

Public Health Assessment for

**DELILAH ROAD
EGG HARBOR TOWNSHIP, ATLANTIC COUNTY, NEW JERSEY
CERCLIS NO. NJD980529002
NOVEMBER 22, 1994**



THE ATSDR HEALTH ASSESSMENT: A NOTE OF EXPLANATION

Section 104 (i) (6) (F) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, states "...the term 'health assessment' shall include preliminary assessments of potential risks to human health posed by individual sites and facilities, based on such factors as the nature and extent of contamination, the existence of potential pathways of human exposure (including ground or surface water contamination, air emissions, and food chain contamination), the size and potential susceptibility of the community within the likely pathways of exposure, the comparison of expected human exposure levels to the short-term and long-term health effects associated with identified hazardous substances and any available recommended exposure or tolerance limits for such hazardous substances, and the comparison of existing morbidity and mortality data on diseases that may be associated with the observed levels of exposure. The Administrator of ATSDR shall use appropriate data, risks assessments, risk evaluations and studies available from the Administrator of EPA."

In accordance with the CERCLA section cited, this Health Assessment has been conducted using available data. Additional Health Assessments may be conducted for this site as more information becomes available.

The conclusions and recommendations presented in this Health Assessment are the result of site specific analyses and are not to be cited or quoted for other evaluations or Health Assessments.

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PUBLIC HEALTH ASSESSMENT

DELILAH ROAD

EGG HARBOR TOWNSHIP, ATLANTIC COUNTY, NEW JERSEY

CERCLIS NO. NJD980529002

Prepared By:

**New Jersey Department of Health
Environmental Health Service**

**Under A Cooperative Agreement With
The Agency For Toxic Substances And Disease Registry**

THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

This Public Health Assessment was prepared by ATSDR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) section 104 (i)(6) (42 U.S.C. 9604 (i)(6), and in accordance with our implementing regulations 42 C.F.R. Part 90). In preparing this document ATSDR has collected relevant health data, environmental data, and community health concerns from the Environmental Protection Agency (EPA), state and local health and environmental agencies, the community, and potentially responsible parties, where appropriate.

In addition, this document has previously been provided to EPA and the affected states in an initial release, as required by CERCLA section 104 (i)(6)(H) for their information and review. The revised document was released for a 30 day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The public health assessment has now been reissued. This concludes the public health assessment process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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FOREWORD

The Agency for Toxic Substances and Disease Registry, ATSDR, is an agency of the U.S. Public Health Service. It was established by Congress in 1980 under the Comprehensive Environmental Response, Compensation, and Liability Act, also known as the Superfund law. This law set up a fund to identify and clean up our country's hazardous waste sites. The Environmental Protection Agency, EPA, and the individual states regulate the investigation and clean up of the sites.

Since 1986, ATSDR has been required by law to conduct a public health assessment at each of the sites on the EPA National Priorities List. The aim of these evaluations is to find out if people are being exposed to hazardous substances and, if so, whether that exposure is harmful and should be stopped or reduced. (The legal definition of a health assessment is included on the inside front cover.) If appropriate, ATSDR also conducts public health assessments when petitioned by concerned individuals. Public health assessments are carried out by environmental and health scientists from ATSDR and from the states with which ATSDR has cooperative agreements.

Exposure: As the first step in the evaluation, ATSDR scientists review environmental data to see how much contamination is at a site, where it is, and how people might come into contact with it. Generally, ATSDR does not collect its own environmental sampling data but reviews information provided by EPA, other government agencies, businesses, and the public. When there is not enough environmental information available, the report will indicate what further sampling data is needed.

Health Effects: If the review of the environmental data shows that people have or could come into contact with hazardous substances, ATSDR scientists then evaluate whether or not there will be any harmful effects from these exposures. The report focuses on public health, or the health impact on the community as a whole, rather than on individual risks. Again, ATSDR generally makes use of existing scientific information, which can include the results of medical, toxicologic and epidemiologic studies and the data collected in disease registries. The science of environmental health is still developing, and sometimes scientific information on the health effects of certain substances is not available. When this is so, the report will suggest what further research studies are needed.

Conclusions: The report presents conclusions about the level of health threat, if any, posed by a site and recommends ways to stop or reduce exposure in its public health action plan. ATSDR is primarily an advisory agency, so usually these reports identify what actions are appropriate to be undertaken by EPA, other responsible parties, or the research or education divisions

of ATSDR. However, if there is an urgent health threat, ATSDR can issue a public health advisory warning people of the danger. ATSDR can also authorize health education or pilot studies of health effects, full-scale epidemiology studies, disease registries, surveillance studies or research on specific hazardous substances.

Interactive Process: The health assessment is an interactive process. ATSDR solicits and evaluates information from numerous city, state and federal agencies, the companies responsible for cleaning up the site, and the community. It then shares its conclusions with them. Agencies are asked to respond to an early version of the report to make sure that the data they have provided is accurate and current. When informed of ATSDR's conclusions and recommendations, sometimes the agencies will begin to act on them before the final release of the report.

Community: ATSDR also needs to learn what people in the area know about the site and what concerns they may have about its impact on their health. Consequently, throughout the evaluation process, ATSDR actively gathers information and comments from the people who live or work near a site, including residents of the area, civic leaders, health professionals and community groups. To ensure that the report responds to the community's health concerns, an early version is also distributed to the public for their comments. All the comments received from the public are responded to in the final version of the report.

Comments: If, after reading this report, you have questions or comments, we encourage you to send them to us.

Letters should be addressed as follows:

Attention: Chief, Program Evaluation, Records and Information Services Branch, Agency for Toxic Substances and Disease Registry, 1600 Clifton Road (E-56), Atlanta, GA 30333.

