundwater standards. The EPA did not use the non-detects in their calculations of the median values. They treated the non-detects as if they were never reported. If a sample was analyzed for a parameter, but the laboratory was not able to detect the parameter, the value given to the parameter is known as a non-detect. The laboratory reports the results as "< x", where x is the method detection limit.

The EPA conducted only a cursory statistical analysis on the leachate data (EPA 1995). The leachate data gathered for this report will be analyzed using statistical procedures described in "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities" (EPA 1989, 1992). This publication is intended to assist in the evaluation of groundwater monitoring data. Although the data under study are from leachate, not groundwater wells, the statistical procedures given in the publication will handle all types of water samples. The advantage to using these statistical procedures is that they can handle non-detected data. Thus, the results of these statistical tests will be more appropriate because the non-detects were included in the study.

3.2 Methodology

The methods used to analyze the data are similar to the methods used in the other reports and studies reviewed in chapter two. The basic approach included several steps. The first step was to determine the mean of all the parameters for each landfill. All of data were then combined

and values determined for the mean and maximum concentrations for each parameter over all of the landfills. Other statistics such as the number of times the parameter was detected at different landfills were also determined. The results of these steps are included in tabular form, and for certain parameters, graphical form. The last step involved conducting a statistical test of the data to determine if parameters could pose a risk to human health and the environment. This was accomplished by comparing leachate data for a particular contaminant to a regulatory standard for groundwater. It is recognized that leachate from a landfill is more concentrated than leachatecontaminated groundwater, but this method provides an assessment of the level of concern which should be awarded a particular contaminant. The following sections will address in detail the methods used to analyze the data.

The number of samples that were reported for each landfill varied from 1 to 20. The raw data could not be analyzed by treating all of the data as one large data set because the landfills with more samples would disproportionately influence the results. In order to avoid this situation, all of the samples at a particular landfill were averaged. The averages were then used to represent each landfill. This procedure ensured that each landfill was equally represented. The averaged data at each landfill were used to conduct the statistical analysis.

The mean was chosen instead of the median because the mean gives a larger numeric value. In order to determine if a parameter is statistically the same as or greater than the applicable regulatory standard, a value representing the parameter is compared to the standard. The larger the value is, the higher the probability is that the parameter will exceed the standard. This investigator wants to report the worst possible scenario, therefore each parameter will be represented by the largest possible value. For the data being analyzed, there tends to be large outlying values. These data points will increase the value of the mean. The median is not influenced by outlying values, therefore the median value would tend to be lower than the mean.

The data are separated into five categories: 1) volatile organics, 2) semi-volatile organics, 3) other organics, 4) heavy metals, and 5) conventional parameters. Most landfills analyzed for conventional parameters and heavy metals. Less than 10 landfills analyzed their samples for volatiles, semi-volatiles, and other organics such as pesticides and herbicides. To compound the problem, few landfills actually detected these three groups of chemicals in the leachate. It is difficult to conduct a full statistical analysis on these three groups because of the infrequency of

sampling and the large percentage of non-detects. For these three categories, the data were analyzed using a simple statistical procedure. For each parameter, the mean was calculated from the average values for the landfills. Along with the mean, the maximum concentration and the maximum mean value for a landfill was reported for each parameter. The data in these three groups were not analyzed further.

The two remaining groups of data are heavy metals and conventional parameters. There were sufficient data in both these groups to perform a complete statistical analysis. There are four methods to handle the data depending on the number of sites that sampled for a parameter, the number of non-detects for a parameter, and the distribution of the data. The methods include Cohen's Method, Aitchinson's Method, the standard student t-test, and a nonparametric test. All methods were taken from "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities" (EPA 1989). The test procedures are briefly summarized in the following sections.

For each landfill, the mean of each parameter was computed. This mean became the reported value of the parameter for each landfill. The non-detects were converted to one-half the method detection limit. If the method detection limit was not given for a sampling round, the method detection limit given by "Test Methods for Evaluating Solid Waste Physical/Chemical Methods" (EPA 1986) or "Methods for Chemical Analysis of Water and Wastes" (EPA 1979), was used in its place. In some cases, the actual test method was also unknown. For these instances, the sampling data from another landfill that analyzed for the same parameter were reviewed. The test method used for the parameter in the majority of the sampling data was substituted for the unknown test method. Appendix B contains a summary of the test methods and method detection limits used in the analysis. The mean values at each landfill were analyzed by all of the following statistical methods.

3.3 Standard Student T-Test

When comparing sampling data to a constant compliance limit, the appropriate statistical method is to determine a confidence interval, tolerance interval, or prediction interval, and compare the compliance limit to the interval. Intervals normally take the following form:

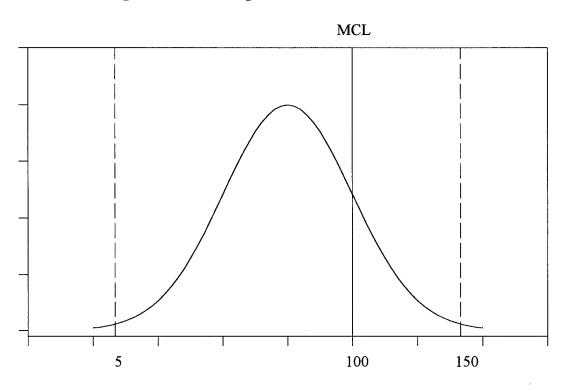
 $\mu \pm z * \sigma / n$, where $\mu = average$, $\sigma = s \tan dard deviation$, n = sample size, z = varies

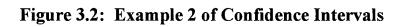
The variable z varies depending on the method used and the characteristics of the data set. The intervals will vary in width depending on the z that is used. The main difference between the three intervals is the z that is used to construct the intervals. Confidence intervals are used when comparing compliance limits that are not health based. They can be less stringent, therefore the z is usually around 2.0 for a 95% confidence interval. Confidence intervals are widely used in statistical analysis (Ott 1992). The tolerance intervals and prediction intervals are specified for groundwater monitoring situations where the compliance officer wants to ensure that the limit is exceeded only a small fraction of the time. Because of this, these intervals are very stringent. The z's used for the tolerance intervals are much higher than two, therefore the intervals are much wider than the confidence intervals. The tolerance and prediction intervals would not be appropriate for analyzing leachate data. As previously discussed, leachate is highly concentrated and is not representative of the groundwater in the area of the landfill. Applying stringent requirements to leachate would result in most of the parameters being identified as problems. Confidence intervals are less stringent than tolerance or prediction intervals, yet they will still identify when the mean of the leachate is approximately equal to or larger than the appropriate groundwater limit.

The confidence intervals are constructed so that there is a 99% chance that the actual mean for the data is contained in the interval. The mean and standard deviation for each parameter are calculated. The confidence interval is constructed by the following equation:

$$\overline{x} \pm t_{(0.99,n-1)} \frac{S}{\sqrt{n}}$$
, where \overline{x} = mean, S = standard deviation, and n = sample size

The EPA publication recommends the following approach (EPA 1989, 1992). The approach is illustrated in Figures 3.1 and 3.2. Figure 3.1 shows a MCL of 100 units which is contained within the confidence interval that extends from 5 to 150 units. Figure 3.2 shows a MCL of 0.5 units which is below the same confidence interval. The EPA manual would say that the situation represented in Figure 3.1 is in compliance because not all of the data are above the MCL of 100 units (EPA 1989, 1992). Figure 3.2 is out of compliance because all of the data are above the MCL of 0.5 units. In summary, 99% of the data must be above the MCL before the EPA approach would consider the parameter out of compliance. This investigator feels the EPA approach is not appropriate for this study. Since the confidence interval is constructed to contain





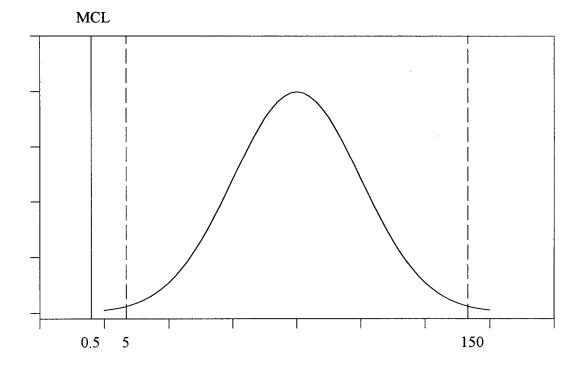


Figure 3.1: Example 1 of Confidence Intervals

99% of the values that could be the actual population mean, if the MCL is within the interval, there is a possibility that the MCL <u>is</u> the population mean. Using this rationale, Figure 3.1 would be out of compliance because there is a possibility that the mean of the data equals 100 units. This investigator feels that if a MCL is within the confidence interval, it should be declared a problem. The only way a set of data would be in compliance is if the MCL was higher than the entire confidence interval. Any other result will be deemed out of compliance and therefore could present a risk to the public health and environment. This investigator feels this combination approach is sufficiently conservative to identify problems, without being so conservative that everything is a problem.

The student t-test can only be used when the sample contains less than 15% non-detects (EPA 1989). The non-detects are set at one-half of the method detection limit, and the mean and standard deviation are calculated including the non-detects. As stated previously, some of the samples did not include method detection limits. In those cases, the appropriate method detection level was determined based on "Test Methods for Evaluating Solid Waste Physical/Chemical Methods" (EPA 1986), or "Methods for Chemical Analysis of Water and Wastes" (EPA 1979). Appendix B contains a summary of the test methods and the method detection limits used in this report. If more than 15% of the sample contained not detects, one of the following methods was used to determine the confidence intervals.

3.4 Cohen's Method

Cohen's method provides estimates of the sample mean and standard deviation when the percent of not-detects is between 15% and 50% (EPA 1989, 1992). The underlying assumption of this method is that all of the data (detects and non-detects) come from the same normal or log-normal population, but that the non-detects have been censored at the detection limit. This means that the parameter is present in the sample, but cannot be "seen." In order to test this assumption, a probability plot of the data should be constructed. To construct a probability plot, all of the data are ranked from smallest to largest, including the non-detects. The cumulative probability and normal quantiles are constructed from the ranked data. The cumulative probability is equal to the i/(n+1) where i is the rank and n is the sample size. The normal quantiles are simple the z statistic that corresponds to the cumulative probability. The actual concentrations are plotted against the normal quantiles. If the sample is normally distributed, the data should plot as a

straight line (approximately). The non-detects are not plotted. Some samples follow a lognormal distribution, or the log of the concentration plotted against the normal quantile is a line. In order to determine whether this method was appropriate, the parameters with percentages of nondetects between 15% and 50% where analyzed in this manner. Probability plots of the data and the log of the data were constructed to determine if it was appropriate to use this method. These plots are included in Appendix C.

Once it was determined that this method was appropriate for a parameter, the following equations were used to calculate a cohen parameter, lambda:

$$h = \frac{(n-m)}{n}, \quad \gamma = \frac{S_d^2}{(x_d - DL)^2}, \text{ where } S_d^2 = \text{variance of detected values,}$$

 $\overline{x_d}$ = mean of detected values, n = total sample size, m = total number of detected values

The first equation calculates the fraction of non-detects, or h. The second equation calculates a parameter γ , which is used to determine lambda. DL is the method detection limit for the parameter. Once is γ determined, the following equation is used to determine the adjusted mean and sample standard deviation:

$$\overline{x} = \overline{x}_d - \hat{\lambda}(\overline{x}_d - DL)$$
 and $S = (S_d^2 + \hat{\lambda}(\overline{x}_d - DL)^2)^{\frac{1}{2}}$, where $\overline{x} = adjusted$ mean,
 $\widetilde{\lambda} = Cohen's$ parameter based on λ and h , and $S = adjusted$ standard deviation

All other variables in the above equation have the same meaning as previously described. These adjusted mean and standard deviations are used in the above student t-test to determine the confidence intervals.

3.5 Atichinson Method

The Atichinson Method may also used when a sample contains between 15% and 50% of non-detects (EPA 1989, 1992). The difference between the two methods lies in the assumptions. This method assumes that the detected values come from a normal or log-normal distribution, but that the non-detects are equal to zero. In order to test the assumption, a probability plot is constructed from the data, but the non-detects are not included in the ranking. If the plot of concentration versus normal quantile is linear, than the assumption is valid. This method was used for only one parameter, and the probability plot for the parameter is included in Appendix B.

The adjusted mean and standard deviation are computed based on the following equations:

$$\hat{\mu} = (1 - \frac{d}{n})\overline{x}^* \text{ and } \hat{\sigma}^2 = \frac{n - (d+1)}{n-1}(s^*)^2 + \frac{d(n-d)}{n(n-1)}(\overline{x}^*)^2, \text{ where } s^* = \text{std dev of detected values,}$$

 \overline{x}^* = mean of detected values, n = total sample size, and d = no. of non-detects.

The adjusted mean and standard deviation are used in a standard student t-test to compute the confidence interval for the parameter.

3.6 Nonparametric Method

A nonparametric approach is necessary if there are more than 50% but less than 90% nondetects (EPA 1989). The nonparametric approach is used because when there are so many nondetected values, the data do not follow a normal distribution. This method requires a minimum of 7 data points. The confidence interval constructed with this method gives a two-sided, 98% confidence interval, corresponding to a one-sided confidence coefficient of 99%. The data are ordered from least to greatest with the lowest rank assigned a value of 1. The critical values of the ordered data are determined by the M value that is calculated as follows:

$$M = \frac{n}{2} + 1 + z_{0.99} \sqrt{\frac{n}{4}}, \text{ where } n = \text{sample size}$$

The z statistic is approximately equal to 2.33. Once M is calculated, the quantity (n+1-M) is calculated. The confidence interval is equal to the data points of rank (n+1-M) and M. If the compliance limit is within the interval or is smaller than the interval, than the parameter is a potential problem.

4.0 Analysis

4.1 Introduction

Each of the five groups of chemicals will be analyzed separately. A statistical test was not conducted on the volatile organics, semi-volatile organics and other organic compounds. The analysis will be limited to a direct comparison of other the minimum, maximum, and mean of the samples to the applicable groundwater standard. Statistical tests were conducted on the heavy metals and conventional parameters, therefore the results of these tests will be analyzed along with box plots for certain key parameters. The analysis will also attempt to identify possible contaminant sources for the parameters.

In the following analysis, parameters will be deemed to be "problems" when the mean concentration of the parameter in the <u>leachate</u> exceeds the applicable groundwater standard. The parameter is a "problem" in leachate because it could be present in <u>groundwater</u> at concentrations that exceed the applicable standards. If the parameter was present at concentrations that exceed the standards, the landfill would be out of compliance. Stronger terminology cannot be used because there is no information on groundwater quality at these landfills. Leachate at these landfills will become diluted with groundwater before it reaches any groundwater monitoring wells. The amount of dilution will vary, therefore no inferences can be made between concentrations in leachate and concentrations in groundwater. The only conclusion that can be made is that if the concentration of a parameter in <u>leachate</u> does not exceed the applicable groundwater standards, the parameter should not be present in <u>groundwater</u> at levels that exceed the standard. Any other scenario could present a problem for the landfill.

4.2 Volatile Organic Compounds

Seventeen volatile organic compounds were detected in the leachate samples. Table 4.1 on the following page summarizes the findings for these parameters. The following nine chemicals never exceeded either the primary maximum contaminant level (MCL), secondary maximum contaminant level (SMCL), or the guidance concentration recommended by the State of Florida (Florida Department of Environmental Protection 1994):

2-Butanone	Carbon Disulfide	1,1-Dichloroethane	Xylenes
Methyl Ethyl Ketone	Ethyl Benzene	1,1,1-Trichloroethane	Toluene
Trichlorofluoromethane			

Table 4.1: Summary Statistics for Volatile Organics.

Parameter	Sites that	Sites that	Percent	Max.	Max.	Mean ³	Primary	Secondary	Guidance	No. Of
	Sampled	Detected	Detected	Conc.	of		MCL	MCL	Conc.	Means
	Parameter	Parameter		Overall ¹	Means ²					Over
										Limits ⁴
Acetone	7	4	57%	100	2570.5	818			700	1
Benzene	6	3	33%	2.7	2.7	1.5			1	1
2-Butanone	9	2	50%	2500	2500	1277			4200	0
Carbon Disulfide	9	3	50%	15	15	10.9			700	0
Chloromethane	6	2	22%	43	43	33.5			3	2
1,1-Dichloroethane	6	5	56%	48	48	13.94			700	0
1,2-Dichloroethane	6	3	33%	26	26	18.07	3			3
1,4-Dioxane	5	1	20%	49	49	49			5	1
Ethyl Benzene	9	5	56%	18	9.5	3.41		700		0
Methyl Ethyl Ketone	9	2	33%	2500	1445	957.5			4200	0
4-Methyl-2-Pentanone	8	2	25%	250	250	129.45				NA
Methylene Chloride	6	4	44%	60	60	26.4	5			4
Toluene	6	7	78%	290	265	60.91	1000			0
1, 1, 1-Trichloroethane	6	1	17%	-	1	1	200			0
Trichloroethylene	9	4	44%	20	20	7.34	e G			6
Trichlorofluormethane	9	2	33%	20	20	16.5			2100	0
Xylenes	9	6	67%	120	69.7	20.25	10000			0
Notes:										

This is the maximum concentration that was every detected of all samples.
 This is the maximum average concentration of the landfills.
 Mean does not include non-detects.
 This is the number of times that the average landfill concentrations exceeded the applicable groundwater standards.

These contaminants should not pose a threat to human health or the environment because they never exceeded the applicable groundwater standards, therefore they will not be considered further. Seven contaminants exceeded the groundwater standards at least once and have means that also exceeded the groundwater standards:

AcetoneBenzeneChloromethane1,2-Dichloroethane1,4-DioxaneMethylene ChlorideTrichloroethylene

The problem with declaring all of these contaminants a potential health problem is that some of these contaminants were only detected at two or three sites. Also, the mean reported in Table 4.1 is a conservative estimate of the actual mean because the non-detects were excluded. The data cannot be analyzed with any degree of confidence because the sample sizes are small and the number of detected values is also small. Of these compounds, only acetone was detected over fifty percent of the time. The mean concentration for acetone was 818 ug/l, which is only slightly higher than the guidance concentration of 700 ug/l. Because the mean is only slightly higher than the groundwater limit, and there were three non-detected values out of seven total sites, it is difficult to say that acetone will be a problem at C&D landfills. C&D landfills should conduct preliminary groundwater tests for acetone to determine if their particular site has a problem with this constituent.

Although methylene chloride and 1,2-dichloroethane were only detected 33% and 44% of the time respectively, the mean concentrations for these contaminants greatly exceed the primary MCL's. The mean concentration of methylene chloride is 26.4 ug/l, which is approximately five times higher than the MCL of 5 ug/l. Likewise, the mean concentration of 1,2-dichloroethane is 18.07 ug/l, which is approximately six times higher than the MCL of 3 ug/l. These contaminants could be present in groundwater at levels that exceed the groundwater standards. Therefore, they could pose a potential risk to health and the environment simply because when they are detected, they are detected at levels that greatly exceed their groundwater standards. Although more research is needed to estimate a true mean concentration for these contaminants, they should be regarded as problems and should C&D landfills should test for these constituents.

The literature indicates several sources of contamination from volatile organic compounds. Petroleum constituents such as benzene can leach from roofing tar and asphalt (EPA 1995). Containers of excess solvents and oils that include many volatile compounds such as

1,2-Dichloroethane are routinely disposed of at C&D landfills. Acetone is a commonly used solvent and cleaner and is found in PVC glue. Acetone could find its way into C&D waste landfills in semi-empty containers.

There are some apparent trends in the data for volatile organic. Of the ten landfills that sampled for these parameters, one landfill accounted for the majority of the highest concentrations. The Massachusetts site detected thirteen compounds and all thirteen were the highest concentrations for the compounds. The Michigan site detected nine compounds, but had none of the highest concentrations. The other landfills had a smaller number of detected compounds and a lower number of the highest concentrations.

In conclusion, more data should be gathered on the presence of volatile organic compounds in leachate. The two contaminants that seem to pose a threat to human health and the environment are methylene chloride and 1,2-dichloroethane because when they are present, they greatly exceed the applicable groundwater standards. Acetone should be included in preliminary testing at C&D landfills because it is present frequently and at concentrations that are roughly equivalent to the groundwater standards.

4.3 Semi-Volatile Organic Compounds

Fourteen semi-volatile organic compounds were detected in the leachate samples. Table 4.2 on the following page summarizes the findings for these parameters. The following eight chemicals never exceeded the guidance concentration recommended by the State of Florida (Florida Department of Environmental Protection 1994):

AcenaphtheneAcetophenone2,4-DimethylphenolDi-n-Butyl PhthalateDiethyl PhthalateFluorantheneo-CreosolPyrene

Because the maximum concentrations for these chemicals do not exceed the recommended guidance concentrations, these chemicals should not pose a threat to health and the environment.

The following five chemicals exceeds the recommended guidance concentration at least once:

Benzoic Acid Napthalene m&p-Creosol Phenathrene Phenol Of these chemicals, the mean concentration for napthalene, m&p-creosol, phenathrene, and phenol exceeded the recommended guidance concentrations. The mean concentrations were calculated without the non-detects, therefore, these means are a conservative estimate of the true

Table 4.2: Summary of Statistics for Semi-Volatile Organics.

)			
Parameter	Sites that	Sites that	Percent	Max.	Max.	Mean ³	Primary	Secondary	Guidance	No. Of
	Sampled	Detected	Detected	Conc.	of		MCL	MCL	Conc.	Means
	Parameter	Parameter		Overall ¹	Means ²					Over
										$Limits^4$
Acenaphthene	5	1	20%	4	3.5	3.5			20	0
Acetophenone	4	1	20%	2	0	0			700	0
Benzoic Acid	6	4	44%	53000	53000	15457			28000	1
Bis-(2-Ethylhexyl)phthalate	8	2	25%	31	31	16.5				NA
2,4-Dimethylphenol	8	1	13%	15	15	15			400	0
Di-n-Butyl phthalate	8	2	25%	11	11	9			700	0
Diethyl Phthalate	8	3	38%	16	16	8			5600	0
Fluoranthene	8	1	13%	180	180	180			280	0
Napthalene	8	3	38%	130	130	86			7	3
m&p-Creosol	8	3	38%	5700	4450	1822			35	3
o-Creosol	8	2	25%	64	64	50			350	0
Phenathrene	8	2	25%	300	300	151.5			10	1
Phenol	6	3	50%	1900	1055	383.5			10	3
Pyrene	8	1	13%	190	190	190			210	0
Notes:								:		

Notes:

1) This is the maximum concentration that was every detected of all samples.

2) This is the maximum average concentration of the landfills.

3) Mean does not include non-detects. 4) This is the number of times that the average landfill concentrations exceeded the applicable groundwater standards.

population means. Moreover, these chemicals were detected less than 40% of the time when they were sampled. Because of the conflicting data, it can not be determined whether these contaminants will pose a problem at all C&D landfills. However, leachate from C&D landfills should initially be analyzed for these constituents to ensure that these constituents are not present in harmful concentrations. If a leachate collection system is not installed, leachate wells should be installed so the leachate can be tested. If preliminary testing indicates that the leachate is free of these constituents, than the testing could be discontinued as long as the composition of the waste stream remains the same.

Some possible sources of the contamination include wood products, adhesives, and resins (EPA 1995). Napthalene and m&p-Cresol are used to preserve wood products, particularly wood products that will be exposed to the weather like railroad ties, utility poles, and pilings. Phenol-formaldehyde resins are used as either adhesives or resins on wood products. Phenol is also used as a laminate. Phenols, xylene, napthalene, fluorene, phenanthrene, anthracene, and pyrene have been shown to leach from roofing felt and building insulation (Goumans 1991). Most of these products are applied to wood products. It would be impractical to ban wood products from C&D landfills. However, if a landfill is having a problem with constituents that are leaching from preserved wood, banning preserved wood should help to alleviate the problem.

There are some apparent trends in the data for semi-volatile organic. Of the nine landfills that sampled for these parameters, two landfills account for the majority of the highest concentrations. The Massachusetts site detected seven compounds and had four of the highest concentrations. The Kentucky Site detected four compounds and all four of these were the highest concentrations for the compounds. The Michigan site detected seven compounds also, but had none of the highest concentrations. The other landfills had a smaller number of detected compounds and a lower number of the highest concentrations.

In conclusion, more study is needed to determine if semi-volatile organic compounds contained in C&D leachate will pose a threat to human health and the environment.

4.4 Other Organic Compounds

This group includes herbicides, pesticides and dioxans/furans. There were nine organic compounds that fall in this group that were detected at least once. Table 4.3 summarizes the

		1 au	1 aute 4.5. Summing of Statistics for Uther Organics	c io yibiii	Laustics IC	or Uther	Urganics.			
Parameter	Sites that	Sites that	Percent	Max.	Max.	Mean ³	Primary	Secondary	Guidance	No. Of
	Sampled	Detected	Detected	Conc.	of		MCL	MCL	Conc.	Means Over
	Parameter	Parameter		Overall ¹	Means ²					Limits ⁴
Alpha-BHC	7	1	14%	0.12	0.12	0.12			0.05	
Endrin	7	2	29%	0.05	0.05	0.06	2.0			0
Dieldrin	7	2	29%	0.2	0.2	0.13			0.10	
Dimethoate	4	1	25%	2.7	2.7	2.7			5	0
Disulfoton	4	2	50%	5.6	5.6	3.28			0.5	2
2,4,5-T	4	1	25%	0.53	0.53	0.53			70	
2,4-D	4	2	50%	29	29	15.6	70			C
HxCDD	4	1	25%	5.5	5.5	5.5				NA
HxCDF	4	1	25%	7.7	7.7	7.7				NA
Notes:										

Table 4.3: Summary of Statistics for Other Organics.

This is the maximum concentration that was every detected of all samples.
 This is the maximum average concentration of the landfills.

3) Mean does not include non-detects. 4) This is the number of times that the average landfill concentrations exceeded the applicable groundwater standards.

findings for these parameters. Of these seven compounds, the following three had means that exceeded the applicable groundwater standards:

Alpha-BHC Dieldrin Disulfoton However, no conclusions can be reached regarding these compounds. Alpha-BHC had a mean concentration of .12 ug/l, which is approximately twice the guidance concentration of 0.05 ug/l. However, alpha-BHC was only detected once out of seven landfills. This low percentage of detection greatly reduces the significance of the mean concentration. Dieldrin had a mean of 0.13 ug/l, which is approximately equal to the guidance concentration of 0.10 ug/l. Dieldrin was detected at two of seven sites. Again, the low percentage of detected values greatly reduces the significance of the mean concentration. Finally, disulfoton had a mean of 3.28 ug/l, which is roughly six times the guidance concentration of 0.5 ug/l. Disulfoton also was detected at fifty percent of the sites that sampled for it. However, only four sites sampled for disulfoton. There is simply not enough data to conclude anything about disulfoton. Because of the low number of samples and the low number of detected values, no conclusions can be reached concerning this group of chemicals.

Although the literature does not identify potential sources for herbicides and pesticides, the source of these chemicals could be vegetation that is accepted at C&D landfills.

There are some trends in the data. Of the seven landfills that tested for these compounds, two landfills account for seven of the nine highest concentrations. The Massachusetts site detected five compounds and had four of the highest concentrations. The Michigan site detected four compounds and had three of the highest concentrations. The other landfills had smaller numbers of detected compounds and the highest concentrations.

In conclusion, more study is needed to determine if herbicides, pesticides and dioxans/furans contained in C&D leachate will pose a threat to human health and the environment.

4.5 Heavy Metals

With a few exceptions, heavy metals were sampled frequently, therefore, a statistical analysis was conducted on this group of parameters. The leachate samples were analyzed for fourteen heavy metals. Only thallium was never detected in any sample. Table 4.4 on the following page summarizes the findings for these parameters, including the results of the statistical analysis.

			Taur	11no . L.L.	unary or L	T CONCENTRAL	1 auto 7.7. Juminary of Diansilos for Hicary Incluis.	ATCIALD.			
Parameter	Sites that	Sites that	Percent	Max.	Max.	Mean ³	Primary	Secondary	Guidance	Confidence	Poses
	Sampled	Detected	Detected	Conc.	Q		MCL	MCL	Conc.	Interval	Problem? ⁴
	Parameter	Parameter		Overall. ¹	Means ² .						
Antimony	9	1	17%	5.8	6.9	36.23	9			NA	NA
Arsenic	16	12	75%	77.3	46	12.27	50			(0, 24.6)	No
Barium	13	13	100%	8000	4750	661.4	2000			(0, 1592.5)	No
Cadmium	19	11	58%	2050	512.88	31.9	5			(0, 100.3)	Yes
Chromium	18	8	44%	250	175	NA	100			(0, 20.8)	No
Copper	18	14	78%	620	315	20.3	1000			(6.9, 59.8)	No
Lead	18	12	67%	2130	1175	8.82	15			(1.2, 66.2)	Yes
Mercury	15	4	27%	6	5	NA	2			(0, 0.5)	No
Nickel	13	7	54%	170	120	20.00	100			(8.1, 49.5)	No
Selenium	14	1	7%	5	3.41	2.78	50			NA	No
Silver	11	2	18%	30	17.5	NA		100		(0, 10.4)	No
Thallium	7	0	0%0	0	0	0	2			(0, 0)	No
Vanadium	5	2	40%	96	42	22.8			49	NA	No
Zinc	15	15	100%	8630	5165	657.70		5000		(0, 1501.4)	No
Notes:											

Table 4.4: Summary of Statistics for Heavy Metals.

Notes:

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1) This is the maximum concentration that was every detected of all samples.

2) This is the maximum average concentration of the landfills.
3) The mean includes non-detects. If a statistical analysis was conducted, the mean is the reported mean is the mean calculated from the stat. tests.
4) A parameter poses a problem if the applicable groundwater standard is contained within the confidence interval.

A statistical analysis could not be conducted on the data for antimony, selenium, and vanadium. There was not enough data gathered on antimony and vanadium to conduct a statistical test. Although selenium was analyzed frequently, 93% percent of the data was non-detects. Statistical tests fail when a data set has more than 90% non-detects. Vanadium and selenium should not pose a problem because the mean of the data, including non-detects, fall below the applicable groundwater. The mean for each landfill was calculated as the mean of all data with the non-detects assuming one-half the value of the method detection limit. If the method detection limit for a sample was not known, the method detection limit was provided by either EPA publication SW-846, "Test Methods for Evaluating Solid Waste Physical/Chemical Methods," or EPA publication EPA-600, "Methods for Chemical Analysis of Water and Wastes." The overall mean was determined in the same manner with non-detects assuming one-half the value of the method detection limit.

For antimony, the overall mean calculated in this manner was higher than the maximum concentration every detected. This happened because the method detection limits for some landfills were much higher than the maximum concentration every detected. For antimony, only one site out of seven ever detected the metal and the detected value was less than the groundwater standard. The mean of 36.23 ug/l is very suspect because the non-detects actually increased the mean, instead of decreasing the mean as would normally happen. No conclusions can be drawn from the data that was reported. Further study is needed to conclusively determine if antimony poses a threat to human health and the environment. The only conclusion that can be drawn is that the method used to test for antimony should have a method detection limit less than the groundwater standard of 6 ug/l. From EPA publication SW-846, Method 7041, antimony has a method detection limit of 3 ug/l.

The results of the statistical tests indicate that the following heavy metals could endanger human health and the environment:

Cadmium Lead

The statistical tests are included in Appendix D. For copper, lead, and nickel, the data had to be transformed into the log of the concentration. The statistical analysis was performed on the transformed data, then the results were converted back to the original scale. The confidence intervals were constructed after the data was converted back the original scale. The adjusted

mean calculated by Aitchinson's Method for cadmium is 31.94 ug/l. The confidence interval is (0, 100.3) ug/l. The groundwater standard for cadmium is 5 ug/l. The confidence interval encompasses the mean, therefore it is statistical possible that actual mean for cadmium at C&D landfills is at least 5 ug/l. The mean is six times higher than the groundwater standard. The adjusted mean calculated by Cohen's Method for lead is 8.82 ug/l. The confidence interval is (1.2, 66.2) ug/l. The confidence interval encompasses the mean, therefore it is statistical possible that actual mean for lead at C&D landfills is at least 15 ug/l. In this case the actual adjusted mean is less than the groundwater standard. However, the confidence interval indicates that the actual mean could be as high as 66.2, therefore lead does pose a risk to human health and the environment.

The statistical tests for the remaining nine heavy metals indicate that there is less than a 2% chance that the actual mean is equal to or higher than the applicable groundwater standard. Therefore, these metals will be classified as not problematic and no further analysis is needed.

4.5.1 Box Plots for Heavy Metals

Box plots for several common heavy metals have been developed to show the distribution of the data. Figure 4.1 shows a typical box plot. The box shows the various percentiles for the data. A percentile is a measure of variability. The xth percentile of a set of measurements arranged in order of magnitude is that value that has x% of the measurements below it (Ott 1993). Therefore the 25th percentile is the value that has 25% of the data below it. The ends of the box indicate the 25th and 75th percentile. The hash marks that extend on a line from the boxes indicate the 10th and 90th percentiles. Any circles indicate values beyond the 10th and 90th percentiles. The solid line inside the box shows the median for the data, or the 50th percentile. The dashed line either inside or outside the box shows the mean of the data, or the average. The solid line that extends from the top of the figure to the x-axis shows the applicable groundwater standard for the parameter. Not all box plots will include this line.

Figures 4.2 through 4.7 show the distribution of data for arsenic, barium, cadmium, copper, lead and zinc respectively. The box plots are based on the means values for each parameter from each landfill. As can be seen, there are no data beyond the applicable groundwater standards for arsenic and copper. These figures agree with the statistical analysis, and these parameters do not appear to pose any problems. The 90th percentiles are below the groundwater standards for

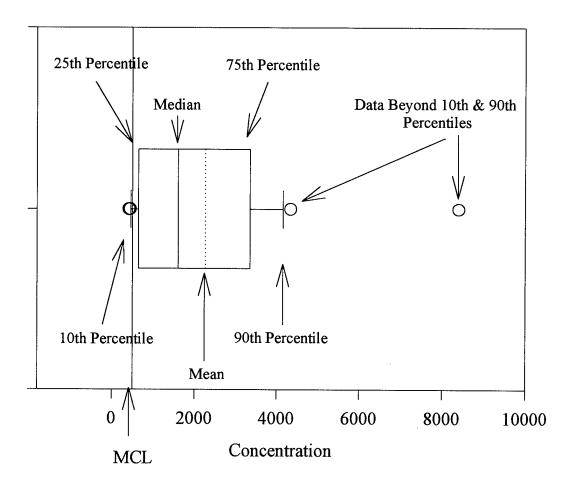
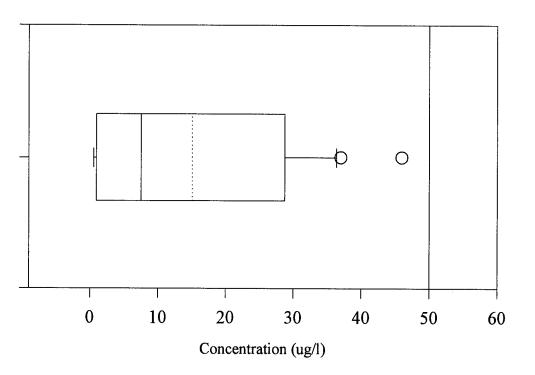
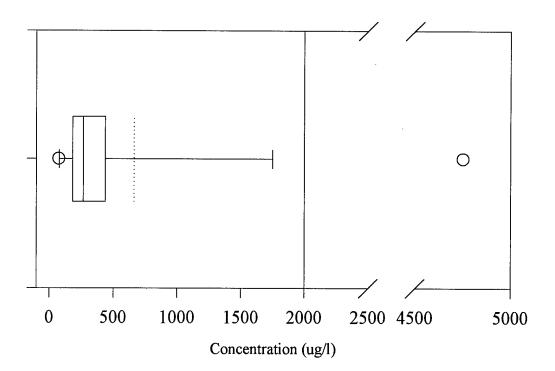


Figure 4.1: Box Plot Example

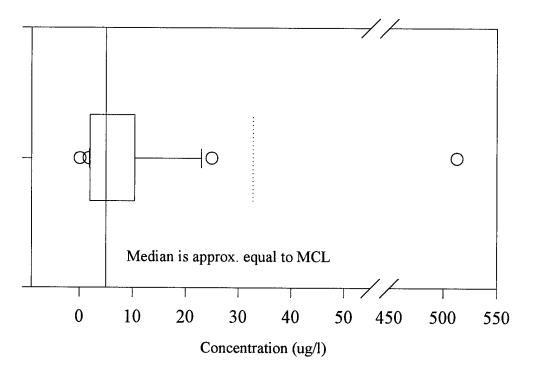














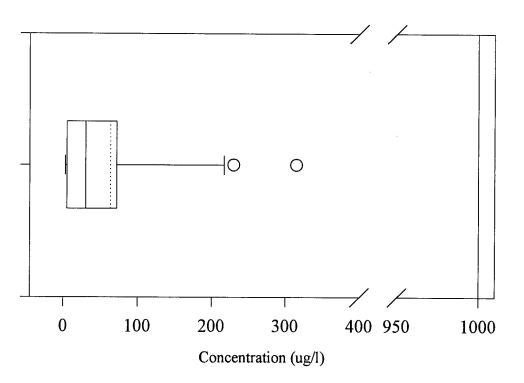


Figure 4.6: Box Plot for Lead

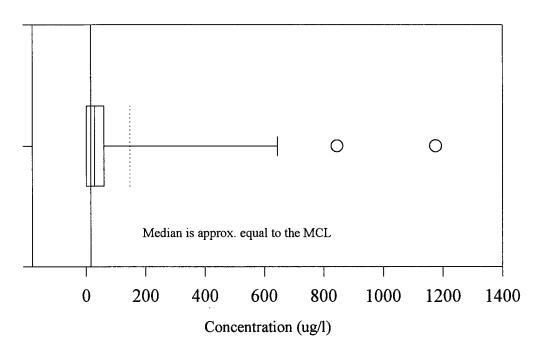
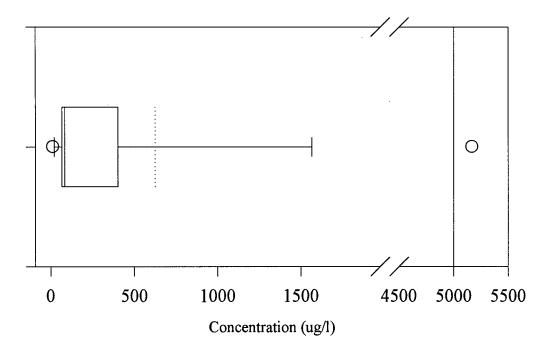


Figure 4.7: Box Plot for Zinc



barium and zinc. Both of these metals have a data point beyond the MCL, but all of the rest of the data are within compliance. The statistical tests for barium and zinc show that the means are below the MCL's with a confidence of 98%. Thus, these metals are also not problems. The box plots for lead and cadmium show that the MCL is exceeded by 50% or more of the data. The median for cadmium is approximately equal to the MCL, therefore, a separate line for the median is not shown on the box plot. The box plots for lead and cadmium support the conclusions of the statistical tests. These metals do pose a risk to human health and the environment.

4.5.2 Other Conclusions

There are some discernible trends in the data for the heavy metals. The Sanifill Landfills (three) of Houston, Texas tested for 10 of the heavy metals. Eight of the highest means came from these landfills. Furthermore, nine of the means were in the top one or two values for the particular metals. The 100 Sand Co. Landfill of New York tested for fourteen of the heavy metals. Only two of the means for this landfill were the highest reported among all of the landfills. Five of the means were in the top one or two values for the particular metals. The remaining landfills either did not have any of the high mean values or had only one of the highest or second highest values. It appears that the Sanifill Landfills of Houston were very contaminated in comparison to the remaining landfills. However, removing the Sanifill Landfills from this study would not have significantly changed the results of the statistical tests. Lead and cadmium were sufficiently high at the other landfills to pose a problem, regardless of the contributions from the Sanifill Landfills.

The source of heavy metal contamination is fairly well documented. Many paints and coating contain lead, mercury, arsenic, and cadmium, chromium, barium, and zinc (EPA 1994). Lead is an additive in caulking and is used in flashing. Cadmium, chromium and arsenic are used to preserve would in various chemical forms. Trace amounts of these metals are also included in common metals used for structural members, flashing, electrical wiring and many other forms of metals commonly used in construction. It is hardly surprising that construction and demolition leachate contains elevated levels of heavy metals, knowing all of the potential sources of heavy metals.