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SUMMARY

The Delilah Road Landfill is the site of a former sand and gravel borrow pit which was excavated to the general depth of the existing water table, and then converted to landfill operations in 1972. The landfill was issued a permit application by the New Jersey Department of Environmental Protection and Energy (NJDEPE) for the disposal of non-hazardous municipal wastes, but liquids chemical wastes and sludges containing volatile organic compounds (VOCs) and heavy metals were deposited in the landfill. The landfill was cited for numerous operational violations by the NJDEPE during its operational life. Landfilling operations ceased at the site in 1980.

Phase I and Phase II Remedial Investigations have been completed at the site (1986 and 1988 respectively). Contaminated media at the site include on/off-site groundwater and on-site soils. Community concerns have focused on the sites impact to off-site groundwater quality in the area; potable wells in the area of the site have generally experienced low level contamination by volatile organic chemicals and heavy metals, and four wells exhibited contamination in excess of ATSDR comparison values. Municipal water supplies were made available to residents in 1989, and contaminated potable wells were sealed.

The landfill has not been closed according to accepted standards and site access remains unrestricted. A Record of Decision (ROD) for the site was signed by NJDEPE in September 1990 which addressed landfill closure and restriction of site access. The ATSDR and the NJDOH consider the Delilah Road Landfill to be a past public health hazard based upon oral exposure of chronic duration to contaminated groundwater between 1972 and 1989, and no apparent public health hazard based upon current conditions at the site. The Delilah Road Landfill site is being considered by the ATSDR for inclusion in the benzene subregistry of the ATSDR National Exposure Registry, if the registry is expanded.

BACKGROUND

A. Site Description And History

The Delilah Road Landfill is located in Egg Harbor Township, Atlantic County, New Jersey at the intersections of Delilah and Doughty Roads (Egg Harbor Tax map reference: lots 10 & 11 of block 402 A). The site occupies an area of approximately 40 acres, and is immediately proximal to the intersection of the Garden State Parkway and the Atlantic City Expressway. Figure 1 indicates the location of the Delilah Road Landfill.

The site of the Delilah Road Landfill was originally used as a borrow pit before being converted to a landfill in 1972. Sand and gravel were mined at the site to the general depth of the existing water table. The owners of the site filed an application for operation of a solid waste facility with the New Jersey Department of Environmental Protection and Energy (NJDEPE) in October 1984, but the final license was never issued. Available information indicates the landfill received solid and liquid wastes including municipal solid waste, construction waste, and bulk liquids. Site records also indicate that Lenox China Inc., a potentially responsible party, deposited more than 86,000 pounds of lead and trichloroethylene sludge at the landfill between 1973 and 1977. Throughout its operational period, the Delilah Road landfill was cited by the NJDEPE for numerous nuisance violations (odors, windblown materials), operational inadequacies, and improper closure. The landfill ceased operations in September of 1980 when fill materials reached the grade of undisturbed areas. Sporadic incidents of unauthorized dumping have occurred at the site since the time of its closure.

Environmental investigation of the site began in October 1982 when the United States Environmental Protection Agency (USEPA) Field Investigation Team installed and sampled five monitoring wells, and sampled several (nine) domestic wells of adjacent residences. The Phase I Remedial Investigation (RI) was conducted by Camp, Dresser, & McKee for the NJDEPE in 1986. Although Phase I sampling identified groundwater contamination in monitoring and potable wells in the study area (primarily to the south and southeast of the site), no clear connection could be established between the landfill and observed contaminants. In 1987 Betz, Converse, and Murdoch (BCM) conducted a groundwater investigation to determine the direction of groundwater flow. In June 1988, CDM conducted the Phase II investigations which included resampling of monitoring and potable wells as well as test pit excavations, surface water and sediment sampling, and various geophysical investigations. The RI report indicates that municipal waste comprises the primary material deposited in the Delilah Road landfill; there is no evidence to suggest the presence of buried drums.

Primary public health concerns associated with the site in the past pertained to contaminated groundwater. Contaminated potable wells of adjacent residents were sealed when a public water supply became available to residents in 1990. The Delilah Road Landfill is located adjacent to a cluster of other landfills: Price's Pit(s) #1, #2, and #3 (see figure 1). Price's Pit #3 is considered to be a primary source of groundwater contamination in the area whose plume may

influence the Delilah Road study area.

No remedial activities have taken place at the site. The site is currently unsecured and not posted. A Record of Decision (ROD) was signed in September 1990 documenting the selected remedy for the site including installation of an impermeable cap, surface water controls, gas collection, air and groundwater monitoring programs, and site security measures.

B. Site Visit

NJDOH personnel (James Pasqualo) and representatives of the Atlantic County Health Department (ACHD) visited the Delilah Road site on May 20, 1992. Access to the site was unrestricted with the exception of a soil barrier across the southern section of Atlantic Avenue. There were no signs visible identifying the landfill as a potentially hazardous area.

The site is partially revegetated and evidence of small game hunting and other recreational activities were observed. Fresh tire tracks suggested that the area had been used by off-road motorcycles and all terrain vehicles within the previous 36 hours.

There was no evidence of recent illegal dumping, although the area of the site was littered with old domestic appliances, furniture, and construction debris. No obvious indication of chemical contamination (stained soils, vegetative stress, lack of insects and small animals) were observed. There were no unusual odors or smells detected during the site visit.

C. Demographics, Land Use, And Natural Resource Use

The area surrounding the Delilah Road landfill is a combination of undeveloped lots, residential properties, warehouses, and light commercial operations. There are approximately 20 private residences located along the perimeter of the site. Residences along Delilah Road are situated directly proximal to the site boundary. Most of the homes in the area of the landfill are single occupancy units situated on lots of one acre or less. Assuming 2.5 persons per household, approximately 50 residents live in close proximity to the landfill (within the boundaries of Delilah Rd., Atlantic Ave., and Fire Rd.). Areas to the east of the site, between Delilah Road and Price's Pit #3, (see Figure 1) are zoned for industrial development and have seen a significant influx of light industry in the past eight years. There are no high density housing units, schools, parks and recreational areas, or other sensitive subpopulations within the Delilah Road Landfill study area. There is no major agricultural production within the site study area.

The Delilah Road Landfill is a generally flat expanse of approximately 40 acres, and is at an elevation of 50 feet above sea level. The site itself is sparsely vegetated with shrubs and grass, while the areas around its perimeter are heavily wooded.

The closest surface water feature to the site is Jarret's Run located approximately 1/4 mile to the north. Jarret's run is often dry during periods of low precipitation, and terminates at Absecon Creek approximately 1 3/4 miles to the northeast of the site. Absecon Creek in turn

empties into Absecon Bay which is formed by the Atlantic City barrier island. Two Atlantic City Municipal Utilities Authority (ACMUA) reservoirs, which supply 15-20% of Atlantic City's potable water, are located approximately two miles to the northwest of the landfill.

The primary aquifer underlying the Delilah Road Landfill is the Kirkwood-Cohansey, which is extensively used by the ACMUA and the New Jersey American Water Company (NJAWC). The NJAWC is a major water purveyor for Atlantic County and has three production wells (#'s 11, 13, and 3; see Figure 2) located in the area of the site. Well 11 is situated 1/2 mile northwest (upgradient), well 13 is approximately 1 mile southwest (sidegradient), and well 3 is 1 1/4 miles southeast (downgradient) of the site. Water quality records of the NJDEPE indicate that these production wells have not been impacted by the Delilah Road Landfill or any of the other landfills in the area.

D. Health Outcome Data

There are multiple sources of health outcome data in New Jersey. State and local data for health outcome information include the New Jersey State Cancer Registry, Birth Defects Registry, Vital Statistics Records, Renal Dialysis network, and hospital discharge reports. Federal databases such as those maintained by the Department of Health and Human Services (National Cancer Institute, National Institute of Occupational Safety and Health, and ATSDR) are not site-specific but may be used for comparison and evaluation purposes.

COMMUNITY HEALTH CONCERNS

The primary community health concern associated with the Delilah Road Landfill pertains to the groundwater contamination problem and the impact to domestic and commercial potable wells in the area. Secondary concerns are related to the accessibility of the site and its continued use as an informal recreation area.

The Delilah Road Landfill is one of four landfills in the area referred to as "Price's Pits". These landfills have been generally regarded by the community as having a cumulative detrimental impact to the local groundwater quality. The contamination associated with Prices Pit #3 has been the basis for the relocation of an ACMUA well in 1986, and the resultant media attention and community concerns were extended to the Delilah Road Landfill. (Available data suggest that the contribution of the Delilah Road landfill to area groundwater problems was comparably minimal.)

In August 1989, the NJDEPE conducted a public meeting to discuss the results of the Phase II RI and proposed remedial alternatives for the site. In summary, the issues expressed by the community at that meeting were:

- * The presence of mercury in domestic wells;
- * The direction of groundwater flow in the area;

- * The criteria for selecting which residences were connected to the public water supply;
- * The method of closure of the landfill.

Other community concerns specific to the Delilah Road Landfill pertain to foul odors emanating from the site, and the release of landfill materials to adjacent properties and streets.

ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

The tables in this section list the contaminants of concern for the Pomona Oaks Wells site. These contaminants are evaluated in subsequent sections of the Public Health Assessment to determine whether exposure to them has public health significance. ATSDR selects and discusses these contaminants based upon the following factors:

- 1) Concentrations of contaminants on and off site.
- 2) Field data quality, laboratory data quality, and sample design.
- 3) Comparison of on-site and off-site concentrations with background concentrations, if available.
- 4) Comparison of on-site and off-site concentrations with health assessment comparison values for carcinogenic and noncarcinogenic endpoints.
- 5) Community Health concerns.

In the data tables that follow under the On-site Contamination subsection and the Off-site Contamination subsection, the listed contaminant does not mean that it will cause adverse health effects from exposures. Instead, the list indicates which contaminants will be evaluated further in the Public Health Assessment. When selected as a contaminant of concern in one medium, that contaminant will be reported in all media.

The data table may include one or more of the following acronyms:

- * CREG = ATSDR Cancer Risk Evaluation Guide
- * EMEG = ATSDR Environmental Media Evaluation Guide
- * MCLG = EPA Maximum Contaminant Level Goal
- * MCL = EPA Maximum Contaminant Level
- * PMCLG = EPA Proposed Maximum Contaminant Level Goal
- * ppm = Parts per million
- * ppb = Parts per billion

- * RfD = EPA Reference Dose
- * RfC = EPA Reference Concentration

Comparison values for public health assessments are contaminant concentrations in specific media that are used to select contaminants for further evaluation. These values include Environmental Media Evaluation Guides (EMEGs), Cancer Risk Evaluation Guides (CREGs), and other relevant guidelines. CREGs are estimated contaminant concentrations based on a one excess cancer in a million persons exposed over a lifetime. CREGs are calculated from USEPA's cancer slope factors. USEPA's Maximum Contaminant Level Goal (MCLG) is a drinking water health goal. USEPA believes that the MCLG represents a level that no known or anticipated adverse effect on the health of persons should occur which allows an adequate margin of safety. Proposed Maximum Contaminant Level Goals (PMCLGs) are MCLGs which are being proposed. Maximum Contaminant Levels (MCLs) represent contaminant concentrations that USEPA deems protective of public health (considering the availability and economics of water treatment technology) over a lifetime of 70 years at an exposure rate of 2 liters of water per day. While MCLs are regulatory concentrations, PMCLGs and MCLGs are not. USEPA's reference dose (RfD) and Reference Concentration (RfC) are estimates of the daily exposure to a contaminant that is unlikely to cause health effects.