4.6 Conventional Parameters

With a few exceptions, the conventional parameters were sampled frequently. However, not all conventional parameters have established groundwater standards, therefore, a statistical analysis was conducted only on the conventional parameters that have groundwater standards. The maximum and mean concentrations were reported for all parameters that did not have groundwater standards.

Twenty-seven conventional parameters were tested for at least once. A statistical test was not conducted on the following seventeen parameters because they do not have established groundwater standards:

Alkalinity Ammonia-N Biological Oxygen Demand Calcium Chemical Oxygen Demand Hardness Magnesium Oil & Grease Organic Nitrogen **Phenols** Phosphorus Potassium Specific Conductance Total Organic Carbon Total Organic Halogens Total Suspended Solids

Table 4.5 on the following page summarizes the findings for these parameters, including the results of the statistical analysis. The statistical tests are included in Appendix D. For nitrate and nitrite, the data had to be transformed into the log of the concentration. The statistical analysis was performed on the transformed data, then the results were converted back to the original scale. The confidence intervals were constructed after the data was converted back the original scale.

Ten conventional parameters have established groundwater standards. With one exception, a statistical test was conducted on these parameters. The exception is boron. Only one site, the Sanifill Landfills of Houston, tested for boron. The highest value of boron at these landfills exceeded the groundwater standards. However, because of the lack of supporting data, no conclusions can be drawn about boron. Six of the ten conventional parameters with groundwater standards could pose a risk to human health and the environment. The results of the statistical tests indicate that the means for the following parameters exceed the appropriate groundwater standard:

Chlorides Sodium

Iron Sulfate Manganese Total Dissolved Solids

		I able 4.5		ry or stau	Summary of Statistics for Conventional Parameters.	onvenue	onal Paral	neters.			
Parameter	Sites that	Sites that	Percent	Max.	Max.	Mean ³	Primary	Secondary	Guidance	Confidence	Poses
	Sampled	Detected	Detected	Conc.	JO		MCL	MCL	Conc.	Interval	Problem?
	Parameter	Parameter		Overall ¹ .	Means. ²						4
Alkalinity	12	12	100%	6520	4115	964.73				NA	NA
Ammonia (N)	17	16	94%	480	138.93	20.42				NA	NA
BOD	14	14	100%	920	530	87.32				NA	NA
Boron	1	1	100%	3.9	2.65	2.65			0.63	NA	NA
Calcium	9	6	100%	600	480	274.3				NA	NA
COD	17	16	94%	11200	7140	754.5				NA	NA
Chlorides	20	20	100%	1400	795.3	157.6		250		(52.7, 262.5)	Yes
Cyanide	13	8	62%	0.34	0.09	0.010	0.2			(0, 0.04)	No
Hardness	9	9	100%	2420	480	274.3				NA	NA
Iron	20	20	100%	5206	275.11	36.76		0.30		(1.8, 71.7)	Yes
Magnesium	6	6	100%	460	224	117.63				NA	NA
Manganese	13	13	100%	258	76.38	8.71		0.050		(0, 23.9)	Yes
Nitrate	12	8	67%	13	8.50	0.45	10			(0.1, 1.7)	No
Nitrite	8	6	75%	0.047	60.	0.06	1			(0.01, 0.5)	No
Oil & Grease	9	7	78%	50	45	15.31				NA	NA
Organic N	10	10	100%	190	20.75	5.70				NA	NA
pH	15	15	100%	8	7.60	6.95		6.5-8.5		(6.7, 7.2)	No
Phenols	7	7	100%	4.9	2.23	0.62				NA	NA
Phosphorus	8	7	88%	3.89	3.20	1.06				NA	NA
Potassium	8	8	100%	618	368	101.33				NA	NA
Sodium	11	11	100%	1290	773	162.63	160			(0, 355.3)	Yes
Specific Conductance	10	10	100%	6850	4885	1666.2				NA	NA
Sulfate	17	16	94%	1700	1126	253.72		250		(0, 443.8)	Yes
Total Dissolved Solids	18	17	94%	8400	8400	2263.1		500		(992, 3534)	Yes
Total Organic Carbon	7	7	100%	2100	926.00	306.54				NA	NA
Total Organic Halogens	4	4	100%	0.91	0.61	0.36				NA	NA
Total Suspended Solids	18	17	94%	43000	22000	1859.1				NA	NA

Table 4.5: Summary of Statistics for Conventional Parameters.

Notes: See Notes from Table 4.4.

Iron, manganese and total dissolved solids had means that were dramatically higher than their groundwater standards. There is little doubt that these three parameters will pose a problem. The means for chloride, sodium, and sulfate were only slightly higher than their groundwater standards. Although the statistical test indicates that they could pose a problem, they will pose less of a problem than iron, manganese, and total dissolved solids. Concentrations for chloride, sodium, and sulfate could be less than the applicable standards at groundwater monitoring wells surrounding the C&D landfills. In all cases, the applicable groundwater standard is a secondary standard. Secondary standards are intended to protect water supplies for aesthetic reasons (taste, color) rather than health-based reasons (EPA 1995). This means that although the groundwater could be degraded, there is no increased risk to human health.

4.6.1 Box Plots for Conventional Parameters

Box plots for several conventional parameters of interest have been developed to show the distribution of the data. Figure 4.1 shows a typical box plot. Refer to section 4.5.1 for an explanation of the typical box plot. Figures 4.8 through 4.17 show the distribution of data for ammonia, COD, chlorides, hardness, iron, manganese, sodium, specific conductance, sulfate, and total dissolved solids respectively.

Ammonia, COD, Hardness, and specific conductance do not have established groundwater standards, therefore, the box plots simply show the distribution of the data. Figure 4.8 shows the data for ammonia. The median is less than 5 mg/l and the average is approximately 20 mg/l. The data are grouped into low concentrations and high concentrations as is evident by the box plot. The median and 10th percentile are very close to each other, but the 75th and 90th percentile and spread out and much higher than the median. The average concentration is 20.42 mg/l, which is approximately equal to the 75th percentile. Figure 4.9 shows the data for COD. Again, the data seem to be distributed between high and low values, but the data are not as spread out as ammonia. The median is located around 250 mg/l, with the mean concentration equal to 754.5 mg/l. There are several data points beyond the 90th percentile, with the highest concentration at over 7000 mg/l. Figure 4.11 shows the data for hardness. The data are distributed more evenly, although the median is still toward the lower end of the data. The mean is located at 771.80 mg/l and the median is at approximately 500 mg/l. There are several data points beyond the 90th percentile with the highest concentration being 2114 mg/l. Figure 4.15 shows the data for specific

Figure 4.8: Box Plot for Ammonia-N

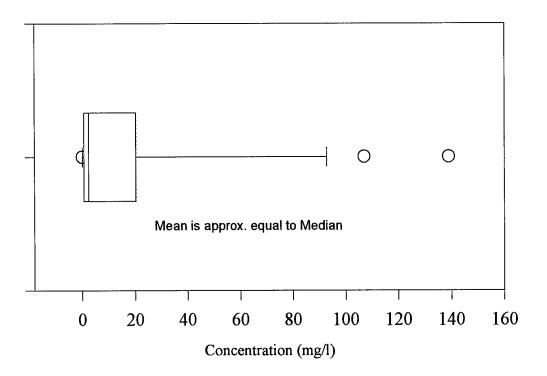
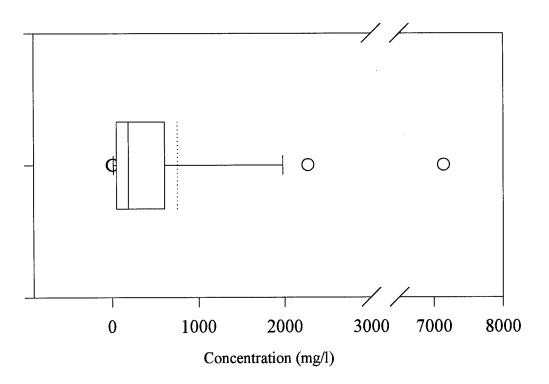


Figure 4.9: Box Plot for Chemical Oxygen Demand





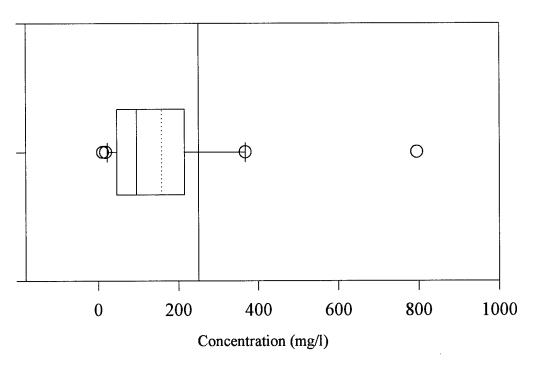
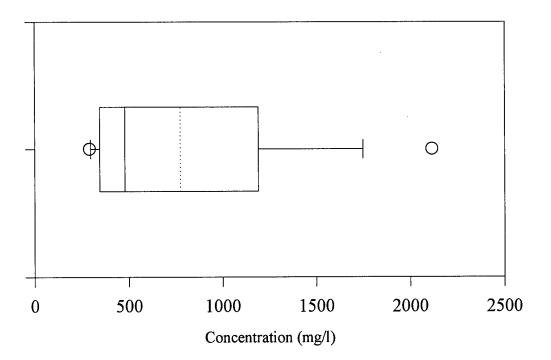


Figure 4.11: Box Plot for Hardness





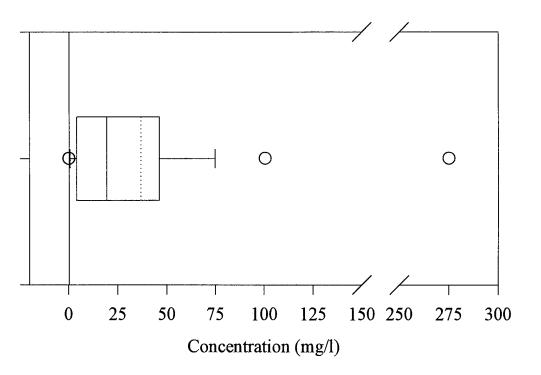
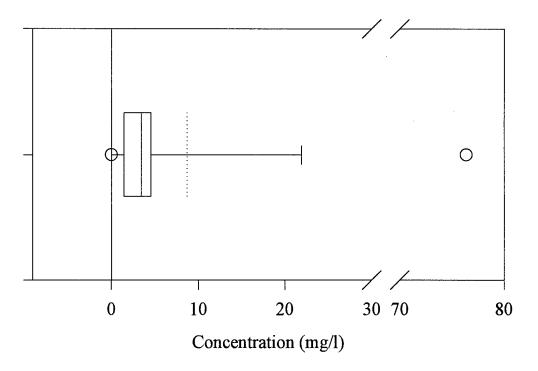


Figure 4.13: Box Plot for Manganese





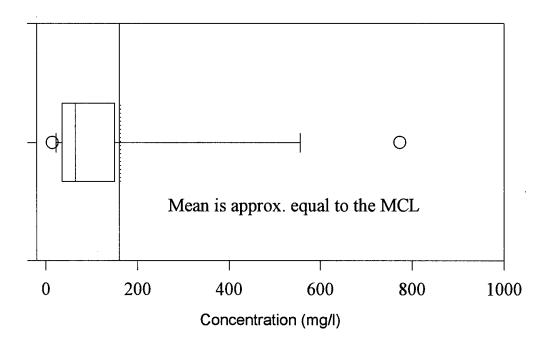


Figure 4.15: Box Plot for Specific Conductance

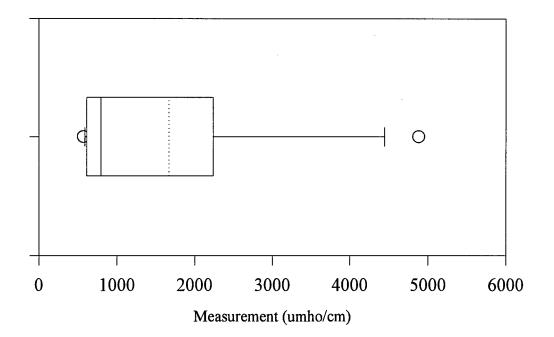


Figure 4.16: Box Plot for Sulfate

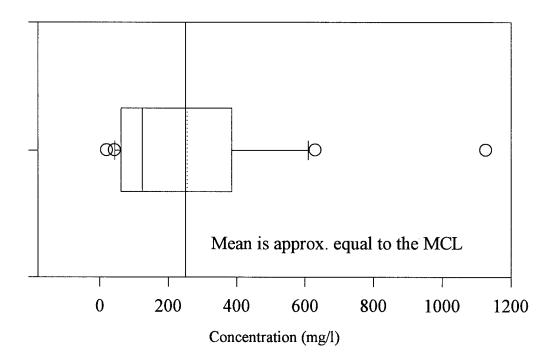
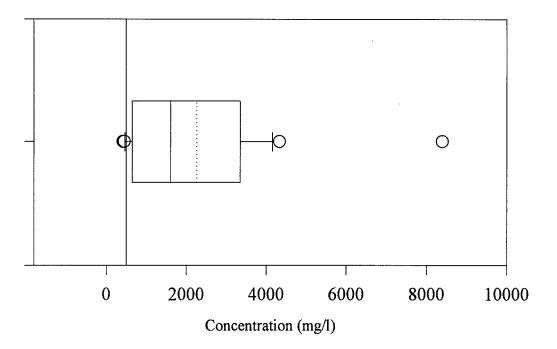


Figure 4.17: Box Plot for Total Dissolved Solids



conductance. Again, the data are distributed between high and low values. The median is located very close to the 10th percentile, and the mean is higher and located closer to the 75th percentile. There are some data points beyond the 90th percentile with the highest concentration being 4885 umho/cm. The mean is equal to 1666.2 umho/cm with the median at approximately 750 umho/cm.

Chloride, iron, manganese, sodium, sulfate, and total dissolved solids have groundwater standards. The standards are shown as the solid line from axis to axis on the box plots. Figure 4.10 shows the data for chlorides. The statistical test for chloride indicates that it is a potential problem. The box plot does not strongly support this conclusion. Over 75% of the data are less than the groundwater standard. The 90th percentile and two other data points are above the standard. Since the statistical test is based on a 98% probability, the statistical test shows that the mean could be equal to or higher than the standard. A review of the box plot would indicate that chloride is mostly within standards. Since the leachate will be diluted by groundwater, it is doubtful whether the groundwater monitoring wells would show that chlorides exceed the standards. Although the statistical test indicates that chloride is a problem, the box plot shows that chloride is more likely to be within standards. More research on chlorides in leachate would clear up this confusion.

Figures 4.12, 4.13 and 4.17 show the data for iron, manganese, and total dissolved solids respectively. There is no doubt that these parameters are problems in C&D leachate. The groundwater standards for all three parameters are at or below the 10th percentile, therefore the vast majority of the data are higher than the standards. The box plots strongly support the conclusions of the statistical tests for these parameters, therefore, iron manganese, and total dissolved solids are present in C&D leachate at levels exceeding the groundwater standards.

Figure 4.14 shows the data for sodium. Like chloride, over 75 percent of the data are less than the applicable standard. The 90th percentile and a data point are above the standard. The statistical test indicates that sodium is a problem, but the box plot does not strongly support this conclusion. There are only three mean values that are over the standard with the highest of 773 mg/l far exceeding the 90th percentile. Although the statistical test indicates that sodium is a problem, the box plot shows that sodium is more likely to be within standards. Further research is

needed to determine whether this highest value is an anomaly or if there is just not enough data in this study to adequately represent the population.

Figure 4.15 shows the data for sulfate. A significant percentage of the data for sulfate exceeds the groundwater standard. The mean of 253.72 mg/l is slightly higher than the standard of 250 mg/l. The 75th and 90th percentiles exceed the standard. The box plot clearly supports the conclusion of the statistical test. Sulfate does pose a problem in C&D leachate.

In conclusion, the box plots show that iron, manganese, total dissolved solids, and sulfate pose problems in C&D leachate. Further research is necessary to determine whether sodium and chloride are actually problems in C&D leachate.

4.6.2 Other Conclusions

There are trends apparent in the data for conventional parameters. Three landfills account for the majority of the highest and second highest mean values seen in the data. The Sanifill Landfills of Houston, Texas, account for 9 of the highest and 6 of the second highest mean values of the conventional parameters. A similar trend was seen in the data for the heavy metals. The Sand Co. Landfill of New York accounts for 4 of the highest and 5 of the second highest mean values. Again, a similar trend was seen in the data for heavy metals. The Massachusetts site accounts for 3 of the highest and 3 of the second highest mean values. A similar trend was seen in the data for volatiles, semi-volatiles and other organic parameters. The remaining landfills either did not have any of the high mean values or had only one of the highest or second highest values. It appears that the Sanifill Landfills of Houston and the Sand Company Landfill were very contaminated in comparison to the remaining landfills.

Removing these landfills from this study would have deleted the data beyond the 90th percentile for both chloride and sodium. This change would have changed the results of the statistical tests. The confidence interval for chloride would be (59.58, 188.58), which does not contain the groundwater standard of 250 mg/l. The confidence interval for sodium would be (0, 111.11), which does not contain the groundwater standard of 160 mg/l. The statistical tests would indicate that chloride and sodium are not problems. This conclusion is more in line with the data shown in the box plots for these parameters. It gives more evidence that the statistical test is too conservative and sodium and chloride are probably not problems in C&D leachate.

Removing these landfills from the study would not have changed the conclusions reached concerning iron, manganese, total dissolved solids, and sulfate. Iron, manganese, and sulfate were sufficiently high at the other landfills to pose a problem, regardless of the contributions from the Sanifill Landfills and Sand Co. Landfill. The highest concentrations for sulfate were seen at other landfills, therefore, removing these landfills from the study would not have changed the results of the statistical test.

The conventional parameters are normally seen in municipal landfills, therefore, it is not surprising that the conventional parameters are seen in C&D leachate. Iron and manganese are present in a large percentage of the metals disposed of at C&D waste landfills. Sulfate is a constituent of the gypsum drywall that makes up a significant portion of C&D waste (EPA 1994). Sodium, potassium, calcium, and chloride can leach from concrete and cement compounds (Goumans 1991). Decaying organic matter such as cardboard, paper, and vegetation will produce elevated levels of COD and ammonia. The literature sources have not attempted to explain the high level of total dissolved solids explicitly. However, C&D waste often includes a large portion of fines. Fines may include dirt, crushed drywall, wood, paint products, and concrete. As particle size decreases, chemicals such as sodium, calcium, potassium, and chromium will leach into liquids more readily (Goetz and Glaseker 1991). The smaller particle size of the fines could contribute to the higher content of dissolved solids.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Based on the results of the statistical analysis, and box plots for selected parameters, the following parameters in C&D leachate could present a risk to human health and the environment because they exceed either primary groundwater standards or guidance concentrations that are based on health risks:

Methylene Chloride1,2-DichloroethaneCadmiumLeadThe data indicate that some degradation of groundwater could occur because of the presence of
these contaminants. It cannot be determined from this study how far the contaminants will spread
from a disposal site or if the levels of these contaminants are high enough to contaminant
groundwater monitoring wells.

The data show that the following parameters should exceed secondary groundwater standards:

iron manganese total dissolved solids sulfate Groundwater in the vicinity of C&D landfills will be degraded. There is a high probability that groundwater monitoring wells will contain iron, manganese, and total dissolved solids in excess of the groundwater standards because of the extremely high levels of these contaminants in C&D leachate. It cannot be determined if the levels of sulfate present in C&D leachate are high enough to contaminant groundwater monitoring wells. It should be noted that while the concerns regarding leachate generated from C&D waste landfills has resulted from contaminants resulting from hazardous waste, contamination may also result from the "clean" fraction of the C&D waste stream.

5.2 Recommendations

Regulators at the EPA proposed standards for non-municipal solid waste facilities in May 1995. The standards include the minimum criteria of location restrictions, groundwater monitoring as necessary to detect contamination, and corrective action (Federal Register 1995). Regulators believe that C&D facilities, in general, do not pose significant risks to the environment. The proposed standards are sufficient to minimize risk to the environment with one exception. This investigator feels there is sufficient evidence that leachate produced from C&D

landfills could degrade groundwater in the immediate vicinity of the site and that several contaminants could pose a risk to human health and the environment. Because of the risk for damage to human health and the environment, C&D waste landfills should be required to prove that they have the financial resources to mitigate any damage caused by the C&D waste landfill. Requiring financial assurance would eliminate operators that do not have the financial resources to correct damage caused by the landfill. The final standards for non-municipal solid waste facilities should require financial assurance.

Because there are insufficient data concerning volatile organics, semi-volatile organics, and other organics such as pesticides and herbicides, further research is required to determine if these classes of contaminants are present in sufficient amounts to endanger human health and the environment. Further research is also required to determine whether sodium and chlorides are actually present in C&D leachate in quantities exceeding the applicable secondary groundwater standards. Until more research is conducted, operators of C&D waste landfills should conduct, at a minimum, annual testing for volatiles, semi-volatiles and other organics to ensure that these contaminants are not entering the groundwater.

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APPENDIX A: SUMMARY OF LANDFILLS & SAMPLING DATA

APPENDIX B: TEST METHODS & METHOD DETECTION LIMITS

APPENDIX C: PROBABILITY PLOTS

APPENDIX D: STATISTICAL TESTS

Copies of these Appendices are not included here. Copies can be obtained from:

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APPENDIX A:

SUMMARY OF LANDFILLS & & SAMPLING DATA

	Characteristics	of the	Armetta	Landfill	of Con	necticut.	
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LANDFILL:	Armetta Landfill.
OWNER/OPERATOR:	Unknown
LITERATURE SOURCE:	Construction and Demolition Waste Landfills. Prepared by ICF Incorporated for the U.S. Environmental Protection Agency, Office of Solid Waste.
WASTE TYPE:	Demolition debris and landclearing debris.
ACREAGE:	Unknown.
YEARS IN SERVICE:	Unknown.
LINER SYSTEM:	Unknown.
LEACHATE SYSTEM:	Unknown.
LEACHATE SAMPLE:	Unknown.
MISCELLANEOUS:	None.

Table A.2: Sampling for the Armetta Landfill of Connecticut.

			D.e I i le				6		Land and	1.1.1.1		ç
Volatiles	Van	ND/NS		ne/	NDMS			ND/NS		Neu Harin		
Acetone		NSN		A	BN		i i	N		- A -		
2-Butanone		N	Ī		e a	T	T	e e				00.001
Corbon Disulda					2	t	T	2				0. W 2
		22	Ī		cz z			2				3.01
		22	T		ŝ			2				0.12
		ŝ			22			2				200.00
1,2-Dicnioroemane		SN S	T		S			ŝ		90.E		
1,4-L/IOXAIIC		SN -			SN			SN				<mark>8</mark>
Ethylbenzene		NS			NS			SN			700.00	
Methyl Ethyl Ketone (MEK)		SN			SN			SN				4200.00
4-Methyl-2-Pentanone		NS			NS			NS				
Methylene Chloride		NS			NS			NS		5.00		
Toluene		NS			NS			NS		1000.00		
1,1,1 Trichloroethane		NS			SN			SN		200.00		
Trichtorethytene		S'N			SN			ž		3 00		
Trichlorofluoromethane		Na			alv			2 9		20.5		00,0010
Vitute (Tete)			T		SZ SZ	T		2 5		000001		7100.00
vyteries (1 creat)		CN.	T		CN.	Ī		g				
6	•	PID AG	T		90044		•			ļ	,	
Semi-Volanies	/ẩn	SNIUN		ugʻi	SNIUN		5	SNIAN		1/2n	1/gn	1/20
Acenaphthene		SN			NS			SN				20.00
Acctophenome		NS			SN			SS				700.00
Benzene		NS			NS			SS		1.00		
Benzoic Acid		SN			SN			SN				28000.00
Bis(2-Ethylhexyl)phthalate		NS			NS			SN				
2,4-Dunethylphenol		NS			ß			SS				400.00
Di-tt-Butyl phthalate		NS			ß			SN				700.00
Dicthyl Phthalate	_	NS			NS			SN				5600.00
Fluoranthene		NS			NS			SN				280.00
Napthalene		NS			NS			SZ				6.80
in&p-Creosol		NS			NS			SN				35.00
o-Creasal		NS			NS			SS				350.00
Phenathrene	_	NS			NS	-		NS				10.00
Phenol		NS			NS	-		NS				10.00
Pyrene		NS			SN			NS				210.00
Herbicides/Pesticides	ng/I	ND/NS		ng/]	ND/NS		ugl	ND/NS		ng/l	ug/I	ug/J
Alpha-BHC		NS			NS			NS				0.05
Endrin		NS			NS			NS		2.00		
Dieldrin		NS			NS			NS				0.10
Dinnethoate		NS			NS			NS				5.00
Disulfoten		NS			SN			SN				0.50
2,4,5-T		NS			SN			NS				70.00
2.4-D		NS			NS			NS		70.00		
HxCDD		NS			SN			NS				
HxCDF		NS			NS			NS				
Heavy Metals	l/gu	ND/NS		ng/	ND/NS		13.	ND/NS		l∕an	1/an	∕an
Antimony		NS			NS			NS		6.00		
Arsenic		NS			NS			NS		50.00		
Barium		NS			NS		_	NS		2000.00		
Cadmium	10.00			30.00			20.00			5.00		
Chromiun		Q		120.00			60.00			100.00		
Copper	50.00			440.00			200.00			1000.00		
Lead	40.00			360.00			110.00			15.00		
Mercury		NS			NS			NS		2.00		
Nickel	90.00			170.00			100.00			100.00		
Seleruttin		NS			NS			SN		50.00		
Silver		NS			sv			SN			100.00	
Thalburn		NS			NS			SN		2.00		
Vanadium		SN			NS			SS				49.00
1				000000								

2,4-D		NS		NS		NS	70 00		
HxCDD		NS		NS		NS			
HxCDF		NS		NS		NS			
								I	
Heavy Metals	ug/l	ND/NS	l/3n	ND/NS	Jan	ND/NS	l∕ân	1/2 n	√ 3 n
Antúnony		NS		NS		NS	6.00		
Arsenic		NS		NS		NS	50.00		
Baritan		sN		NS		NS	2000.00		
Cadinium	10.00		30.00		20.00		5.00		
Chroniun		DN	120.00		60.00		100.00		
Copper	50.00		440.00		200.00		1000.00		
Lead	40.00		360.00		110.00		15.00		
Mercury		NS		NS		NS	2.00		
Nickel	90.00		170.00		100.00		100.00		
Seleniun		NS		NS		NS	50.00		
Silver		NS		NS		NS		100.00	
Thallium		NS		NS		NS	2.00		
Vanadimn		NS		NS		NS NS			49 00
Zinc	240.00		2600.00		610.00			5000.00	
Conventional Parameters	mg/l	ND/NS	mg/l	ND/NS	∕3œ	ND/NS	l/gan	l∕3m	mg/l
Biological Oxygen Demand		NS		NS		NS			
Chemical Oxygen Demand	330.00		880.00		605 00	NS			
Clubrides	80.00		140.00		110.00			250.00	
Cyanide		NS		NS		NS	0.20		
Armonia, Nitrogen	2.00		11.00		2.00				
Organic Nitrogen	<u>s.00</u>		11.00		5.00				
Nibate	0.04		0.44	-	0.24		10.00		
Nitrite	0.01		10.0		0.01		1.00		
Iron	1.10		10.00		5.50			0.30	
Oil and Grease		NS		NS		NS			
pH		NS		NS		NS		6.5-8.5	
Phenols (Total)		NS		SS		SN			
Phosphorus		SN		NS		NS			
Total Suspended Solids	15.00		490.00		245 00				
Total Dissolved Solids	2700.00		4200.00		3450 00			500.00	
Sulfate		SN		NS		NS		250 00	
Total Organic Carbon		SN		SN		S			
I UC (Duplicate)		sz		NS		NS			
Total Organic Halogens		SN		NS		SN			
Magnesiun		SN		SN		SN			
Mangenese	1 20		1.50		 1.80			0.05	
Potassium		SS		NS		NS			
Sodium		NS		NS		NS	160.00		
Alkalinity	750.00		1200.00		1050.00				
Calcium		NS		NS		NS			
Hardness		NS		NS		NS			
Boron		\$N NS		SN		SN			0.63
Specific Conductance (umho/cm)	24000.00		25000.00		24500.00				

NS - Not Sampled ND - Not Datested Det Limit - Sampling Datestion Limit MC - Maximum Contaminant Level; Enforceable Groundwater Standarda SMCL - Secondary Maximum Contaminant Level; Enforceable Groundwater Standarda Guidance Concentrativne-Not Enforceable Standarda

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Table A.3: Charact	teristics of the Blydenburg Cleanfill Landfill of New York.
LANDFILL:	Blydenburg Cleanfill Landfill, New York.
OWNER/OPERATOR:	Town of Islip Resource Recovery Agency 40 Nassau Avenue Islip, New York 11751
LITERATURE SOURCE:	New York State Department of Environmental Conservation Presented in C&D Waste Landfills, Leachate Quality Data, Volume 1. Prepared by Gershman, Brickner & Bratton, Inc. For the National Association of Demolition Contractors.
WASTE TYPE:	Demolition debris and landclearing debris. Known as "Clean Fill".
ACREAGE:	12 acres.
YEARS IN SERVICE:	Unknown.
LINER SYSTEM:	Yes.
LEACHATE SYSTEM:	Yes.
LEACHATE SAMPLE:	Leachate sample taken from leachate collection system.
MISCELLANEOUS:	None.

Table A.4: Sampling for the Blydenburg Cleanfill of New York

		Aug-92 Barrile Der		Z	26-40		Receipt	1			(6- 3 n	Det 1 imit	Primary MCI.	Secondary MCL.	Guldance Conc
Volation		DNN		1	DING			NNS I			DNN		Ven	Ven	Van
Voiantes	1/2	CNION			CUMU	T		SNIM			S NN				200.00
Acetone		SZ 2			2	T	T	NS	┼	╋	C DIA		T		1200.00
2-Butanone		2	T		2		T	2N2	╎	╉	2	T			200.001
Carbon Disulnde		22	T	Ť	2	T	Ī	22					T		01.00
Chloromethane		NS	T		SZ	T		SN	+	╁	z ;				2. /0
1, 1-Dichloroethane		SN			ŝ			SZ		╉	2				W.W/
1,2-Dichloroethane		NS	1		ĩ			NS	+	┨	SZ		8. M		
1,4-Dioxane		NS			SS			NS	+	┥	SZ				5.00
Ethylbenzene		NS			SN NS			NS		┨	SZ Z			700.00	
Metliyl Ethyl Ketone (MEK)		NS			ŝ			NS			SZ				4200.00
4-Methyl-2-Pentanone		NS			NS			NS		-	SN		1		
Methylene Chloride		NS			NS			NS		_	SN		°8		
Toluene		NS			NS			NS			NS		1000.00		
1.1.1.Trichloroethane		NS			NS			NS			NS		200.00		
Trichloroethylene		SN			SN			NS			NS		3.00		
Trichlorofluoromethane		NS	T		sv			NS			NS				2100.00
Vulence (Total)		NG			s N	Ī		SN			sz		10000.00		
Vyteries (1 com)		2	t					2		╞		ſ			
Comt. Volatiles		SN/UN	T	Ven	SN/QN		Van	ND/NS		1	SNUDN		Vau	l'an	l'an
A consultibute		SN		╈	SN			SN		┢	NS				20.00
Acetonhamone		SN SN	ſ		Ň			SN		╞	NS				700.00
Accophenois		evi No		T				SN SN			SN SN	T	8		
Delizette		en l	t	t	2 2		Ī	S N			, vi	T			28000.00
Benzine Acid		2N	T		2 2			alv	╞	╎		Ī			
Bist 2-Eurythexyt)philialate		SN S	Ť	Ť	2 9	Ī		2014		1	e Pi				100.001
2,4-Duneutyphenol		CN ST	t		2			C N		╀					100.007
Di-fi-Buryl prunalate		ev.	Ť		2			BIN			ž			-	00 0095
Dieutyi Fhutatate		SN 1	T	Ť	2 9		i	oly	╀	╎	N N				780.00
Fluorantiene		SN SN	Ì	T	2			2 2	╁		ž				6 80
Napulaterie		SNI			2 M	T		2 N			SZ Z	T	T		35.00
		SN N	T			T		S.		╞	SN				350.00
Phenothrane		SN N	T		2 M	ſ		SN		┢	SZ	T			10.00
r neuaun cue Dhanol		SN	ſ	T	SZ			NS		╞	SN	Ī			10.00
Pyreile		NS			NS			NS			NS				210.00
Herbicides/Pesticides	l/ân	ND/NS		l/ân	ND/NS		∕3∎	ND/NS		ug/l	ND/NS		l/an	ug/J	l∕3n
Alpha-BHC		SN			NS			NS			NS				0.05
Endrin		NS			NS			NS		-	NS		2.00		
Dieldrin		NS			NS			NS			NS				0.10
Dimethoate		NS			SN			NS		+	NS				5.80
Disulfoton		NS			SN			NS	┥		NS				0.50
2,4,5-T		NS			SZ			NS	┥		SN				00.0/
2,4-D		SN	┦		SN			SN	╉	╎	SZ S		20.00		
HxCDD		SN	T		SZ 5	T		SN SN	╀	╎	2 2	T			
HxCDF		×2			ŝ	Ī		cz.		╎	2	T			
Heavy Metals	Van	ND/NS		Van	ND/NS	T	ue/	ND/NS		l/an	ND/NS		Vân	l∕3n	µ∕∂n
Antinony		SN	T		sz			NS		┢	SN		6.00		
Arsenic		SN	Ì		SN	Ι		NS		-	NS		50.00		
Bariun		SN			NS			NS			NS		2000.00		
Cadmium		Q	8	2050.00					1.00		DN	1.00	5.00		
Chromiun		NS			NS			NS			NS		100.00		
Copper		NS			NS			NS			NS		1000.00		
Lead	2.00			669.00			25.00	_		11.00			15.00		
Mercury		NS			NS			NS			SN		2.00		
Nickel		NS			NS			NS			sz		8.00		
Seleruurn		SN			SN :			SN		+	2 P		<u>w.vc</u>	100.001	
Silver		SN SI	Ţ		sz s			NS NG		╎	e z		2.00	8.81	
1 hallmin		No.			CN N			SN		╞	sz				49.00
Vanaduun Zinc		2 SZ			SN	10.00		NS	10.00	10.00	NS			5000.00	
2077															

Dieldrin		NS			NS			NS			NS				0.10
Dunethoate		NS			NS			NS			NS				5.00
Disulfaton		NS			NS			NS			NS				0.50
2,4,5-T		NS			NS			NS			NS				70.00
2,4-D		NS			NS			NS			NS	ſ	70.00		
HxCDD		NS			NS			NS			NS				
HxCDF		NS			ß			NS			NS				
Heavy Metals	la"	ND/NS		l'ân	NDNS		۲¢	NDNS		19n	ND/NS		Jan 1	l/gu	Vân
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Chromitine		014	8.1	M-007	-			2 5	3			3	N I		
Cumun		22			2 S			2 S			z :		100.00		
Lead	2.00	CN.		640 00	ŝ		w v	ŝ	T	8	2	T	00.001		T
Mercury		NS		201.200	NS			SN			NS		00 0		
Nickel		NS			NS			SN			NS		100.00		Γ
Selenum		NS			NS			NS			NS		50.00		
Silver		NS			NS			NS			NS			100.00	
Thallium		NS			NS			NS			NS		2.00		
Vanadium		NS			NS			NS			NS				49.00
Zinc		NS			SN	10.00		NS	10.00	10.00	NS			5000.00	
Conventional Parameters	l/gm	ND/NS		l/gm	ND/NS		l/am	ND/NS		l/am	ND/NS		mg/l	mg/l	mg/l
Biological Oxygen Demand		NS			SN			SN			NS			-	
Chemical Oxygen Demand	78.50			202.40			200.00			508.00	-				
Chlondes	100.00			143.00			77.50			1150.00				250.00	
Cyarude		NS		!	SN			SN			SN		0.20		
Ammojua, Nitrogen	0.12			1.17		T	-1-			10.60					
UPPER NUCCEI		NS			SZ SZ			SN !			SN				
Nihile	\$1.0	NIC			CIN N	10.0			10:0	0.50	97	T	8 8		
Iren	0 12	CN1		07 10	2	Ī	17 (2)	2		1 40	2		3	0.0	T
Oil and Grease		NS		04.172	NS	Ī		SN	T		NN		T	0.5 D	
Hq	6 90			6.50			6.20			6.80			1	6.5-8.5	Ī
Phenols (Total)	10.0			0.01			0.03				DN	0.01			
Pliceplicrus		SN			ß			NS			NS				
Total Suspended Solids		NS			SN	1		SN			NS				
I REAL DISSOTVED SOLIDS	702.00			1428.00			1110.00			2040.00		T		500.00	T
Total Oreanic Carbon	211.00	QN	5	00.022		Ţ	00.016			0.11		T		250.00	T
TOC (Dublicate)		SN	1.00	07.70	N			NIG		3 Å	Mc			T	
Total Organic Halogens		NS			ž			e su		T	2 VX	T		T	
Magnesium	1.92			5.29			40.23	2		122.00		Ī			
Mangenese	7.61			258.00			21.99			11.90				0.05	
Potassium	0.24			17.60			77.93			112.00					
Sodium	25.70			100.00			49.20			233.00	-		160.00		
Alkalinity	300.00			663.00			548.00			1480.00					
Calciun		Q	0.03	136.00			124.00			96.40					
Hardness	340.00			840.00				ŝ		2420.00					
Souton Snecific Conductance (umho/cm)	1040.00	ŝ		000000	SZ		0000	SZ		1 200 00	SN				0.63
	00.0001			2010.00	-		- M. M.	~		1000.00			1		

NS - Net Sampled ND - Net Detected Del Limit - Sampling Detection Limit Del Limit - Sampling Detection Limit MCL - Maximum Contanniane Level; Enforceable Groundwater Standards SMCL - Secondary Alsairrum Contanniane Level; Enforceable Groundwater Standards Utuldance Concentrationes Net Enforceable Standards

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2072

LANDFILL:	Construction Disposal, Inc. (CDI) landfill, Adams County, Colorado.
OWNER/OPERATOR:	Construction Disposal Incorporated 9450 Monaco Street Henderson, Colorado 80640
LITERATURE SOURCE:	 Hazardous Materials and Waste Management Division Colorado Department of Health Presented in C&D Waste Landfills, Leachate Quality Data, Volume 1. Prepared by Gershman, Brickner & Bratton, Inc. For the National Association of Demolition Contractors.
WASTE TYPE:	Demolition debris and landclearing debris.
ACREAGE:	Unknown.
YEARS IN SERVICE:	Unknown.
LINER SYSTEM:	Unknown.
LEACHATE SYSTEM:	Unknown.
LEACHATE SAMPLE:	Leachate sample taken from spring water discharge culvert.
MISCELLANEOUS:	None.

Table A.5: Characteristics of the Construction Disposal Inc. Landfill of Colorado.

Table A.6: Sampling for the Construction Disposal Inc. Landfill of Colorado.