To identify possible facilities that could contribute to contamination of environmental media near the Delilah Road Landfill site, the ATSDR and the NJDOH searched the 1987, 1988, and 1989 Toxic Chemical Release Inventory (TRI). TRI is developed by the USEPA from chemical release (air, water, and soil) information provided by certain industries. Upon review and evaluation, TRI was not found to contain information on toxic chemical release in Egg Harbor Township which was pertinent to the contaminants and pathways of concern at the Delilah Road Landfill site.

Phase I and Phase II investigations (CDM; August 1989) of the Delilah Road Landfill provided data describing on-site soil quality (test pit excavations), on-site and off-site groundwater quality, and off-site surface water and sediments (Jarrets Run). Investigation of other environmental media were not conducted as part of the RI/FS process.

A. On-Site Contamination

Soils

During the RI/FS, site soils were characterized through test pit excavations to determine the composition of the material within the landfill, determine the nature and extent of potential chemical contamination, and to verify results of magnetometer surveys. Municipal waste is the primary material deposited within the landfill, although paving and construction debris was also found. Information regarding the depth at which specific samples were taken was not available. The western portion of the landfill contains evidence of sludge deposition. This area contained several inorganics in excess of NJDEPE action levels; arsenic (866 ppm), barium (719 ppm),

beryllium (5.4 ppm), and selenium (11.8 ppm). Of these, arsenic is above the ATSDR comparison value of 210 ppm (based upon Rfd) for an adult. Several volatile and semivolatile compounds were detected in test pit samples but these were all below NJDEPE action levels and ATSDR comparison values (adult Rfd).

Groundwater

During Phase I and Phase II investigations a total of sixteen monitoring wells were installed in and around the landfill (figures 3 and 4). One on-site well, DEL-B, exhibited benzene (4 ppb) in excess of the ATSDR CREG for the compound (1.2 ppb). Table 1 presents a summary of contaminants of concern present in groundwater at the Delilah Road Landfill.

Table 1 - Groundwater Contamination; Contaminants of Concern, Delilah Road Landfill, Egg Harbor Twp., N.J.

Values Are Maximum Reported Concentrations.

Contaminant	Monitor Wells		Potable Wells		Comparison Value	
	ppb	Well	ppb	Well	ppb	Source
Tetrachloroethene	11	MW6-100	5	PO-25	5	MCL
Benzene	4	DEL-B	12	PO-25	1.2	CREG
Vinyl Chloride	ND	-	9	PO-25	0.7	EMEG
Mercury (metallic)	NA*	-	5	PO-7	2	MCL
Lead	153	MW3-40	46.4	PO-5	0	MCLG
Cadmium	NA*	-	9.5	PO-3	2	EMEG

* = Data rejected; holding times exceeded.

ND = Not Detected

MCL = EPA Maximum Contaminant Level

MCLG = EPA Maximum Contaminant Level Goal

CREG = ATSDR Cancer Risk Evaluation Guide

EMEG = ATSDR Environmental Media Evaluation Guide

Data from Phase I and Phase II Remedial Investigation Report, CDM: August 1989.

B. Off-Site Contamination

Sediments

Sediment samples of Jarrets Run were taken at two locations to determine if the site had impacted this intermittent stream (figure 5). Results indicated the presence of polynuclear aromatic hydrocarbons, none of which exceeded ATSDR screening values. However, although surface water run-off from the landfill might enter the stream as a result of heavy precipitation

or flood conditions, the contaminants detected are reported to likely be products of combustion and/or highway runoff, and not related to the landfill.

Surface Water

Water samples from Jarrets Run were analyzed as part of the Phase I RI/FS process for the site (figure 5). Results showed no organic or inorganic contaminants in excess of ATSDR comparison values.

Ground Water

Off site groundwater data were provided by numerous monitoring and private potable wells in the proximity of the landfill (figures 3 and 4). Ground water in the area is moving to the southeast. Monitoring well MW6-100 (tetrachloroethene; 11 ppb) and MW3-40 (lead; 153 ppb) exhibited contaminants exceeding ATSDR comparison values. One potable well (PO-25) exhibited tetrachloroethene (5 ppb), benzene (12 ppb), and vinyl chloride (9 ppb) at levels exceeding ATSDR comparison values. Two other potable wells exhibited one contaminant in excess of ATSDR comparison values: PO-7 (mercury; 5 ppb), and PO-3 (cadmium; 9.5 ppb). Additionally, one potable well (PO-5) contained lead (46.4 ppb) at a level slightly below the ATSDR comparison value of 50 ppb. Table 1 contains a summary of off-site groundwater contaminants of concern.

C. Quality Assurance And Quality Control

In preparing this public health assessment, the ATSDR and the NJDOH rely on the information provided in the referenced documents and assume that adequate quality control measures were followed with regard to chain-of-custody, laboratory procedures, and data reporting. The validity of analysis and conclusions drawn for this health assessment is determined by the availability and reliability of the referenced information.

D. Physical And Other Hazards

The Delilah Road Landfill contains abundant debris which represent potential hazards to trespassers, particularly children. The remains of past illegal dumping, old appliances, furniture, and other materials represent a potential for physical injury.

Based upon available data, the Delilah Road Landfill does not present any radiological or biological hazards.