Result Result Det Volatiles wg/n ND/NS Acedon Disulfide NS NS Cabon Disulfide NS NS Chloromethane NS NS 1.1.Dichlorothane NS NS 1.2.Dichlorothane NS NS 1.2.Dichlorothane NS NS 1.2.Dichlorothane NS NS Ethylber.zene NS NS Ethylber.zene NS NS Methyleth Chloride NS NS 1.1.1.Tichlorothane NS NS 1.1.1.Tichlorothane NS NS Nethyleth Chloride NS NS Toluce NS NS NS Nethylether Chloride NS NS NS Stoteophthene NS NS NS	Result Det Limit ND/NS NS NS NS NS<	MCL ug/ 1.000 00 1.000 00 1.0000 00 1.0000 00 1.0000 00 1.0000 00 1.0000 00 1.0000 00 1.0000000000000000000000000000000000	MCL ug1 700:000	Cent. Lent. ug/l 700.00 700.00 2700.00 2700 2700 200.00 5.00 200.00 2.00 200.00 2.00 200.00 2.00 200.00 2.00 200.00 2.00 200.00 2.00 200.00 2.00 200.00 2.00
ugn sufficie ugn ee sufficie bane hane cochaate coch ane cochaate coch are cochaate coch are cochaate coch are cochaate coch and bylene coch alorotethaate coch alorotethaate coch bylene coch alorotethaate coch bylene coch alorotethaate coch bylene coch alorotethaate coch alorotethaate coch alorotethaate coch alorotethaate coch alorotethaate coch bylene coch alorotethaate	NS N	ug/1 3.00 3.00 3.00 3.00 10000.00 10000.00 10000.00	100.000 100.000	ug/l 100.00 700.00 2700.00 700.00 2700.00 5.00 5.00 700.00 2100.00 700.00 2100.00 700.00 2100.00 700.00 2100.00 700.00 280.00 700.00 280.00
e sulfide banc sulfide banc iotethane cothane cothane cothane cothane cothane cothane cothane cothane by Ketone (MBK) by Ketone by the cothan cothane	N N N N N N N N N N N N N N N N N N N	3.00 3.00 3.00 3.00 1.000.00 1.000.00 1.000.00	700.000 Mg/	700.00 700.00 2.70 5.00 5.00 5.00 700.00 700.00 280.00 280.00 280.00 280.00 280.00 280.00
interface in the second	NS N	3.00 3.00 3.00 3.00 1.000.00 1.000.00 1.000.00	700.000 Mg/	4200.00 700.00 5.00 5.00 5.00 2.000 700.00 280.00 280.00 280.00 280.00 280.00
suffice baller baller baller baller baller betrettante betrettante betrettante betrettante betrettante betrettante bylytene betrettante bylytene betrettante bylytene betrettante bylytene betrettante betrettante bylytene betrettante bylytene betrettante betrettante betrettante betrettante bylytene betrettante betrettante betrettante betrettante betrettante bylytene betrettante	NS N	3.00 3.00 3.00 3.00 3.00 1000.00 1.000 1.000 1.000 1.000	700.000 UE	700.00 2.70 5.00 4.200.00 4.200.00 2.100.00 2.200.000 2.200.000 2.200.000 2.200.000 2.200.000 2.200.00000000
hanc troethane recethane ere and and 2-Pentanone Chloride Chloride Unforethane Unforethane Unforethane Unforethane Unforethane Coal) Hytherol Cheile Coal Coal Coal Coal Coal Coal Coal Coal	NS NS NS NS NS NS NS NS NS NS NS NS NS N	3 00 3 00 3 00 3 00 1 000 00 1 000 00 1 000 00 1 000 00	700.000 Marine 1	2.70 700.00 5.00 4200.00 2100.00 2100.00 280.00
nectrante nectrante nectrante nectrante ne coethante ne en	NS N	3.00 3.00 3.00 3.00 1000.00 11000.00 11000.00 11000.00	100.000	700.00 5.00 5.00 2100.00 280.00 280.00 280.00 280.00 280.00 280.00 280.00 280.00 280.00
necutante ne en e	NS N	3.00 3.00 3.00 1.00000 1.00000	00:00	5.00 4200.00 2100.00 2000 700.00 280.00 280.00 280.00 280.00 280.00 280.00 280.00
are and a set of the s	NS N	5.00 3.00 3.00 1.000.00 1.000.00	700.000 ug/l	4200.00 4200.00 2100.00 280.00 280.00 280.00 280.00 280.00 280.00 280.00 280.00
WI Ketone (MEK) 2-Pentanone Chloride Chloride Uorocthane thylene Inoromethane I	NS N	5.00 200.00 3.00 1.000 1.00		4200.00 4200.00 2100.00 700.00 700.00 280.00 280.00 280.00 280.00 280.00
2. Pentanone Chloride Uorocthane Ubylene Ioromethane Ioromethane Ioromethane Ioromethane Intexticidas Intexticidas Intralate Iphthalate Iphthalate Iphthalate Iphthalate Iphthalate Iphthalate Iphthalate Iphthalate Intralate Int	NS N	5.00 200.00 3.00 1.000.00 1.00	۲	2100.00 2100.00 20.00 700.00 280.00 280.00 280.00 280.00 280.00
Chloride Chloride Chloride Chloride Chloride Chlore Later Later Later Coll Later Coll Coll Coll Coll Coll Coll Coll Col	NS NS NS NS NS NS NS NS NS NS NS NS NS N	5.00 200.00 3.00 1.000 00 1.000 10	الألم A	2100.00 2000 280.00 280.00 280.00 280.00 280.00 280.00 280.00 280.00
loroethane utylene utyles lotal) utiles utylphenol ene utilate util	NS NS NS NS NS NS NS NS NS NS NS NS NS N	1000.00 200.00 3.00 10000.00 11.00	Vân	2100.00 2100.00 280.00 280.00 280.00 280.00 280.00 280.00
loroethane btylene ugf ten bylene btylene btyl	NS NS NS NS NS NS NS NS NS NS NS NS NS N	200.00 3.00 ug/1 1.00	Vân	2100.00 2100.00 2800.00 280.00 280.00 280.00 280.00 280.00
thylene concluance will be a concluance of the concluance of the concluance of the concluance of the conclust	NS NS NS NS NS NS NS NS NS NS NS NS NS N	3.00 ug/1 1.00	۲. R	2100.00 2000 2000 2000 28000 28000 28000 28000 28000 28000
lucromethane lucromethane loal) ug/l lites ug/l lites ug/l lites ug/l lites ug/l lites load lites ug/l lites ug/l lites ug/l lites load lites ug/l lites load lites l	NS NS NS NS NS NS NS NS NS NS NS NS NS N	1.00 1.00	Vân	2100.00 ug/l 20.00 700.00 280000 280000 280000 280000 280000 280000
otal) (otal) (otal) (otal) (otal) (otel) (ot	NS NDAS NS NS NS NS NS NS NS NS NS NS NS NS NS	ug/1 1.00	l/2n	ug/l 20.00 700.00 28000.00 700.00 700.00 700.00 2800.00 2800.00 2800.00 2800.00
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titles ug/l tene ug/l cid id httpalate ug/l phthalate ug/l tralate ug/l c ug/l tralate ug/l c ug/l	╾╋╋╋╌╋╋╋╋	ng/l		ug/l 20.00 700.00 400.00 700.00 700.00 2800.00 5600.00 2800.00 2800.00
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one cid biotylphthalate cid hevid cid hylphenol cid thalate cid thalate cid thalate cid thalate cid the cid th	NS N	8		700.00 28000.00 400.00 5600.00 280.00
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lihesyl)phthalate bytphenoi phthalate thalate soi ce soi c c c c c c c c c c c c c c c c c c c	SX S			400.00 700.00 280.00
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Lettalate Italate Ene seol seol C C C L L L L L L L L L L L L L	N N N N N N N N N N N N N N N N N N N			700.00 5600.00 280.00
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sol be wPerticides ug/ C C at b ug/ ug/	SN	1		6.80
ne «Pesticides ug/l C C alb ug/l adb ug/l				35.00
re Pretiticides ug/ C C alb ug/l	SZ 1			00000
vPesticides ug/ C e e als ug/	2 S			
vPesticides ug/ C e ug/ tals ug/	SN			
VPerificides ug/l C E E als ug/l	2			70.01
c a also ugh	╈	Nev Nev	Van	l'au
e ugh	+			200
e alson ugA	SN	2.00		
als ug/	NS			01.0
ials ug/	NS			5.00
als ug/	NS			0.50
als ug/	NS			70.00
ais ugl	NS	70.00		
iais ug/l	NS			
tals ug/	NS			
	+	-		
	+	l/ân	1/ 3 m	ng/i
	NN SN	00.9		
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	SN			
		1000001		
		15.00		
ury	NS	2.00		
	NS	100.00		
	NS	50.00		
Silver	NS I		100.00	

Disulfoton		SN SN				0.50
2,4,5-T		NS				70.00
2,4-D		NS		70.00		
HxCDD		NS				
HxCDF		NS				
Heavy Metals	√8n	SNON		√3n	Ngu	ng/
Antimony		SN		6.00 6		
Arsenic		SS		20.00		
Barium		SZ		2000.00		1
Cadmium		SS		<u>د</u> 8		
Chromium		SS		100.00		
Copper		S		1000.00		
Lead		NS		15.00		
Mercury		NS		2.00		
Nickel		NS		100.001		
Selenium		NS		50.00		
Silver		NS			100.00	
Thallium		NS		2.00		
Vanadium		NS				49.00
Zinc		SN			5000.00	
-						
Conventional Parameters	mg/l	ND/NS		mg/l	mg/l	mg/l
Biological Oxygen Demand		SN				
Chemical Oxygen Demand		Q	5.00			
Chlorides	56.70				250.00	
Cyanide		NS		0.20		
Ammonia, Nitrogen		NS				
Organic Nitrogen		NS				
Nitrate		NS		10.00		
Nitrite		NS		00		
Iron	0 05				0.30	
Oil and Grease		Ð	1.00			
pH	7.24				6.5-8.5	
Phenols (Total)		NS				
Phosphorus		NS				
Total Suspended Solids		Ð	5.00			
I otal Dissolved Solids		NS			200.00	
Sulfate	118.00	10			250.00	
Lotal Organic Carbon		2				
TOC (Duplicate)		SN				
Lotal Olganic nalogens	20.21	CNI				
Mondanese	3.6				20.0	
ivializatiose Dotossitim	7 80				60.0	
Sodium	64.00			160.00		
Albeliedar	2012	NIC				
Calcium	00 16	CNI				
Hardness		NS				
Boron		NS				0.63
Specific Conductance (umho/cm)	611.00					

NS - Not Sumpled ND - Not Detected Det Limit - Sumplug Detection Limit Det. Limit - Sumplug Detection Limit S.C.L. Maximmar Level: Enforceable Groundwater Standards S.M.C.L. Secondary Maximum Contaminant Level. Enforceable Groundwater Standards Childance Concentrations- Not Enforceable Standards

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LANDFILL:	Cross Trails Rubble Landfill, Maryland.
OWNER/OPERATOR:	Brandywine Enterprises, Inc. 5800 Sheriff Road Fairmont Heights, Maryland 20743
LITERATURE SOURCE:	C&D Waste Landfills, Leachate Quality Data, Volume 2. Prepared by Gershman, Brickner & Bratton, Inc. for the National Association of Demolition Contractors.
WASTE TYPE:	Construction waste and demolition debris. Specific composition characteristics are unknown.
ACREAGE:	Unknown.
YEARS IN SERVICE:	Unknown.
LINER SYSTEM:	Unknown.
LEACHATE SYSTEM:	Leachate collection system installed.
LEACHATE SAMPLE:	Leachate sampled from leachate collection system.
MISCELLANEOUS:	Maryland Department of the Environment proved the leachate data for this landfill. Although liner system is unknown, at least one liner is probable since a leachate collection system is installed. Amount of leachate produced per month varies between 1,000 and 3000 gallons.

Table A.7: Characteristics of the Cross Trails Rubble Landfill of Maryland.

Table A.8: Sampling for the Cross Trails Rubble Landfill of Maryland.

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Visatis Particle Pariticle Particle		1	1993 Sampling	ية 1	Primary	Secondary	Guidance
NS NS<	Volatiles		ND/NS	11HIN 1941	Nau Nau	Non Non	
me NS NS<	Acetone		NS				700.00
midilate NS <	2-Butanone		NS				4200.00
Italiane ND 0.50 3.00 recellane ND 0.50 3.00 recellane ND 0.50 3.00 ne ND 0.50 3.00 ne ND 0.50 1000.00 Morethane ND ND 3.00 Morethane ND ND 3.00 Morethane ND ND 3.00 Morethane ND ND 0.50 1.00	Carbon Disulfide		SN				700.00
NS NS 0.50 3.00 reclause NS 0.50 3.00 API Katone NS 0.50 3.00 API Katone NS 0.50 5.00 API Notellane NS 0.50 1.00 Interventiane NS NS 1.000.00 Interventiane NS NS 1.00 Interventiane	Chloromethane		GN	050			2 70
NIC 0.50 3.00 3.00 Reference ND 0.50 3.00 700.00 Marcellane ND 0.50 1.000.00 700.00 Marcellane ND 0.50 1.000.00 1.000.00 Marcellane ND 0.50 1.000.00 1.000.00 Marcellane ND NS 0.50 1.000.00 Marcellane ND NS 0.50 1.000.00 Marcellane ND NS 0.50 1.000 Marcellane ND NS 0.50 1.000 Marcellane ND NS 0.50 1.000 Marcellane NS NS 0.50 1.00 Marcellane NS	1, 1-Dichloroethane		NS				700.00
me NS 0.50 0.7000 Eventance NS 0.50 1000.00 2-Pentance NS 0.50 1000.00 2-Pentance NS 0.50 1000.00 Ubrotellane NS 0.50 1000.00 Ubrotellane NS 0.50 1000.00 Ubrotellane NS 0.50 1000.00 Ubrotellane NS 0.50 1000.00 Untrovellane NS 0.50 1000.00 Untrovellane NS 0.50 1000.00 Untrovellane NS 0.50 1000.00 Untrovellane NS NS 0.50 100 Untrovellane NS NS NP NP Untrovellane NS NS NP NP Untrovellane NS NS NS NS Untrovellane NS NS NS NS Untrovellane NS NS NS NS	1,2-Dichloroethane		ND	0.50	3.00		
metric ND 0.50 700.00 All Microeffance NS NS 700.00 2-Petramene NS ND 0.50 500 700.00 Clutoride NS NS 2000.00 700.00 700.00 Microeffance NS NS 2000.00 700.00 700.00 Microeffance NS NS 700.00 700.00 700.00 Microeffance NS NS 700.00 700.00 700.00 Microeffance NS NS 700.00 700.00 700.00 Microeffance NS NS NS 700.00 700.00 Microeffance NS NS NS 90 90 Microeffance NS NS 90	1,4-Dioxane		NS				5.00
Jyl Ketone (MEK) NS	Ethylbenzene		ND	0.50		700.00	
2-Perthanne NS 0.50 500 Cilloride ND 0.50 100.000 Morrethane ND 0.50 100 Morrethane ND 0.50 1000.00 Morrethane ND 0.50 1000.00 Morrethane ND 0.50 1000.00 Morrethane ND 0.50 100 Morrethane ND 0.50 100 Morrethane ND 0.50 100 Morrethane NS NS NS Morrethane NS NS NS Morrethane NS NS NS NS NS NS NS NS<	Methyl Ethyl Ketone (MEK)		NS				4200.00
Chlorate ND 0.50 1500 Moreetlaare NS 0.0 0.00 0.00 Moreetlaare NS NS 0.00 0.00 Moreetlaare NS NS 0.0 1.00 Moreetlaare NS NS 0.0 0.00 Moreetlaare NS NS 0.0 0.00 0.00 Moreetlaare NS NS 0.0 0.00 0.00 0.00 0.00 Moreetlaare NS NS NS 0.00 0.	4-Methyl-2-Pentanone		NS				
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Ine NS	o-Creasol		NS				350.00
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Arsenic	8.00		5.00	2000.00		
Barium	1000.00		NA	<u>\$</u> 00		
Cadmium		DN	20.00	100.001		
Chromiun		QN	60.00	1000.00		
Copper		QN	30.00	15.00		
Lead		QN	200.00	2.00		
Mercury		QN	0.50	100.00		
Nickel		QN	60.00	5 0.00		
Selenium		Q	5.00		100.00	
Silver		Q	5.00	2.00		
Thallium		Q	400.00			49.00
Vanadhun		SN			5000.00	
Zinc	84 00		8.00			
Conventional Parameters	mg/l	ND/NS		mg/l	mg/l	mg/l
Biological Oxygen Demand	11.00		1.00			
Chemical Oxygen Demand	180.00		10.00		250.00	
Clumides	100.00		1.00	0.20		
Cyande		NS				
Anunonia, Nitrogen	1.40		1.00			
Organic Nitrogen		NS		10.00		
Nitrate		Ð		1.00		
Nitrite		Q			0.30	
Iron	46.00		1.00			
Oil and Grease		NS			6.5-8.5	
pH	6.46					
Phenols (Total)		NS				
Phosphorus	0.82		0.15			
Total Suspended Solids		NS			500.00	
Total Dissolved Solids	1606.00				250.00	
Sulfate	380.00		28			
Total Organic Carbon		NS				
I OC (Duplicate)		SN				
Total Organic Halogens		NS				
Magnesium	120.00		8.00		0.05	
Mangenese	2.20		0.04			
Potassium	42.00		90.F	160.00		
Soduun	100.00		4.00			
Alkalınıty	1800.00		1.00			
Calchun	480.00		80.00			
Hardness	2114.00	210				0.63
Boron Streetfo (Conductance (umbo/em)	00 07 07 0	ŝ				
specific Conductance (mnicken)	7740.00					

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NS - Not Sampled ND - Not Detected Del Limit - Sampling Detection Limit MCL - Instrumton Comminian Levie Enforceable Groundwater Standards MCL - Astrumton Comminian Levie Enforceable Groundwater Standards Colidence Concentratione-Not Enforceable Standards

Table A.9: Characteristics of the D&M Site of Connecticut.

i.

LANDFILL:	D&M Site, Connecticut.
OWNER/OPERATOR:	Unknown.
LITERATURE SOURCE:	Construction and Demolition Waste Landfills. Prepared by ICF Incorporated for the U.S. Environmental Protection Agency, Office of Solid Waste.
WASTE TYPE:	Demolition debris and landclearing debris.
ACREAGE:	Unknown.
YEARS IN SERVICE:	Unknown.
LINER SYSTEM:	Unknown.
LEACHATE SYSTEM:	Unknown.
LEACHATE SAMPLE:	Unknown.
MISCELLANEOUS:	None.

Table A.10: Sampling for the D and M Landfill of Connecticut.

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NS	- Dichloroethane		SN			SN				700.00
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NS 2.00	lver		NS			NS			100.00	
BIN	haltium		NS			NS		2.00		

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HxCDF	1	No No	-	-	24			Ī
Heavy Metals	ug/i	ND/NS		ug/J	ND/NS	2	l∕3n	√3n
Autunony		NS			NS	6.00		
Arsenic		NS			NS	50.00		
Bariun		NS			NS	2000.00		
Cadınium		NS			NS	5.00		
Chronniun		SN			NS	100.00		
Copper		NS			NS	1000.00		
Lead		NS			NS	15.00		
Mercury		NS			NS	2.00		
Nickel		NS			NS	100.00		
Seleniun		NS			NS	50.00		
Silver		SN		ſ	NS		100.00	
Thattiun		NS			NS	2.00		
Vanadium		NS			NS			49.00
Zinc		NS			NS		5000.00	
Conventional Parameters	∕am	ND/NS		l/am	ND/NS	l/am	l∕am	l/am
Biological Oxygen Demand		SN			NS			
Chemical Oxygen Demand		NS			NS			
Chlorides	17.00			38.00			250.00	
Cvanide		NS			NS	0.20		
Anmonia, Nitrogen		NS			NS			
Organic Nitrogen	1.80				NS			
Nitrate		SN			NS	10.00		
Nitrite		NS			NS	1.00		
lron	0:30			2.00			0.30	
Oil and Grease		NS			NS			
Н	7.20			8.00			6.5-8.5	
Phenols (Total)		NS			NS			
Phosphorus		NS			NS			
Total Suspended Solids	26.00				NS			
Total Dissolved Solids	640.00			2900.00			500.00	
Sulfate		NS			NS		250.00	
Total Organic Carbon		NS			NS			
TOC (Duplicate)		NS			NS			
Total Organic Halogens		NS			NS			
Magnesium		NS			NS			
Mangenese		SN			SN		0.05	
Potassiun		NS			NS			
Sediun		NS			NS	160.00		
Alkalinity	620.00				NS			
Calciun		NS			NS			
Hardness		NS			NS			
Boron		NS			NS			0.63
Specific Conductance (unho/cm)	L	SN			NS			

NS - Not Sampled ND - Not Datested De Limit - Sampling Detection Limit MCL - Assimum Contaninaet Leviel: Euforceable Groundwater Standards MCL - Secondary Musimum Contanniaet Level: Euforceable Standards Guidance Concentratione- Not Euforceable Standards

Table A.11: Character	istics of the Deep River Bulky Waste Landfill of Connecticut.
LANDFILL:	Deep River Bulky Waste Landfill, Connecticut.
OWNER/OPERATOR:	Unknown.
LITERATURE SOURCE:	Bulky Waste Leachate Characterization Survey Maurice Hamel, Connecticut Department of Environmental Protection Presented in C&D Waste Landfills, Leachate Quality Data, Volume 2. Prepared by Gershman, Brickner & Bratton, Inc. For the National Association of Demolition Contractors.
WASTE TYPE:	Demolition debris and landclearing debris. Includes scrap metal.
ACREAGE:	4 acres.
YEARS IN SERVICE:	Opened in 1976.
LINER SYSTEM:	Unknown.
LEACHATE SYSTEM:	Unknown.
LEACHATE SAMPLE:	Leachate sample taken from seep at base of fill at edge of wetland.
MISCELLANEOUS:	There is black manganese staining at the seep. Ammonia concentrations are consistently elevated suggesting siting or operational problems.

Table A.12: Sampling for the Deep River Bulky Waste Landfill of Connecticut.

Opsile eg1 NDvs eg1 NDvs eg1 NDvs NS	Volatiles Acetone 2-Butanone	Re		Det Limit	Aug Result	ut-1984	Det Limit	Octal Result	ber-1981	t Det Limit	December-1955 Result D	er-1988 Det Limit	Primary MCL	Secondary MCL.	Guidance Conc
1 NS NS NS NS NS diffat NS NS NS NS NS diffat NS NS NS NS NS colume NS	vcetone -Butanone	141	DINS		┢	SN/Q		les.	SN/G		NDUS	F	-		
factor Na Na Na Na Na $extor Na Na Na Na Na extor Na Na Na Na Na Cloudid Na Na Na Na Na Cloudi$	-Butanone		8N		t	NG			NIG		No				100
auther N3 N3 <th< td=""><td>Altaimato</td><td></td><td>DIA DIA</td><td></td><td>T</td><td>2</td><td>T</td><td>T</td><td>en en</td><td></td><td>ź</td><td></td><td></td><td></td><td>N.W/</td></th<>	Altaimato		DIA DIA		T	2	T	T	en en		ź				N.W/
mannet N3 N3 N3 N3 N3 N3 créthune N3 N3 N3 N3 N3 N3 Chlorida N3 <t< td=""><td>arhon Disul6da</td><td></td><td>214</td><td></td><td>t</td><td>2</td><td>T</td><td>T</td><td>SN 1</td><td></td><td></td><td></td><td></td><td></td><td>4200.00</td></t<>	arhon Disul6da		214		t	2	T	T	SN 1						4200.00
method NS NS NS NS NS celline NS NS NS NS NS Unic NS </td <td></td> <td></td> <td>22</td> <td></td> <td></td> <td>en :</td> <td></td> <td></td> <td>ŝ</td> <td></td> <td>Ż</td> <td></td> <td></td> <td></td> <td>/00.00</td>			22			en :			ŝ		Ż				/00.00
Continue NS NS NS NS NS contaute NS NS NS NS NS contaute NS NS NS NS NS contaute NS NS NS NS NS Petrolocition NS NS NS NS NS Coloridio NS NS NS NS NS Coloridio NS NS NS NS NS Controlicio NS NS NS NS NS </td <td>Uoromeutane</td> <td></td> <td>sz</td> <td></td> <td>T</td> <td>SN</td> <td></td> <td></td> <td>SZ</td> <td></td> <td>z</td> <td>~</td> <td></td> <td></td> <td>2.70</td>	Uoromeutane		sz		T	SN			SZ		z	~			2.70
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n NS NS NS NS NS NS $Vikkene(MEk)$ NS NS NS NS NS NS $Vikkene NS NS NS NS NS NS $	2-Dichloroethane		NS			NS			NS		Ż	~	3.00		
methods NS NS NS NS NS $Feltomethods$ NS NS NS NS NS $Feltomethods$ NS NS NS NS NS $Feltomethods$ NS NS NS NS Fel	4-Dioxane		NS			NS			NS	_	SN				<u>5</u> .00
Telefone NS NS NS NS P (minone NS NS NS NS <td>hylbenzene</td> <td></td> <td>NS</td> <td>_</td> <td></td> <td>NS</td> <td></td> <td></td> <td>SN</td> <td></td> <td>Ż</td> <td>10</td> <td></td> <td>700.00</td> <td></td>	hylbenzene		NS	_		NS			SN		Ż	10		700.00	
Pethatome NS NS NS NS NS Activatione NS NS NS NS NS NS Activatione	ethyl Ethyl Ketone (MEK)		NS			NS			NS		ž	8			4200.00
	Methyl-2-Pentanone		NS			NS			NS		Ż				
Name Name <t< td=""><td>ethylene Chloride</td><td></td><td>NS</td><td></td><td></td><td>NS</td><td></td><td></td><td>NS</td><td></td><td>Ż</td><td></td><td>5.00</td><td></td><td></td></t<>	ethylene Chloride		NS			NS			NS		Ż		5.00		
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Mixendance Nis Nis <th< td=""><td>chloroethylene</td><td></td><td>SN SN</td><td></td><td>t</td><td>D N</td><td>T</td><td></td><td>No.</td><td></td><td></td><td></td><td>8.07</td><td></td><td></td></th<>	chloroethylene		SN SN		t	D N	T		No.				8.07		
(ad) NS NS NS NS NS (ad) U/I NS U/I NS NS NS (ad) U/I NS U/I NS U/I NS (ad) NS NS NS NS NS NS (ad) NS NS NS NS NS<	chlorofluoromethane		2 VZ		Ť	N N			2 DIV		ź		8.e		00 0010
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	enaphthene		NS		1	NS			NS		Ż	~			20.00
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idiNoNoNoNoNoMalateNSNSNSNSNSNSNSDubbalateNSNSNSNSNSNSDubbalateNSNSNSNSNSNSDubbalateNSNSNSNSNSNSDubbalateNSNSNSNSNSNSDubbalateNSNSNSNSNSNSDubbalateNS </td <td>IZ¢he</td> <td></td> <td>SN</td> <td></td> <td></td> <td>NS</td> <td></td> <td></td> <td>NS</td> <td></td> <td>Ż</td> <td></td> <td>1.00</td> <td></td> <td></td>	IZ¢he		SN			NS			NS		Ż		1.00		
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Mythelen NS	(2-Ethylhexyl)phthalate		NS			NS			NS		Ż	3			
Inductation Inductation	-Dimethylphenol		NS			NS			NS		ż				400.00
Indiate NS <	n-Butyl phthalate		SN			NS			NS		Ż	-			700.00
ue NS NS<	thyl Phthalate		NS			NS			NS		ž				5600.00
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ed NS	othalene		SN	-		NS			NS		Ż	10			6.80
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e NS NS </td <td>reosot</td> <td></td> <td>SN</td> <td></td> <td></td> <td>NS</td> <td></td> <td></td> <td>NS</td> <td></td> <td>NS</td> <td></td> <td></td> <td></td> <td>350.00</td>	reosot		SN			NS			NS		NS				350.00
Refait NS NS <t< td=""><td>mathrene</td><td></td><td>SN</td><td></td><td></td><td>NS</td><td></td><td></td><td>NS</td><td></td><td>z</td><td></td><td></td><td></td><td>10.00</td></t<>	mathrene		SN			NS			NS		z				10.00
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N N <td>sldrin</td> <td></td> <td>NS</td> <td></td> <td></td> <td>NS</td> <td></td> <td></td> <td>NS</td> <td></td> <td>ż</td> <td></td> <td></td> <td></td> <td>0.10</td>	sldrin		NS			NS			NS		ż				0.10
NS	nethoate		NS			NS			NS		NS	10			5.00
NS	ulfoton		SN			NS			NS		ž				0.50
NS	,S-T		NS			NS			NS		ž				70.00
NS	-D		NS			NS			NS		ž		70.00		
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data ug/l NDNS ug/l NDNS ug/l NDNS ug/l NDNS NDNS <th< td=""><td>CDF</td><td></td><td>NS</td><td></td><td></td><td>NS</td><td></td><td></td><td>NS</td><td></td><td>ž</td><td></td><td></td><td></td><td></td></th<>	CDF		NS			NS			NS		ž				
data ug/l ND/NS ug/l ND/NS ug/l ND/NS N3 N3 N3 N3 N3 N3 N3 N4 N3 N3 N3 N3 N3 N3 N4 N3 N3 N3 N3 N3 N3 N5 N3 N3 N3 N3 N3 N3 N3 N3 N3 N3 N3 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>															
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ND ND ND ND ND 160:00 ND 300:00 200:00 ND ND ND ND ND ND ND 10:00 ND ND ND ND ND 30:00 ND ND ND ND ND 50:00 ND 20:00 ND ND ND 50:00 ND ND ND ND ND 50:00 ND ND ND ND ND 10:00 ND ND ND ND ND	üneny		NS			NS			NS		NS	~	6.00		
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Heavy Metals	Van	ND/NS	l/an	╋	ND/NS	Van	ND/NS		∕an	ND/NS	∩øn	l/an	ng/J
Antimony		NS		┢	NS		NS			NS	6.00		
Arsenic		QZ		╞	QN		GN			DN	50.00		
Bariun	160 00		300.00	8		200.00			200 00		2000 00		
Cadmiun		QN			DN		QN		10.00		°2 8		
Chronniun		QN			QN		QN			Q	100.00		
Copper	30.00		20.00	8		110.00			40.00		1000.00		
Lead	50.00		50.00	8		50.00			70.00		5.00		
Mercury		QN			DN		ĝ			Ð	50		
Nickel		NS		$\left \right $	NS		NS			SN	100.00		
Selenium		Q		\vdash	DN		QN			Ð	<u>\$0.00</u>		
Silver	10.00				DN		Q			Ð		100.00	
Thallium		NS			NS		NS			ß	2.00		
Variadium		NS			NS		SZ			SN			49.00
Zinc		NS		+	NS		SN			SN		2000.00	
				+		- -					5		Vern
Conventional Parameters	l/am	ND/NS	l/gm	-	ND/NS	/gm	NDINS		l) M	ND/NS	12	1/dm	1.2 m
Biological Oxygen Demand	45.00			┥	NS	8	-+		24.00		T		
Chemical Oxygen Demand	45.00		5 0.	50.00		30.00			58.00			00000	
Chlorides	23.00		120	120.00		100 100 100	4		120.00			00.062	
Cyanide		ND			QN		g		0.34		0.20		
Armnorua, Nitrogen	3.00		3.0	3.00		4.80			4.20				
Organic Nitrogen	2.00		0.5	0.70			QN		0.80				
Nitrate		QN		-	QN		Q			ĝ	10.00		
Nitrite		QN	0.0	0.00			Q		0.0		8		
Iron	36.00		88	88.00		33.00			29.00			0.30	
Oil and Grease		NS		-	NS		SN			SN			
Н	6.70		9	6.70		6.60			6.40			6.5-8.5	
Phenols (Total)		NS			NS	_	SN			NS			
Phospherus		NS			NS		_			SN			
Total Suspended Solids	150.00		150	150.00		110.00			100 00			200.00	
Total Dissolved Solids	480.00		510	510.00		500 00	-		550.00			00.002	
Sulfate	95.00		21	21.00					8.00			00.007	
Total Organic Carbon		NS		+	SN		ŝ,			CN A			
TOC (Duplicate)		SN		+	SZ SZ		2 s	T		S N			
Total Organic Halogens		SN		╉	SN	+	ź,			cz z			
Magnesium		NS		┥	SN		SZ		:	ŝ		0.06	
Mangenese	2.20		6	6.30		3.50			2.60			c0.0	
Potassiun		NS		+	ß		NS			sz			
Sedium	20.00		8	82.00			SS		24.00		160.00		
Alkalinity	360.00	_	300	300.00			Ð		170.00				
Calcium		NS		┥	NS	-	SS			NS			
Hardness	400.00		42(420.00			SZ		250.00				59.0
Boron				╉		+			00.010				60.0
Specific Conductance (unho/cm)	770.00		78(780 00		_	NS		840.00				

NS - Nei Sampled ND - Noi Daected Dd Linni - Sampling Detection Laint MCL - Kokimun Communat Level: Euforceable Groundwater Standards MCL - Secondariant Level: Euforceable Standards Outdance Concentrations - Noi Enforceable Standards

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LANDFILL:	Des Moines Landfill #4 SLF, Iowa.
OWNER/OPERATOR:	Unknown.
LITERATURE SOURCE:	State of Iowa, Department of Natural Resources Presented in C&D Waste Landfills, Leachate Quality Data, Volume 1. Prepared by Gershman, Brickner & Bratton, Inc. For the National Association of Demolition Contractors.
WASTE TYPE:	Demolition debris and landclearing debris.
ACREAGE:	Unknown.
YEARS IN SERVICE:	Unknown.
LINER SYSTEM:	Unknown.
LEACHATE SYSTEM:	Unknown.
LEACHATE SAMPLE:	Leachate sample taken from leachate wells.
MISCELLANEOUS:	None.

Table A.13: Characteristics of the Des Moines Landfill #4 of Iowa.

Table A.14: Sampling for the Des Moines Landfill #4 of Iowa.

Folditist error Activation error Activation error erroror erroro		:	60503		Primary	Secondary	Guidance
NS NS NS NS NS 0.40 3.00 6.20 ND 10.00 3.00 6.20 ND 0.40 3.00 2.60 NS 1.00 3.00 2.10 NS 5.00 5.00 30.30 ND 1.00 1000 3.70 NS 1.00 1000 12.30 ND 100 1000 12.30 ND 1000 100 NS 1.00 1000 100 ND ND 1000 1000 ND ND 1000 1000 ND ND 1000 1000 ND ND 1000 1000 ND ND 1000 1	Volatiler		ND/NS	Det Lant	-The second		
NIS NIS <td>Actors</td> <td>2</td> <td>NIC</td> <td></td> <td></td> <td></td> <td>100.001</td>	Actors	2	NIC				100.001
NID NID <td>Acetotic</td> <td></td> <td>2</td> <td></td> <td></td> <td></td> <td></td>	Acetotic		2				
ND ND 10.00 3.00 6.20 ND 0.40 3.00 2.60 NS 1.00 3.00 2.60 NS 1.00 3.00 2.100 NS 1.00 3.00 2.40 NS 1.00 1.00 3.030 NS 1.00 1.00 3.11 NS 1.00 1.00 3.20 NS 1.00 1.00 3.20 NS 1.00 1.00 3.20 NS 1.00 1.00 13.20 NS 1.00 1.00 10.00	2-Butanone		2				4200.00
ND 10.00 0.40 3.00 6.20 ND 0.40 3.00 260 ND 0.40 3.00 2140 NS 1.00 1.00 30.30 ND 1.00 3.00 30.30 ND 1.00 1.00 30.30 ND 1.00 1.00 30.30 ND 1.00 1.00 30.30 ND 1.00 1.00 12.30 ND 1.00 1.00 ND ND 1.00 1.00 ND ND ND 1.00 ND ND 1.00 1.00 ND ND 1.00 1.00 ND ND	Carbon Disulfide		NS				700.00
6 200 ND 0.400 3.00 2 60 NS 1.00 3.00 2 410 NS 1.00 3.00 2 3.10 NS 1.00 5.00 3 20 ND 1.00 100.00 3 20 ND 1.00 3.00 3 20 NS 1.00 1.00 3 20 ND 1.00 3.00 12 30 NS 1.00 1.00 12 30 ND 1.00 1.00 10 00	Chloromethane		Q	10.00			2.70
ND 0.40 3.00 2.60 NS 1.00 5.00 2.440 NS 5.00 5.00 3.030 ND 1.00 1.00 3.030 ND 1.00 3.00 3.030 ND 1.00 3.00 3.20 ND 1.00 3.00 3.20 NS 1.00 3.00 12.30 NS 1.00 1000.00 12.30 NS 1.00 1000 12.30 NS 1.00 1000 10.0 NS 1.00 1.00 11.0 ND 1.00 1.00 10.0 ND 1.00 1.00 10.0 ND 1.00 1.00 10.0 ND <t< td=""><td>1, 1-Dichloroethane</td><td>6.20</td><td></td><td>1.00</td><td></td><td></td><td>200.00</td></t<>	1, 1-Dichloroethane	6.20		1.00			200.00
30 NS 1.00 S.00 S.0	1,2-Dichloroethane		QN	0.40	3.00		
260 NS 100 500 500 2440 NS 500 500 500 30.30 ND 100 100 100 30.30 ND 1.00 100 100 30.30 ND 1.00 200.00 3.00 30.30 ND 1.00 1.00 3.00 13.30 NS 1.00 1000.00 1.00 12.30 NS 1.00 1000.00 1.00 12.30 NS 1.00 1000 1.00 12.30 NS 1.00 1.00 1.00 12.30 NS 1.00 1.00 1.00 12.30 NS 1.00 1.00 1.00 12.30 ND 10.00 1.00 1.00 12.30 ND 10.00 1.00 1.00 10.00 ND 10.00 1.00 1.00 10.00 ND 10.00 1.00 1.00 <td>I,4-Dioxane</td> <td></td> <td>NS</td> <td></td> <td></td> <td></td> <td>5.00</td>	I,4-Dioxane		NS				5.00
NS S00	Ethylbenzene	2.60		1.00		700.00	
NS 5.00 1	Methyl Ethyl Ketone (MEK)		NS				4200.00
24 40 5.00 5.00 5.00 30.30 ND 1.00 1000.00 3.20 NS 1.00 1000.00 3.20 NS 1.00 1000.00 ug/ NDANS 1.00 1000.00 ug/ NDAS 1.00 1000 ug/ NDA NS 1.00 12.30 NS 1.00 1000 ug/ ND NS 1.00 2.70 NS 1.00 1.00 1 ND 10.00 1.00 310 ND 10.00 1.00 1 ND	4-Methyl-2-Pentanone		NS				
30.30 ND 1.00 200.00 3.20 ND 1.00 200.00 12.30 ND 1.00 1000 ug/1 ND/NS 1.00 1000 ug/1 ND/NS 1.00 1000 ug/1 ND/NS 1.00 1000 ug/1 ND/NS 1.00 1000 10 ND 100 1000 11 ND 1000 1.00 1000 ND 1000 1.00 1000 ND 1000 1.00 1000 ND 1000 1.00 1000 ND 1000 1.000 1000 ND </td <td>Methylene Chloride</td> <td>24.40</td> <td></td> <td>5 00</td> <td>5 00</td> <td>Γ</td> <td></td>	Methylene Chloride	24.40		5 00	5 00	Γ	
ND 1.06 200.00 3.20 NS 1.00 3.00 12.30 NS 1.00 3.00 ug/n ND 1.00 3.00 ug/n NS 1.00 3.00 ug/n NS 1.00 1000 12.70 ND 90.00 1.00 12.70 ND 1000 1.00 12.70 ND 1000 1.00 12.70 ND 1000 1.00 12.70 ND 1000 1.00 13.00 ND 1000 1.00 14.0 ND 10.00 1.00 14.0 ND 10.00 1.00 10.00 ND 10.00 1.00 10.00 ND 10.00 1.00 10.00 ND 1.000 1.000 10.00 ND 1.000 1.000 10.00 ND 1.000 1.000 10.00 ND	Toluene	10.10		1 00	1000 00		
3.20 NS 1.00 3.00 12.30 NS 1.00 1000.00 ug/1 ND/NS N ug/1 NS NS 1.00 1000 1 NS ND 1000 1 ND 1000 100 1 ND 1000 1000 1 ND 1000 10000	1 1 1 Trichloroethane		G	1 30	200.00		
NS 1.00 1000.00 12.30 ND/NS 1.00 1000.00 12.30 NS 1.00 1000 12.30 NS 1.00 100 12.30 ND 1000 100 12.30 ND 1000 100 14 ND 1000 1000 14 ND 1000 1000 14 ND 1000 1000 100 ND 1000	Trichlorosthulana	0.5		8	001		
12.30 N3 1.00 100000 ug/1 ND/NS 1.00 1000 2.70 ND 1000 1.00 1.00 1000 1.00 1.00 1.00 ND 1000 1.00 1.01 1000 1.00 1.00 1.01 1000 1.00 1.00 1.01 ND 1000 1.00 1.01 ND 1.00 1.00 1.01 ND 0.05 2.00 1.01 ND 0.05 1.000 1.01 ND 0.05 1.000 1.01 ND 1.00 1.000 1.01 ND 1.000 1.000 1.01 ND 1.000 1.000 1.01 ND 1.000 1.000 1.01 ND 1.000		0.50	MO	8- 1	8.0		00 00 10
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Let ug/l ND/Ns ug/l ND/Ns 100 NS NS 1.00 1.00 101 ND 1000 1.00 1.00 101 ND ND 1.00 1.00 101 ND ND 1.00 1.00 101		05.21		8.	10000		
ue ue NINNS ue ue 100 NS 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 1000 1000 100 100 100 1000 1000 1000 100 101 1000 1000 1000 100 101 1000 1000 1000 1000 101 1000 1000 1000 1000 101 1000 1000 1000 1000 101 1000 1000 1000 1000 101 1000 1000 1000 1000 101 1000 1000 1000 1000 101 1000 1000 1000 1000 101 1000 1000 1000 1000 11		ľ	100		ŀ	,	
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dd 1.00 1.00 1.00 iexv/)plutalate ND 1000 100 iexv/)plutalate ND 1000 100 iexv/)plutalate ND 1000 100 ievv/)plutalate ND 1000 100 ievv/)plutalate ND 1000 100 iata ND 1000 1000 1000 of ND 1000 005 200 of ND 005 200 2000 of ND 005 200 2000 of ND 005 500 10000 of ND 005 500 10000 of ND ND 005 500 500 of ND ND 005 0	Acetophenone		NS				700.00
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ND 1000 ND	Benzoic Acid		QN	50.00			28000.00
Applement ND 1000 ND 1000 ND Adlate ND 1000 ND 1000 ND e ND ND 1000 ND ND e ND ND 1000 ND ND e ND ND 1000 ND ND e ND ND 0.05 ND ND e ND ND 0.05 2.00 1.000 abs ND <td>Bis(2-Ethythexyl)phthalate</td> <td></td> <td>DN</td> <td>10.00</td> <td></td> <td></td> <td></td>	Bis(2-Ethythexyl)phthalate		DN	10.00			
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adlate ND 1000 10 <	Di-n-Butyl phthalate		ND	10.00			700.00
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ol ND 1000 ND e ND 1000 1 e ND 1000 1 Parkidat ND 1000 1 Parkidat ND 000 1 1 Parkidat UP ND 0.05 UP 1 Parkidat UP ND 0.05 UP 1 1 Parkidat UP ND 0.05 UP 1	Fluoranthene		QN	10.00			280.00
ol ND 1000 ND nND 1000 1000 1 Penkicks ug/1 ND 1000 1 Parkicks ug/1 ND 1000 1 Parkicks ug/1 ND 0.05 100 1 Parkicks ug/1 ND 0.05 200 1 1 0.07 ND 0.05 ND 0.05 200 1 1 0.07 ND ND 0.05 0.05 1	Napthalene		QN	10.00			6.80
ND 10 00 10 00 ND ND 10 00 1 ND ND 10 00 1 1 Perididat ugit ND 10 00 1 1 Perididat ugit ND 0 05 ugit 1 Perididat ugit ND 0 05 2.00 1 ND 0.07 ND 0.05 2.00 1 ND ND 0.05 2.00 1 1 ND ND NS N 1 1 1 MD NS NS N 1	in&p-Creosol		QN	10.00			35.00
e ND 10 00 ND 10 00 Penticidar ug/l NDNS ND 0.05 2.00 NS NS 70.00 NS NS 70.00 NS NS 70.00 NS NS 2000 NS NS 2000 NS NS 1000 NS 13.00 1000.00 NS 13.00 1000.00 NS 10.00 10.00 </td <td>o-Creosol</td> <td></td> <td>ΩN</td> <td>10.00</td> <td></td> <td></td> <td>350.00</td>	o-Creosol		ΩN	10.00			350.00
NS NS<	Phenathrene		QN	10.00			10.00
ND ND 1000 ugh ND Pendidat ugh ND 0.05 ugh N 0.07 ND 0.05 ugh 1 1 0.07 ND 0.05 2.00 1 1 0.07 ND 0.05 2.00 1	Phenol		NS				10.00
Peritidar ug/l ND/NS ug/l ug/l 0.07 ND 0.05 2.00 1 0.07 ND 0.05 2.00 1 NS NS 0.05 2.00 1 NS NS 10.05 2.00 1 NS NS NS 70.00 1 NS NS NS 70.00 1 MS NS NS 200.00 1 MS NS 5.00 5000 1 MS NS 5.00 1000.00 1 MS ND 1.00 5.00 1000.00 13.00 NS 5.00 1000.00 1 13.00 NS 5.00 100.00 1 13.00 NS 5.00 100.00 1 13.00 NS 5.00 100.00 1 13.00 NS 0.00 1000.00 1 NS <td< td=""><td>Pyrene</td><td></td><td>QN</td><td>10.00</td><td></td><td></td><td>210.00</td></td<>	Pyrene		QN	10.00			210.00
Particidate ug/l ND/NS ug/l ug/l 0.07 0.05 2.00 2 0.07 ND 0.05 2.00 2 0.07 ND 0.05 2.00 2 ND NS NS 0.05 2.00 2 ND NS NS 170.00 2 2 ND NS NS 170.00 2 2 Math NDNS NS 100.00 2 2 2 Math NDNS NS NS 2							
ND 0.05 2.00 0.07 ND 0.05 2.00 NS NS 0.05 2.00 NS NS NS 70.00 NS NS NS 200.00 NS NS NS 9.00 NS NS NS 9.00 NS NS NS 9.00 NS NS 9.00 9.00 NS NS 9.00 1000.00 NS NS 10.00 9.00 NS NS 10.00 9.00 NS NS 1	Herbicides/Pesticides	l/3n	ND/NS		i/an	ng/l	∕3n
007 007 200 ND 0.05 2 NS NS NS 1 NS NS 1 1 NS NS 1 2000 NS NS 500 5000 NS NS 1 000 NS NS 500 10000 NS NS 1 000 NS NS 30.00 100.00 NS NS 0.00 100.00 NS 1 0.00 100.00 NS 0.00 10.00 100.00 NS NS 0.00	Alpha-BHC		QN	0.05			0.05
ND 0.05 N NS NS NS NS NS 70.00 NS NS 70.00 NS NS 70.00 NS NS 70.00 NS NS 90.00 NS NS 6.00 NS NS 5.00 NS 9.00 10.00 NS 1.00 5.00 NS 1.00 5.00 NS 5.00 15.00 NS 9.00 1000.00 NS 9.00 1000 NS 0.00 10.00 NS NS 10.00 </td <td>Endrin</td> <td>0.07</td> <td></td> <td></td> <td>2.00</td> <td></td> <td></td>	Endrin	0.07			2.00		
NS NS 7000 NS NS 8 NS NS 7000 NS NS 900 NS 900 19000 NS 900 900 NS 900 900 <t< td=""><td>Dieldrin</td><td></td><td>QN</td><td>0.05</td><td></td><td></td><td>01.0</td></t<>	Dieldrin		QN	0.05			01.0
NS NS 70.00 MS NS 70.00 NS NS 70.00 NS NS 70.00 NS NS NS NS NS 8 NS NS 600 NS NS 500 NS NS 500 NS NS 500 NS 30.00 100.00 NS 0.50 100.00 NS 0.50 100.00 NS 0.50 100.00 NS 0.50 100.00 NS NS 0.50 NS NS 0.50 NS NS 0.50 NS NS 0.50 NS NS 2.00 NS 0.50	Dimethoate		SN				s 00
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Also Ug/I NNS I	1-CDD		a a		10.00		
Abs NDS Ug/1 NDNRS Ug/1 abs Ug/1 NDNRS Ug/1 NS 500 5000 1800 NS 5000 NS 100 5000 1300 1000 10000 1300 1000 10000 1300 0.50 10000 1300 0.50 10000 1300 1000 500 1300 1000 500 1300 1000 500 1300 1000 500 1300 1000 500 1300 1000 500 1300 1000 500	11XLUU		21				
ds ug/l NDNS ug/l u	HXCDF		SN				
ME UP/NS UP			NIN OLD				
I8 00 NS 6.00 18 00 NS 5.00 5.00 ND 1.00 5.00 100 72 00 ND 30.00 100.00 13.00 0.50 30.00 1000.00 13.00 10.00 5.00 1000.00 13.00 0.50 1000.00 15.00 0.50 ND 50.00 1000.00 10.00 50.00 100.00 100.00 NS ND 10.00 50.00 NS NS 10.00 50.00 NS NS 2.00 100.00 NS NS 2.00 10.00	Heavy Metab	an l	SNIGN		n Bri	1ÅD	1Ân
IR 00 NS 500 500 ND 1.00 200.00 ND 1.00 30.00 13.00 100.00 30.00 13.00 100.00 30.00 13.00 1000.00 1000.00 13.00 0.50 30.00 1000.00 13.00 0.50 1000.00 15.00 ND 500 10000 50.00 ND 10.00 50.00 10000 NS NS 10.00 50.00 NS NS 10.00 50.00 NS NS 2.00 30.00	Antinony		SN		6.00		
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ND 1.00 5.00 ND 30.00 100.00 172.00 ND 30.00 100.00 132.00 0.50 2.00 0.50 ND 50.00 100.00 ND 10.00 50.00 ND 10.00 50.00 NS 2.00 10.00 30.00 10.00 30.00 10.00 30.00 10.00 30.00 10.00 30.00 10.00 30.00 10.00 30.00 10.00 30 10.00 30	Baniun		NS		2000.00		
ND 30.00 100.00 72.00 72.00 30.00 1000.00 13.00 0.50 50.00 1000.00 0.50 0.50 0.50 100.00 ND 50.00 100.00 50.00 NS NS 10.00 50.00 NS NS 10.00 50.00 NS NS 2.00 30.00	Cadmium		QN	1.00	5.00		
72.00 30.00 1000.00 13.00 0.50 5.00 15.00 0.50 ND 9.00 2000 ND 10.00 50.00 10.00 NS NS 10.00 50.00 NS NS 10.00 50.00 NS NS 10.00 50.00 NS NS 10.00 30.00	Chromium		QN	30.00	100.00		
13.00 5.00 15.00 0.50 0.50 2.00 0.50 ND 50.00 19.00 ND 10.00 50.00 10.00 NS NS 10.00 50.00 NS NS 2.00 10.00 A03.00 NS 2.00 10.00	Copper	72.00		30.00	1000.00		
0.50 0.50 2.00 ND 50.00 100.00 ND 10.00 50.00 NS NS 2.00 403.00 NS 2.00 100.00 50.00 100.00 50.00 100.00 100.00 50.00 100.000 100.00000000	Lead	13.00		5.00	15.00		
ND 50.00 190.00 ND 10.00 50.00 50.00 NS NS NS 2.00 NS NS NS 2.00 NS NS 30.00 30.00	Mercury	0.50		0.50	2.00		
ND 10.00 50.00 10.	Nickel		QN	50.00	100.00		
NS NS 200	Selenium		QN	10.00	50.00		
A03.00 30.00	Silver	1	NS			100.00	
403.00 30.00	Thallium		NS		2.00		
403.00	Vauadiun		NS				49.00
	Zinc	403.00		30.00		\$000.00	

2,4,5-T		NS				70.00
2,4-D		NS		70.00		
HxCDD		NS				
HxCDF		NS				
Heavy Metals	ug/J	ND/NS		ug/I	ug/l	ug/I
Antimony		NS		6.00		
Arsenic	18.00		5.00	50.00		
Bariun		NS		2000.00		
Cadmium		QN	1.00	5.00		
Chronninn		ND	30.00	100.00		
Copper	72.00		30.00	1000.00		
Lead	13.00		5.00	15.00		
Mercury	0.50		0.50	2.00		
Nickel		DN	50.00	100.00		
Seleruun		QN	10.00	50.00		
Silver		NS			100.00	
Thalkum		8N		2.00		
Vanadium		NS				49.06
Zinc	403.00		30.00		5000.00	
Conventional Parameters	mg/l	SN/QN		mg/l	mg/l	l/gm
Biological Oxygen Demand	170.00		3.00			
Chemical Oxygen Demand	130.00		3.00			
Chlorides	153.00		10.00		250.00	
Cyauide		DN	0.02	0.20		
Ammonia, Nitrogen	18.40		1.00			
Organic Nitrogen	5.10		10.00			
Nitrate		QN	1.00	10.00		
Nitrite		NS		1.00		
Iron	49.10		0.03		0.30	
Oil and Grease		NS				
pH		NS			6.5-8.5	
Phenols (Total)		NS				
Phosphorus	1.30		1.00			
Total Suspended Solids	6100.00		1.00			
Total Dissolved Solids		NS			500.00	
Sulfate		NS			250.00	
Total Organic Carbon		NS				
TOC (Duplicate)		NS				
Total Organic Halogens		SN				
Magnesiun		NS				
Mangenese		NS			0.05	
Potassiun	110.00		1.00			
Sedium		NS		160.00		
Alkalinity		NS				
Calcium		NS				
Hardness		NS				
Boron		NS			· · · · · · · · · · · ·	0.63
Specific Conductance (umho/cm)		NS				

NS - Not Sampled ND - Not Detected Dol Linith - Sampling Detection Linith MCL - Maximum Containing Level: Euforceable Groundwage Standards SMCL - Secondary Maximum Containing Level: Euforceable Groundwage Standards Guidrate - Concentrations- Non Euforceable Standards

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Table A.15: Characteristics of the Des Moines Landfill #5 of Iowa.

LANDFILL:	Des Moines Landfill #5 SLF, Iowa.
OWNER/OPERATOR:	Unknown.
LITERATURE SOURCE:	State of Iowa, Department of Natural Resources Presented in C&D Waste Landfills, Leachate Quality Data, Volume 1. Prepared by Gershman, Brickner & Bratton, Inc. For the National Association of Demolition Contractors.
WASTE TYPE:	Demolition debris and landclearing debris.
ACREAGE:	Unknown.
YEARS IN SERVICE:	Unknown.
LINER SYSTEM:	Unknown.
LEACHATE SYSTEM:	Unknown.
LEACHATE SAMPLE:	Leachate sample taken from leachate wells.
MISCELLANEOUS:	None.

Table A.16: Sampling for the Des Moines Landfill #5 of Iowa.

Volation			D	-		\$
	Ven	NDNS	111117 10/7	-	MLK M	
Acetone		NIGN		A.	-A-	A 002
2-Butanone		e v				00.001
Carbon Disulfida		No.				
Chloromethane		S G	10.00			2.00
1.1-Dichloroethane	\$ 60		801			100.00
1 2-Dichloroethane		UN	070	1.00		20.004
1.4-Dioxane		NSN	04-0			8
Ethylbenzene	1 90		001		100.00	8 r
Methyl Ethyl Ketone (MEK)		NS			100.001	4200.00
4-Methyl-2-Pentanone		NS				
Methylene Chloride		QN	5 00	5.00		
Toluene	2.60		001	1000.00		
1,1,1 Trichloroethane		QN	1.00	200.00		
Trichloroethylene		GN	8	100		
Trichlorofluoromethane		S.N.	8	20-2		2100.00
Xvlenes (Total)	6 60		8	10000 00		
Semi-1'alatiles	1/211	ND/NS			V	
Acenanistica	2	NIC		.,,		
Acatoritations		214				00.005
Dentaire			90	-		M.W/
			M.1	8		
Delizate Acid			00.00			78000.00
bist 2-Eurypriexy1.printauate			10.00			
4,4-Lumeuryiphenol		N	00.01			400.00
Di-n-Bilityi pinualate		n	10 00			200.00
Lincuryi Finutalate	90.00		10.00			5600.00
ruorantiene		QN	10.00			280.00
Napthalene		Q	10.00			680
in&p-Creosol	_	Q	10 00			35.00
n-Creosol		Q	10.00			350.00
Phenathrene		QN	10 00			80
Phenol		SN				10.00
ryrene		QN	10.00			210.00
Herbicides/Pesticides	ug'i	ND/UNS		Én	√3n	Én
Alpha-BHC		QN	0.05			0.05
Endrun		QN	0.05	2.00		
Dieldrin		Q	0.05			0.10
Dimethoate		NS				<u>ی</u> 8
Disulfeten		NS				0.50
2,4,5-T		NS				70.00
2,4-D		NS		70.00		
HxCDD		NS				
HxCDF		NS				
Heary Metals	l/gu	ND/NS		√3 ⊓	∩gu	Ja n
Antimony	_	NS		6.00		
Arsenic	37.00		5.00	50.00		
Barium		NS		2000.00		
Cadmiun		ND	1.00	5.00		
Chromiun		ΔN	30.00	100.00		
Copper	\$7.00		30.00	1000.00		
Lead	40.00		5.00	15.00		
Mercury	0.50		0.50	2.00		
Nickel	99.00		50.00	100.00		
Selenium		QN	10.00	50.00		
Silver		NS			100.00	
Thallinn		NS		2.00		
Vanadium		NS				^{\$0}
7110	135.00		30.00		5000.00	
	-					

Antimony		SN		6.00		
Arsenic	37.00		5 00	50.00		
Bariun		NS		2000.00		
Cadmium		QN	1.00	5.00		
Chromium		QN	30.00	100.00		
Copper	57.00		30.00	1000.00		
Lead	40.00		5.00	15.00		
Mercury	0.50		0.50	2.00	ĺ	
Nickel	99.00		50.00	100.001		
Selenium		DN	10.00	50.00		
Silver		NS			100.00	
Thalliun		NS		2.00		
Vanadium		<u>SN</u>				49.00
Zinc	135.00		30.00		\$000.00	
Conventional Parameters	l/3cu	ND/NS		l/gm	mg/l	mg/l
Biological Oxygen Demand	15.00		3.00			
Chemical Oxygen Demand	14.00		3.00			
Cluorides	39.80		10.00		250.00	
Cyanide		DN	0.02	0.20		
Annronia, Nitrogen		DN	1.00			
Organic Nitrogen	17.90		10.00			
Nitrate		QN	1.00	10.00		
Nitrite		NS		1.00		
Iron	48.50		0.03		0.30	
Oil and Grease		NS				
pH		NS			6.5-8.5	
Phenols (Total)		NS				
Phosphorus		ND	1.00			
Total Suspended Solids		140.00	1.00			
Total Dissolved Solids		NS			500.00	
Sulfate		NS			250.00	
Total Organic Carbon		NS				
TOC (Duplicate)		NS				
Total Organic Halogens		NS				
Magnesiun		NS				
Mangenese		NS			0.05	
Potassium	3.02		1.00			
Sodium		NS		160.00		
Alkaliuity		NS				
Calcium		NS				
Hardness		NS				
Boron		NS				0.63
Specific Conductance (umho/cin)		NS				

NS - Not Sampled ND - Not Detected Dd Limit - Samping Detection Limit Dd Limit - Samping Detection Limit MCL - Ascimum Constantiant Level: Enforceable Groundwater Standards MCL - Secondary Maximum Constantiant Level: Enforceable Groundwater Standards Outdaree Concentrations - No. Enforceable Stardards

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	sites of the Glustonbury Dunky Waste Lanum of Connecticut
LANDFILL:	Glastonbury Bulky Waste Landfill, Connecticut.
OWNER/OPERATOR:	Unknown.
LITERATURE SOURCE:	Bulky Waste Leachate Characterization Survey Maurice Hamel, Connecticut Department of Environmental Protection Presented in C&D Waste Landfills, Leachate Quality Data, Volume 2. Prepared by Gershman, Brickner & Bratton, Inc. For the National Association of Demolition Contractors.
WASTE TYPE:	Demolition debris and landclearing debris.
ACREAGE:	15 acres.
YEARS IN SERVICE:	Opened in 1977.
LINER SYSTEM:	Unknown.
LEACHATE SYSTEM:	Unknown.
LEACHATE SAMPLE:	Leachate sample taken from monitor well B2, approximately 10 feet from the toe of the landfill.
MISCELLANEOUS:	None.

Table A.17: Characteristics of the Glastonbury Bulky Waste Landfill of Connecticut.

Table A.18: Sampling for the Glastonbury Bulky Waste Landfill of Connecticut.

		July-1988			12			. ₩		Å,	- E		2	Secondary	Guidance
	- 13		Det Nam	UN I					Let Limit	Ĕ I		Det tamit		MCL	Cenc
Volatiles	l/an	SN/QN		12	NDNS		5	ND/NS		120	ND/NS		12m	¶9∎	Ŋ
Acetone		NS			s			NS			NS				700.00
2-Butanone		SN			NS			NS			NS	-			4200.00
Carbon Disulfide		NS			NS			NS			NS				700.00
Chloromethane		NS			ß			NS			NS				2.70
1, 1-Dichloroethane		NS			NS			NS	-		NS	•			700.00
1,2-Dichloroethane		NS			NS			NS			NS		3.00		
1,4-Dioxane		NS			NS			NS			NS				5.00
Ethylbenzene		NS			NS			NS			NS	_		700.00	
Methyl Ethyl Ketone (MEK)		SN			SN			SN			NS				4200.00
4-Methyl-2-Pentanone		NS			SN			NS			NS				
Methylene Chloride		NS			NS			NS			NS		5.00		
Toluene		NS			NS			NS			NS		000.000		
1, 1, 1-trichloroethane		NS			NS			NS			NS		200.00		
Trichloroethylene		NS			NS			NS			NS	-	3.00		
Trichlorofluoromethane		NS			NS			NS			NS				2100.00
Xylenes (Total)		SN			NS			NS			NS	-	10000.00		
												-			
Semi-Volatiles	ng/	ND/NS		Уâп	ND/NS		l'an	ND/NS		Van	ND/NS		√2n	¶¶0	ug/
Acenaphthene		NS			NS			SN			SS				20.00
Acetophenone		NS			ŝ			NS			sz				700.00
Benzene		NS			S			NS NS			SN	┫	8.		
Benzoic Acid		NS			SN			NS			SN				28000.00
Bis(2-Ethyllicxyl)phthalate		SN			SN			NS			NS				
2,4-Dunethylphenol		SN			SZ			SN			sz				400.00
Di-in-Butyl phthalate		SN			SN 1			SN			SN				700.00
Diethyl Phthalate		SZ			SZ			SN		T	SZ				5600.00
Fluoranthene		2			SZ :		T	SN S		T	SN 5		T		280.00
Napulaiene		SN S			2			2 Z	T		2				0.80
inep-Crease		CN PI	T		SZ P		T	SN 94	Ť	T	SN SN		T		90.0F
Plianstirana		e su			e si			en a		T	en av				10.00
Plienol		SZ SZ			e si			SN		T	SN SN				10.00
Pyrene		NS			NS			NS			NS				210.00
Herbicides/Pesticides	l/an	SN/QN		µ∕an	ND/US		Į/an	ND/NS		l∕an	ND/NS		ı∕3n	l∕3n	l∕gu
Alplia-BHC		NS			NS			NS			NS				0.05
Endrin		NS			NS			NS			NS		2.00		
Dieldrin		NS			NS			NS			NS				0.10
Dimethoate		NS			NS NS			SN			SN				5.00
Disulfoton		SN			ŝ			ŝ			SS				0.50
2,4,5-T		NS			SN			NS			SZ :				70.00
2,4-U U-CDD		SZ 9			SZ 2			SN N	+	T	SZ Z		00.0/		
HVCDF		2 N			e su			ž	t	T					
					2	Î						F			
Heavy Metals	∕an	ND/NS		∕an	ND/NS		1/3n	ND/NS	T	l/än	ND/NS		l/an	l'an	ı∕an
Antimeny		NS			NS			NS			NS		6 00		
Arsenic		QN			QN		20.00		-		QN		50.00		
Bariun	400.00			300.00	-		800.00			100.00			2000.00		
Cadmun	20.00				Q		10.00			10.00			5.00		
Cluromium	10.00				g		40.00		Ť		g		100.00		
Copper	20.00			00.05			620.00			80.00			000.00		
Lead	00.00	ļ		40.00	4	T	40.00	9		40.00	4	╞	3.6		
Mercury	0000	Ð			No.			NIC			NG	+	10,00		
Mickel Selenitri	20.00	GN				T		ŝ			GN		50.00		
Silver		2 g			Q			Ð			Q			100.00	
Thallium		NS			NS			NS			NS		2.00		
Vanadiun		NS			NS			NS			SN				49.00
Zinc	70.00				NS	-		NS			NS I		-	5000.00	

2.4-D		l SN			SN	H	H	SN						T
HxCDD		NS			NS			NS		SN				T
HxCDF		NS			NS	-		NS		NS				
							┥						ľ	
Heavy Metals	Van	ND/NS		l'an	ND/NS		"ed	ND/NS	l/an	NDNS		l jan	len l	1an
Antinonv		NS			NS			NS		NS		6.00	T	T
Arenic		Q		┢	QN		20.00			_		<u>50.00</u>		
Rariun	400.00		Ē	300.00			800.00		100.00			2000.00		
Cadmium	20.00				DN		10.00		10.00	4		°8		
Chromiun	10.00				QN		40.00			Ð		100.00		
Conner	50.00			30.00		-	620.00	_	<u> 80.00</u>			1000.00		T
Lead	60.00			40.00			40.00		40.00	_		15.00		
Merrin		QZ		F	Ð			DN		Q		5.8 2		
Nickal	00 0\$				NS			NS		NS		00.001		
Mickel Velevium		GZ			QN			QN		QN		50.00		
ocretuum		Ş		T	QN		ŀ	QN		ą			100.00	
		NG			SN	F		NS		NS		2.00		
Venedium		sz		T	SN	ŀ	F	NS		NS				49.00
7 1110	20.00			ſ	NS			NS		NS			5000.00	
71117				T										
Conventional Parameters	1 Me	ND/NS		l/am	ND/NS		l/3m	ND/NS	Ngm	ND/NS		Ъ ^в	¶8⁄n	l/gm
Biological Octoon Demand	20.00			20.00					16.00					
Chamical Ovicen Demand	30.00			13.00				QN	15.00	-				
Citerinea Cojfer Contant	21 00			17.00			20.00		18.00				250.00	
Cvanide		Q		ſ	DN			DN	0.03			0.20		
Amnonia Nitrogen	0.10			ſ	QZ			DN	0.04					
Oreanic Nitropen	110			0.9			0.32		0.32	_				
Nitrate	4.60			5.30			3.00		5.10		_	10.00		
Nitrite	0.01			0.02			0.02		0.02	_		1.8		
Iron	0.20			0.40			33.00		14.00	_			0:30	
Oil and Grease		NS			NS			NS		SN				
DH	7.30			6.90			7.00		6.70	+			6.5-8.5	
Phenols (Total)		NS			NS			NS	-	ŝ				
Phosphorus		NS			NS			NS		SN				
Total Suspended Solids	5000.00		e.	3600.00			1900.00	-	2400.00	8			00000	
Total Dissolved Solids	700.00			700.00			630.00		720.00				00.000	
Sulfate	42.00			36.00			44.00		28.00	4			00:067	
Total Organic Carbon		NS			NS			SN		2 :				
TOC (Duplicate)		NS			NS			NS		SZ :	-			
Total Organic Halogens		NS			NS			NS		ŝz				
Magnesium		NS			NS			NS		NS				
Mangenese	0.07			0.08	_		2.10		3.10	-	_		0.05	
Potassiun		NS			NS			NS	_	SN	-			
Sodiun	61.00			78.00			54.00		33.00			160.00		
Alkalinity	500.00			440.00			550.00		260.(2				
Calcium		NS			NS			NS		SN	_			
Hardness	440.00	Ц		720.00			500.00		250.00	_				5
Boron	_	NS			NS			NS		£				0.03
Specific Conductance (umho/cm)	970.00			220.00			1000.00		980.00	2	-			

NS - Not Sampled ND - Not Detected Del Limit - Sampling Detection Limit MCL - Maximum Contaminan Level: Euforceable Groundwater Standards SMCL - Secondry Maximum Contaminant Level: Euforceable Groundwater Standards cuttance Conceerations: Not Enforce able Standards

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Table A.19: Charact	eristics of the Groton Bulky Waste Landfill of Connecticut.
LANDFILL:	Groton Bulky Waste Landfill, Connecticut.
OWNER/OPERATOR:	Unknown.
LITERATURE SOURCE:	Bulky Waste Leachate Characterization Survey Maurice Hamel, Connecticut Department of Environmental Protection Presented in C&D Waste Landfills, Leachate Quality Data, Volume 2. Prepared by Gershman, Brickner & Bratton, Inc. For the National Association of Demolition Contractors.
WASTE TYPE:	Demolition debris and landclearing debris.
ACREAGE:	33 acres.
YEARS IN SERVICE:	Opened in 1978.
LINER SYSTEM:	Unknown.
LEACHATE SYSTEM:	Unknown.
LEACHATE SAMPLE:	Leachate sample taken from seep at the toe of landfill.
MISCELLANEOUS:	None.

Table A.19: Characteristics of the Groton Bulky Waste Landfill of Connecticut.

Table A.20: Sampling for the Groton Wells Bulky Waste Landfill of Connecticut.

		June-1988		G	February-1989	89	Primary	Secondary	Guidance
	Re	Result	Det Limit	Re	Result	Det Limit	MCL	MCL	Conc
Volatiles	ng/	SN/QN		l∕3n	ND/NS		Van	/an	S.
Acetone		SN			SN				700.00
2-Butanone		NS			SN				4200.00
Carbon Disulfide		NS			SN				00.00/
Chloromethane		NS			SN				10/ 72
1, 1-Dichloroethane		SN			SN		00.0		100.00
1,2-Dichloroethane		SN			SN		3.00		50.5
1,4-Dioxane		SN .			SN SI			00.005	8.0
Ethylbenzene		SN SN			CN DIA			/////	00.000
Methyl Ethyl Ketone (MEK)		SN S			NS NS				00.0044
4-Methyl-Z-Pentanone		ŝ			CVI OIN		4		
Methylene Chlonde		SN SN			CN BIN		1000.00		
Toluene		SZ -					200.001		
1, 1, 1-trichloroethane		SZ			SZ S		200.002		
Trichloroethylene		SN			SN S		90.5		00 0010
Trichlorofluoromethane		z			SZ ;		10000 00		7100.00
Xylenes (Total)		SN			NS		10000.00		
n		NDM		Von	ND/NS		l/an	l/an	ue/
Semu-vountes		NIG		-#-	SN			Å	20.00
Acenaphunette		e la			SN				700.00
Acetophenone		NG			SN		1 00		
Benzelle Descrite Arid		SN			NS				28000.00
Delizare Avia Dia(7. Ethickervi) Inhithelate		SN			NS				
Dis(2-Eurydroxy1)pinuaare 2.4. Dimethylmhenol		SZ			NS				400.00
2,4-1.000000000000000000000000000000000000		SN N			SN				700.00
Distrut Duthalate		SN			SN				5600.00
Fuoranthene		NS			NS				280.00
Napthalene		NS			NS				6.80
m&p-Creosol		NS			NS				35.00
o-Creosol		SN			NS				350.00
Phenathrene		SN			SN				10.00
Phenol		sz			sz				10.01
Pyrene		SS			SN				210.00
								0	
Herbicides/Pesticides	ng/	SN/QN		l⁄an	SN/GN		12	Iân	
Alpha-BHC		SZ :			NZ Z		60 0		60.0
Endrin		SZ			SN S		7		010
Dieldrin		SZ ;			SZ Z				00.5
Dunethoate		SZ P			en a				050
Disultoton		e si			SN				70.00
2,4,5-T		sz z			en su		70.00		20.01
2,4-D U-CDD		S N			SN				
HACIDI		sz			SN				
IIAUII									
Heavy Metals	l/gu	ND/NS		l∕an ∣	ND/NS		ön	l∕gµ	Van
Antimony		NS			NS		6.00		
Arsenic		Q			g		50.00		
Bariun	300.00			100.00			2000.00		
Cadmium		Q		10.00	!		5.00		
Chromium		g		00.01	g		100.00		
Copper	20.00			40.00			1000.00		
Lead	40.00	-		00.0/	4		0.C		
Mercury					2 g		70000		
Nickel							\$0.00		
Scientifi		2 G			2		22.22	100.00	
011 101		SZ Z			NS		2.00		

				Ŕ					
Copper	20.00			40.00	$\frac{1}{1}$		14 00		
Lead	40.00			/0.00			3.0		
Mercury	1	QN	_		ĝ	-	2.00		
Nickel		NS			QN	-	100.00		
Selenium		QN			DN		50.00		
Silver		QN			DN			100.00	
Thallium		NS			NS		2.00		
Vanadium		NS			NS				49.00
Zinc		NS			NS			\$000.00	
Conventional Parameters	l/gm	SN/QN		mg/l	ND/NS		mg/l	ng/1	l∕gm
Biological Oxygen Demand	28.00				NS				
Chemical Oxygen Demand	68.00			35.00					
Chlorides	15.00			8.00				250.00	
Cvanide		QN		0.09			0.20		
Amnonia, Nitrogen	0.50			0.30		-			
Organic Nitrogen	0.07			0.50					
Nitrate		QN		0.10			10.00		
Nitrite		QN		0.01			1.00		
Iron	2.50				NS			0.30	
Oil and Grease		NS			NS				
pH	6.70			6.20				6.5-8.5	
Phenols (Total)		NS			SN	-			
Phosphorus		NS			NS				
Total Suspended Solids	270.00			53.00					
Total Dissolved Solids	400.00		7	440.00				500.00	
Sulfate	40.00			200.00		-		250.00	
Total Organic Carbon		NS			NS				
TOC (Duplicate)	_	NS			NS				
Total Organic Halogens		NS			NS	-			
Magnesium		NS			NS				
Mangenese	5.80			1.10		_		0.05	
Potassium		NS			NS				
Sodium	17.00			11.00			160.00		
Alkalinity	280.00			58.00					
Calciun		SN			NS				
Hardness	280.00			300.00					
Boron		NS			NS				0.63
Specific Conductance (nmho/cm)	610.00			530.00					

NS - Not Surpled ND - Not Datacted Dat Limit - Surpjurg Dataction Limit MCL - Limit - Surpjurg Dataction Limit MCL - McRimum Constantiant Level; Enforceable Groundwater Standards SMCL - Secondary Maximum Contarniant Level; Enforceable Groundwater Standards Cutidence Concentratione- Not Enforceable Standards

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Table A.21: Characte	eristics of the Guilford Bulky Waste Landfill of Connecticut.
LANDFILL:	Guilford Bulky Waste Landfill, Connecticut.
OWNER/OPERATOR:	Unknown.
LITERATURE SOURCE:	Bulky Waste Leachate Characterization Survey Maurice Hamel, Connecticut Department of Environmental Protection Presented in C&D Waste Landfills, Leachate Quality Data, Volume 2. Prepared by Gershman, Brickner & Bratton, Inc. For the National Association of Demolition Contractors.
WASTE TYPE:	Demolition debris and landclearing debris and wood.
ACREAGE:	5 acres.
YEARS IN SERVICE:	Opened in 1973.
LINER SYSTEM:	Unknown.
LEACHATE SYSTEM:	Unknown.
LEACHATE SAMPLE:	Leachate sample taken from seep 100 feet southeast of culvert at a stone wall.
MISCELLANEOUS:	Runoff may sometimes dilute samples.

Table A.22: Sampling for the Guilford Bulky Waste Landfill of Connecticut.

	'	June-1988		ľ	October-1988		Primary	Secondary	Guidance
Volatiles	ne/i	ND/NS	NIER IN	ne/	ND/NS	Det Limit	Vau MCL	<u>mut</u>	<u>Lonc</u>
Acetone		NS			NS				700.00
2-Butanone		NS			SN				4200.00
Carbon Disulfide		NS			SN				700.00
Chloromethane		NS			NS				2.70
1, 1-Dichlorvethane		NS			NS				700.00
1,2-Dichloroethane		NS			NS		3.00		
1,4-Dioxane		SN			SN			00,005	<u>د</u> 8
Eulyloeitzene		en o			en a			V.00.	100000
Methyl Ethyl Kelolie (MEK)		e su			2 Z				4200.00
4-iviculy-2-Felidanous Mathylana Chlorida		en N	T	T	SN N		90 x		Γ
Tolinene		SN SN			a sz		1000.00		
1 1 1-trichloroethane		SN			SN		200.00		
Trichloroethylene		s z			SN		1 00		
Trichlorofluoromethane		SN	ſ	I	SN		20.17		2100.00
Xvlenes (Total)		SN			NS		10000.00		
Semi-Volatiles	∕∂n	SN/DN		l/an	ND/NS		lan	l/an	l'an
Acenaphthene		NS			NS				20.00
Acetophenone		NS			NS				700.00
Benzene		NS			NS		1.00		
Benzoic Acid		NS			NS				28000.00
Bis(2-Ethylhexyl)phthalate		NS			NS				
2,4-Dimethylphenol		NS			SN				400.00
Di-n-Butyl phthalate		NS			NS				700.00
Diethyl Phthalate		NS	-		SN				5600.00
Fluoranthene		NS			SN				280.00
Napthalene		NS			NS				6.80
m&p-Creosol		NS			SN				35.00
o-Creosol		SN ;			SN ;				350.00
Phenathrene		NS			SZ :				10.00
Phenol		Z Z			SN S				10.00
Рутепе		22			2				710.00
Herhicides/Perticides	/su	ND/NS		Van	SN/QN		l/an	Van	l/an
Aluha-BHC	à	NSN			SN		. A-		0.05
Pudnin Findmin		SN			SN		2.00		20.0
Dieldrin		SN.	Ī		SN	Γ			0.10
Dimethoate		NS			NS				5.00
Disulfoton		NS			NS				0.50
2,4,5-T		NS			NS				70.00
2,4-D		NS			SS		70.00		
HxCDD		NS			SN				
HxCDF		SN			SN				
Heavy Metals	l/an	SN/QN		/an	ND/NS		/an	l'an	ne/l
Antimony	b	SN			NS		6.00		
Arsenic		DN			QN		50.00		
Bariun	60.00			100.00			2000.00		
Cadmium	10.00	-			QN		5.00		
Chromium		Q			ĝ		100.00		
Copper	50.00			30.00			1000.00		
Lead	40.00	4		40.00	¢,		00.CI		
Mercury	\$0.00	R			an N		100.00		
Nuckei Selenium	00.00	GN			e G		50.00		
Silver		e g			g	Ι		100.00	
Thallium		NS			NS		2.00		
Vanadiun		NS			SN				49.00
Zinc	70.00				NS			5000.00	
Compared Descent	1/200	NUNC		1	NDNG		/pm	Vom	me/l
Distantial Amount Damand		CALIFORNI	Ť	11 V	CALIFORN	T		.A.	A

Mercury		QN			DN	2.00		
Nickel	50.00				NS	100.00		
Selenium		QN			DN	50.00		
Silver		DN			ND		100.00	
Thallium		NS			SN	2.00		
Vanadiun		NS			NS			49.00
Zinc	70.00				NS		5000.00	
Conventional Parameters	l/am	ND/NS		l∕gm	SN/QN	 l/gm	(Å10	l∕3m
Biological Oxygen Demand	40.00			5.70				
Chemical Oxygen Demand	350.00			120.00				
Chlorides	45.00			60.00			250.00	
Cyanide		DN			DN	0.20		
Ammonia, Nitrogen	1.40			0.08				
Organic Nitrogen	2.20			1.80				
Nitrate	0.80			0.40		10.00		
Nitrite	0.05			0.00		1.00		
Iron	7.80		-	6.60			0.30	
Oil and Grease		NS			NS			
pH	6.90			7.00			6.5-8.5	
Phenols (Total)		NS			NS			
Phosphorus		NS			NS			
Total Suspended Solids	440.00			78.00				
Total Dissolved Solids	440.00			460.00			500.00	
Sulfate	64.00			97.00			250.00	
Total Organic Carbon		NS			NS			
TOC (Duplicate)		NS			NS			
Total Organic Halogens		NS			NS			
Magnesium		NS			NS			
Mangenese	4.10			2.80			0.05	
Potassium		NS			NS			
Sodium	34.00			32.00		160.00		
Alkalinity	190.00				NS			
Calciun		NS			NS			
Hardness	330.00			280.00				
Boron		NS			NS			0.63
Specific Conductance (unho/cm)	670.00			540.00				

NS - Not Sampled ND - Not Datested Det Limit - Sampling Detection Limit MCL - Maximum Contanuiura Level; Enforceable Groundware Standarda SMCL - Secondary Maximum Contanniura Level; Enforceable Groundware Standarda Guidauce Conceatrations- Not Enforceable Standarda

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Table	A.25: Unaracteristics of the Kentucky Site.
LANDFILL:	Kentucky Site
OWNER/OPERATOR:	Waste Management of North America, Inc. 3003 Butterfield Road Oak Brook, IL 60521
LITERATURE SOURCE:	Construction and Demolition Landfill Leachate Characterization Study Prepared by Rust Environments & Infrastructure for WMX Technologies, Inc.
WASTE TYPE:	Construction waste and demolition debris. Includes brick, concrete, wood, plaster, plumbing fixtures, soil, rock, sawdust, metals, furniture, insulation, roofing materials. Yard waste, tires, and paper are not accepted.
ACREAGE:	13.5 acres.
YEARS IN SERVICE:	Opened in August 1985 and closed in November 1991.
LINER SYSTEM:	None.
LEACHATE SYSTEM:	None.
LEACHATE SAMPLE:	Leachate sample obtained by digging down 20 feet into the landfill until liquid was found.
MISCELLANEOUS:	None.