PATHWAYS ANALYSIS

To determine whether nearby residents are exposed to contaminants migrating from the site, ATSDR and NJDOH evaluate the environmental and human components that lead to human

exposure. This pathways analysis consists of five elements: (1) a source of contamination; transport through an environmental medium; (3) a point of human exposure; (4) a route of human exposure; and, (5) an exposed population.

ATSDR and NJDOH classify exposure pathways into three groups: (1) completed pathways (those in which exposure has occurred, is occurring, or will occur; (2) potential pathways (those in which exposure might have occurred, may be occurring, or may yet occur; and, (3) eliminated pathways (those that can be eliminated from further analysis because one of the five elements is missing and will never be present, or in which no contaminants of concern can be identified.

A. Completed Exposure Pathways

Completed exposure pathways at the Delilah Road Landfill are associated with the ingestion of contaminated ground water prior to the availability of municipal water supplies in 1989. Landfilling operations at the site began in 1972. There are no data or information to indicate when the onset of groundwater contamination occurred, but the proximity of shallow potable wells to the site, together with the deposition of fill materials at or below the water table suggest a rapid transport of contaminants. Wells to the southeast (PO's 3,5,7, & 25; figure 3 & 4) are directly downgradient of the landfill and were impacted by site-related contaminants. Ingestion of groundwater (for a maximum period of 17 years) is the primary completed exposure pathway at the site, although secondary pathways associated with non-potable domestic water usage may have existed. Table 2 summarizes the completed exposure pathway elements at the Delilah Road Landfill site.

Table 2 - Completed Exposure Pathways; Delilah Road Landfill, Egg Harbor Twp., N.J.

Pathway Name	Exposure Pathway Elements					Time
	Source	Media	Point Of Exposure	Route Of Exposure	Exposed Population	
Potable Water	DRL*	Ground Water	Residence	Ingestion	Residents	Past

* = Delilah Road Landfill

B. Potential Exposure Pathways

Potential exposure pathways at the Delilah Road Landfill are associated with on site soils and air. Limited soil data (test pit excavations) have suggested that areas of the landfill contain inorganics (arsenic) in excess of ATSDR comparison values. Other areas of the site may harbor undocumented hotspots of metals and other compounds. As it is known the landfill and adjacent areas are utilized for recreational purposes, and are presently unsecured, a potential exposure pathway exists for on-site trespassers. Activities such as operating trail motorcycles and other vehicles may generate dust from contaminated soils and result in the respiration or ingestion of contaminants.

Although not documented in existing site data, it is expected that the Delilah Road Landfill generates methane gas as the byproduct of waste decomposition. Methane gas, if present in sufficient concentration and under changing atmospheric conditions, represents a potential hazard to persons on-site through asphyxiation and explosivity.

Table 3 summarizes the elements of the potential exposure pathways at the Delilah Road Landfill Site.

Table 3 - Potential Exposure Pathways; Delilah Road Landfill, Egg Harbor Twp., N.J.

Pathway Name	Exposure Pathway Elements					Time
	Source	Media	Point Of Exposure	Route Of Exposure	Exposed Population	
Dusts	DEL*	Soils	Landfill	Inhalation Ingestion	On-Site Trespassers	Past Present Future
Methane	DEL*	Air	Landfill	Inhalation	On-Site Trespassers	Past Present Future

* = Delilah Road Landfill

PUBLIC HEALTH IMPLICATIONS

A. Toxicological Evaluation

This section discusses the potential for health effects in persons exposed to specific contaminants, evaluate state and local databases, and address specific community health concerns. Health effects evaluations are accomplished by estimating the amount (or dose) of

those contaminants that a person might come in contact with on a daily basis. This estimated exposure dose is then compared to established health guidelines. People who are exposed for some crucial length of time to contaminants of concern at levels above established guidelines are more likely to have associated illnesses or disease.

Health guidelines are developed for contaminants commonly found at hazardous waste sites. Examples of health guidelines are the ATSDRs Minimum Risk Level (MRL) and the USEPAs Reference Dose (RfD). When exposure (or dose) is below the MRL or RfD than non-cancer, adverse health effects are unlikely to occur.

MRLs are developed for each route of exposure, such as acute (less than 14 days), intermediate (15 to 364 days), and chronic (365 days and greater). ATSDR presents these MRLs in Toxicological Profiles. These chemical-specific profiles provide information on health effects, environmental transport, human exposure, and regulatory status.

The toxicological evaluation of the completed exposure pathway at the Delilah Road Landfill is based upon a duration of seventeen (17) years for the ingestion pathway. As it is impossible to accurately determine when groundwater at the site first exhibited contamination above health based criteria, the use of a 17 year exposure duration represents the time from the onset of the earliest known landfilling operations at the site (1972) to the availability of a public water supply (1989). Additionally, groundwater in the area of the site contains contaminants (particularly metals) which are not site related and may have been present before the onset of landfilling operations at the site.

The toxicological effects of the contaminants detected in potable wells at the Delilah Road Landfill site have been considered singly. The cumulative or synergistic effects of possible mixtures of contaminants may serve to enhance their public health significance. Additionally, individual or mixtures of contaminants may have the ability to produce greater adverse health effects in children as compared to adults. This situation depends upon the specific chemical being ingested, its pharmacokinetics in children and adults, and its toxicity in children and adults.

Non-potable domestic usage of contaminated water (showers, washing machines) may be associated with significant exposure through the inhalation and dermal contact routes. Current literature suggests exposure doses from these routes may approach those associated with direct ingestion (Reference 12). Although there exist no data to describe these secondary routes of exposure at the Delilah Road Landfill site, this toxicological discussion recognizes their potential contribution to exposure dose estimates and consequent public health implications.