Table A.23: Characteristics of the Kentucky Site.

Table A.24: Sampling for the Kentucky Site.

	1991 Result	1991 Sampling esult D	ng Det Limit	1992 Result	1992 Sampling esult D	ng Det Limit	Primary MCL	Secondary	Guidance <u>Conc</u>
Volatiles	l/3n	ND/NS		√∄n	ND/NS		∕∂n	ng∕l	l∕gu
Acetone		QN	100.00		NS				700.00
2-Butanone		QN			NS				4200.00
Carbon Disulfida	15.00		5.00		NS				700.00
Thromathane	24.00		10.00		NS				2.70
1 1-Dichloroethane		QN	5.00		SN				700.00
1 2-Dichloroethane	19.00		5.00		NS		3.00		
1.4-Dioxane		Q	10.00		NS				5.00
Cthulhenzene		QN	5.00		NS			700.00	
Bulylocitzette Mathial Ethial Vietone (MEV)		GZ	100.00		sz				4200.00
Metulyt Euryt Neurice (MLAN)		GN	50.00		SN				
4-Meulyr-2-t Climitolic	T		6 00		SN		5.00		
Memoriae Cruonae			00.5		SN N		1000.00		
l oluene		AN MG	20.5		NN		200.00		
1, 1, 1 Incruoroetnane			90.9		Ne o		00 6		
Trichloroethylene		Z,	00.0		CN OIA				2100.00
Trichlorofluoromethane			00.01		en old		10000		20.0044
Xylenes (Total)			00.0		2		10000		
	1				VIDAIO			Ven	101
Semi-Volatiles	l/ân	ND/NS		1/Jan	SNIUN	100.001	ıØn	a a	
Acenaphthene		g	49.00			100.00			100.001
Acetophenone		R	100.00		n,	100.00	00.		20.001
Benzene		Q			z		00.T		00,00000
Benzoic Acid		g			SN				70000
Bis(2-Ethylhexyl)phthalate		g	100.00		Q	200.00			00.001
2,4-Dimethylphenol		Q	100.00		Q	100.00			400.00
Di-n-Butyl phthalate		Q	100.00		Ð	100.00			/00.00/
Diethyl Phthalate		Q	100.00		Q	100.00			5600.00
Fluoranthene		Q	100.00	180.00		100.00			280.00
Napthalene		Q	100.00	130.00		100.00			0.0
m&p-Creosol		Q	100.00		QN	100.00			20.02
o-Creosol		Q	100.00		n	100.00			00.000
Phenathrene		a	100.00	300.00	4	00.001			10.00
Phenol		Z !	100.001	00.001		100.001			210.00
Pyrene		nz	100.00	190.00		100.001			22.244
	5	NTANG			SN/UN		1/011	l/an	1/3N
Herbicides/Pesticides	1/3m	SUIUN				010	A	- 8-	000
Alpha-BHC			0.01		2	010	00.0		6.5
Endrin		a i	10:0	000	Ĩ	010	7.00		010
Dieldrin			10:0	0.20	Ę	00.001			200
Dimethoate		Į,	N -1			100.001			050
Disulfoton		2	1.00			00'n			20.05
2,4,5-T		ĝ	0.19		2 ¢	3	00.04		20.02
2,4-D			1.20			00.1	V.U		
HxCDD		2	06.2			00.020			
HxCDF		Q	1.80		N	710.00	,		
		0.00			ND/N			Von	1/211
Heavy Metals	l/gu	SUGN	00 5	1ân	CIN	100.00	009	-A-	
Antimony			00.7	00.11		10.00	200		
Arsenic	12.00		4.00	41.30		200.00	00000		
Bartum	340.00	UN N	9.0 V	00.040	QN	2 00 V	\$ 00		
Cadmuum			0001	36.60	2	10.00	100.00		
Circordum		g	20.00	155.00		25.00	1000.00		
Lopper Tada	220.00		15.00	1470.00		250.00	15.00		
Leau .	20.044	G	0.20		Q	0.20	2.00		
Mercury	23.00		20.00	46.90		40.00	100.00		
l'Alchei Sulanium		g	°00		g	5.00	50.00		
Science		NSN			NS			100.00	
Thelinin		Q	5.00		QN	10.00	2.00		
Vanadium		Q	20.00		QN	50.00			49.00
7inc	810.00		20.00	2320.00		20.00		5000.00	

Corper Copper Lead Mercury		IND	10.00	20.00					
Lead Mercury		QN	20.00	155.00		25.00	1000.00		
Mercury	220.00		15.00	1470.00		250.00	15.00		
		DN	0.20		QN	0.20	2.00		
Nickel	23.00		20.00	46.90		40.00	100.00		
Selenium		ND	5.00		QN	5.00	50.00		
Silver		NS			NS			100.00	
Thalliun		DN	5.00		QN	10.00	2.00		
Vanadium		DN	20.00		QN	50.00			49.00
Zinc	810.00		20.00	2320.00		20.00		5000.00	
Conventional Parameters	mg/i	ND/NS		l/gm	SN/QN		1∕3m	l/But	l/But
Biological Oxygen Demand	14.00		1.00		NS				
Chemical Oxygen Demand	180.00		60.00	199.00		10.00			
Chlorides	180.00		2.60	44.40		0.50		250.00	
Cyanide	0.01		0.01		ND	0.02	0.20		
Ammonia, Nitrogen	44.00		0.52	7.51		0.10			
Organic Nitrogen		NS			NS				
Nitrate		NS			NS		10.00		
Nitrite		NS			NS		1.00		
Iron	26.00		. 04	48.60		0.10		0.30	
Oil and Grease	1.00		0.26	18.20		1.00			
PH	6.80			6.83				6.5-8.5	
Phenols (Total)		QN	0.01	0.01		0.01			
Phosphorus	1.00		0.06	0.86		0.20			
Total Suspended Solids	390.00		10.00	934.00		3.00			
Total Dissolved Solids	1200.00		10.00	1010.00		5.00		500.00	
Sulfate	15.00		0.05	241.00		5.00		250.00	
Total Organic Carbon	52.00		1.00	33.00		1.00			
TOC (Duplicate)	52.00		1.00	33.30		1.00			
Total Organic Halogens	0.86		0.01	0.03		0.01			
Magnesium		NS			NS				
Mangenese		NS			NS			0.05	
Potassiun		NS			NS				
Sodium		NS			NS		160.00		
Alkalinity		NS			NS				
Calcium		NS			NS				
Hardness		SN			NS				
Boron		NS			NS				0.63
Specific Conductance (umho/cm)		NS			NS				

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NS - Not Sumpled ND - Not Detected Del Limit - Sampling Detection Limit Del Limit - Sampling Detection Limit MCL - Maximum Contantiant Level; Enforceable Groundwater Standards SMCL - Secondary Maximum Contantiant Level; Enforceable Groundwater Standards Guidance Consentrations - Not Enforceable Standards

LANDFILL: Massachusetts Site **OWNER/OPERATOR**: Unknown. Construction and Demolition Landfill Leachate Characterization LITERATURE SOURCE: Study Prepared by Rust Environments & Infrastructure for WMX Technologies, Inc. WASTE TYPE: Construction waste and demolition debris. Includes wood, plaster, roofing materials, fencing, telephone poles, tires, and appliances. Does not accept special waste such as asbestos. ACREAGE: 4 acres. YEARS IN SERVICE: Opened in November 1989. LINER SYSTEM: 60-mil HDPE liner. LEACHATE SYSTEM: Yes. LEACHATE SAMPLE: Leachate sample taken from a composite of two leachate tanks which drain the three active landfill cells. MISCELLANEOUS: Waste Management reported the analytical results from this landfill, but did not identify the location or the owner/operators of the landfill.

Table A.25: Characteristics of the Massachusetts Site.

Table A.26: Sampling for the Massachusetts Site.

	Result	esult D	Det Limit	Rei	Result D	Det Limit	Res	Result D	Det Limit	MCL	MCL	Conc
Volatiles	l'an	ND/NS		1/2m	ND/US		ng/	SN/QN		l/an	Van	l/ân
Acetone	5100.00		250.00		g	680.00	41.00		10.00			700.00
2-Butanone	2500.00		250.00		g			QN				4200.00
Carbon Disulfide		GZ	12 00		Gz	100.00		QN	5.00			700.00
Chloromethane	43 00		25.00		CIN	200.00		Q	10.00			2.70
1 1-Dickloroethane	48.00		12.00		g	100.00		QN	5.00			700.00
1 2-Dichloroethane	26.00		12.00		g	100.00		QN	5.00	3.00		
1.4-Dioxane		QN	10.00		QN		49.00		20.00		İ	5.00
Ethylbenzene	18.00		12.00		QN	100.00	1.00		5.00		700.00	
Methyl Ethyl Ketone (MEK)	2500.00		250.00	390.00		200.00		QN	10.00			4200.00
4-Methvl-2-Pentanone	250.00		120.00		QN	200.00		QN	10.00			
Methylene Chloride	60.00		12 00		Q	100.00		Q	5.00	5.00		
Toluana	240.00		12 00	290.00		100.001		QN	5.00	1000.00		
1 0 1 1 Trichlorosthans	00.042	NSN	00.44	00.0/4	SN			SN		200.00		
1,1,1 1 Hourdeniane	00.00	2	11 00			100.00		CIN	90 y	100		
I ncilioroeunylene	20.00	4	12.00		ΩN.	100.00			00.01	200 F		000010
Trichlorofluoromethane		Q	25.00		ΠN	100.00		n	10.00			7100.00
Xylenes (Total)	85.00		12.00	120.00		100.00	4.00		5.00	10000.00		
Semi-Volatiles	1/an	SN/GN		l∕gu	ND/NS		∕3n	ND/NS		ng/	ng/l	l/gu
Acenanhthene		CIN	47.00		QN	100.00		q	10.00			20.00
A catomhanona		G	47.00		CIN	100.00	2 00		10.00			700.00
Accupitentitie			12.00			00 ¥		CIN N	\$ 00	1 00		
Benzene	00000		14.00		an a	8				2011		28000.00
Benzoic Acid	00.000.00	UN .	240.00		CNI .	00.001			00.00			00.00004
Bis(2-Ethylhexyl)phthalate			47.00		Z (00.005			00.01			00 004
2,4-Dimethylphenol		DN	47.00			100.00		an	10.00			400.00
Di-n-Butyl phthalate		DN	47.00		QN	100.00		Q	10.00			700.00
Diethyl Phthalate		ND	47.00		DN	100.00	1.00		10.00			5600.00
Fluoranthene		QN	47.00		DN	100.00		QN	10.00			280.00
Napthalene	63.00		47.00		QN	100.00		ND	10.00			6.80
m&n-Creosol	5700.00		47.00	3200.00		100.00		Q	10.00			35.00
n-Creosol	64.00		47.00		QN	100.00		QN	10.00			350.00
Dhanathrane		CN	47.00		QN	100.00	3.00		10.00			10.00
Dhandl	1000.00	CZ	47.00	210.00		100 00		G	10.00			10.00
Durana		CZ	47.00		Ę	100.00		GN	10.00			210.00
1												
the set of sector set of sector set of sector se		NDMG		l'au	SN/UN		1/211	SN/UN		Van	l/en	l/an
	- An	SMINT	0.06	-An		0.00		CIN I	0.50			000
Alpha-BHC	0.12	4	c0:0			0.00				20		2010
Endrm			0.0			n su		2	2.0	M .7		010
Dieldrin	0.07		0.05		2	0.80		ī	0.20			0.10
Dimethoate		Q	1.90		g	100.00	2.70		- 20			0.0
Disulfoton		QN	1.90		Q	100.00	5.60		1.50			0.50
2,4,5-T	0.53		0.19		Q	2.00		ĝ	4.70			70.00
2,4-D		ND	1.10		QN	2.00		Q	4.70	70.00		
HxCDD		ND	2.00		ND	360.00		g	1.90			
HxCDF		ND	1.10		QN	210.00		Q	1.40			
Heavy Metals	(∕3n	ND/NS		ug/l	ND/NS		ng/J	ND/NS		ön	l∕an	l∕gu
Antúmony		DN	7.00		QN	500.00		Q	100.00	6.00		
Arsenic	33.00		4.00		DN	35.00	15.00		30.00	50.00		
Banun	500.00		10.00	368.00		200.00	200.00		50.00	2000.00		
Cadminn		QN	20.00		Q	5.00		QN	10.00	5.00		
Thromium	45.00		10.00		Q	50.00		ΩN	20.00	100.00		
Conner		QN	80.00		Q	125.00		QN	20.00	1000.00		
Land	13.00		3 00		G	25.00		g	50.00	15.00		
Marcurv		QN	0.20		QN	0.20		Q	0.20	2.00		
Nickel		QN	80.00		QN	200.00		Q	20.00	100.00		
Selenum		DN	5.00		QN	5.00		QN	2.00	\$0.00		
Silver		NS			NS			NS			100.00	
Thallium		DN	5.00		QN	10.00		QN	\$00.00	2.00		
Vanadium	96.00		20.00		Q	50.00		g	10.00			49.00
Zinc	300.00		80.00	78.50		20.00	13.00		10.00		5000.00	
											0 -11	
Conventional Parameters	mg/l	ND/NS		mg/l	SNIUN		ng/i	SU/ON		l/gm	ugu	a.

Codminue		aN	20.00		aN				00.01-	00.6		
Chronitin	45.00		10.00		QZ	50.00		QN	20.00	100.00		Ī
Cutomin		QN	80.00		QN	125.00		QN	20.00	1000.00		
Induced	13 00		3 00		Q	25.00		QN	50.00	15.00		
Lead	20.171	CIN ND	0.20		g	0.20		g	0.20	2.00		
Mercury			80.00		GZ	200.00		Q	20.00	100.00		
Nickel			200 ¥		Ę	<u>د 00</u>		Ð	2.00	50.00		
Selenum		NG	201-2		SN			NS			100.00	
Sulver		CIN	\$ 00		Q	10.00		Q	500.00	2.00		
1 nautur	04.00		20.00		g	50.00		Q	10.00			49.00
Vanadum Zine	300.00		80.00	78.50		20.00	13.00		10.00		5000.00	
21117	22022											
Commissional Parameters	Vom	ND/NS		mg/l	ND/NS		\∕3m	SN/QN		l/gm	l/Bui	ng/i
Dislocational I a aneres	110.00		1.00		NS		27.00		2.00			
Divington Oxygen Demand	4700.00		200.00	1690.00		200.00	420.00		50.00			
Cherinear Oxygen Pennans	410.00		1 00	493.00		2.50	200.00		20.00		250.00	
Conda	0.02		0.01		g	0.02		DN	0.01	0.20		
Amoria Nitrocan	40.00		8.00	42.80		0.40	25.80		1.00			
	22.24	NN			NS			NS				
		SZ			SN			NS		10.00		
INIU due Niterita		SZ			NS			NS		1.00		
Inut	27.00		0.04	44.80		0.50	14.00		0.03		0.30	
Dil and Grasse	24.00		0.48		QN	2.50		ND	6.00			
	9 60			7.18			7.20				6.5-8.5	
Dhande (Total)	4 90		0.20	1.75		0.05	0.04		10.0			
Flicticus (1000) Dhoethorite	99		0.10	1.42		0.20	0.21		0.05			
Total Summard Solide	01.00		10.00	78.00		3.00	44.00		5.00			
Total Dissolved Solids	6500.00		9.00	4710.00		5.00	1800.00		10.00		500.00	
Total planta control of the	21.00		0.05	112.00		50.00	18.90		10.00		250.00	
Total Orvanic Carbon	2100.00		30.00	550.00		10.00	128.00		10.00			
TOC (Duplicate)	1900.00		30.00	529.00		10.00	128.00		10.00			
Total Organic Halogens	16.0		0.01	0.59		0.01	0.32		0.01			
Macnesium		NS			NS			NS				
Mangenese		SN			NS			NS			0.05	
Potassium		SN			NS			NS				
Sodium		SN			SN			NS		160.00		
Alkalinity		NS			NS			NS				
Calcium		SN			NS			NS				
Hardness		SN			NS			NS				
Borott		SN			NS			NS				0.63
Specific Conductance (unho/cm)		NS			SN			NS				

NS - Not Sampled ND - Not Detected De Limit - Sampling Detection Limit MCL - Assimum Contantinat Level; Enforceable Groundwater Standards MCL - Secondary Maximum Contantinat Level; Enforceable Groundwater Standards Guidance Concentrations- Not Enforceable Standards

	A.27: Characteristics of the Michigan Site.
LANDFILL:	Michigan Site
OWNER/OPERATOR:	Waste Management of North America, Inc. 3003 Butterfield Road Oak Brook, IL 60521
LITERATURE SOURCE:	Construction and Demolition Landfill Leachate Characterization Study Prepared by Rust Environments & Infrastructure for WMX Technologies, Inc.
WASTE TYPE:	Construction waste and demolition debris. Includes concrete, brick, wooden pallets, and brush. Does not accept white goods or tires.
ACREAGE:	2 acres.
YEARS IN SERVICE:	Opened in June 1990.
LINER SYSTEM:	30-mil PVC liner.
LEACHATE SYSTEM:	Yes.
LEACHATE SAMPLE:	Leachate sample taken from a leachate manhole in the C&D portion of the landfill.
MISCELLANEOUS:	None.

Table A.27: Characteristics of the Michigan Site.

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Table A.28: Sampling for the Michigan Site.

		1991 Sampling	ng Det 1 imit	1992 Besult	1992 Sampling	Re I Jmir	1993 Sampling Result	mpling ult	Det Limit	Primary MCL	Secondary MCL	Guidance Conc
Volatiles	l/an	ND/NS		Van	ND/NS		l/an	ND/NS		ķ	l/an	l∕∂n
A catorie	160		100.00		g	34	010		100.00			700
Acetute	100	CN N	100.001		CZ			Q				4200
			00 \$		E E	00 \$	1		5 00			700
			00.01		. c	10.00		G	10.00			6
			00 V		E	-	•		60			700
1, 1-Dictuol oeutatie	0.7		00 S		Ē	, , ,		GN	5 00	"		
	4.5	44	00.01			Ì		GZ	20.00			S
1,4-Dioxane			00.01			Į,			00.5		100	
Ethylbenzene			00.001				ULV		00.001		22	4200
Methyl Ethyl Ketone (MEK)			100.00			2 9	*		10.00			
4-Methyl-2-Pentanone		ŊŊ	00.00		Į,	<u>-</u>	,		10.00			
Methylene Chloride	é		5.00		g				0.0	^		T
Tohiene		DN	5.00		g	۰	110		5.00	1000		
1.1.1 Trichloroethane		NS			NS			NS		200		
Trichloroethylene		QN	5.00		QN	Ś		QN	5.00	3		
Trichlorofhioromathane	1		10.00		g	10		QN	10.00			2100
Videos (Total)		QN	00 \$		ſ	10	2		5.00	10000		
VATCHES (TOWN)												
		NDAK		Unit.	ND/NS		1/21	SN/QN		1/3n	l/an	1/3n
Semi-Volance	1ân		10.00	-An	CIN CIN	10.01		CIX.	10.00			20
Acenaphthene			46.00			00.01			10.00			700
Acetophenone			40.00		<u></u>	20.01		e c	00.5	-		
Benzene		CN	00.0			90°C	11000		200.00	-		28000
Benzoic Acid	5500		240.00		2				10.00			0000*
Bis(2-Ethylhexyl)phthalate		QN	48.00		Ð	20.00	7		10.00			997
2,4-Dimethylphenol		Q	48.00		g	10.00	≏		10.00			94
Di-n-Butyl phthalate		QN	48.00		Q	10.00		Q	10.00			<u>)</u>
Diethyl Phthalate		QN	48.00		Q	10.00	7		10.00			0000
Fluoranthene		DN	48.00		QN	10.00		Ð	10.00			280
Napthalene		DN	48.00		QN	10.00	8		10.00			-
in&p-Creosol	190		48.00		QN	10.00	1100		100.00			<u>ج</u>
o-Creosol		QN	48.00		DN	10.00		QN	10.00			350
Phenathrene		QN	48.00		ND	10.00		QN	10.00			0
Phenol		QN	48.00		QN	10.00	22		10.00			9
Pyrene		QN	48.00		DN	10.00		QN	10.00			210
												1
Herbicides/Pesticides	l∕an	SN/QN		ug/l	ND/NS		ug/l	ND/NS		lgu	ng/	Man
Alpha-BHC		QN	0.940		DN	0.40		QN	0.26			0.05
Endrin		Q	0.940		QN	0.40		DN	0.51	2.0		
Dieldrin		Q	0.940		QN	0.40		ND	0.51			0.10
Dimethoate		Q	0.94		QN	10.00		QN	2.50			۶
Disulfoton	0.96		0.94		QN	10.00		QN	1.90			0.5
2 4 5-T		Ð	0.19		QN	1.00		QN	4.80			70
2.4-D		ĝ	1.10		DN	1.00	29		4.80	70		
HxCDD		QN	2.70		DN	68.00	5.5		5.50			
HxCDF		QN	1.60		QN	53.00	7.7		7.70			
										,		
Heavy Metals	l∕ĝn	ND/NS		ug∕1	ND/NS		ng/l	ND/NS	00.001	1/ 3 n	nĝ,	Iĝu
Antimony		Ð	7.00	, i	QN	100.00	;	R	100.00			
Arsenic	61		4.00	3/.0	CIV.	200.00	9F		20.00	2000		
Banum	140		10:00			\$ 00	210	Q	10.00	~		
Cadmum	0.0					10.00		Ē	20.00	100		
Chromun						25.00		Ę	20.00	1000		
Copper			20.02			4 00		Ę	\$0.00	2		
Lead		N N	0.0		E	0.20		Ð	0.20	2		
Mercury			20.00		2	40.00		Q	20.00	100		
Nickel		Ę	200		g	5.00		Ð	10.00	50		
Scientifit		SZ			SN			NS			100	
Thallinn		g	5.00		Q	10.00		DN	50.00	2		
Vanadium		g	20.00		ΟŅ	50.00	16		10.00			49
Zinc	23		20.00	34.8		20.00	38		10.00		5000	
	malt	NUNC	_	l'arra l	ND/NS		l/am	I ND/NS	_	mg/	[mg/]	mg/

Arsenic	61		4.00	37.6		10.00	36		10.00	50		
Barium	140		10.00		DN	200.00	510		50.00	2000		
Cadınium	6.9		5.00		DN	5.00		QN	10.00	Ś		
Chroniun		QN	10.00		DN	10.00		DN	20.00	100		
Copper		DN	20.00		DN	25.00		QN	20.00	1000		
Lead		DN	3.00		Q	5.00		DN	50.00	15		
Mercury		DN	0.20		ND	0.20		QN	0.20	2		
Nickel		QN	20.00		QN	40.00		Q	20.00	100		
Selenium		QN	5.00		ND	5.00		DN	10.00	50		
Silver		NS			SN			NS			100	
Thalliun		QN	5.00		QN	10.00		ND	50.00	2		
Vanadium		QN	20.00		DN	50.00	16		10.00			49
Zinc	23		20.00	34.8		20.00	38		10.00		\$000	
Conventional Parameters	l/gm	SN/QN		l∕8m	ND/NS		mg/l	ND/NS		mg/l	mg/l	mg/l
Biological Oxygen Demand	140		1.00		NS		920		2.00			
Chemical Oxygen Demand	390		5.00	156		10.00	1300		50.00			
Chlorides	51		0.40	48.2		0.50	130		5.00		250	
Cyaride	0.02		0.01		DN	0.02	0.01		0.01	0.2		
Amnonia, Nitrogen	1.1		0.08	0.74		0.02	5.4		0.20			
Organic Nitrogen		NS			NS			NS				
Nitrate		NS			NS			NS		10		
Nitrite		NS			NS			NS		-		
lron	1.4		0.04	6.29		0.10	27.6		0.03		0.30	
Oil and Grease	1.1		0.44	4.4		1.00	6		6.00			
Hd	7.2			7.15		0.05	6.9				6.5-8.5	
Phenols (Total)	0.14		0.01		QN	0.01	0.35		0.03			
Phosphorus	0.1		0.02	0.26		0.20	0.27		0.05			
Total Suspended Solids		DN	10.00	19		3.00	86		5.00			
Total Dissolved Solids	3000		9.00	1760		5.00	2700		10.00		5 00	
Sulfate	770		1.00	459		100.00	68.3		25.00		250	
Total Organic Carbon	180		2.00	49.6		1.00	434		50.00			
TOC (Duplicate)	170		2.00	48.7		1.00	436		50.00			
Total Organic Halogens	0.74		0.01	0.07		0.01	0.14		10.0			
Magnesium		NS			NS			SN				
Mangenese		SN			NS			NS			0.050	
Potassium		NS			NS			NS				
Sodium		SN			NS			NS		160		
Alkalinity		NS			NS			NS				
Calcium		NS			NS			NS				
Hardness		NS			NS			NS				
Boron		NS			NS			SN				0.63
Specific Conductance (umho/cm)		NS			NS			NS				

NS - Not Sumpled ND - Not Detected Del Limit - Sumpling Detection Limit MCL - Accimum Constaniant Levic: Enforceable Groundwater Standards MCL - Accimum Contaniant Levic: Enforceable Groundwater Standards Loudoaree Concentrationa- Not Enforceable Standards

Table A.29: Charac	teristics of the Mount Olivet Landfill, Seattle, Washington.
LANDFILL:	Mount Olivet Landfill, Seattle, Washington.
OWNER/OPERATOR:	Fioorillo Northwest, Inc. Post Office Box 66826 Seattle, Washington 98166-0826
LITERATURE SOURCE:	Washington State Department of Ecology Presented in C&D Waste Landfills, Leachate Quality Data, Volume 1. Prepared by Gershman, Brickner & Bratton, Inc. For the National Association of Demolition Contractors.
WASTE TYPE:	Demolition debris and landclearing debris.
ACREAGE:	Unknown.
YEARS IN SERVICE:	Unknown.
LINER SYSTEM:	Unknown.
LEACHATE SYSTEM:	Unknown.
LEACHATE SAMPLE:	West and East Leachate Ponds.
MISCELLANEOUS:	None.

Table A.30: Sampling for the Mt. Olivet Landfill of Washington.

	198	1989 East Pond		198	1989 West Pond		2	ŗ.	Guidance
	퉲	=	Det Limit	<u>8</u>		Det Limit	WCL	WCL	Conc
Volafiles	+	ND/NS		+	SNIAN				700.00
Acetone	150.00		T	00.00			Ì		4200.00
2-Butanone	94.00	T		1 80	T	I			700.00
Carbon Disulfide	8	ļ	1 80	700-1	ſz	3.80			2.70
Chloromethane			0.60	T	g	0.60			700.00
1, 1-Dichloroethane			000		GZ	0.50	3.00		
1,2-Dichloroethane		a v	22-5		SN				5.00
1,4-Dioxane		GR	0.80	0.80				700.00	
Ethyloenzette		NS			NS				4200.00
Meury Eury Destances	06 8				DN	3.50			
4-Meulyr-z-relumine		g	3.30		QN	3.30	5.00		
	8		080	1.00			1000.00		
I olucite 1 1 1 Trichlorouthane		Q	0.60		QN	0.60	200.00		
1, 1, 1-110000 Octobric		SN			NS		3.00		
I fictuoi ocurytene		SN			NS				2100.00
		Ē	1 80	23.00			10000.00		
Xylencs (1 otal)			-						
		NUMA		Ven	ND/NS		ng/	1/8n	ug/J
Semi-Volatiles			Ī		NN				20.00
Acenaphthene		SZ			Ne o				700.00
Acetophenone		SZ	1			001	8		
Benzene		g	1.00	0000	n,	8	7.00		28000.00
Benzoic Acid	910.00			210.00	1	00 07			
Bis(2-Ethylhexyl)phthalate		Q	10.00		2	10.01			100.00
2.4-Dimethylphenol		QN	20.00		ĝ	20.00			200.004
Di-n-Butyl phthalate	11.00				Ð	10.00			00.00/
Diethvl Phthalate		QN	10.00		Ð	10.00			00.0000
Guoranthene		QN	10.00		QN	10.00			280.00
1.1001 duration		g	10.00		QN	10.00			6.80
reputation	670.00			74.00					35.00
filled	36.00				DN	10.00			350.00
Discontinuation		Q	10.00		ND	10.00			10.00
Phenauu ence	130.00			17.00					10.00
		Ę	10.00		QN	10.00			210.00
Lytene									
tt (David ai dav	Von	ND/NS		ng/	ND/NS		l∕ân	l/gu	∩g'ı
Herbicides/Fenciaes		SN			SN				0.05
Alpha-BHC		en di			SN		2.00		
Endrin		CN OIA			SN				0.10
Dieldrin		2			NIG				5.00
Dimethoate		SN							0.50
Disulfoton		NS			23				10.00
2,4,5-T		SN			z		00.05		22.22
2,4-D		NS			ź		30.02		
HxCDD		SN			2				
HxCDF		SN			sz				
									1/2m
Heavy Metals	Ìn	ND/US		ug/	NUN				
Antimony		SN S			en a		0005		
Arsenic		SZ S			Na la		2000.00		
Barium		z,	2			00 6	\$ 00		
Cadmium		2 S			Ē	200	100.00		
Chrommin	00 0		2	2.00	SN		1000.00		
Copper	o.0	Ę	30.00		g	30.00	15.00		
Lead		a su	20.00		SN		2.00		
Mercury	00 0 5			10.00			100.00		
NICKEI		SZ			SN		50.00		
Selenum		SN			NS			100.00	
Thallium		SN			NS		2.00		40 47
Vanadium		SN			sz			00 0009	49.00
Zinc	24.00			17.00				00'000C	
					SNUN		Vom	l'au	l/am
Conventional Parameters	l/am	SUIUN			SN				
Biological Oxygen Demand		2 PX			SN				
Chamical Oxygen Demand	-	en I	-		211				

Copper	8.00			2.00	SS		1000.00		T
Lead		QN	30.00		g	30.00	15.00		
Mercury		NS			NS		2.00		
Nickel	50.00			10.00			100.00		
Selenium		SN			NS		50.00		
Silver		NS			NS			100.00	
Thallium		NS			NS		2.00		
Vanadium		NS			NS				49.00
Zinc	24.00			17.00				5000.00	
Conventional Parameters	l/3m	ND/NS		mg/l	ND/NS		l/gm	l/gm	l/gm
Biological Oxygen Demand		NS			NS				
Chemical Oxygen Demand		SN			NS				
Chlorides		SN			NS			250.00	
Cvanide		NS			NS		0.20		
Annonia, Nitrogen		NS			NS				
Organic Nitrogen		NS			NS				
Nitrate		NS			NS		10.00		
Nitrite		SN			NS		1.00		
ron		NS			NS			0.30	
Oil and Grease	40.00		10.00	50.00		10.00			
pH		NS			NS			6.5-8.5	
Phenols (Total)		NS			SN				
Phosphorus		NS			SN				
Total Suspended Solids		NS			SN				
Total Dissofved Solids		NS			NS			500.00	
Sulfate		NS			SN			250.00	
Total Organic Carbon		NS			SN				
TOC (Duplicate)		NS			SN				
Total Organic Halogens		NS			SN				
Magnesiun		NS			SZ Z				
Mangenese		NS			SN			0.05	
Potassium		NS			SZ Z				
Sodium		NS			SN		160.00		
Alkalinity		NS			SN				
Calcium		SN			SN				
Hardness		NS			SN				
Boron		NS			SZ				0.63
Specific Conductance (unho/cm)		NS			NS				

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NS - Not Sampled ND - Not Datasted Da Limit - Sampling Datastion Limit MCL - Maximum Constantiant Levis: Enforceable Groundwater Standarda SMCL - Secondary Maximum Contantunar Lovei: Enforceable Groundwater Standarda Guidance Concatentiasus - Not Enforceable Sua darda

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Table A.31: Characteris	tics of the 110 Sand Company Clean Fill Landfill of New York.
LANDFILL:	110 Sand Company Clean Fill Landfill, New York.
OWNER/OPERATOR:	Broad Hollow Estates/110 Sand Company 170 Cabot Street West Babylon, New York 11704
LITERATURE SOURCE:	New York State Department of Environmental Conservation Presented in C&D Waste Landfills, Leachate Quality Data, Volume 1. Prepared by Gershman, Brickner & Bratton, Inc. For the National Association of Demolition Contractors.
WASTE TYPE:	Demolition debris and landclearing debris.
ACREAGE:	12.1 acres in Phase V. Capacity 3,300,000 cubic yards.
YEARS IN SERVICE:	Unknown.
LINER SYSTEM:	Double Liner.
LEACHATE SYSTEM:	Yes.
LEACHATE SAMPLE:	Leachate sample taken from leachate collection system.
MISCELLANEOUS:	None.

Table A.32a: Sampling for the 100 Sand Company Clean

		3/19/91			3/13/92			6/11/92			9/11/92			12/16/92		w	EST, DEC	15	E	AST, DEC	85	w	EST, APR	86
	Re		Det Lindt	Re		Det Limit	Re		Det Limit	Re		Det Limit	Re		Det Limit	Rei		Det Limit	Re	rat	Det Limit	Re		Det Link
Volatiles	wg/1	ND/NS		44/	ND/NS		wg/l	ND/NS		wg/1	ND/NS		wg/1	ND/NS		wg/1	ND/NS		ug/ 1			ug/1	ND/NS	
Acetone	31.00		5.00		NS			NS			NS			NS			NS			NS			NS	
2-Butanone		ND	5.00		NS ND	5.00		NS NS			NS NS			NS NS			NS NS			NS NS			NS NS	
Carbon Disulfide Chloromethane		ND ND	5.00 5.00		ND	10.00		NS			NS			NS		}	NS			NS			NS	
1,1-Dichloroethane		ND	5.00		ND	1.00		NS			NS			NS			NS			NS			NS	
1,2-Dichloroethane		ND	5.00		ND	5.00		NS			NS			NS			NS			NS			NS	
1,4-Dioxane		NS			NS			NS			NS			NS			NS			NS NS			NS NS	
Ethyfbenzene		ND	5.00		ND NS	5.00		NS NS			NS NS			NS NS			NS NS			NS			NS	
Methyl Ethyl Ketone (MEK) 4-Methyl-2-Pentanone		NS ND	5.00		ND	10.00		NS			NS			NS			NS			NS			NS	
Methylene Chloride		ND	5.00		ND	5.00		NS			NS			NS			NS			NS			NS	
Toluene		ND	5.00	1.00				NS			NS			NS			NS			NS			NS	
1,1,1-Trichloroethase		ND	5.00		ND	5.00		NS NS			NS NS			NS NS		2.90	ND	1.00		ND ND	1.00 0.10		ND	1.00
Trichloroethylene Trichlorofluoroeuethane	-	NS NS	 	├ ──┤	NS NS			NS			NS			NS			NS			NS			NS	
Xylenes (Total)		ND	5.00		ND	5.00		NS			NS			NS			NS			NS			NS	
																					 	· ·		
Semi-Voinilies	- ug/i	ND/NS		<u>ug/1</u>	ND/NS		ug/1	ND/NS NS		<u>ug/1</u>	ND/NS NS		ug/1	ND/NS		14 /1	ND/NS		*g/1	ND/NS	<u> </u>	ug/t	ND/NS NS	
Acetophenone	3.00	NS	2.00	4.00	NS			NS			NS			NS			NS		· · · ·	NS			NS	
Benzenie		ND	2.00	1.00				NS			NS			NS			NS			NS			NS	
Benzoic Acid		ND	2.00		NS			NS			NS			NS			NS			NS			NS	
Bis(2-Ethyfnexyl)phthalate		ND	2.00		ND	10.00		NS			NS		ļ	NS		I	NS		·	NS			NS	
2,4-Dimethylphenol		ND	2.00		ND	10.00		NS NS			NS NS			NS NS	<u>├</u> ───	┠	NS NS			NS NS	ł		NS NS	
Di-n-Butyt phihalate Diethyl Phihalate		ND	2.00	t'	ND ND	10.00		NS NS			NS			NS		† − − †	NS NS			NS			NS	
Fluoranthese		ND	2.00		ND	10.00		NS			NS			NS			NS			NS			NS	
Napthalene		ND	2.00		ND	10.00		NS			NS			NS			NS			NS			NS	
mAp-Creosol		ND	2.00	L	ND	10.00		NS			NS			NS	ļ]	NS			NS	ļ		NS NS	
o-Creosol		ND	2.00	 '	ND	10.00		NS NS			NS NS			NS NS	<u> </u>	├ ──┤	NS NS			NS NS			NS NS	
Phenethrene Phenol		ND	2.00	<u> </u>	ND	10.00		NS NS	-		NS	h		NS	<u> </u>	<u>†</u>	NS			NS	<u>t – – – – – – – – – – – – – – – – – – –</u>		NS	
Pyrane		ND	2.00		ND	10.00		NS			NS			NS			NS			NS			NS	
																						-		
Herbicides Pesticides	16 /1	ND/NS		mg/1	ND/NS		wg/1	ND/NS		ug/ 1	ND/NS		ug/ 1	ND/NS		<u>ug/1</u>	ND/NS		ug/i	ND/NS NS		ug/l	ND/NS NS	
Alpha-BHC		ND ND	0.10	<u> </u>	ND	0.05		NS NS			NS NS			NS NS			NS			NS			NS	
Endrin Dieldrin			0.10		ND	0.10		NS			NS			NS			NS			NS			NS	
Dimethoate		NS	0.10		NS			NS			NS			NS			NS			NS			NS	
Disulfoton		NS	0.10		NS			NS	l	L	NS			NS	ļ		NS			NS_			NS	
2,4,5·T		NS	0.10	i	NS			NS NS			NS NS			NS NS			NS NS		<u> </u>	NS NS	<u> </u>		NS NS	
2,4-D HrCDD		NS NS	0.10	<u> </u>	NS NS			NS			NS			NS		t	NS			NS	1		NS	
HrCDF		NS	0.10		NS			NS			NS			NS			NS			ŇS			NS	
																							1	
			<u> </u>	<u> </u>										NIDAIR	<u> </u>		ATDATE			NDOIF	<u> </u>		NDAR	
Heavy Metats	ug/l	ND/NS	16.00	1 10g/1	ND/NS		ng/1	ND/NS		4 /1	ND/NS		ug/1	ND/NS		11 1	ND/NS		ug1 .	ND/NS		ng/l	ND/NS	
Henry Metats Antimony Arsonic		ND/NS ND	16.00	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ND/NS		ng/1	ND/NS NS		ug/l	ND/NS NS NS		ug/1	ND/NS NS NS		ng/i	ND/NS NS ND	5.00	ug/i	ND/NS NS ND	5.00	wg/l	ND/NS NS ND	8.00
Antimorry	ug/1 32.00 370.00			5.60 77.30 722.00	ND/NS			NS		ug/l	NS NS NS		ug/1	NS NS NS		ng/1	NS ND NS		ugi	NS ND NS		ug/l	NS ND NS	
Antimony Arsenic Berium Cedmiam	32.00 370.00		16.00	5.80 77.30 722.00 15.80	ND/NS		ng/3	NS NS NS		¥21	NS NS NS ND	3.00	ug/1	NS NS ND	2.00	ng/1	NS ND NS ND	1.00		NS ND NS ND	1.00	ug1	NS ND NS ND	0.80
Anthinony Arsenic Barium Cadmisum Chromium	32.00 370.00 15.00	ND		5.80 77.30 722.00 15.80 41.60	NTD/NS			NS NS NS NS		¥/	NS NS ND NS	3.00	ug/1	NS NS ND NS	2.00	ng/	NS ND NS ND ND		ug/1 .	NS ND NS	1.00 25.00	- ug/1	NS ND NS	
Antimony Arsenic Berium Cedmiam	32.00 370.00	ND ND	4.00	5.80 77.30 722.00 15.80		10.00		NS NS NS	4.20	491	NS NS NS ND	3.00	ug/1	NS NS ND	2.00	ng/1	NS ND NS ND	1.00 25.00	ug/i .	NS ND NS ND ND	1.00		NS ND NS ND ND	0.80
Antinoory Arsecic Berkun Codonison Conomison Chromison Copper Lead Mercury	32.00 370.00 15.00	ND ND ND ND	4.00	5.60 77.30 722.00 15.80 41.60 14.20	ND/NS	10.00		NS NS NS NS NS ND NS	4.20		NS NS ND NS NS ND NS			NS NS ND NS NS ND NS			NS ND ND ND ND ND ND	1.00 25.00 25.00		NS ND NS ND ND ND ND	1.00 25.00 25.00		NS NS NS NS NS NS NS NS NS NS NS NS NS N	0.80 2.5.00 16.00
Autimony Antimic Barkan Cictonian Cictonian Cictonian Lead Marcury Nickel	32.00 370.00 15.00 10.00	ND ND ND	4.00	5.80 77.30 722.00 15.80 41.60	ND	0.20		NS NS NS NS ND NS NS NS	4.20		NS NS ND NS ND NS ND NS ND NS		ug/1	NS NS ND NS ND NS ND NS NS			NS ND ND ND ND ND ND ND	1.00 25.00 25.00 5.00 0.20		NS ND ND ND ND ND ND ND ND	1.00 25.00 25.00 5.00 0.20		NS ND ND ND ND ND ND ND ND ND ND	0.80 25.00 16.00 4.00 0.40
Antinony Anteric Bartan Cadmium Cadmium Contronium Copper Lead Mercury Nickel Steinbara	32.00 370.00 15.00	ND ND ND ND ND	4.00 14.00 0.20 14.00	5.60 77.30 722.00 15.80 41.60 14.20	ND ND ND	0.20		NS NS NS NS NS ND NS NS NS	4.20	491 	NS NS ND NS NS ND NS NS NS			NS NS ND NS NS ND NS NS NS			NS ND ND ND ND ND ND ND ND ND ND	1.00 25.00 5.00 0.20 5.00		NS ND ND ND ND ND ND ND ND ND ND	1.00 25.00 25.00 5.00		NS ND ND ND ND ND ND ND ND ND ND ND	0.80 25.00 16.00 4.00 0.40 4.00
Autinony An anic Bartum Codmann Company Lasd Mercury Nickel Selenkan Selenkan Selenkan	32.00 370.00 15.00 10.00	ND ND ND ND ND ND	4.00 14.00 0.20 14.00	5.60 77.30 722.00 15.80 41.60 14.20	ND ND ND ND	0.20 2.00 5.00		NS NS NS NS ND NS NS NS	4.20	¥1	NS NS ND NS ND NS ND NS ND NS			NS NS ND NS ND NS ND NS NS			NS ND ND ND ND ND ND ND	1.00 25.00 25.00 5.00 0.20		NS ND ND ND ND ND ND ND ND	1.00 25.00 25.00 5.00 0.20 5.00		NS ND ND ND ND ND ND ND ND ND ND	0.80 25.00 16.00 4.00 0.40
Addinosy An enic Berhan Cadrisian Chronian Copper Laid Mercury Nicki Shrei Shrei Shrei Thalian	32.00 370.00 15.00 10.00 5.00	ND ND ND ND ND	4.00 14.00 0.20 14.00	5.80 77.30 722.00 15.80 41.60 14.20 57.80 57.80	ND ND ND	0.20		NS NS NS NS NS NS NS NS NS NS	4.20		NS NS ND NS NS NS NS NS NS NS			NS NS ND NS NS ND NS NS NS NS NS NS			NS ND ND ND ND ND ND ND ND ND ND ND ND ND	1.00 25.00 25.00 5.00 0.20 5.00 10.00		NS ND ND ND ND ND ND ND ND ND ND ND	1.00 25.00 25.00 5.00 0.20 5.00		N3 N0 N1 N2 N3 N3 N3	0.80 25.00 16.00 4.00 0.40 4.00 10.00
Antinony Anteric Bartan Cudniam Cudniam Cudniam Copper Lead Mercuty Nickel Silver Silv	32.00 370.00 15.00 10.00	ND ND ND ND ND ND ND	4.00 14.00 0.20 14.00 14.00 4.00	5.80 77.30 722.00 15.80 41.60 14.20	ND ND ND ND	0.20 2.00 5.00		NS NS NS NS NS NS NS NS NS NS	4.20		NS NS ND NS NS NS NS NS NS NS			NS NS ND NS NS NS NS NS NS NS NS			NS ND ND ND ND ND ND ND ND ND ND ND ND	1.00 25.00 5.00 0.20 5.00	100.00	NS ND ND ND ND ND ND ND ND NS ND NS	1.00 25.00 25.00 5.00 0.20 5.00		NS ND ND ND ND ND ND ND ND ND ND ND ND ND	0.80 25.00 16.00 4.00 0.40 4.00
Antinony Antenic Antenic Bertum Cudmium Cudmium Cudmium Copper Lead Mercury Nickel Silver Silver Tualitem Vaschum Zilc	32.06 370.00 15.00 10.00 5.00 91.00	ND ND ND ND ND ND ND ND ND	4.00 14.00 0.20 14.00 14.00 4.00	5.80 77.30 722.00 15.80 14.60 14.20 57.80 57.80 53.70 47.90	ND ND ND ND ND ND	0.20 2.00 5.00	3.40	NS NS NS NS NS NS NS NS NS NS	4.20		NS NS ND NS NS NS NS NS NS NS NS NS			NS NS ND NS ND NS NS NS NS NS NS NS			NS ND ND ND ND ND ND ND ND ND ND ND ND ND	1.00 25.00 25.00 5.00 0.20 5.00 10.00	100.00	NS ND ND ND ND ND ND ND ND ND NS NS	1.00 25.00 25.00 5.00 0.20 5.00		N3 N0 N1 N2 N3 N3 N3	0.80 25.00 16.00 4.00 0.40 4.00 10.00
Antiniony Antiniony Antiniony Betaun Cudmium Cudmium Cudmium Copper Lead Mercury Nickel Selenium Silver Thalium Venachum Zanc Coverentional Personenterr	32.00 370.00 15.00 10.00 5.00	ND ND ND ND ND ND ND	4.00 14.00 0.20 14.00 14.00 4.00	5.80 77.30 722.00 15.80 41.60 14.20 57.80 57.80	ND ND ND ND	0.20 2.00 5.00		NS NS NS NS NS NS NS NS NS NS	4.20	ug1	NS NS ND NS NS NS NS NS NS NS		ug/1	NS NS ND NS NS ND NS NS NS NS NS NS			NS ND ND ND ND ND ND ND ND ND ND ND ND ND	1.00 25.00 25.00 5.00 0.20 5.00 10.00		NS ND ND ND ND ND ND ND ND NS NS NS ND/NS	1.00 25.00 25.00 5.00 0.20 5.00		NS ND ND ND ND ND ND ND NS NS NS NS ND NS NS	0.80 25.00 16.00 4.00 0.40 4.00 10.00
Anthenory Artenic Berlam Cadenium Cadenium Cadenium Copper Lend Mercury Mickel Silven Silven Tualium Y machum Zinc	32.06 370.00 15.00 10.00 5.00 91.00 91.00 91.00 91.00 91.00	ND ND ND ND ND ND ND ND ND	4.00 14.00 0.20 14.00 14.00 4.00	5.80 77.30 722.00 15.80 14.60 14.20 57.80 57.80 53.70 47.90	ND ND ND ND ND ND ND ND NS NS	0.20 2.00 5.00	3.40 	NS NS NS NS NS NS NS NS NS NS NS NS NS N	4.20		NS NS NS NS NS NS NS NS NS NS NS NS NS N		mg/1 630.00	NS NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS		mgi	NS ND ND ND ND ND ND ND NS ND ND ND ND ND ND ND ND	1.00 25.00 25.00 5.00 0.20 5.00 10.00	100.00 mg/l	NS ND ND ND ND ND ND NS ND NS NS ND/NS	1.00 25.00 25.00 5.00 0.20 5.00	mgʻl	NS ND ND ND ND ND ND ND NS NS ND NS ND NS	0.80 25.00 16.00 4.00 0.40 4.00 10.00
Antiniony Antiniony Antiniony Butum Cultinium Cultinium Copper Lead Mercuty Mickel Selenium Selven Selven Selven Selven Selven Selven Selven Conventioned Faramation Conventioned Chemical Coppen Demand Chemical Chemical Coppen Demand Chemical Chemical Chemical Chemical Chemical Chemical Chemical Chemical Chemical Chemica	32.06 370.00 15.00 10.00 5.00 91.00 91.00 mg1 26.00 960.00 840.00	ND ND ND ND ND ND ND ND ND	4.00 14.00 0.20 14.00 14.00 4.00	5.80 77.30 722.00 15.80 41.60 14.20 57.80 57.80 53.70 47.90 mg/	ND ND ND ND ND ND ND ND ND ND/NS	0.20 2.00 5.00	3.40	NS NS NS NS NS NS NS NS NS NS NS NS NS N	4.20		NS NS ND ND NS NS NS NS NS NS NS NS NS NS NS NS NS		mg/i	NS NS ND ND NS NS NS NS NS NS NS NS NS NS NS NS NS			NS ND ND ND ND ND ND ND ND ND NS NS ND ND NS NS NS	1.00 25.00 25.00 5.00 0.20 5.00 10.00	100.00	NS ND ND ND ND ND ND ND ND ND NS NS NS NS NS	1.00 25.00 25.00 5.00 0.20 5.00		NS ND ND ND ND ND ND ND ND ND NS NS NS NS NS NS	0.80 25.00 16.00 4.00 0.40 4.00 10.00
Anthenory Artenic Berlam Cadminum Cadminum Cadminum Caronikan Copper Lend Lend Lend Mickel Silver Silver Silver Tbalikam Yenachun Zac Covercellend Perseseter Biologica Oxygen Demand Chenical Oxygen Demand Chenical Cyenicle	32.06 370.00 15.00 10.00 5.00 91.00 91.00 960.00 840.00 6.04	ND ND ND ND ND ND ND ND ND	4.00 14.00 0.20 14.00 14.00 4.00	5.80 77.30 722.00 15.80 14.60 14.20 57.80 57.80 53.70 47.90	ND ND ND ND ND ND ND ND ND ND NS NS NS	0.20 2.00 5.00	3.40 	NS NS NS NS NS NS NS NS NS NS NS NS NS N	4.20	mg/1 540.00 600.00	NS NS NS NS NS NS NS NS NS NS NS NS NS N			NS NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS			NS ND ND ND ND ND ND ND NS ND NS NS ND NS ND ND NS ND NS ND ND	1.00 25.00 25.00 5.00 0.20 5.00 10.00	100.00 mg/l	NS ND ND ND ND ND ND ND ND NS NS NS ND/NS	1.00 25.00 25.00 5.00 0.20 5.00		NS ND ND ND ND ND ND ND NS NS NS NS ND NS NS	0.80 25.00 16.00 4.00 0.40 4.00 10.00
Antimory Anteriory Anteriory Berham Coopies Berham Copper Lead Mercuty Mickel Seleniten Selver Thalien Venscham Zinc Coverentiesed Perseneter Biologist Oxygen Densend Chemicel Oxygen Densend Chemicel Cysticle	32.06 370.00 15.00 10.00 5.00 91.00 91.00 mg1 26.00 960.00 840.00	ND ND ND ND ND ND ND ND ND ND ND ND	4.00 14.00 0.20 14.00 14.00 4.00	5.80 77.30 722.00 15.80 41.60 14.20 57.80 57.80 53.70 47.90 mg/	ND ND ND ND ND ND ND ND NS NS	0.20 2.00 5.00	3.40 	NS NS NS NS NS NS NS NS NS NS NS NS NS N	4.20		NS NS ND ND NS NS NS NS NS NS NS NS NS NS NS NS NS		mg/1 630.00	NS NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS		mgi	NS ND ND ND ND ND ND ND ND ND NS NS ND ND NS NS NS	1.00 25.00 25.00 5.00 0.20 5.00 10.00	100.00 mg/l	NS ND ND ND ND ND ND ND ND ND NS NS NS NS NS	1.00 25.00 25.00 5.00 0.20 5.00	mgʻl	NS ND ND ND ND ND ND ND ND ND NS NS NS NS NS NS	0.80 25.00 16.00 4.00 0.40 4.00 10.00
Anthenory Artenic Berlam Cadminum Cadminum Cadminum Caronikan Copper Lend Lend Lend Mickel Silver Silver Silver Tbalikam Yenachun Zac Covercellend Perseseter Biologica Oxygen Demand Chenical Oxygen Demand Chenical Cyenicle	32.06 370.00 15.00 10.00 5.00 91.00 91.00 960.00 840.00 6.04	ND ND ND ND ND ND ND ND ND	4.00 14.00 0.20 14.00 14.00 4.00	5.80 77.30 722.00 15.80 41.60 14.20 57.80 57.80 53.70 47.90 mg/	ND ND ND ND ND ND ND ND ND ND ND NS NS	0.20 2.00 5.00	3.40 	NS NS NS NS NS NS NS NS NS NS NS NS NS N	4.20	mg/1 540.00 600.00	NS NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS			NS NS NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS		mg/1 200.00	NS ND ND ND ND ND ND ND ND ND ND ND ND ND	1.00 25.00 25.00 5.00 0.20 5.00 10.00	100.00 mg/l 160.00	NS ND ND ND ND ND ND ND ND ND ND NS NS NS NS	1.00 25.00 25.00 5.00 0.20 5.00		NS ND ND ND ND ND ND ND ND ND ND ND ND NS NS NS NS ND ND	0.80 25.00 16.00 4.00 0.40 4.00 10.00
Antimony Artenic Barham Cadminum Cadminum Cadminum Cadminum Cadminum Capper Lead Mercury Nickel Silver Tballium Vanadum Zinc Conventioned Parameter Biologicu Orzygen Demand Chemical Orzygen Demand Nitrate Nitrate Nitrate	32.00 370.00 15.00 10.00 5.00 91.00 91.00 91.00 960.00 840.00 0.04 120.00 0.25	ND ND ND ND ND ND ND ND ND ND ND ND	4.00 14.00 0.20 14.00 14.00 4.00	5.80 77.30 722.00 15.80 14.80 14.20 57.80 57.80 53.70 47.90 mg/l 0.02	ND ND ND ND ND ND ND NS NS NS NS	0.20 2.00 5.00	3.40 	NS NS NS NS NS NS NS NS NS NS NS NS NS N		540.00 600.00 81.00 1.30	NS NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS		mg/1 630.00 580.00 91.00 0.75	NS NS ND NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS		mg1 200.00 3.47 0.25	NS ND ND ND ND ND ND NS NS NS NS NS NS NS NS	1.00 25.00 25.00 5.00 10.00 37.00	100.00 360.00 15.28 0.04	NS ND ND ND ND ND ND NS NS NS NS NS NS	1.00 25.00 25.00 5.00 0.20 5.00 10.00	mg/1 1140.00 20.30 0.40	NS ND ND ND ND ND ND ND ND NS NS NS NS	0.80 25.00 16.00 4.00 0.40 4.00 10.00
Antimory Antimory Antimory Antimory Butan Cudmian Cudmian Copper Lead Mercury Nickel Steption Store Thilium Yenschum Zinc Conventional Personenterr Biological Oxygen Denand Choricles Chemical Oxygen Denand Choricles Antimocia, Nitrogen Antimocia, Nitrogen Nitrate Nitrat	32.06 370.00 15.00 10.00 5.00 91.00 91.00 91.00 940.00 960.00 960.00 960.00	ND ND ND ND ND ND ND ND ND ND ND ND ND N	4.00 14.00 0.20 14.00 14.00 4.00	5.80 77.30 722.00 15.80 41.60 14.20 57.80 57.80 53.70 47.90 mg/	ND ND ND ND ND ND ND NS NS NS NS NS NS NS NS	0.20 2.00 5.00	3.40 	NS NS NS NS NS NS NS NS NS NS NS NS NS N		mg1 540.00 600.00 81.00	NS NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS		mg1 530.00 580.00 91.00	NS NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS		mg/1 200.00	NS ND ND ND ND ND ND ND ND ND ND ND ND ND	1.00 25.00 25.00 5.00 10.00 37.00	100.00 mg/l 160.00	NS ND ND ND ND ND ND ND NS NS NS NS NS NS	1.00 25.00 25.00 5.00 0.20 5.00 10.00	mg/1 1140.00 20.30	NS ND ND ND ND ND ND ND ND ND ND ND NS NS NS NS	0.80 25.00 16.00 4.00 0.40 4.00 10.00
Athinory Attende Attende Attende Barban Cudnistan Cudnistan Cudnistan Cupper Lead Mescury Nickel Silver Tballist Silver Commendiestal Parametetor Biological Cryptin Demand Chemical Cryptin Demand Crypt	32.00 370.00 15.00 10.00 5.00 91.00 91.00 91.00 960.00 840.00 0.04 120.00 0.25	ND ND ND ND ND ND ND ND ND ND ND ND ND N	4.00 14.00 0.20 14.00 14.00 4.00	5.80 77.30 722.00 15.80 14.80 14.20 57.80 57.80 53.70 47.90 mg/l 0.02	ND ND ND ND ND ND ND NS NS NS NS NS NS	0.20 2.00 5.00	3.40 	NS NS NS NS NS NS NS NS NS NS NS NS NS N		540.00 600.00 81.00 1.30	NS NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS		mg/1 630.00 580.00 91.00 0.75	NS NS NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS		200.00 3.47 12.00	NS ND ND ND ND ND ND ND ND ND ND ND ND ND	1.00 25.00 25.00 5.00 10.00 37.00	100.00 360.00 15.28 0.04	NS ND ND ND ND ND ND ND ND ND ND NS NS NS NS	1.00 25.00 25.00 5.00 0.20 5.00 10.00	mg/1 1140.00 20.30 0.40	NS ND ND ND ND ND ND ND ND ND ND ND ND NS NS NS NS ND ND	0.80 25.00 16.00 4.00 0.40 4.00 10.00
Antinony Antinony Antinony Antinony Antinony Betaun Codomaan Codomaan Copper Lead Mercury Nickel Selevian Selevian Selevian Dislicen Zinc Courrentievent Person Courrentievent Person Courrentievent Person Cole and Crease Pit Selevian Cole and Crease Pit Cole and Cole and Crease P	32.00 370.00 15.00 10.00 5.00 91.00 91.00 91.00 960.00 840.00 0.04 120.00 0.25	ND ND ND ND ND ND ND ND ND ND ND ND ND N	4.00 14.00 0.20 14.00 14.00 4.00	5.80 77.30 722.00 15.80 14.80 14.20 57.80 57.80 53.70 47.90 mg/l 0.02	ND ND ND ND ND ND ND NS NS NS NS NS NS NS NS NS NS NS NS NS	0.20 2.00 5.00	3.40 	NS NS NS NS NS NS NS NS NS NS NS NS NS N		540.00 600.00 81.00 1.30	NS NS NS NS NS NS NS NS NS NS NS NS NS N		mg/1 630.00 580.00 91.00 0.75	NS NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS		mg1 200.00 3.47 0.25	NS ND ND ND ND ND ND ND ND ND ND ND ND NS NS NS NS NS	1.00 25.00 25.00 5.00 10.00 37.00	100.00 mg/l 150.00 15.28 0.04	NS ND ND ND ND ND ND ND ND ND ND ND NS NS NS	1.00 25.00 25.00 5.00 0.20 5.00 10.00	mg²l 1140.00 20.30 0.40 9.60	NS ND ND ND ND ND ND ND ND ND ND NS NS NS NS NS NS	0.80 25.00 16.00 4.00 0.40 4.00 10.00
Antinony Antinony Antinony Antinony Antinony Antinony Codomain Codomain Copper Lead Mercury Nickel Selevian Selevian Selevian Dislicen Zinc Courrentievent Persenentor Biologici Oxygen Demand Chorides Cynnice Copperie Nitrogen Nitrate Nitrate Nitrate Nitrate Nitrate Dia Ol and Greuse Dif Phosphoru	32.00 370.00 15.00 10.00 5.00 91.00 91.00 91.00 840.00 0.04 120.00 0.29 30.00	ND ND ND ND ND ND ND ND ND ND ND ND ND N	4.00 14.00 0.20 14.00 14.00 4.00	5.80 77.30 722.00 15.80 14.80 14.20 57.80 57.80 53.70 47.90 mg/l 0.02	ND ND ND ND ND ND ND ND NS NS NS NS NS NS NS NS NS NS NS NS NS	0.20 2.00 5.00	3.40 	NS NS NS NS NS NS NS NS NS NS NS NS NS N		540.00 600.00 81.00 1.30 22.00	NS NS NS NS NS NS NS NS NS NS NS NS NS N		mg/1 630.00 580.00 91.00 0.75 7.10	NS NS NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS		mg1 200.00 3.47 12.00 7.29	NS ND ND ND ND ND ND ND ND ND NS NS NS NS NS NS NS NS NS	1.00 25.00 25.00 5.00 10.00 37.00	100.00 360.00 152.28 0.04 14.00 6.50	NS ND ND ND ND ND ND ND ND ND NS NS NS	1.00 25.00 25.00 5.00 0.20 5.00 10.00	mg ² 1140.00 20.30 0.40 9.60 6.72	NS ND ND ND ND ND ND ND ND ND ND ND ND ND	0.80 25.00 16.00 4.00 0.40 4.00 10.00
Anteniory Anteniory Anteniory Anteniory Berham Coopies Berham Copper Lead Mercury Nickel Selenken Selver Thollium Vanadum Zinc Correntioned Persuenter Biologis Oxyges Densued Chemical Oxyges Densued Chemical Oxyges Densued Chemical Nitrogen Nitrate Fron Oil and Greuse pR Phenols (Total) Phonphorus Total Supended Solids	32.00 370.00 15.00 10.00 5.00 91.00 91.00 91.00 960.00 840.00 0.04 120.00 0.29 30.00	ND ND ND ND ND ND ND ND ND ND ND ND ND N	4.00 14.00 0.20 14.00 14.00 4.00	5.80 77.30 722.00 15.80 14.80 14.20 57.80 57.80 53.70 47.90 mg/l 0.02	ND ND ND ND ND ND ND NS NS NS NS NS NS NS NS NS NS NS NS	0.20 2.00 5.00	3.40 3.40 mg/l 1100.00 1300.00 170.00 14.00	NS NS NS NS NS NS NS NS NS NS NS NS NS N		mg1 540.00 600.00 1.30 22.00	NS NS NS NS NS NS NS NS NS NS NS NS NS N		mg1 639.00 390.00 91.00 0.75 7.10	NS NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS		mg1 200.60 3.47 0.25 12.00 12.00	NS ND ND ND ND ND ND ND ND ND ND ND ND NS NS NS NS NS	1.00 25.00 25.00 5.00 10.00 37.00	100.00 mg/l 1528 0.04 14.00 6.50 0.46	NS ND ND ND ND ND ND ND ND ND ND NS NS NS NS	1.00 25.00 25.00 5.00 0.20 5.00 10.00	1140.00 20.30 0.40 9.60 6.72 0.02	NS ND ND ND ND ND ND ND ND ND ND NS NS NS NS NS NS	35.00 35.00 4.00 4.00 10.00 35.00 35.00
Antibiosy Artenic Artenic Berlan Cadminian Cadminian Capper Lead Mercury Nicked Selver	32.06 370.00 15.00 10.06 5.00 91.00 91.00 91.00 91.00 91.00 0.04 90.00 92.00 0.04 90.00 92.00 0.04 90.00 0.04 90.00 0.04 90.00 0.05 90.00 0.05 90.00 0.05 90.00 90	ND ND ND ND ND ND ND ND ND ND ND ND ND N	4.00 14.00 0.20 14.00 14.00 4.00	5.80 77.30 722.00 15.80 14.80 14.20 57.80 57.80 53.70 47.90 mg/l 0.02	ND ND ND ND ND ND NS NS NS NS NS NS NS NS NS NS NS NS NS	0.20 2.00 5.00	3.40 3.40 mg/l 1100.00 1300.00 170.00 14.00 4000.00	NS NS NS NS NS NS NS NS NS NS NS NS NS N		mg/1 540.00 500.00 1.30 22.00 0.02	NS NS NS NS NS NS NS NS NS NS NS NS NS N		mg/1 580.00 580.00 91.00 0.75 7.10 0.04 1900.00	NS NS NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS		mg1 200.00 3.47 12.00 7.29 0.03	NS ND ND ND ND ND ND ND ND ND NS NS NS NS NS NS NS NS NS	1.00 25.00 25.00 5.00 10.00 37.00	100.00 mg/l 152.8 0.04 14.00 0.46	NS ND ND ND ND ND ND ND ND ND ND NS NS NS NS	1.00 25.00 25.00 5.00 0.20 5.00 10.00	mg ² 1140.00 20.30 0.40 9.60 6.72	NS ND ND ND ND ND ND ND ND ND ND ND ND ND	35.00 35.00 4.00 4.00 10.00 35.00 35.00
Antinory Antinory Antinory Antinory Antinory Burkun Cadentian Copper Lasd Mercury Nickel Stenken Steve Thalian Vandum Zinc Conventioned Personnet Chemical Oxygen Densed Chemical Oxyge	32.00 370.00 15.00 10.00 5.00 91.00 91.00 91.00 960.00 840.00 0.04 120.00 0.29 30.00	ND ND ND ND ND ND ND ND ND ND ND ND ND N	4.00 14.00 0.20 14.00 14.00 4.00	5.80 77.30 722.00 15.80 14.80 14.20 57.80 57.80 53.70 47.90 mg/l 0.02	ND ND ND ND ND ND ND NS NS NS NS NS NS NS NS NS NS NS NS	0.20 2.00 5.00	3.40 3.40 mg/1 1100.00 1300.00 170.00 14.00	NS NS NS NS NS NS NS NS NS NS NS NS NS N		mg1 540.00 600.00 1.30 22.00	NS NS NS NS NS NS NS NS NS NS NS NS NS N		mg1 639.00 390.00 91.00 0.75 7.10	NS NS NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS		mg1 200.60 3.47 0.25 12.00 12.00	NS ND ND ND ND ND ND ND ND ND NS NS NS NS NS NS NS NS NS	1.00 25.00 25.00 5.00 10.00 37.00	100.00 mg/l 1528 0.04 14.00 6.50 0.46	NS ND NS NT NT ND ND ND NS NS NS NS NS NS NS NS NS NS NS NS NS	1.00 25.00 25.00 5.00 0.20 5.00 10.00	mg/l 1140.00 20.30 0.40 9.60 6.72 0.02 1810.00	NS ND ND ND ND ND ND ND ND ND ND ND NS NS NS NS NS NS NS NS NS NS	0.80 25.00 16.00 4.00 0.40 4.00 10.00
Antiniony Antiniony Antiniony Antiniony Burham Galorization Galorizati	32.00 370,00 15.00 10.00 5.00 91.00 91.00 91.00 91.00 92.00 92.00 93.00 93.00 940.00 0.04 120.00 0.29 330.00	ND ND ND ND ND ND ND ND ND ND ND ND ND N	4.00 14.00 0.20 14.00 14.00 4.00	5.80 77.30 722.00 15.80 14.80 14.20 57.80 57.80 53.70 47.90 mg/l 0.02	ND ND ND ND ND ND ND ND ND ND ND ND ND N	0.20 2.00 5.00	3.40 3.40 mg/1 1100.00 1300.00 170.00 14.00 0.03 4000.00 29.00	NS NS NS NS ND/NS NS NS		mg1 540.00 600.00 81.00 22.00 0.02 2400.00 200.00	NS NS NS NS NS NS NS NS NS NS NS NS NS N		mg1 530.00 580.00 91.00 0.75 7.10 1900.00 320.00	YS NS		mg1 200.00 3.47 0.26 7.29 0.03 1570.00 522.00	NS ND ND ND ND ND ND NS ND NS ND NS ND NS ND NS ND NS NS NS NS	1.00 25.00 25.00 5.00 10.00 37.00	100.00 mg/1 260.00 15.22 0.04 14.00 6.50 0.46 1150.00	NS ND ND ND ND ND ND NS ND NS ND NS NS NS NS NS NS NS	1.00 25.00 25.00 5.00 0.20 5.00 10.00	mg1 1140.00 20.30 0.40 9.60 6.72 0.02 11810.00	NS ND NS ND ND ND ND ND ND NS NS NS NS NS NS NS	35.00 35.00 4.00 4.00 10.00 35.00 35.00
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	ND NS ND NS NS ND NS NS NS NS	0,40 4.00 10.00	400.00	ND NS ND ND ND ND ND NS NS NS NS	0.40 4.00 15.00	mg/1 1400.00	ND NS ND NS NS ND/NS NS NS	0.20 5.00	2.00 100.00 50.00 2.00 	5000.00 mg/l	
	ND NS ND NS NS ND ND NS NS	0,40 4.00 10.00	400.00	ND NS ND NS ND ND/NS NS NS NS	0.40 4.00 15.00	mg/1 1400.00 160.00 90.00 0.04	ND ND ND NS ND/NS NS NS	0.20 5.00	2.00 100.00 50.00 2.00 mg/1 0.20	5000.00 mg/l 250.00	
	ND NS ND NS NS NS NS NS NS NS NS	0,40 4.00 10.00	400.00	ND NS ND ND NS ND NS	0.40 4.00 15.00	mg/1 1400.00 160.00 90.00	ND NS ND NS NS NS/ NS NS NS	0.20 5.00	2.00 100.00 50.00 2.00 	5000.00 mg/l	
	ND NS ND NS NS ND NS NS NS NS	0,40 4.00 10.00	400.00 41.60 0.50 12.00	ND NS ND ND ND ND ND NS NS NS NS	0.40 4.00 15.00	38g/1 1400.00 160.00 90.00 90.00 11.00	ND NS ND NS NS ND/NS NS NS	0.20 5.00	2.00 100.00 50.00 2.00 	3000.00 mg/l 250.00 0.30	
	ND NS ND NS NS NS NS NS NS NS NS	0,40 4.00 10.00	400.00 41.60 0.50 12.00 6.84	ND NS ND ND NS ND NS	0.40 4.00 15.00	mg/1 1400.00 160.00 90.00 0.04	ND NS ND NS NS NS/ NS NS NS	0.20 5.00	2.00 100.00 50.00 2.00 	5000.00 mg/l 250.00	
	ND ND ND ND ND ND ND NS NS NS NS NS NS NS	0,40 4.00 10.00	400.00 41.60 0.50 12.00	ND NS ND NS NS ND NS NS NS NS NS NS NS NS NS NS	0.40 4.00 15.00	mg/1 1400.00 160.00 90.00 0.04 11.00	ND NS ND NS NS NS/ NS NS NS	0.20 5.00	2.00 100.00 50.00 2.00 	3000.00 mg/l 250.00 0.30	
	ND NS ND ND ND ND ND NS NS NS NS NS NS NS NS	0,40 4.00 10.00	400.00 41.60 0.50 12.00 6.84	ND NS ND ND ND ND ND NS NS NS NS	0.40 4.00 15.00	mg/1 1400.00 160.00 90.00 0.04 11.00	ND ND ND NS NS NS NS NS NS NS	0.20 5.00	2.00 100.00 50.00 2.00 	5000.00 mg/l 250.00 0.30 6.5-8.5	
	ND ND ND ND ND ND ND NS NS NS NS NS NS NS	0,40 4.00 10.00	400.00 41.60 0.50 12.00 6.84	ND NS ND NS NS ND NS NS NS NS NS NS NS NS NS NS	0.40 4.00 15.00	mg/1 1400.00 160.00 90.00 0.04 11.00	ND NS ND NS NS NS NS NS NS NS NS NS	0.20 5.00	2.00 100.00 50.00 2.00 	5000.00 mg/l 250.00 0.30 6.5-8.5	
	ND NS ND ND ND ND ND NS NS NS NS NS NS NS NS	0,40 4.00 10.00	400.00 41.60 0.50 12.00 6.84 0.04	ND NS ND ND ND ND ND NS NS NS NS	0.40 4.00 15.00	mg/l 1400.00 90.00 0.04 11.00 7.10 0.06	ND NS ND NS NS NS NS NS NS NS NS NS	0.20 5.00	2.00 100.00 50.00 2.00 	5000.00 mg/l 250.00 0.30 6.5-8.5	
	ND NS ND ND ND ND NS NS NS NS NS NS NS NS NS	0,40 4.00 10.00	400.00 41.60 0.50 12.00 6.84 0.04 3064.00	ND NS ND ND ND ND ND NS NS NS NS	0.40 4.00 15.00	mg1 1400.00 90.00 0.04 11.00 7.10 0.05 4340.00	ND ND ND NS NS NS NS NS NS NS NS NS NS NS	0.20 5.00	2.00 100.00 50.00 2.00 	5000.00 mg/l 250.00 0.30 6.5-8.5	
	ND NS ND ND NS NS ND NS NS NS NS NS NS NS	0,40 4.00 10.00	400.00 41.60 0.50 12.00 6.84 0.04 3064.00 370.00	ND NS ND ND ND ND ND NS NS NS NS	0.40 4.00 15.00	mg/1 1400.00 90.00 0.04 11.00 7.10 0.06 4340.00 89.00	ND NS ND NS NS NS NS NS NS NS NS NS	0.20 5.00	2.00 100.00 50.00 2.00 	5000.00 mg/l 250.00 0.30 6.5-8.5	
	ND NS ND ND ND ND NS NS NS NS NS NS NS NS NS	0,40 4.00 10.00	400.00 41.60 0.50 12.00 6.84 0.04 3064.00 370.00	ND NS ND ND ND NS NS NS NS NS NS NS NS NS NS NS	0.40 4.00 15.00	mg/1 1400.00 90.00 0.04 11.00 7.10 0.06 4340.00 89.00	ND ND ND NS NS NS NS NS NS NS NS NS NS NS	0.20 5.00	2.00 100.00 50.00 2.00 	5000.00 mg/l 250.00 0.30 6.5-8.5	
	ND NFD NFD NFD NFS NFS NFS NFS NFS NFS NFS NFS NFS NFS	0,40 4.00 10.00	400.00 41.60 0.50 12.00 6.84 0.04 3064.00 370.00 96.00	ND NS ND NS NS NS NS NS NS NS NS NS NS	0.40 4.00 15.00	mg/l 1400.00 90.00 0.04 11.00 7.10 0.06 4340.00 89.00 220.00	ND ND ND NS NS NS NS NS NS NS NS NS NS NS	0.20 5.00	2.00 100.00 50.00 2.00 	5000.00 mg/l 2.50.00 0.30 6.5:8.5 500.00 2.50.00	
	ND ND ND NS NS ND ND NS NS NS NS NS NS NS	0,40 4.00 10.00	400.00 41.60 0.50 12.00 6.84 0.04 3064.00 370.00	ND NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS	0.40 4.00 15.00	mg/1 1400.00 90.00 0.04 11.00 7.10 0.06 4340.00 89.00	ND NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS	0.20 5.00	2.00 100.00 50.00 2.00 	5000.00 mg/l 250.00 0.30 6.5-8.5	
	ND NS MD NS	0,40 4.00 10.00	400.00 41.60 0.50 12.00 6.84 0.04 3064.00 370.00 96.00	ND NS ND ND NS ND ND NS NS NS NS NS NS NS NS NS NS NS NS NS	0.40 4.00 15.00	mg/l 1400.00 90.00 0.04 11.00 7.10 0.06 4340.00 89.00 220.00	ND NS	0.20 5.00	2.00 100.00 30.00 2.00 0.20 10.00 1.00	5000.00 mg/l 2.50.00 0.30 6.5:8.5 500.00 2.50.00	
	ND NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS	0,40 4.00 10.00	400.00 41.60 0.50 12.00 5.84 0.04 3064.00 370.00 96.00 17.00	ND NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS	0.40 4.00 15.00	3.50	ND NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS	0.20 5.00	2.00 100.00 50.00 2.00 	5000.00 mg/l 2.50.00 0.30 6.5:8.5 500.00 2.50.00	
	ND NS MD NS	0,40 4.00 10.00	400.00 41.60 0.50 12.00 5.84 0.04 3064.00 370.00 96.00 17.00 38.20	ND NS ND ND NS ND ND NS NS NS NS NS NS NS NS NS NS NS NS NS	0.40 4.00 15.00	mg/l 1400.00 160.00 0.04 11.00 7.10 0.06 4340.00 89.00 220.00 220.00	ND NS	0.20 5.00	2.00 100.00 2.00 0.20 10.00 1.00	5000.00 mg/l 2.50.00 0.30 6.5:8.5 500.00 2.50.00	
	YD NS NS NS NS NS ND/NS NS ND ND ND ND NS NS	0,40 4.00 10.00	400.00 41.60 0.50 12.00 5.84 0.04 3064.00 370.00 96.00 17.00	ND NS NS	0.40 4.00 15.00	3,900	ND NS	0.20 5.00	2.00 100.00 2.00 0.20 10.00 1.00	5000.00 mg/l 2.50.00 0.30 6.5:8.5 500.00 2.50.00	
	YD NS NS NS	0,40 4.00 10.00	400.00 41.60 0.50 12.00 5.84 0.04 3064.00 370.00 96.00 17.00 38.20	ND NS ND ND NS	0.40 4.00 15.00	mg/l 1400.00 160.00 0.04 11.00 7.10 0.06 4340.00 89.00 220.00 220.00	ND ND NS NS NS NS	0.20 5.00	2.00 100.00 2.00 0.20 10.00 1.00	5000.00 mg/l 2.50.00 0.30 6.5:8.5 500.00 2.50.00	
	YD NS NS NS NS NS ND/NS NS ND ND ND ND NS NS	0,40 4.00 10.00	400.00 41.60 0.50 12.00 5.84 0.04 3064.00 370.00 96.00 17.00 38.20	ND NS NS	0.40 4.00 15.00	3,900	ND NS	0.20 5.00	2.00 100.00 2.00 0.20 10.00 1.00	5000.00 mg/l 2.50.00 0.30 6.5:8.5 500.00 2.50.00	