Tetrachloroethylene

Site data indicate that exposure to tetrachloroethylene occurred among residents in the area of the Delilah Road Landfill through the ingestion pathway. For a period of approximately 17 years, three households were exposed daily to low doses of tetrachloroethylene by using contaminated groundwater for drinking and other domestic purposes. Exposure doses assessment

assumes that adults drink on the average of two liters of well water per day, and children drink one liter of well water per day.

Based upon maximum levels of tetrachloroethylene detected in potable wells at the site, exposure doses were below the USEPA oral RfD of 0.01 mg/kg/day. Calculated exposure dosages are well below the Minimum Risk Level (MRL) for chronic oral exposure represented in the ATSDR Toxicological Profile for Tetrachloroethylene. At such concentrations, it is not likely that adverse health effects would occur.

Tetrachloroethylene is considered by the USEPA to be a probable human carcinogen based upon evidence from animal studies. There is no current oral carcinogenic slope factor from which to calculate a Lifetime Excess Cancer Risk (LECR) value for tetrachloroethylene exposure at the site. However, exposure doses based upon maximum detected concentrations of the compound are well below the Cancer Effect Levels for animals represented in the ATSDR Toxicological Profile for tetrachloroethylene. At such concentrations it is unlikely that any increased cancer risk would result.

Benzene

Site data indicate that exposure to benzene occurred among residents in the area of the Delilah Road landfill through the ingestion pathway. For a period of approximately 17 years, two households were exposed daily to low doses of benzene by using contaminated groundwater for drinking and other domestic purposes. Exposure dose assessment assumes that adults drink on the average of two liters of well water per day while children drink one liter of well water per day.

Presently there is no MRL or RfD for chronic oral exposure to benzene. However, exposure doses calculated from the maximum reported levels of benzene at the site were below the No Observed Adverse Effect Level (NOAEL) for animal studies presented in the ATSDR Toxicological Profile for Benzene. At such concentrations, it is not likely that non-carcinogenic adverse health effects would occur.

Benzene is considered by the USEPA to be a known human carcinogen. The maximum reported concentration of benzene in well water exceeded ATSDR's Cancer Risk Evaluation Guide (CREG). The lifetime excess cancer risk (LECR) associated with the oral exposure route for benzene at the site would present no apparent increased risk of cancer.

The cancer risk associated with benzene exposure at the Delilah Road Landfill site may be interpreted according to the following example. If 100,000 persons were exposed through ingestion for 17 years to the maximum concentration detected in potable wells, at most and additional 3 cases of cancer may occur in 70 years. For the approximately 6 persons at the site who were exposed to benzene in their contaminated well water, it is therefore unlikely that they will develop cancer as a result of their exposure.

Vinyl Chloride

Site data indicate that exposure to vinyl chloride occurred among residents in the area of the Delilah Road Landfill through the ingestion pathway. For a period of approximately 17 years, one household was exposed daily to vinyl chloride by using contaminated groundwater for drinking and other domestic purposes. Exposure dose assessment assumes that adults drink on the average of two liters of well water per day, while children drink 1 liter of well water per day.

Based upon maximum levels of vinyl chloride detected in potable wells at the site, calculated exposure doses exceeded the ATSDR Minimum Risk Level (MRL) of 0.00002 mg/kg/day for chronic oral exposure. Such concentrations may equal and perhaps exceed the No Observed Adverse Effect Level (NOAEL) for chronic exposure in animals (for effects other than cancer) represented in the ATSDR Toxicological Profile for Vinyl Chloride. At such concentrations, hematological, hepatic, and dermal/ocular effects are possible.

Vinyl chloride is considered by the USEPA to be a known human carcinogen. There is no current oral carcinogenic slope factor from which to calculate a Lifetime Excess Cancer Risk (LECR) value for vinyl chloride exposure at the site. However exposure doses (based upon maximum detected concentrations of the compound in potable wells) are within estimated human cancer risk levels (low increased to no apparent increased risk) represented in the ATSDR Toxicological Profile for Vinyl Chloride. This excess cancer risk may be interpreted according to the following scenario. If ten thousand persons were exposed for 17 years through ingestion to the maximum levels of vinyl chloride found in groundwater at the site, one additional cancer may occur in 70 years. For the members of the one household where vinyl chloride was found in well water it is therefore unlikely that they will develop cancer as a result of their exposure.

Mercury

Site data indicate that exposure to mercury occurred among residents in the area of the Delilah Road Landfill through the ingestion pathway. For a period of approximately 17 years, between two and ten households were exposed daily to low doses of mercury by using contaminated groundwater for drinking and other domestic purposes. (Mercury data at the site was rejected for QA/QC; ten households represent the maximum number potentially exposed.) Exposure dose assessment assumes that adults drink on the average of 2 liters of well water per day, while children drink one liter per day.

There is no current chronic oral minimum risk level value or oral RfD for mercury. Based upon maximum levels of mercury detected in potable wells at the site, calculated exposure doses were below the no observed adverse effect level represented in the ATSDR Toxicological Profile for Mercury. At such concentrations, it is not likely that adverse health effects would occur.

Lead

Site data indicate that exposure to lead occurred among residents in the area of the Delilah Road Landfill through the ingestion pathway. For a period of approximately 17 years, 9 households were exposed daily to lead by using contaminated groundwater for drinking and other domestic purposes. Exposure dose assessment assumes that adults drink on the average of two liters of well water per day, while children drink one liter per day.

There is no current chronic oral exposure minimum risk level value or oral RfD for lead. Based upon maximum levels of lead detected in potable wells at the site, calculated exposure doses were below the NOAEL (for animal studies) represented in the ATSDR Toxicological Profile for Lead. However, maximum levels of lead found at the site in potable wells exceeded the USEPA action level of 15 ppb. Children are particularly sensitive to the effects of lead; hematological, renal, hepatic, and neurological effects may have been possible among children exposed in the area of the site.