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	Pi	I IV, APR 8		со	MP, DEC	88	со	MP, MAY	89	co	MP, DEC	89	co	DMP, MAY	98	co	MP, JUN		PH III,	IV: WEST		PH 11	
	Res		Det Limit	Rest	ult	Det Limit	Res	ult	Det Limit	Res	ult	Det Limit	Res	nult	Det Limit	Res		Det Limit		suit	Det Limit		esult
Volatiles	ug/t	ND/NS		աց/I	ND/NS		ug/1	ND/NS		ug/1	ND/NS		ug/l	ND/NS		(I	ND/NS		ug/l	ND/NS		- ug/1	N
Acetone		NS			NS			NS			NS			NS			NS			NS			+
2-Butanone		NS			NS			NS			NS			NS			NS			NS			+
Carbon Disulfide		NS			NS			NS		· · ·	NS			NS			NS NS			NS NS			-
Chloromethane		NS			NS			NS			NS			NS			NS			NS			+
1.1-Dichloroethane		NS			NS			NS			NS NS			NS NS			NS			NS			
1.2-Dichloroethane		NS			NS			NS	I		NS			NS		t	NS			NS			+
1.4-Dioxane		NS		ł	NS NS			NS NS			NS			NS			NS			NS			-
Ethylbeazene		NS			NS NS			NS			NS			NS			NS			NS			+
Methyl Ethyl Ketone (MEK)		NS NS			NS			NS			NS			NS			NS			NS			1
4-Methyl-2-Pentanone		NS			NS			NS			NS			NS			NS			NS			1
Methylene Chloride		NS			NS			NS			NS			NS			NS			NS			
1.1.1-Trichloroethane		ND	1.00		ND	5.00		ND	5.00		ND	5.00		ND	20.00		ND	10.00		ND	5.00		
Trichloroethylene		ND	1.00		ND	5.00		ND	5.00		ND	5.00		ND	20.00		ND	10.00		ND	5.00		
Trichlorotluoromethane		NS			NS			NS			NS			NS			NS			NS			
Xvlenes (Total)		NS			NS			NS			NS			NS			NS			NS	I		+
																			ļ	100.010			+ N
Semi-Volatiles	ug/i	ND/NS		ug/l	ND/NS		ug/l	ND/NS		ug/l	ND/NS		ug/l	ND/NS		ug/l	ND/NS		ug/l	ND/NS		ug/l	+
Acenaphthene		NS			NS			NS			NS			NS			NS			NS NS	<u> </u>	L	+
Acetophenone		NS			NS			NS			NS			NS			NS				<u> </u>		+
Benzene		NS			NS			NS			NS			NS			NS NS	ļ	├ ──	NS NS		t	+
Benzoic Acid		NS			NS			NS			NS			NS NS		├	NS NS		 	NS		+	+
Bis(2-Ethylhexyl)phthalate		NS			NS			NS NS			NS			NS NS			NS NS			NS	t	1	+
2.4-Dimethylphenol		NS	ł		NS NS			NS NS			NS			NS		├───	NS		t	NS	1	+	1
Di-n-Butyl phthalate		NS			NS			NS			NS			NS			NS		1	NS	1	1	1
Diethyl Phthalate		NS NS		ł	NS			NS			NS			NS		· · · · · -	NS		1	NS	1		1
Fluoranthene		NS			NS			NS			NS			NS			NS		1	NS			1
Napthalene		NS			NS			NS			NS			NS			NS			NS			T
o-Creosol		NS			NS			NS	-		NS			NS			NS			NS		1	Τ.
Phenathrene		NS		t	NS			NS			NS			NS			NS			NS		1	1
Phenol		NS			NS			NS			NS			NS			NS	L		NS	Į	_	+
Pyrene		NS			NS			NS			NS			NS			NS	<u> </u>	 	NS	 	+	+
																			L	AND OLD			
Herbicides/Pesticides	ug/l	ND/NS		ug/1	ND/NS		ug/l	ND/NS		ug/i	ND/NS		ug/l	ND/NS		աց/Լ	ND/NS		ug/l	ND/NS		ug/l	+-
Alpha-BHC		NS			NS			NS			NS			NS			NS			NS NS			+
Endrin		NS			NS			NS			NS			NS			NS			NS			+
Dieldrin		NS			NS			NS			NS			NS			NS			NS			+
Dimethoate		NS			NS			NS			NS NS			NS NS			NS NS		<u>+</u>	NS	+	+	
Disulfaton		NS			NS NS			NS NS			NS			NS			NS		1	NS	1	1	
2.4.5-T		NS NS			NS			NS NS			NS			NS			NS	t	1	NS	1.	1	1
2.4-D HxCDD	l	NS NS			NS			NS			NS			NS			NS		1	NS	L .		1
HxCDD	t —	NS			NS			NS			NS			NS			NS			NS		1	T
Heavy Metals	ug/l	ND/NS		ug/1	ND/NS		щ(/1	ND/NS		ug/t	ND/NS		ug/l	ND/NS		ug/l	ND/NS		ug/l	ND/NS		ug/1	N
Antimony	<u> </u>	NS			NS			NS			NS			NS			NS	L	1	NS		1	+
Arsenic	40.00			9.00			37.00			57.00			32.00	I		63.00		I	42.00			39.00	-
Barium		NS			NS			NS			NS	ļ		NS	ļ		NS		+	NS	<u> </u>	+	-
Cadmium		ND	10.00	12.00				ND	1.00	24.00		10.00	14.00		50.00	21.00		<u> </u>	22.00	ND	40.00	+	
Chromium		ND	10.00	23.00		ļ	17.00		 		ND ND	50.00 6.00	28.00	ND	50.00	40.00 25.00		<u> </u>	+	ND	20.00	22.00	+
Copper		ND	10.00	50.00	100	- 100	7.00				ND	2.00	12.00	1	· ·	3.00		<u> </u>	29.00	1		1	+
Lead		ND	5.00 0.20		ND	2.00	4.00	ND	0.20	+	ND	0.20	12.00	ND	0.20		ND	0.20	1	ND	0.80	1	1
Mercury	 	ND NS	0.20		ND NS	0.20		NS	V.20	1	NS	0.00		NS		t	NS	1	1	NS	1		1
Nickel Selenium	 	ND	5.00	3.00	1.13	<u> </u>	3.00		1	2.00	<u> </u>	1	l	ND	2.00		ND	2.00		ND	8.00		
Silver	1	ND	10.00	16.00		<u> </u>	10.00		İ		ND	3.00		ND	5.00	9.00				ND	32.00		T
Thallium	i	NS			NS	1		NS			NS			NS			NS	1		NS	1		
Vanadium	1	NS			NS			NS			NS			NS			NS		1	NS		+	-
Zinc	220.00			62.00			35.00			27.00			200.00	L	ļ	27.00		I	45.00	+		100.00	4
									ļ	L			<u> </u>	1	l	l	1 mar		+	him are		-	+.
Conventional Parameters	mg/l	ND/NS		mg/l	ND/NS		mg/l	ND/NS	l	mg/l	ND/NS	┣───	mg/l	ND/NS		mg/1	ND/NS		<u>nug/l</u>	ND/NS		mg/l	-+ '
Biological Oxygen Demand	I	NS	L		NS	<u> </u>	<u> </u>	NS		130.00	210	+	67.00	NS	<u> </u>	68.00	NS	+	1	NS	+	+	
Chemical Oxygen Demand		NS	ļ	090.00	NS	l	1000.00	NS	+	580.00	NS	+	1000.00		 	880.00		+	1100.00		+	1000.0	0
Chlorides	740.00	NS	<u> </u>	980.00	NS	+	1000.00	NS	<u> </u>	1,00,00	NS	1	1000.00	NS	<u> </u>		NS	t	1	NS		1	+
Cyanide	140.00	+ NS		130.00	143	+	140.00	- 113	t	95.00	1.3	+	110.00	+ ^ -	1	95.00	1	1	480.00		1	460.00	21
Ammonia, Nitrogen Organic Nitrogen	1+0.00	ND	<u> </u>	10.00		+	1.40.00	ND	t	1	ND	1	190.00	1	t	1	ND	1	1	ND	1		
Nitrate	0.01	+	<u> </u>	0.02	t	1	0.02	†	1	0.26	1	1	0.02		1		ND	0.20	0.22			0.18	_
Nitrite	<u> </u>	NS	1	1	NS	1	<u> </u>	NS			NS			NS	1		NS			NS			
Iron	23.00	1		0.72			19.80			33.00		Ľ	18.00	1		13.00	1		4.50			6.50	_
Oil and Grease	1	NS	<u> </u>		NS			NS		1	NS		1	NS		1	NS		-	NS			1
pH	6.75	I		7.07			7.40			6.70		1	L	NS	<u> </u>	L	NS	+		NS		+	-
Phenols (Total)	0.08		[0.03	1	ļ		ND	0.00	L	ND	0.01	 	ND	0.02	I	ND	0.01	0.06	10		0.05	_
Phosphorus	1	NS	I	L	NS	 	I	NS	+		NS	+		NS	 	l	NS	+		NS NS		+	
Total Suspended Solids	1	NS	↓	-	NS	+	10000.00	NS	+	3800.00	NS	l	3800.00	NS	+	4300.00	NS	+	4300.00		+	4300.0	
Total Dissolved Solids	4180.00	1	<u> </u>	4340.00	<u> </u>		5000.00	<u> </u>	+	170.00		+	370.00		+	220.00	+	+	4300.00			190.00	
Sulfate	280.00	+	├ ──	1100.00	+	+	1000.00 460.00	+		620.00		+	370.00		+	32.00	+	1	400.00			380.0	
Total Organic Carbon	260.00	NS	+	360.00	NS	+	+00.00	NS	+	020.00	NS	+ ·	330.00	NS	1	+	NS	1	-	NS		1	+
TOC (Duplicate)	+	NS NS	+	+	NS	+	 	NS	-†	1	NS	+	1	NS	1	1	NS	1	+	NS		1	+
Total Organic Halogens	+	NS NS	+		NS	+	+	NS	+	1	NS	+	1	NS	1	1	NS	1	+	NS		1	
Magnesium Mangenese	5.20	+ 115	<u>+</u>	8.80	1	+	5.07	1 10	1	6.70	1	1	4.00	· · · · · · · · · · · · · · · · · · ·	1	5.00	1	1	0.99			1.80	
Potassium		NS	t	V.00	NS	1	1	NS	1	1	NS	1	1	NS	1	1	NS			NS			
Sodium	+	NS	1	1	NS	+	1	NS	1	1	NS	1	1	NS	T	1	NS			NS			
	1500.00		1	1400.00	1	1	1600.00		1	1800.00			1700.00			2100.00				NS			T
			+	270.00	1	1	295.00	1	1	250.00			120.00			235.00			210.00			210.0	0 1
Alkalinity	270.00	1		270.00																	_		
Alkalinity Calcium				1700.00			1400.00			1530.00			790.00			1600.00			1400.00	0		1400.0	
Alkalinity	270.00	NS			NS		1400.00	NS		1530.00	NS		790.00	NS		1600.00	NS NS						

b: Sampling for the 100 Sand Company Cleanfill of New York.

PH III, <u>Re</u> s	IV: WEST	(10/90) Det Linnit	PH III. <u>Re</u> s		(19/90) Det Limit	Res		1/90) Det Limit	Re		198) Det Limit	MCL	Secondary MCL	Guidan Cenc
ug/l	ND/NS		ug/l	ND/NS		ug/1	ND/NS		wg/l	ND/NS		ug/l	ug/i	ug/l
	NS		_	NS			NS			NS				700.00
	NS			NS			NS			NS				4200.0
†	NS			NS			NS			NS				700.00
+	NS			NS			NS			NS				2.70
ł	NS			NS			NS		-	NS				700.00
+				NS			NS			NS		3.00		/00.00
	NS						NS			NS		5.00		5.00
	NS			NS									700.00	5.00
	NS			NS			NS			NS			700.00	4300.0
	NS			NS			NS			NS				4200.0
	NS			NS			NS			NS				
	NS			NS			NS			NS		5.00		
	NS			NS			NS			NS		1000.00		
	ND	5.00		ND	5.00		ND	5.00		ND	5.00	200.00		
	ND	5.00		ND	5.00		ND	5.00		ND	5.00	3.00		
	NS			NS			NS			NS				2100.0
	NS			NS			NS			NS		10000.00		
ug/l	ND/NS		ug/1	ND/NS		ug/1	ND/NS		ug/l	ND/NS		ug/l	ug/l	ug/
	NS			NS		* _+	NS			NS				20.0
				NS			NS			NS				700.0
	NS											1.00		700.0
	NS			NS			NS			NS		1.00		28000
	NS			NS			NS			NS				10000
	NS			NS			NS			NS			<u> </u>	400.0
	NS			NS			NS			NS				400.0
	NS			NS			NS		ļ	NS	L			700.0
1	NS			NS			NS			NS				5600.
	NS			NS			NS			NS				280.0
	NS			NS			NS			NS				6.80
	NS			NS			NS			NS				35.0
	NS			NS			NS			NS				350.0
	NS			NS			NS			NS				10.0
	NS			NS			NS			NS				10.0
	NS		_	NS			NS			NS				210.0
ug/1	ND/NS		ug/l	ND/NS		ug/l	ND/NS		ug/l	ND/NS		ug/l	ug/l	ug/
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42.00 22.00 29.00 45.00 mg/l 1100.00 480.00 0.22 4.50 0.06 4300.00 48.00	NS NS ND/NS NS ND ND ND ND ND ND NS NS NS NS NS NS NS NS NS	20.00 0.80 8.00	39.00 222.00 100.00 mg/l 1000.00 460.00 0.18 6.50 0.05 0.05	NS ND/NS ND/NS ND ND ND ND ND ND NS NS NS NS NS NS NS	40.00 20.00 0.80 8.00	54.00 12.00 630.00 37.00 21.00 0.17 14.00 0.33 4600.00 440.00	NS NS ND/NS ND ND ND ND ND ND ND ND NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS	100.00 50.00 0.80 20.00 8.00	41.00 7.00 15.00 8.60 19.00 28.00 28.00 580.00 250.00 32.00 32.00 0.04 1400.00 360.00	NS ND/NS NS ND ND ND ND NS ND NS NS NS NS NS NS	0.80	ug/l 6.00 50.00 2000.00 5.00 1000.00 1000.00 50.00 2.00 2.00 2.00 2.00 0.00 50.00 2.00 2	100.00 5000.00 wg/l 250.00 6.5-8.5 500.00	49.0
42.00 22.00 29.00 45.00 mg/l 1100.00 480.00 0.22 4.50 0.06 4300.00 48.00	NS NS NDMNS NS ND ND ND ND ND ND NS NS NS NS NS NS NS NS NS	20.00 0.80 8.00	39.00 222.00 100.00 mg/l 1000.00 460.00 0.18 6.50 0.05 0.05	NS ND/NS NS ND ND ND ND ND ND ND ND NS NS NS NS NS NS NS NS NS NS NS NS NS	40.00 20.00 0.80 8.00	54.00 12.00 630.00 37.00 21.00 0.17 14.00 0.33 4600.00 440.00	NS NS NS NS NS ND ND ND ND ND ND ND ND ND ND ND ND ND	100.00 50.00 0.80 20.00 8.00	41.00 7.00 15.00 8.60 19.00 28.00 28.00 580.00 250.00 32.00 32.00 0.04 1400.00 360.00	NS ND/NS NS ND ND ND ND NS NS NS NS NS NS NS NS	0.80	ug/l 6.00 50.00 2000.00 5.00 1000.00 1000.00 50.00 2.00 2.00 2.00 2.00 0.00 50.00 2.00 2	100.00 5000.00 wg/l 250.00 6.5-8.5 500.00	49.0
42.00 22.00 29.00 45.00 mg/l 1100.00 480.00 0.22 4.50 0.06 4300.00	NS NS ND/NS NS ND ND ND ND ND ND NS NS NS NS NS NS NS NS NS	20.00 0.80 8.00	39.00 22.00 100.00 mg/l 1000.00 460.00 0.18 6.50 4300.00 190.00 380.00	NS ND/NS ND/NS ND ND ND ND ND ND NS NS NS NS NS NS NS	40.00 20.00 0.80 8.00	54.00 12.00 	NS NS ND/NS ND ND ND ND ND ND ND ND NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS	100.00 50.00 0.80 20.00 8.00	41.00 7.00 15.00 8.60 19.00 28.00 28.00 28.00 28.00 28.00 28.00 28.00 28.00 250.00 250.00 250.00 250.00 250.00	NS ND/NS NS ND ND ND ND NS ND NS NS NS NS NS NS	0.80	ug/l 6.00 50.00 2000.00 5.00 1000.00 1000.00 50.00 2.00 2.00 2.00 2.00 0.00 50.00 2.00 2	100.00 5000.00 wg/l 250.00 6.5-8.5 500.00 250.00	49.0
42.00 22.00 29.00 45.00 mg/l 1100.00 480.00 0.22 4.50 0.06 4300.00 48.00	NS NS ND/NS NS ND ND ND ND ND ND NS NS NS NS NS NS NS NS NS NS NS NS NS	20.00 0.80 8.00	39.00 222.00 100.00 mg/l 1000.00 460.00 0.18 6.50 0.05 0.05	NS ND/NS NS ND ND ND ND ND ND NS NS NS NS NS NS NS NS NS NS	40.00 20.00 0.80 8.00	54.00 12.00 630.00 37.00 21.00 0.17 14.00 0.33 4600.00 440.00	NS NS ND/NS ND ND ND ND ND ND ND ND NS NS NS NS NS NS NS NS NS NS NS NS NS	100.00 50.00 0.80 20.00 8.00	41.00 7.00 15.00 8.60 19.00 28.00 28.00 580.00 250.00 32.00 32.00 0.04 1400.00 360.00	NS ND/NS NS ND ND ND NS NS NS NS NS NS NS NS NS	0.80	ug/l 6.00 50.00 2000.00 5.00 1000.00 1000.00 50.00 2.00 2.00 2.00 2.00 0.00 50.00 2.00 2	100.00 5000.00 wg/l 250.00 6.5-8.5 500.00	49.0
42.00 22.00 29.00 45.00 mg/l 1100.00 480.00 0.22 4.50 0.06 4300.00	NS NDMNS NS ND ND ND ND ND ND ND NS NS NS NS NS NS NS NS NS NS NS	20.00 0.80 8.00	39.00 22.00 100.00 mg/l 1000.00 460.00 0.18 6.50 4300.00 190.00 380.00	NS ND/NS ND ND ND ND ND ND ND ND NS NS NS NS NS NS NS NS NS	40.00 20.00 0.80 8.00	54.00 12.00 	NS NS NS ND/NS NS ND ND ND ND ND ND ND ND ND ND ND NS NS NS NS NS	100.00 50.00 0.80 20.00 8.00	41.00 7.00 15.00 8.60 19.00 28.00 28.00 28.00 28.00 28.00 28.00 28.00 28.00 250.00 250.00 250.00 250.00 250.00	NS ND/NS NS ND ND ND ND NS NS NS NS NS NS NS NS NS	0.80	ug/l 6.00 5000 2000.00 1000.00 15.00 2.00 1000.00 5.00 2.00 100.00 5.00 2.00 100.00 5.00 100.00 5.00 100.00 100.00 100.00 1.00 1	100.00 5000.00 wg/l 250.00 6.5-8.5 500.00 250.00	49.0
42.00 22.00 29.00 45.00 mg/l 1100.00 480.00 0.22 4.50 0.06 4300.00	NS NS ND/NS ND ND ND ND ND ND ND ND NS NS NS NS NS NS NS NS NS NS NS	20.00 0.80 8.00	39.00 22.00 100.00 mg/l 1000.00 460.00 0.18 6.50 4300.00 190.00 380.00	NS ND/NS ND/NS ND ND ND ND ND NS NS NS NS NS NS NS NS NS NS NS NS NS	40.00 20.00 0.80 8.00	54.00 12.00 	NS NS NS ND/NS ND ND ND ND ND NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS	100.00 50.00 0.80 20.00 8.00	41.00 7.00 15.00 8.60 19.00 28.00 28.00 28.00 28.00 28.00 28.00 28.00 28.00 250.00 250.00 250.00 250.00 250.00	NS ND/NS NS ND ND NS NS NS NS NS NS NS NS NS NS NS NS NS	0.80	ug/l 6.00 50.00 2000.00 5.00 1000.00 1000.00 50.00 2.00 2.00 2.00 2.00 0.00 50.00 2.00 2	100.00 5000.00 wg/l 250.00 6.5-8.5 500.00 250.00	49.0
42.00 22.00 29.00 45.00 mg/l 1100.00 480.00 0.22 4.50 0.06 4300.00 430.00	NS NDMNS NS ND ND ND ND ND ND ND NS NS NS NS NS NS NS NS NS NS NS	20.00 0.80 8.00	39.00 22.00 100.00 meg/1 1000.00 460.00 0.18 6.50 0.05 4300.00 190.00 380.00	NS ND/NS ND ND ND ND ND ND ND ND NS NS NS NS NS NS NS NS NS	40.00 20.00 0.80 8.00	54.00 12.00 	NS NS NS ND/NS NS ND ND ND ND ND ND ND ND ND ND ND ND NS NS NS NS NS	100.00 50.00 0.80 20.00 8.00	41.00 7.00 15.00 8.60 19.00 28.00 28.00 28.00 28.00 28.00 250.00 250.00 32.00 32.00 250.00 250.00 250.00 7.40	NS ND/NS NS ND ND ND ND NS NS NS NS NS NS NS NS NS	0.80	ug/l 6.00 5000 2000.00 1000.00 15.00 2.00 1000.00 5.00 2.00 100.00 5.00 2.00 100.00 5.00 100.00 5.00 100.00 100.00 100.00 1.00 1	100.00 5000.00 wg/l 250.00 6.5-8.5 500.00 250.00	49.0
42.00 22.00 29.00 45.00 mg/l 1100.00 480.00 0.22 4.50 0.06 4300.00	NS NS ND/NS ND ND ND ND ND ND ND ND NS NS NS NS NS NS NS NS NS NS NS	20.00 0.80 8.00	39.00 22.00 100.00 mg/l 1000.00 460.00 0.18 6.50 1000.00 190.00 380.00 1.80	NS NS ND/NS ND ND ND ND ND ND ND NS ND NS NS NS NS NS NS NS NS NS NS NS	40.00 20.00 0.80 8.00	54.00 12.00 12.00 	NS NS NS ND/NS ND ND ND ND ND NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS	100.00 50.00 0.80 20.00 8.00	41.00 7.00 15.00 8.60 19.00 28.00 28.00 28.00 580.00 250.00 32.00 32.00 1400.00 360.00 240.00 7.40	NS ND/NS NS ND ND NS NS NS NS NS NS NS NS NS NS NS NS NS	0.80	ug/l 6.00 5000 2000.00 1000.00 15.00 2.00 1000.00 5.00 2.00 100.00 5.00 2.00 100.00 5.00 100.00 5.00 100.00 100.00 100.00 1.00 1	100.00 5000.00 wg/l 250.00 6.5-8.5 500.00 250.00	49.0
42.00 22.00 29.00 45.00 mg/l 1100.00 480.00 0.22 4.50 0.06 4300.00 430.00 0.99	NS ND/NS ND/NS ND ND ND ND ND NS NS NS NS NS NS NS NS NS NS NS NS NS	20.00 0.80 8.00	39.00 22.00 100.00 meg/1 1000.00 460.00 0.18 6.50 0.05 4300.00 190.00 380.00	NS ND/NS ND ND ND ND ND ND ND ND ND NS NS NS NS NS NS NS NS NS NS NS NS NS	40.00 20.00 0.80 8.00	54.00 12.00 	NS NS ND/NS ND ND ND ND ND ND ND NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS	100.00 50.00 0.80 20.00 8.00	41.00 7.00 15.00 8.60 19.00 28.00 28.00 28.00 28.00 28.00 250.00 250.00 32.00 32.00 250.00 250.00 250.00 7.40	NS ND/NS NS ND/NS NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS	0.80	ug/l 6.00 5000 2000.00 1000.00 15.00 2.00 1000.00 5.00 2.00 100.00 5.00 2.00 100.00 5.00 100.00 5.00 100.00 100.00 100.00 1.00 1	100.00 5000.00 wg/l 250.00 6.5-8.5 500.00 250.00	49.0
42.00 22.00 29.00 45.00 mg/l 1100.00 480.00 0.22 4.50 0.06 4300.00 480.00 0.99 0.99	NS ND/NS ND/NS ND ND ND ND ND NS NS NS NS NS NS NS NS NS NS NS NS NS	20.00 0.80 8.00	39.00 22.00 100.00 mg/l 1000.00 460.00 0.18 6.50 1000.00 190.00 380.00 1.80	NS NS ND/NS ND ND ND ND ND ND ND NS ND NS NS NS NS NS NS NS NS NS NS NS	40.00 20.00 0.80 8.00	54.00 12.00 12.00 	NS NS NS ND/NS ND ND ND ND ND NS ND NS NS NS NS NS NS NS NS NS NS NS NS NS	100.00 50.00 0.80 20.00 8.00	41.00 7.00 15.00 8.60 19.00 28.00 28.00 28.00 580.00 250.00 32.00 32.00 1400.00 360.00 240.00 7.40	NS ND/NS NS ND ND NS NS NS NS NS NS NS NS NS NS NS NS NS	0.80	ug/l 6.00 5000 2000.00 1000.00 15.00 2.00 1000.00 5.00 2.00 100.00 5.00 2.00 100.00 5.00 100.00 5.00 100.00 100.00 100.00 1.00 1	100.00 5000.00 wg/l 250.00 6.5-8.5 500.00 250.00	49.0

Table A.33: Cha	aracteristics of the Sanifill Landfills of Houston, Texas.
LANDFILL:	Houston Landfills, Texas.
OWNER/OPERATOR:	Sanifill Inc. Houston, Texas.
LITERATURE SOURCE:	Properties of Leachate from Construction/Demolition Waste Landfills James M. Norstrom, Charles E. Williams, and Paul A. Pabor. In Proceedings Fourteenth Annual Madison Waste Conference, Sept 25-26, 1991.
WASTE TYPE:	Construction waste and demolition debris. Includes in descending order of % volume: wood brush, and grass; concrete, rock, asphalt, and soil; paper and cardboard; metal, rubber, plastic, and glass.
ACREAGE:	Unknown.
YEARS IN SERVICE:	Opened in mid to late 1980's.
LINER SYSTEM:	Yes.
LEACHATE SYSTEM:	Unknown.
LEACHATE SAMPLE:	Leachate sample taken from leachate wells developed at each of the landfills for this study. Approximate depth to the bottom of the wells from the top of the landfills ranged from 23 to 60 feet.
MISCELLANEOUS:	The investigators sampled leachate from three C&D landfills owned by Sanifill and located in Houston Texas. Two samples were taken from each landfill and analyzed for a variety of parameters. Only the minimum and maximum analytical results were presented in the report.

Table A.34: Sampling for the Sanifill Landfills of Houston, Texas.

		nimum			Maximum		Primary	Secondary	Guidance
	Result		Det Limit	Result	ult Virgense	<u>Det Limit</u>	MCL	MCL	Conc
Volatiles	1/81	SNIUS	T	Ian	NIGN		-An		100.00
Acetorie	Ī	CN 3			er v				4200.00
2-Butanone		e s	T		evi ov				100.001
Carbon Lisuinde		c s			SN				2.70
					S N				700.00
1, I-Dicition octuarie	T	N N			SN N		3.00		
		NN			SN				5.00
1,4-LJOXARC Etholbantana	ĺ	SN			SN			700.00	
	T	e n			NS				4200.00
Meulyl Eulyl Retone (MER.)		an a			NN				
4-Mettry-2-Pendatione		SN SIN	T		SN SN		\$ 00		
Methylene Unonde	T	011	T	T	Na		1000.00		
Toluene	T	2 S			aN		200.00		
1, 1, 1-trichloroethane		ŝ			CN1		00 5		
Trichloroethylene		SZ			ŝ		00.0		00000
Trichlorofluoromethane		NS			Z				7100.00
Xylenes (Total)		SN			NS		10000.00		
							•	•	
Semi-Volatiles	ng/	ND/NS		l/ân	NDINS		13n	ngu	181
Acenaphthene		S			NS				20.00
Acetophenone		NS			NS				700.00
Benzene		SZ			NS		1.00		000000
Benzoic Acid		NS			NS				28000.00
Bis(2-Ethylhexyl)phthalate		NS			NS				
2,4-Dimethylphenol		NS			NS				400.00
Di-n-Butyl phthalate		NS			NS				700.00
Diethyl Phthalate		NS			NS				5600.00
Fluoranthene		NS			NS				280.00
Nauthalene		NS			NS				6.80
in&p-Creosol		NS			NS				35.00
n-Creosol		NS			NS				350.00
Phenathrene		sn			NS				10.00
Phenol		NS			NS				10.00
Pvrene		NS			NS				210.00
Herbicides/Pesticides	l/an	SN/QN		ng/J	ND/NS		1∕ân	ug/J	ng/
Alnha-RHC		SN			NS				0.05
Fudrin		NS			NS		2.00		
Dialdrin		SN			SS				0.10
Dimethoate		NS			NS				5.00
Disulfaton		SZ			NS				0.50
Distuictori		NSN			NS				70.00
2,4,)-1 7 4_D		SN			SN		70.00		
		NS			NS				
HXCDF		SN			NS				
Heavy Metals	ng/	ND/NS		ug/Ì	ND/NS		ug/ł	ng/	ug/l
Antinony		NS			NS		900		
Arsenic	17.00			75.00			20.00		
Bariun	1500.00			8000.00			2000.00		
Cadınium	20.00			30.00			S.00		
Chronum	100.00			250.00			100.001		
Copper	140.00			490.00			0.001		
Lead	220.00	4	00.0	00.0012		00 0	8.5		
Mercury		ND	2.00	2.00	SN	3	100.00		
NICKEI			1 00		GN	1 00	\$0.00		
Seletium			10.00	30.00		10.00	20102	100.00	
Duver		NSN NSN	10.00	00-02	SN		2.00		
Vanadium		SN			SN				49.00
Zinc	1700.00			8630.00				5000.00	
									Veri
Conventional Parameters	l/gm	ND/NS		120 00	SNIUN		l/au	- - - 	-Am
Biological Oxygen Demand	100.00			320.00					

Baniun	00'0051 1			Source 1			00'0007		
Cadmun	20.00			30.00			5.00		
Chronium	100.00			250.00			100.00		
Conner	140.00			490.00			1000.00		
Lead	220.00			2130.00			15.00		
Mercury		QN	2.00	9.00		2.00	2.00		
Nickel		NS			NS		100.00		
Selenum		QN	1.00		QN	1.00	50.00		
Silver		QN	10.00	30.00		10.00		100.00	
Thallium		NS			NS		2.00		
Vanadium		NS			NS				49.00
Zine	1700.00			8630.00				5000.00	
Conventional Parameters	l/am	ND/NS		mg/l	ND/NS		ng/l	l/am	ng/
Biological Oxygen Demand	100.00			320.00					
Chemical Oxvzen Demand	3080.00			11200.00					
Chlorides	125.00			240.00				250.00	
Cvanide		DN	0.10		QN	0.10	0.20		
Ammonia, Nitrogen	30.00			184.00					
Organic Nitrogen		SN			NS				
Nitrate	4.00			13.00			10.00		
Nitrite		QN			QN		1.00		
Iron	29.00			172.00				0.30	Ţ
Oil and Grease	18.00			47.00					
hd	6.50			7.30				6.5-8.5	
Phenols (Total)	0.70			2.99					
Phosphorus	2.50			3.89					
Total Suspended Solids	1000.00			43000.00					
Total Dissolved Solids	2412.00			4270.00				500.00	
Sulfate		QN	40.00		QN	40.00		250.00	
Total Organic Carbon	76.00			1080.00					
TOC (Duplicate)		SN			SN				
Total Organic Halogens		NS			NS				
Magnesiun	92.00			192.00					
Mangenese	1.00			4.90				0.05	
Potassium	118.00			618.00					
Sodium	256.00			1290.00			160.00		
Alkalinity	1710.00			6520.00					
Calciun	148.00			578.00					
Hardness	597.00			1516.00					
Boron	1.40			3.90					0.63
Specific Conductance (unho/cm)	2920.00			6850.00					

NS - Not Sampled ND - Not Datested De Linui - Sampling Detection Limit MCL - Assimum Constantinat Level; Enforceable Groundwater Standards MCL - Secondar Maximum Lovis, Enforceable Groundwater Standards Guida.ce Concentrations - Not Enforceable Standards

Table A.55: Characteristic	cs of the SKB Rich valley Demolition waste Facility, Minnesota.
LANDFILL:	SKB Rich Valley Demolition Waste Management Facility, Minnesota.
OWNER/OPERATOR:	SKB Demolition Waste Disposal. 251 Starkey Street St. Paul, Minnesota 55107
LITERATURE SOURCE:	Potential for Environmental Impairment at the SKB Rich Valley Demolition Waste Management Facility Prepared by Interpoll Laboratories for SKB Demolition Waste Disposal
WASTE TYPE:	Construction waste and demolition debris. This includes concrete, brick asphalt, stucco, rock/gravel, metal, roofing, wood etc. Garbage, yard wastes, liquids, septic tank pumping, tires, appliances, and fertilizers are prohibited at the facility.
ACREAGE:	69 acres.
YEARS IN SERVICE:	Opened in August 1989.
LINER SYSTEM:	Two foot compacted clay liner with three foot protective drainage layer.
LEACHATE SYSTEM:	Leachate collection system installed consisting of PVC collection pipes and lift station. Leachate disposed of off-site.
LEACHATE SAMPLE:	Leachate sampled from leachate collection system.
MISCELLANEOUS:	Groundwater contamination in the area surrounding the facility existed prior to opening the facility. Notably, drinking water quality criteria for iron, manganese and total dissolved solids were exceeded in baseline groundwater samples.

 Table A.35: Characteristics of the SKB Rich Valley Demolition Waste Facility, Minnesota.

Landfill of Maryland.
n Valley
SKB Rich
for the S
Sampling
Table A.36:

	<u>s</u>	ng 199(Sun	mer 199		1 1	II 1990		as .	ing 1992		3	mer 199;		Primary	Secondary	Guldance
	Result	Ī	Det Limit	al l		Det Limit			Det Limit	2	0.00	Det Limit	Nesult	0.00	The Filmer	MLL MLL	771	107
Volatiles	l∕g⊎	ND/NS		- Vân	ND/NS		l/ân	ND/NS		1/3n	SN/ON		1/3n			Ian	iå	100.001
Acetone		ĝ	10.00		NSN 55			SN S		╉	CN SI	Ì		en a	T			4200.00
2-Butanone		SN			ZZ :			SZ 5			en a	T		en ol	T			100.00
Carbon Disulfide		SZ :			Z ;			SN SN		╋	CN OIX	T		N	T			2 70
Chloromethane		z :			SZ S	╋	t	CN SI	╉	╎	evi Nic			er v	T			700.00
1,1-Dichloroethane			00.1		SN SN	T		No No	+		or of	T	T	ž	T	100		20.001
1,2-Dichloroethane			00 ⁻ T		en a		T	Ne		\uparrow	Ne la	T		SN SN	T			۶ ۵0
1,4-Lhoxatic		2	00		No.			NIG			n NN		T	SN			700.00	
Ethylbenzene			00.1		evi Ng			NI NI		╎	a sz		ſ	SN				4200.00
Meinyi Eunyi Ketone (MEK)			D0.C		evi Vic			NI			2 M			SN				
4-Methyl-2-Pentanone		sz		Ì	en al			2014			Ne Ne	T		SN SN	ſ	5 00		
Methylene Chlonde	00.0	4			Ω.			on an	╎		or of	ſ	T	N N		1000.00		
Toluene		R	1.00		2	╋				╎	QV OI			e la		00 000		
1, 1, 1-Trichloroethane	1.00				SN			sz		+	2	T		Ω,		400.00		
Trichloroethylene		NS			SN			NS			SN			SZ I		9.6		
Trichlorofluoromethane	20.00				NS			NS			SN			SZ	T			2100.00
Xylenes (Total)		NS			NS			NS			SZ			SN		10000.00		
				-			┥			+								,
Semi-Volatiles	1/3n	ND/NS		l/ân	ND/NS		ng∕l	ND/NS		r √3n	ND/NS		l/an	SN/QN		12n	ug/	ug/I
Acenauhthene		NS			NS			NS	-		NS	-		NS				20.00
Acetonhenone		NS			SN			NS			NS			NS				700.00
Benzene		SN SN			NS			NS	$\left \right $		NS			NS		1.00		
Danzoin Arid		NN			sz		ſ	NS			NS			NS				28000.00
Delizion Avia Bio/2 Bibrithavidhahehalata		NIG			. SN		ſ	SN			NS			NS				
Dist 2-Eurymery1,printation		alv			NZ NZ			SN			NS			SN				400.00
2,4-DBIIGUIYIPIIGIA		an an			NIS			SN			NS			SN				700.00
		CN1			a N			SN		┢	SN			NS				5600.00
Liteuryi Printalate		on oix			a N			SN		┢	NS	ĺ		NS				280.00
		CN1			NIG			SN			SZ			NS				6.80
Inapulatie		en a			S N			SN			NS			SN				35.00
		NN N			SN SN	T		SN			NS			NS				350.00
Dhundhrana		S. N			SN			NS			NS			NS				10.00
r neuaur vic		sz.			SN			NS			NS			NS				10.00
Durane		SZ		-	NS			NS			NS			NS				210.00
. 7.000																		
Herbicides/Pesticides	l/an	SN/QN		l/an	ND/NS		1/311	ND/NS		l∕∂n	SN/QN		ug/J	ND/NS	_	l∕gu	l/gu	l∕gu
Aluha-BHC		NS		╞	SN			NS		-	NS			NS				0.05
Endrin		SN			NS			NS			NS			NS		2.00		
Dieldrin		NS			SN			NS			NS			NS				0.10
Dimethoate		NS			NS			NS			NS			NS				5.00
Disulfaton		NS			SN			NS			NS			NS				0.50
2 4 5-T		NS			NS			NS			NS			NS				70.00
2.4-D		NS			NS			NS			NS			NS		70.00		
HxCDD		NS			NS			NS			NS			SN				
HxCDF		NS			NS			NS			SN			s				
				+						+			,			-		
Heavy Metals	l/ân	SN/DN		l/än	ND/NS	+	l/ân	ND/NS		l/an	SN/ON	T	ng/				1/an	an
Antinony		SN			z	Ť		╉	4	5	en		50,0	22	T	00.05		
Arsenuc			4.00	70.02	-			Ne	╋	00.001			160.00			2000.00		
Barnin	010	22				010	0.00	CNI		010			20.004	G	0.40	5.00		
Cadmum	0.10	9	00 01			00.01	N7-0	- UN	10.00	~	GN	6		Ē	4 00	100.00		
Chroman		2 £	10.00				10.01	╀	20.0	┢		10.00		g	10.00	1000.00		
Copper			- <u>20</u>			0.01	20.01	╀	8		e G	0.00		GZ	0.20	15.00		
Lead			01.0			0.20		+	0.00		Ē	0.20	0.30			2.00		
Mercury			V.4.V		Ne	27.0	T	╀	-		SN			SN		100.00		
NICKEI		en al			S N			SN			SN			NS		50.00		
Selenum		er N		t				SN			SN	ſ		SN			100.00	
Thailium		SN			NS			SN			NS			NS		2.00		
Vanadium		NS			NS						SN			SN				49.00
Zinc	10.00				Ð	10.00		+	10.00	10.00	1		30.00				2000.00	
				+			1	010 010		+	an Ard	T	5	NDUNG		Varm	Jom	lam
Conventional Parameters	mg/l	ND/UN		mg/l	ND/NS	.	mg/l	SN/ON		mg/i	SUITN		mg'i	ENI/ON		1/2111	1/2.00	

					1			4			4	0000			000	15.00		
		QN	1.00		R	9.00		R	1-00			0.20			0.4V			
		g	0.40		QN	0.20		DN	0.20		DN	0.20	0.30			2.00		
		SN			NS			NS			NS			NS		100.00		
		NS			NS			NS			NS			NS		50.00		
		SN			NS			NS			NS			NS			100.00	
	Ī	NS			NS			NS			NS			SN		2.00		
		NS			NS			NS			NS			SN				49.00
	10.00				DN	10.00		DN	10.00	10.00			30.00				5000.00	
Conventional Parameters	hgm	ND/NS		∕am	SN/QN		ı∕au	ND/NS		mg/l	ND/NS		mg/l	ND/NS		mg∕l	mg/l	13m
Biological Oxygen Demand		NS			SN			NS			NS			NS				
Chemical Oxygen Demand		NS			NS			SN		110.00			220.00					
	160.00			300.00			460.00			100.00			100.00				250.00	
		SN			NS			NS			NS			NS		0.20		
Armonia, Nitrogen	0.66			1.20			0.82			0.99				Q	50.00			
Organic Nitrogen		SN			SN			NS			NS			NS				
	3.50				an	0.50		ND	0.25	0.28			0.91	-		10.00		
		QN	0.10		DN	0.50		DN	0.25		QN	0.00		QN	0.00	1.00		
	0.02			1.30			0.22			9.50			14.00				0.30	
		NS			NS			NS			NS			NS				
		NS			NS			NS			SN			NS			6.5-8.5	
		NS			NS			NS			NS			NS				
		NS			NS			NS			NS			SN				
Total Suspended Solids		QN	4.00	21.00			65.00			23.00			51.00					
Total Dissolved Solids	1700.00			5740.00			4600.00			2000.00			2500.00				500.00	
	690.00			1600.00			1700.00			730.00			910.00				250.00	
Total Organic Carbon		NS			SN			NS			SN			SN	T			
TOC (Duplicate)		NS			NS			NS			SN			NS				
Fotal Organic Halogens		NS			NS			SN			SN			SN				
	90.00			460.00			280.00			130.00			160.00					
	0.08			9.80			12.00			3.10			3.90				0.05	
	5.20			55.00			13.00			14.00			15.00					
	31.00			370.00			230.00			100.00			95.00			160.00		
	410.00			1450.00			770.00			570.00			790.00					
	310.00			600.00			520.00			280.00			340.00					
		NS			NS			NS			SN			NS				
		NS			NS			NS			NS			NS				0.63
		~. ~			210			NIC			MIG			ALC: N				

NS - Not Sampled ND - Not Detected De Limit - Sampling Detection Limit De Limit - Sampling Detection Limit De Limit - Sampling Detection Limit SMCL - Maximum Contaminan Level, Buforceable Groundwater Standards SMCL - Noreatrations. Not Enforceable Mandreds Guidance Froncatrations. Not Enforceable Mandreds

LANDFILL:	South Carolina Landfill.
OWNER/OPERATOR:	Unknown.
LITERATURE SOURCE:	South Carolina Department of Health and Environmental Control Presented in C&D Waste Landfills, Leachate Quality Data, Volume 1. Prepared by Gershman, Brickner & Bratton, Inc. For the National Association of Demolition Contractors.
WASTE TYPE:	Demolition debris and landclearing debris.
ACREAGE:	Unknown.
YEARS IN SERVICE:	Unknown.
LINER SYSTEM:	Unknown.
LEACHATE SYSTEM:	Unknown.
LEACHATE SAMPLE:	Unknown.
MISCELLANEOUS:	None.

Table A.37: Characteristics of the South Carolina Landfill.

Table A.38: Sampling for the South Carolina Site.

		1994		Primary	Secondary	Guidance
	Re	Result	Det Limit	MCL	MCL	Conc
Volatiles	l∕an	ND/NS		l/gu	1/Øn	l∕∂n
Acetorie		NS				700.00
2-Butanone		SN				4200.00
Carbon Disulfide		NS				700.00
Chloromethane		NS				2.70
1,1-Dichloroethane		NS				700.00
1,2-Dichloroethane		NS		3.00		
1,4-Dioxane		SN			00.00	<u>5.00</u>
Ethylbenzene		SN			700.00	
Methyl Ethyl Ketone (MEK)		SN				4200.00
4-Methyl-2-Pentanone		SN				
Methylene Chlonde		SN		5.00		
I oluene		22				
Tricklossethiland		en Sid		3 00		
Tricking the second sec		on Ng		00.0		2100.00
		evi ala		1000000		00.0014
Aylerics (10tal)		GNI		10000-00		T
Comi-Volatilau	1/arr	SN/CN		l/on	l/an	Van
Semi-routines	ıAn	ani/uni Ate		-A-	-An	
Acchaphthene		SN S				20.00
Acetophenone		SZ ;				/00.00
Benzene		N N N		1.00		00 00000
Benzoic Acid		SN				28000.00
Bis(2-Ethylhexyl)phthalate		NN NN				00.00
2,4-Duneuryphenol		en of				100.00
Di-n-Butyl phthalate		SN S				100.00
Diethyl Plithalate		SN SN				200.00
Fluoranthene		SN SS				280.00
Napthalene		NZ Z				0.80
in&p-Creosol		NS				35.00
o-Creosol		SN				350.00
Phenathrene		NS				10.00
Phenol		SN				10.00
Pyrene		SN				210.00
						,
Herbicides/Pesticides	ug/l	ND/NS		l/gu	ng/	l/gu
Alpha-BHC		SN				0.05
Endrin		NS		2.00		
Dieldrin		SN				0.10
Dimethoate		NS				5.00
Disulfoton		NS				0.50
2,4,5-Т		NS				70.00
2,4-D		SN		70.00		
HxCDD		NS				
HxCDF		NS				
	,					ļ
Heary Metals	ug/J	ND/NS		l∕an	ng∕l	۱¢/۱
Antimony		NS		0.00		
Arsenic	1.40	217		00.00		
Banum	1 70	ŝ		2000.00		
Cadriana	16.00			100.00		
Curvingut	0.00			1000.001		
Copper Lead	A7.7	NS		15.00		
Mercurv		NS		2.00		
Nickel		NS		100.00		
Selenium		NS		50.00		
Silver		NS			100.00	
Thallium		SN		2.00		00.01
Vanadium	VV 37	SN	Ī		2000.00	49.00
2010	00.00				M.0000	
Conventional Parameters	mg/l	SN/QN		mg/l	mg/l	mg/l
Biological Oxygen Demand		NS				
Charlest Commendation		NIG	v v			

Cadmium	1.79			5.00		
Chromiun	16.00			100.00		
Copper	9.20			1000.00		
Lead		NS		15.00		
Mercury		NS		2.00		
Nickel		NS		100.00		
Selenium		NS		50.00		
Silver		NS			100.00	
Thallium		NS		2.00		
Vanadiun		NS				49.00
Zinc	65.00				5000.00	
Conventional Parameters	mg/l	ND/NS		mg/l	mg/J	l/gm
Biological Oxygen Demand		NS				
Chemical Oxygen Demand		NS	5.00			
Chlorides	250.00				250.00	
Cyanide		NS		0.20		
Annonia, Nitrogen		NS				
Organic Nitrogen		NS				
Nitrate		NS		10.00		
Nitrite		NS		1.00		
Iron	0.30				0.30	
Oil and Grease	15.00					
pH		SN			6.5-8.5	
Phenols (Total)		NS				
Phosphorus		NS				
Total Suspended Solids	110.00					
Total Dissolved Solids	8400.00				500.00	
Sulfate	250.00				250.00	
Total Organic Carbon		NS				
TOC (Duplicate)		NS				
Total Organic Halogens		NS				
Magnesium		NS				
Mangenese	0.05				0.05	
Potassium		NS				
Sodium		NS		160.00		
Alkalinity		NS				
Calcium		SN				
Hardness		NS				
Boron		NS				0.63
Specific Conductance (umho/cm)		NS				

NS - Not Sampled ND - Not Detected De Limit - Sampling Detection Limit De Limit - Sampling Detection Limit MCL - Maximum Containinat Level; Enforceable Groundwater Standarda SMCL - Secondar Maximum Containinat Level; Enforceable Groundwater Standarda Outdarce Concentrations - Not Enforceable Standarda

aracteristics of the South Windsor Site of Connecticut.						
South Windsor Site, Connecticut.						
Unknown.						
Bulky Waste Leachate Characterization Survey Maurice Hamel, Connecticut Department of Environmental Protection Presented in C&D Waste Landfills, Leachate Quality Data, Volume 2. Prepared by Gershman, Brickner & Bratton, Inc. For the National Association of Demolition Contractors.						
Demolition debris and landclearing debris.						
3 acres.						
Opened between 1969 and 1975.						
Unknown.						
Unknown.						
Leachate sample taken from seep at the base of landfill.						
Two samples taken from SW 3 in 1987 by Geotoxi as part of site closures.						

Table A.39: Characteristics of the South Windsor Site of Connecticut.

Table A.40: Sampling for the South Windsor Bulky Waste Landfill of Connecticut.

		July-1988 Result D	Det Limit	A 194	ust-1988		Octo	ber-198	B 1 1 mit	Decer Recult	aber-191	18 Det L1mit	Primary 1	Secondary MCL	Guidance
Volatiles	l/an	D/NS	1111177 1.7	N Ven	D/NS		Ven	D/NS		L Van	DINS		l'an	Van	ue/
Acetone	-A-	SN		$^{+}$	SN	Ī	5	NSN		╈	SN				700
2-Butanone		NS		ſ	NS			SN			NS				4200.00
Carbon Disulfide		SN		Ī	SN			SN			NS				700.00
Chloromethane		SN			SN			NS			NS				2.70
1,1-Dichloroethane		NS			NS			NS			NS				700.00
1,2-Dichloroethane		NS			NS			NS			NS		3.00		
1,4-Dioxane		NS			NS			NS			ß				5.00
Ethylbenzene		SS			SN			NS			SN			700.00	
Methyl Ethyl Ketone (MEK)		NS			ŝ	Ì		SN			NS				4200.00
4-Methyl-2-Pentanone		NS		Ť	SN 2		T	SN 5		Ť	S2 :				
Methylene Chlonde		SN 3		Ť	SN S	Î		SN S			SN SN	ſ	00.00	T	
l'oluene		SN SN	T	T	SN 92	T		cy siz		t	2 5				
Troblemathulance		CN.		T	CN N						a si	` 			
1 Hould really lette		on Na	T	T	SN SN	T	T	a N		t	2 SZ		3		2100.00
Vienes (Total)		NSN SN			SN			SN			SN	Ĕ	00.000		00.0014
(max -)										T					
Semi-Volatiles	ne/	ND/NS		ı∕∂n	ND/NS		∕ān	ND/NS		ng∕l	ND/NS		ng/l	ug/J	ug/l
Acenaphthene		NS			NS			NS			NS				20.00
Acetophenone		NS			NS			NS			NS				700.00
Benzene		NS			NS			NS			NS	-	1.00		
Benzoic Acid		NS			NS			NS		+	SN				28000.00
Bis(2-Ethylhexyl)phthalate		NS			SN			SN			NS				
2,4-Dimethylphenol		NS			SN			NS			SN				400.00
Di-n-Butyl phthalate		NS			SN			SN		┥	SN		1		700.00
Diethyl Phthalate		SN		T	SN :	Ì		SN :			SN SI		Ť		00.000
Fhioranthene		NS	+	T	SN 55			ZZ S			NN N	+	T		280.00
Napthalene		SZ SZ			SZ SZ	T		NN S	┥		NN N		╋		0.8U
morp-Creosol		NS		T	en a			CN N		t	SN	1	T		350.00
0-1-160501		old	T	T	Q P		Ī	DIN DIN			SN	-			10.00
Princiatu stre		an NS			en su	Ī		SN		╋	s SZ		ſ		10.00
Porene		SN		T	SN	T		SN			NS		+-		210.00
						ľ									
Herbicides/Pesticides	ug/]	SN/QN		l/an	ND/NS		l/3n	ND/NS		ne/	ND/NS		l/an	ng/l	1/8n
Alpha-BHC	- A	NS			NS		5	NS		-	SN				0.05
Endrin		SN			NS			NS			NS		2.00		
Dieldrin		NS			NS			NS			NS		-		0.10
Dunethoate		NS			SS			NS	-		NS	+			5.00
Disulfoton		NS			SN			SS			SN 5			T	0.50
2,4,5-T		SN S			SN SN			NN N	╋	t	SZ P		10.00		00.0/
2,4-D		NG		T	CN N			en sin		T	2 M	╉	N.0/		
HXCDF		SN			SN			SN		t	SN	┢			
Heavy Metals	ug/J	ND/NS		ug/i	ND/NS		l∕∂n	ND/NS		(an	ND/NS		1/3n	l∕3n	l∕an
Antunony		SN			SN		T	SN SN		+	SN	╈	9 9 9 9		
Arsenic	100.00	ſŊ		00,000	Z	T	T	No.	5	+-		•	00,000		
Barturn	20.00			700.002	GN		T	a N	5	10.00			\$ 00		
Chroniun	00.04	Q	ŀ	ĺ	g			NS	-	0.0			100.00		
Copper	60.00			20.00				QN	4	0.00		-	000.00		
Lead	80.00		-	70.00				Q	0	0.0			15.00		
Mercury		Q	-		g			NS			Ð		5.00		
Nickel		NS			SN ;	T		SZ ;		t	2 f		00.00		
Selenum		2 S						NN NN		┢		+	00.00	100 001	
Suver		NSN	╈	T	NN NN	T		SN SN		+-	SZ SZ		2.00	00.001	
Vanadium		NS			NS			NS			NS				49.00
Zinc		NS			SN			NS			SN			5000.00	
				5	MINNE			NDUN		-	NUNG	╈	1/211	lem	hall
CONVENTIONAL FALANCIERS	1 00 1 C	SMICH			evine.		.A.	UN	1 00		UN	1 00			

n anna ann an Annaich ann a' Annaich an startacht ann ann ann an anna an ann an ann an an						•	22		.	1 AN	L	-1 -00.00		
Bariun	400.00		200.00	00			NS		200.00			2000.00		
Cadmium	20.00				DN		NS		10.00			5 .00		
Chromiun		QN			QN		NS		10.00			100.00		
Copper	60.00		20.00	0			DN		40.00			1000.00		
Lead	80.00		70.0	0			QN		90.00			15.00		
Mercurv		QN			DN		NS			Q		2.00		
Nickel		NS			NS		NS			SS		100.00		
Selenium		Q			QN		NS			QN		50.00		
Silver		QN		╞	QN		NS			QN			100.00	
Thallinm		NS		$\left \right $	NS		ßN			NS		2.00		
Vanadiim		NS		┝	SN		NS			NS				49.00
Zinc		SN			NS		NS			NS			5000.00	T
				╞										
Conventional Parameters	ne/	ND/NS	l/ama	-	ND/NS	∥⁄3 m	ND/NS		mg/l	ND/NS		¶ ng⊓	mg/	mg/
Biological Oxveen Demand	21.00		10.00	8			ND	1.00		Q	90			
Chemical Oxveen Demand	110.00		35.00	8		50.00			40.00					
Chlorides	33.00		30.00	8			NS		37.00				250.00	
Cvanide		QN			QN	0.04			0.02			0.20		
Amnonia Nitroen	0.40		1.10	0		0.80			0.44					
Oreanic Nitroen	1.50		0.50			0.20			0.32					
Nitrate		QN	0.01				NS		0.10			10.00		
Nifette	0.01		0.01			0.01			0.01			1.00		
Iron	13.00		54.00	8			NS		14.00				0.30	
Oil and Grease		SN			NS		NS			NS		-		
Ha	6.80		6.70	0		6.70			6.50				6.5-8.5	
Phenols (Total)		NS			NS		NS			NS	-			
Phosphorits		NS			NS		NS			SN				
Total Suspended Solids	260.00		6.60	0		140.00			18.00					
Total Dissolved Solids	440.00	NS	580.00	00	NS	530.00	NS		510.00	SN			500.00	
Sulfate	26.00		55.00	00		140.00			75.00				250.00	
Total Organic Carbon		NS			NS		NS			NS				
TOC (Duplicate)		SN			NS	-	NS			NS				
Total Organic Halogens		NS			NS		SN			NS				
Magnesiun		NS			NS		SN			SN				
Mangenese	3.40		5.60	0			NS		3.40	l			0.05	
Potassiun		NS	_		NS		NS			SN				
Sodium	20.00		28.00	00		31.00	_		33.00			160.00		
Alkalinity	320.00		240.00	80			SN		260.00					
Calcium		NS			NS		SN			SN				
Hardness	320.00		720.00	8.			SN		250.00					
Boron		NS		_	NS		SN			NS				0.63
Specific Conductance (umho/cm)	570.00		810.00	00		810.00	-		760.00					

a de la companya de l

NS - Not Sampled ND - Not Detected Dei Limit - Sampling Detection Limit MCL - Maximum Constiminat Level: Enforceable Groundwater Standards MCL - Recondary Maximum Contaminat Level: Enforceable Groundwater Standards Guidause Consents ations- Not Enforceable Standards

LANDFILL:	Wisconsin Site.
OWNER/OPERATOR:	Unknown.
LITERATURE SOURCE:	Construction and Demolition Landfill Leachate Characterization Study Prepared by Rust Environments & Infrastructure for WMX Technologies, Inc.
WASTE TYPE:	Demolition debris and landclearing debris. Includes brick, concrete, wood, metals, and roofing shingles.
ACREAGE:	Unknown. However, capacity is estimated at 50,000 cubic yards.
YEARS IN SERVICE:	Began operations in August 1991.
LINER SYSTEM:	Ten foot thick clay liner with a two foot thick drainage layer.
LEACHATE SYSTEM:	Yes.
LEACHATE SAMPLE:	Taken at the low point of the fill area where leachate collected and was visible.
MISCELLANEOUS:	None.

Table A.41: Characteristics of the Wisconsin Site.

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Table A.42: Sampling for the Wisconsin Site.

	1993	1993 Sampling	-	Primary 1	Secondary (Guidance Conc
	Nesul	ND/NS		5	1/an	S.
Volatiles	$^{+}$		10 00			4200.00
2-Butanone	+	2 G	5.00			700.00
Carbon Distunde		G	10.00			2.70
Chloromeutane	┢	Q	5.00			700.00
1, 1-Dichloroethane	╂─	Ð	5.00	3.00		
1,2-Division communication	-	QN	20.00			5.00
Fthvlhenzene		DN	5.00		700.00	00 000
Methyl Ethyl Ketone (MEK)	-	QN	10.00			4200.00
4-Methyl-2-Pentanone		Q	10.00	,		
Methylene Chloride		g	5.00	5.00		T
Toluene		Q	<u>5</u> .00	1000.00		
1,1,1 Trichloroethane	+	SN		200.002		
Trichloroethylene		g	5.00			2100.00
Trichlorofluoromethane	-	ĝ		000000		7100.001
Xylenes (Total)		Q	<u>د</u> 80	10000.00		
	┥			1		_
Seni-Volatiles	l'an	ND/NS		1Ån	-An	20.00
Acenaphthene		Q!	10.00			700.00
Acetophenone	+	2	00-01 •	100		22.227
Benzene		2	00.0	00-T		78000.00
Benzoic Acid	5		00.00			20.0007
Bis(2-Ethylhexyl)phthalate	Ţ		10.00			400.00
2,4-Dimethylphenol	,		10.00			700.00
Di-n-Butyl phthalate		Ę	10.00			5600.00
Diethyl Phunalate		Q	10.00			280.00
Fluoratiuteite		QN	10.00			6.80
indputatories m. B. n. Cransol		QN	10.00			35.00
n-Creosol		QN	10.00			350.00
Phenathrene		DN	10.00			10.00
Phenol		QN	10.00			10.01
Pyrene		ĝ	10.00			710.00
					l'en	1/011
Herbicides/Pesticides	ng/l	ND/NS		IÂN		0.05
Alpha-BHC		2	0.040	00 0		
Endrin	T		0.080			0.10
Dieldrin	T	Î	2.30			5.00
Dimethoate	T	G	1.70			0.50
Disulfoton	T	22	0.44			70.00
2,4,5-1	2.2		0.44	70.00		
2,4-D HvrDD		QN	1.40			
HXCDF		DN	0.70			
					.	
Heavy Metals	۳¢۱	ND/NS	00.00	3		
Antimony			100.00	0.00 \$0.00		
Arsenic	76		50.00	20		
Bariun	0/	UN	10.00			
Cadmun		GN	20.00	Ĕ	0	
Cluronnum		Q	20.00		0	
Copper		QN	50.00	15.00	0	
Mercury		QN	20.00		0	
Nickel		DN	20.00	-		
Selerium		Q	20.00	50.00	100 001	
Silver		SN	00.03	00 0		
Thalliun						49.00
Vanadium	400		10.00	0	5000.00	
Conventional Parameters	l/gm	SN/QN		mg/l)au	20
n'il Our mand	13		2.00	lo		

	Ver	SN/UN	T	l/an	l/an	ug/J
Heavy Metals	A.		00 001	6.00		
Antimony	ľ		2 00	50.00		
Arsenic	, <u>,</u>		00.05	2000.00		
Bariun	9/	4		5 00		
Cadmium		Î	10.00	00.0		
Chromium		Q	20.00	100.00		
Conner		QN	20.00	1000.001		
t and		QN	50.00	15.00		
		QN	20.00	2.00		
Mercury		QZ	20.00	100.00		
NICKET		QZ	20.00	50.00		
Selenum		Z			100.001	
Silver			00.05	2 00		
Thallium			10.00			49.00
Vanadium			10.00		5000.00	
Zinc	400		10.01			
	, 	alocale.		ma/	/am	me/l
Conventional Parameters	ng/I	+	0000			
Biological Oxygen Demand	13		7.00			
Chemical Oxygen Demand	220		50.00		00 00	
Chlorides	59		5.00			
Comple		ND	0.01	0.20		
Amonia Nitroven	57	4	0.10			
Constitution Mitroren		SN				
Urganic Ivin Ogen		NS		10.00	0	
		NS		1.00		
	1.6		0.03		0.30	
Iron						
Oil and Grease	74				6.5-8.5	
PH			100			
Phenols (Total)	0.02		10.0			
Phosphorus	0.45	-	00.5			
Total Suspended Solids		0/1	10.00		500.00	
Total Dissolved Solids	1400		20.01		250.00	
Sulfate	630		20.00			
Total Organic Carbon	°	63	20.00			
TOC (Duplicate)	49.6	9	20.00			
Total Organic Halogens	0.08		0.01			
Mamesium		SN				
Mangenese		NS	10		0.0	
Potassiitm		NS	5			
Quality		NS	8	160.00	8	
Albelinity		NS	S			
Automacy Coloinn		SN	S			
Hardness		Z	NS			-
Boron		z	NS			0.03
Buroife Conductance (umbo/cin)		z	NS			

•

NS - Not Sampled ND - Not Detected De Limit - Sampling Detection Limit MCL - Ankiunun Constantinat Level; Enforceable Groundwater Standards MCL - Reconstantinat Level; Enforceable Groundwater Standards Guidance Constantiatour - Not Enforceable Standards

APPENDIX B:

TEST METHODS & METHOD DETECTION LIMITS

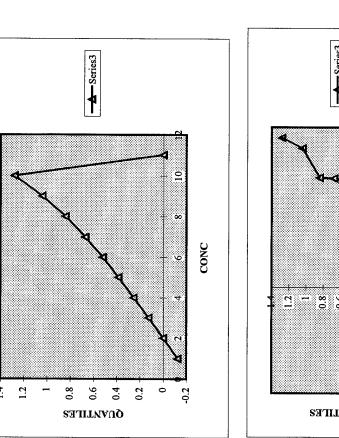
Table B.1: Summary of Test Methods at	Test Methods and Method Detection Limits		
PARAMETER	TEST METHOD	DETECTION LIMIT	SOURCE
Copper	6010: Inductive Coupled Plasma Atomic Emission Spectroscopy	6 ug/l	EPA SW-846
Nickel	6010: Inductive Coupled Plasma Atomic Emission Spectroscopy	15 ug/l	EPA SW-846
Cadmium	6010: Inductive Coupled Plasma Atomic Emission Spectroscopy	4 ug/l	EPA SW-846
Chromium	6010: Inductive Coupled Plasma Atomic Emission Spectroscopy	7 ug/l	EPA SW-846
Silver	6010: Inductive Coupled Plasma Atomic Emission Spectroscopy	7 ug/l	EPA SW-846
Vanadium	6010: Inductive Coupled Plasma Atomic Emission Spectroscopy	8 ug/l	EPA SW-846
Thallium	6010: Inductive Coupled Plasma Atomic Emission Spectroscopy	40 ug/l	EPA SW-846
Nitrate	300.0: Determination of Inorganic Anions by Ion Chromatography	0.42 mg/l	EPA-600
Nitrite	300.0: Determination of Inorganic Anions by Ion Chromatography	0.36 mg/l	EPA-600
Sulfate	300.0: Determination of Inorganic Anions by Ion Chromatography	2.85 mg/l	EPA-600
Antimony	7041: Antimony (Atomic Absorption, Furnace Method)	3.0 ug/l	EPA SW-846
Selenium		2 ug/l	EPA SW-846
Arsenic	7060: Arsenic (Atomic Absorption, Furnace Method)	1 ug/l	EPA SW-846
Lead	7421: Lead (Atomic Absorption, Furnace Method)	l ug/l	EPA SW-846
Phenols	8040: Phenols (Gas Chromatography)	1.4 ug/l	EPA SW-846
Total Organic Carbon	9060: Total Organic Carbon	1 mg/l	EPA SW-846
Cyanide	9010: Total Cyanide (Manual, Colorimetric)	5 ug/l	EPA SW-846
Oil and Grease	9070: Oil and Grease	5 mg/l	EPA SW-846
Biological Oxygen Demand	405.1: Biological Oxygen Demand (5 day, 20 degrees C)	2 mg/l	EPA-600
Chemical Oxygen Demand	410.2: Chemical Oxygen Demand (Titrimetric, Low Level)	5 mg/l	EPA-600
Mercury	245.2: Mercury (Automated Cold Vapor Technique)	.2 ug/l	EPA-600
Ammonia	350.2: Nitrogen, Amnonia (Colorimetric)	.05 mg/l	EPA-600

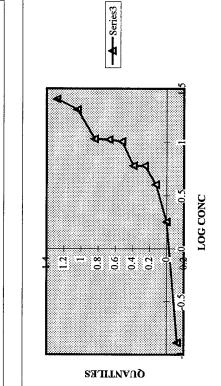
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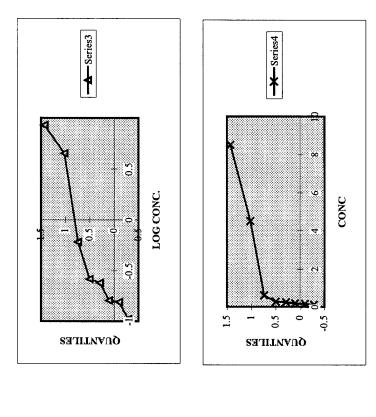
APPENDIX C:

PROBABILITY PLOTS

				1.4	12			ES 0.8			00 0:4 +	0.2			-0.2 4 4				
	Quantiles	-1.645	-1.28	-1.04	-0.84	-0.67	-0.52	-0.385	-0.255	-0.125	0	0.125	0.255	0.385	0.52	0.67	0.84	1.04	1.28
	Prob (0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7	0.75	0.8	0.85	0.9
	Rank	1	2	3	4	5	9	7	8	6	10	11	12	13	14	15	16	17	18
	Log									-0.88606	0.252853	0.60206	0.778151	0.778151	1.002166	1.021189	1.028029	1.30103	1.39794
Cadmium	ug/l	0	0	0	0	0	0	0	0.	0.13	1.79	4	9	9	10.05	10.5	10.66667	20	25

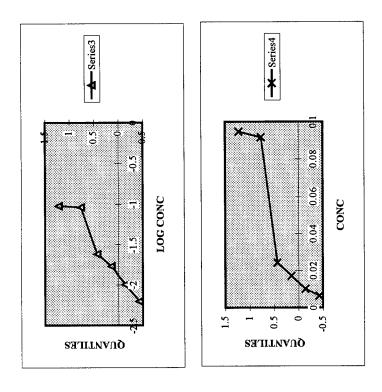






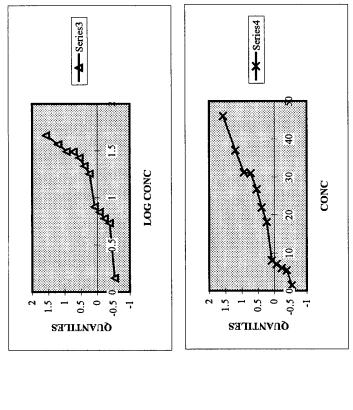
Nitrate				
	Log	Rank	Prob	Quantiles
0		1	0.076923	-1.43
0		2	0.153846	-1.02
0		3	0.230769	-0.74
0		4	0.307692	-0.5
0.105	-0.97881	5	0.384615	-0.29
0.155	-0.80967	9	0.461538	-0.1
0.16	-0.79588	7	0.538462	0.1
0.24	-0.61979	8	0.615385	0.29
0.260529	-0.58414	6	0.692308	0.5
0.6	-0.22185	10	0.769231	0.74
4.5	0.653213	11	0.846154	1.02
8.5	0.929419	12	0.923077	1.43

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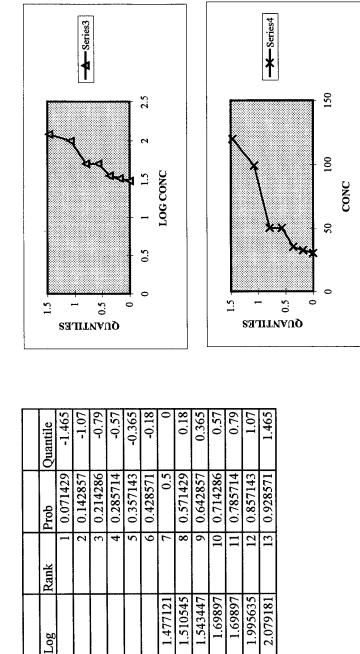
Nitrite				
mg/l	Log	Rank	Prob	Quantile
0		1	0.111111	-1.22
0		2	0.222222	-0.765
0.00625	-2.20412	3	0.3333333	-0.43
0.01	-2	4	0.444444	-0.14
0.017	-1.76955	5	0.555556	0.14
0.024	-1.61979	9	0.666667	0.43
0.0915	-1.03858	2	0.777778	0.765
0.0945	-1.02457	8	0.888889	1.22

-



Arsenic				
ug/l	log	Rank	Prob	Quantile
0		1	0.058824	-1.57
0		2	0.117647	-1.19
0		3	0.176471	-0.93
0		4	0.235294	-0.72
1.4	0.146128	5	0.294118	-0.54
5.375	0.730378	9	0.352941	-0.38
9	0.778151	7	0.411765	-0.23
L	0.845098	8	0.470588	-0.075
8	0.90309	6	0.529412	0.075
18	1.255273	10	0.588235	0.23
21.83	1.33912	11	0.647059	0.38
26.65	1.425697	12	0.705882	0.54
30.87	1.48949	13	0.764706	0.72
31.10588	1.492843	14	0.823529	0.93
37	1.568202	15	0.882353	1.19
46	1.662758	16	0.941176	1.57

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32.4 34.95

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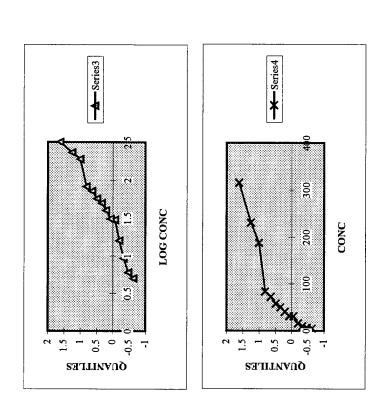
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Log

Nickel ug/l 0 0 0 120

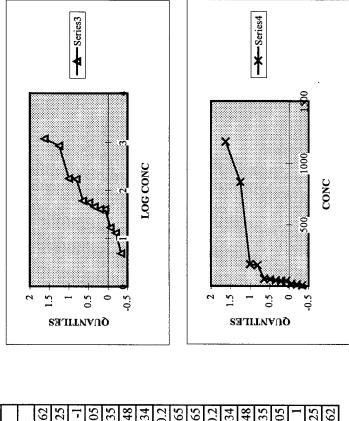
3 2 6

	quantile	-1.62	-1.25	[-	-0.805	-0.635	-0.48	-0.34	-0.2	-0.065	0.065	0.2	0.34	0.48	0.635	0.805	1	1.25	1.62
	prob	0.052632	0.105263	0.157895	0.210526	0.263158	0.315789	0.368421	0.421053	0.473684	0.526316	0.578947	0.631579	0.684211	0.736842	0.789474	0.842105	0.894737	0.947368
	Rank	1	2	3	4	5	9	7	8	6	10	11	12	13	14	15	16	17	18
	log					0.69897	0.778151	0.963788	1.19898	1.477121	1.487845	1.60206	1.69897	1.755875	1.857332	1.916454	2.273001	2.361728	2.498311
Copper	ug/l	0	0	0	0	5	9	9.2	15.81176	30	30.75	40	50	57	72	82.5	187.5	230	315



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Lead				
ug/l	log	Rank	prob	quantile
0		1	0.052632	-1.62
0		2	0.105263	-1.25
0		3	0.157895	-1
0		7	0.210526	-0.805
0		5	0.263158	-0.635
0		9	0.315789	-0.48
4.905	0.690639	L	0.368421	-0.34
13	1.113943	8	0.421053	-0.2
16.83333	1.22617	6	0.473684	-0.065
40	1.60206	10	0.526316	0.065
40	1.60206	11	0.578947	0.2
45	1.653213	12	0.631579	0.34
55	1.740363	13	0.684211	0.48
60.125	1.779055	14	0.736842	0.635
170	2.230449	15	0.789474	0.805
176.75	2.247359	16	0.842105	1
845	2.926857	17	0.894737	1.25
1175	3.070038	18	0.947368	1.62

APPENDIX D:

STATISTICAL TESTS

Confidence Intervals for Various Parameters: Using Standard Student T-Tests.

Statistics	Chlorides	ides	Ĕ	Iron	Ha		TDS		Mangenese	nese	Sodium	Шŋ	Bar	Barium	Zii	Zinc	Sul	Sulfate
	mg/l	ND/NS	l/gm	SN/QN	l/âu	ND/NS	mg/l	ND/NS	mg/l	ND/NS	mg/l	ND/NS	l/Bn	ND/NS	ng/l	ND/NS	mg/l	ND/NS
	112.20		37.30		6.82		1105.00			NS		NS	328.00		1565.00		128.00	
	367.67		28.60		6.99		4336.67			NS		NS	356.00		130.50		50.63	
	76.40		11.76		7.08		2486.67			NS		NS	250.00		31.93		432.43	
	59.00		3.10		7.60		1400.00			NS		NS	76.00		400.00		630.00	
	100.00		46.00		6.46		1606.00		2.20		100.00		1000.00		84.00		380.00	
	248.00		5.01			NS	3308.00		5.78		165.20		130.00		12.00		1126.00	
	90.75		46.50		6.60		510.00		3.65		42.00		215.00			NS	43.11	
	52.50		7.20		6.95		450.00		3.45		33.00		80.00		70.00		80.50	
	19.00		11.90		6.98		687.50		1.34		56.50		400.00		70.00	NS	45.00	
	33.33		27.00		6.68		515.00		4.13		28.00		266.67			NS	74.00	
	11.50		2.50		6.45		420.00		3.45		14.00		200.00			NS	120.00	
	56.70		0.05		7.24			NS	0.02		64.00			NS		NS	118.00	
		NS		NS		NS		NS		NS		NS		NS	20.50			NS
	367.63		28.13		6.60		1320.00		76.38		101.98			NS		NS	189.43	
	795.26		275.11		6.97		3366.00		8.30		411.20		546.00		71.26		390.95	
	250.00		0:30			NS	8400.00		0.05			NS		NS	403.00		250.00	
	153.00		49.10			NS		NS		NS		NS		NS	135.00			NS
	39.80		48.50			NS		NS		NS		NS		NS	65.00			NS
	27.50		1.15		7.60		1770.00			NS		NS		NS	1150.00			NS
	110.00		5.53			NS	3450.00		1.50			NS	4750.00		5165.00			NS
	182.50		100.50		6.90		3341.00		2.95		773.00			NS	1150.00		1.43	Ð
Average	157.64		36.76		6.93		2263.05		8.71		162.63		661.36		657.70		253.72	
Std Dev	184.77		61.53		0.36		2028.49		20.46		231.19		1252.25		1297.07		292.18	
Sample No.	20.00		20.00		15.00		17.00		13.00		11.00		13.00	_	16.00		16.00	
Degrees of Freedom	19.00		19.00		14.00		16.00		12.00		10.00		12.00		15.00		15.00	
t _(0.99,n-1)	2.54		2.54		2.62		2.58		2.68		2.76		2.68		2.60		2.60	
t _(0.99,n-1) *S/(n)^.5	104.90		34.93	<u> </u>	0.24		1270.79		15.21		192.67		931.15		843.74		190.06	
Lower Limit of C.L	52.74		1.83		6.69		992.26		0.00		0.00		0.00		0.00		0.00	
Upper Limit of C. I.	262.54	_	71.70		7.17		3533.84		23.92		355.30		1592.51		1501.44		443.78	
MCL, SMCL or Guidance	250.00		0.30		6.5-8.5		500.00		0.05		160.00		2000.00		5000.00		250.00	
Problem	Yes		Yes		νo	-	Yes		Yes		Yes		°N		No		Yes	

Confidence Intervals for Various Parameters: Calculated by Cohen's Method

Statistics	Cyanide	đe	Arsenic	nic		Nitrate			Nitrite			Copper			Lead			Nickel	
	mg/l	ND/NS	l/ân	ND/NS	mg/l	ND/NS	Log (y)	/8m	ND/NS	Log (y)	∥an	ND/NS	Log (y)	_ √ 8n	ND/NS	Log (y)	l/ân	ND/NS	Log (y)
	0.01		26.65			SN			NS		82.50			845.00		2.93	34.95		1.54
	0.01		21.83			NS			NS			ND		16.83		1.23		DN	
	0.01		30.87			SN			NS			ND			QN			ND	
		ND	7.00			NS			NS			ND			ND			ND	
		NS	8.00			DN			DN			DN			QN			DN	
		NS	6.00			NS			NS		6.00		0.78		QN .			NS	
	0.09			ДŅ		QN		0.09		-1.04	50.00		1.70	55.00		1.74		NS	
		DN		QN	0.60		-0.22	0.02		-1.62	40.00		1.60	40.00		1.60	50.00		1.70
	0.01		5.38		4.50		0.65	0.02		-1.77	187.50		2.27	45.00		1.65	50.00		1.70
	0.02			ND	0.11		-0.98	0.01		-2.20	30.75		1.49	60.13		1.78		NS	
	0.05			DN	0.16		-0.81	0.09		-1.02	30.00		1.48		DN			QN	
		NS	:	NS		SN			NS			NS			NS			NS	
		NS		NS		NS			NS		5.00		0.70		Q		30.00		1.48
		NS		NS	0.16		-0.80		NS			NS		176.75		2.25		NS	
	0.03		31.11		0.26		-0.58		NS		15.81		1.20	4.91		0.69	32.40		1.51
		NS	18.00			NS			NS		72.00		1.86	13.00		1.11		QN	
		ND	37.00			DD			NS		57.00		1.76	40.00		1.60	99.00		2.00
		ND	1.40			ND			NS		9.20		0.96		NS			NS	
		NS		NS		NS			NS		230.00		2.36	170.00		2.23	120.00		2.08
		NS	46.00		0.24		-0.62	0.01		-2.00	315.00		2.50	1175.00		3.07	-	NS	
		DN			8.50		0.93		QN										
Mean of Detects	0.0281		19.9359	-	-0.3034			-1.6094			1.5886			1.8235			1.7148		
Variance of Detects	0.000729		211.5282		0.510792			0.239976			0.334942			0.490556			0.056619		
No. of ND	\$		4		4			2			4			6			6		
No. of Detected	8		12		8			6			13			12			7		
Total Sampled	13		16		12			8			17			18			13		
Percentage of ND	0.385		0.250		0.333			0.250			0.235	_		0.333			0.462		
gamma=s ² /(mean-DL) ²	1.363		0.590		95.037			0.177			0.510	_		0.148			0.195		
Detection Limit (DL)	0.005		1		-0.37675	(.42 mg/l)		-0.4437 (.36 mg/l)		0.778151 ((6.0 ug/l)		0	(1.0 ug/l)		1.176091	(15.0 ug/l)	
Cohen's Parameter	0.7853		0.4045		0.5519			0.34865			0.34765			0.4813			0.7678		
Corrected Mean	0.009965		12.27633		-0.3439			-1.203			1.306864			0.945858			1.301188		
Corrected Std Dev	0.033891		18.88304		0.716769			0.84485			0.750535			1.446023			0.528651		
Degrees of Freedom	12		15		11			7			16			17]	12		
t(0.99,n-1)	2.681		2.602		2.718			2.998			2.583			2.567			2.681		
t(0.99,n-1)*S/(n)^.5	0.025201		12.28342		0.562391			0.895501			0.470187			0.874913			0.393092		
Lower Limit of C.I.	-0.01524		-0.00708		-0.90629				0.007971		0.836677	6.865575		0.070945	1.177458		0.908096	8.092749	
Upper Limit of C. I.	0.035166		24.55975		0.218491	1.653831	-	-0.3075	0.492608		1.777051	59.84825		1.820771	66.18677		1.694281	49.46302	
MCL, SMCL or Guidance	0.2		50			10			1			1000			15			100	
Problem	No		No			No		4	No		~	No			Yes			No	

Confidence Interval for Cadmium: Using Aitchinson's Method.

Statistics	Cadn	nium
	ug/l	ND/NS
		ND
		ND
		ND
		ND
		ND
	0.13	
	4.00	
	6.00	
	10.50	
	10.67	
	6.00	
		NS
		ND
	512.88	
	10.05	
		ND
		ND
	1.79	
	20.00	
	25.00	
No. of ND (d)	8	
No. of Detects	11	
Total Sampled (n)	19	
Mean of Detected Values	55.18	
Variance of Detected Values	23098.54	
Adjusted Mean	31.94798	
Adjusted Variance	13616.07	
Adjusted Std Dev	116.6879	
Degrees of Freedom	18	
t(0.99,n-1)	2.552	
t(0.99,n-1)*S/(n)^.5	68.31715	
Lower Limit of C.I.	-36.3692	
Upper Limit of C. I.	100.2651	
MCL, SMCL or Guidance	5	
Problem	Yes	

Statistics	Chro	mium	Me	rcury	Si	ilver
	ug/l	ND/NS	ug/l	ND/NS	ug/l	Rank
	0.00	1	0	1	0	1
	0.00	2	0	2	0	2
	0.00	3	0	3	0	3
	0.00	4	0	4	0	4
	0.00	5	0	5	0	5
	0.00	6	0	6	0	6
	0.00	7	0.00	7	0	7
	0.00	8	0	8	0	8
	0.00	9	0	9	0	9
	0.00	10	0	10	10.35	10
	5.67	11	0	11	17.5	11
	14.25	12	0.16	12		
	16.00	13	0.5	13		
	20.68	14	0.5	14		
	20.80	15	5	15		
	26.67	16				
	61.17	17				
	175.00	18				
M**=		15		13		10
n+1-M=		4		3		2
Confidence Interval=		(0,20.80)		(0,0.5)		(0, 10.35)
MCL (ug/l)=		100		2		100*
Potential Risk?		No		No		No

Nonparmetric Confidence Intervals for Selected Compounds

* This is a Secondary Drinking Water Limit

** $M = n/2 + 1 + z_{0.99}(n/4)^{.5}$, from the Statistical Analysis of Ground-Water Monitoring Data, EPA, Office of Solid Waste