Cadmium

Site data indicate that exposure to cadmium occurred among residents in the Delilah Road Landfill through the ingestion pathway. For a period of approximately 17 years, five households were exposed daily to low doses of cadmium by using contaminated groundwater for drinking and other domestic purposes. Exposure dose assessment assumes that adults drink two liters of well water per day, while children drink one liter per day.

Based upon maximum levels of cadmium detected in potable wells at the site, exposure doses were approximately equal to the ATSDR chronic oral Minimum Risk Level of 0.0002 mg/kg/day. At such concentrations, it is not likely that adverse health effects would occur.

Arsenic

Arsenic was detected in on-site soils at levels exceeding ATSDR comparison values but represents only a potential exposure pathway. No one resides on or comes in long term (chronic) contact with the arsenic contaminated area of the landfill. Although arsenic is known to produce various systemic effects in high concentrations, levels found in on-site soils are not sufficient to induce adverse health effects during short term (acute) exposures.

B. Health Outcome Data Evaluation

Health outcome data for the Delilah Road Landfill site were not evaluated. Four households exhibited potable well contamination above ATSDR comparison values; available databases would not yield observable results for a study population of this size. Should the ATSDR and the NJDOH decide to do so, the health status of those residents whose wells were effected by

site related contamination may best be determined by individual case investigation.

The area of the Delilah Road Landfill may be included in the investigation of the area including the Price's Pit Superfund site which is located nearby (3/4 mile) and impacts groundwater quality to a geographically greater extent.

C. Community Health Concerns Evaluation

The primary community concern regarding the Delilah Road Landfill site, specifically the impact of the site on groundwater quality, has been addressed through the introduction of a public potable water supply to the area. Residents were connected to municipal water supplies at State expense in 1989, and private wells were sealed. Since the introduction of the public water supply, community health concerns regarding groundwater quality have been minimal.

One groundwater issue expressed by residents at the NJDEPE public meeting of August 1989 regarded the presence of mercury in domestic wells. Site data indicate that mercury was not found extensively throughout the RI study area. In addition, a mercury plume is not associated with the site. Sources other than the landfill may be contributing to the presence of mercury in area groundwater. In addition, estimated exposure doses for mercury in groundwater are below the NOAEL cited in the ATSDR Toxicological Profile for Mercury (see Toxicological Evaluation sub-section); therefore adverse health effects are not likely.

The issue of site closure and accessibility is addressed in the Record of Decision (September 1990) for the site. Although not yet implemented, a preferred alternative which includes capping, gas collection, runoff control, and access restrictions has been selected.

Public Comment Period

The New Jersey Department of health conducted a public comment period for the Public Health Assessment of the Delilah Road Landfill site from March 28, through April 29, 1994. The Public Health Assessment was placed in local repositories to facilitate written commentary and reaction from the public at large. In addition, the document was circulated to the Atlantic County Health Department for the purpose of soliciting commentary by local Health Officials.

A summary of the commentary received by the NJDOH and associated responses is presented in Appendix 1.

CONCLUSIONS

From the information reviewed, the Delilah Road Landfill site is judged to have constituted a public health hazard in the past on the basis of exposure of chronic duration, through the

ingestion pathway, to hazardous substances present in the potable well water of residents immediately adjacent to the site. However, as a result of mitigative action taken by the NJDEPE to address this exposure pathway, the Delilah Road Landfill site is currently judged to represent no apparent public health hazard.

From the information reviewed, one potable well (PO-25) exhibited contamination of a greater public health significance than generally exhibited by other potable wells sampled in the RI/FS.

There were insufficient data to determine whether the presence of mercury in potable wells was a result of site related contamination.

Remedial activities specified in the Record of Decision for the Delilah Road Landfill, when implemented, are sufficient to address remaining concerns of the ATSDR, the NJDOH, and the community regarding the site, and are consistent with protection of the public health.

RECOMMENDATIONS

A. Recommendations and the Health Activities Recommendations Panel (HARP) Statement.

Cease/Reduce Exposure Recommendations

1. The remedial activities specified in the selected remedy of the Record of Decision, specifically to close the Delilah Road Landfill in accordance with promulgated solid waste landfill closure requirements, are consistent with protection of the public health. The ATSDR and the NJDOH encourage implementation of this remedial plan with all possible expediency.
2. Unauthorized access to the site should be restricted.

Site and Exposure Characterization Recommendations

Should additional data become available regarding characterization of on-site soil contamination prior to closure and/or restriction of access to the landfill ATSDR and NJDOH should review the public health significance of this information.

Health Activities Review Panel Statement

In accordance with CERCLA as amended, the Delilah Road Landfill site, Egg Harbor Township, New Jersey, has been reviewed for appropriate follow-up with respect to health activities. This site is being considered for follow-up health activities at this time. Specifically,

should ATSDR decide to expand the benzene subregistry part of the National Exposure Registry, this site will be considered for inclusion in that subregistry.

B. Public Health Actions

The Public Health Action Plan (PHAP) for the Delilah Road Landfill site contains a description of the actions to be taken by ATSDR and/or NJDOH at or in the vicinity of the site subsequent to the completion of this Public Health Assessment. The purpose of the PHAP is to ensure that this health assessment not only identifies public health hazards, but provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment. Included, is a commitment on the part of ATSDR/NJDOH to follow up on this plan to ensure that it is implemented. The public health actions to be implemented by ATSDR/NJDOH are as follows:

Public Health Actions Taken

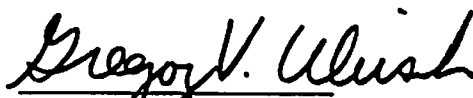
1. Environmental data and proposed remedial activities have been evaluated within the context of human exposure pathways and relevant public health issues.

Public Health Actions Planned

1. ATSDR and the NJDOH will coordinate with the appropriate environmental agencies to develop plans to implement the cease/reduce exposure and site characterization recommendations contained in this health assessment.
2. ATSDR will provide an annual follow up to this PHAP, outlining the actions completed and those in progress. This report will be placed in repositories that contain copies of this health assessment, and will be provided to persons who request it.
3. The ATSDR and/or the NJDOH will reevaluate and expand the Public Health Action Plan (PHAP) when needed. New environmental, toxicological, health outcome data, or the results of implementing the above proposed actions may determine the need for additional actions at this site.

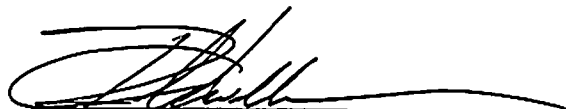
CERTIFICATION

The Public Health Assessment for the Delilah Road Landfill site was prepared by the New Jersey Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the public health assessment was initiated.



Technical Project Officer, SPS, SSAB, DHAC

The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this Public Health Assessment and concurs with its findings.



Division Director, DHAC, ATSDR

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- 2) Feasibility Study Report, Remedial Investigation Feasibility Study of Delilah Road Landfill. Camp, Dresser, & McKee Inc.: Edison, N.J., August 1989.
- 3) Statement Of Work; Delilah Road Landfill. New Jersey Department of Environmental Protection and Energy: Trenton, N.J., April 1991.
- 4) Community Relations Plan, Delilah Road Site. NUS Corporation; USEPA Work Assignment Number 12-2VB5.0, March 1984.
- 5) Record of Decision; Delilah Road Landfill. New Jersey Department of Environmental Protection and Energy: Trenton, N.J., September 1990.
- 6) Agency for Toxic Substances and Disease Registry. Draft Toxicological Profile for Tetrachloroethylene. Atlanta, Georgia: Agency For Toxic Substances and Disease Registry, October 1991.
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- 8) Agency for Toxic Substances and Disease Registry. Toxicological Profile for Mercury. Atlanta, Georgia: Agency For Toxic Substances and Disease Registry, December 1989.
- 9) Agency for Toxic Substances and Disease Registry. Draft Toxicological Profile for Lead. Atlanta, Georgia: Agency For Toxic Substances and Disease Registry, October 1991.
- 10) Agency for Toxic Substances and Disease Registry. Draft Toxicological Profile for Cadmium. Atlanta, Georgia: Agency For Toxic Substances and Disease Registry, October 1991.
- 11) Agency for Toxic Substances and Disease Registry. Draft Toxicological Profile for Arsenic. Atlanta, Georgia: Agency For Toxic Substances and Disease Registry, October 1991.
- 12) Ram, N.M., Christman, R.F., and Cantor, K.P., Eds. "Significance and Treatment of Volatile Organic Chemicals in Water Supplies." Chelsea, Maine: Lewis Publishers. pp. 485-504.

APPENDICES

APPENDIX - 1

Response Summary

This response summary represents those comments and reactions to the Public Health Assessment for the Delilah Road Landfill site received by the New Jersey Department of Health during the public comment period which occurred from March 28, 1994 through April 29, 1994. In some cases similar commentary was received from various sources, while other concerns were expressed by individuals or groups. Comments and concerns have been grouped by content where possible and are followed by the consequent response.

Comments were received from a representative of the responsible parties (RPs). The comments expressed general concurrence with the conclusions of the Health Assessment, but did offer input with regard to the three specific issues listed below.

Comment

The RP representative expressed a lack of understanding as to why the DRL site would be considered for inclusion into the ATSDR benzene subregistry.

Response

Benzene occurred in two potable wells associated with the DRL site above the ATSDR comparison value for the compound (1.2 ppb; CREG). Although site data do not conclusively demonstrate the source of the benzene is the DRL site, it is the policy of the ATSDR and the NJDOH to consider the public health implications of all contaminants found in the potable wells. As stated in the Toxicological Evaluation sub-section of the Public Health Implications section of the Health Assessment, calculated exposure doses were not at levels where non-carcinogenic adverse health outcomes were likely, and consequently, there resulted no apparent excess lifetime cancer risk. The decision by the ATSDR HARP committee to consider the DRL site for inclusion into the benzene subregistry was not based upon site management issues, but as a means to follow-up individuals known to have been exposed to the compound at levels exceeding ATSDR comparison values.

Comment

The RP representative expressed the opinion that the presence of mercury in potable wells is not site-related, and community concerns regarding this issue should be directed to another source.

Response

The Remedial Investigation report ⁽¹⁾ was cited by the RP representative as stating the DRL site was not the likely source of mercury contamination in the potable wells. Groundwater mercury data were not presented in the RI/FS; data were rejected because holding times were exceeded. Thus it was not possible to definitively conclude the origin of mercury in groundwater. Notwithstanding the origin of the mercury detected in the potable wells, it is the policy of the ATSDR and the NJDOH to evaluate all contaminants found in excess of ATSDR comparison values. The Health Assessment has been amended to reflect the possibility that the presence of mercury in potable wells may not be site related (see Conclusions).

Comment

The RP representative expressed an opinion that the institutional controls specified in the Record Of Decision for the DRL site would serve to interrupt any potential exposure pathways and adequately protect the public health.

Response

The ATSDR and the NJDOH concur (as stated in the Conclusions section of the Health Assessment) that the remedial activities and institutional controls specified in the ROD, when implemented, are consistent with protection of the public health.

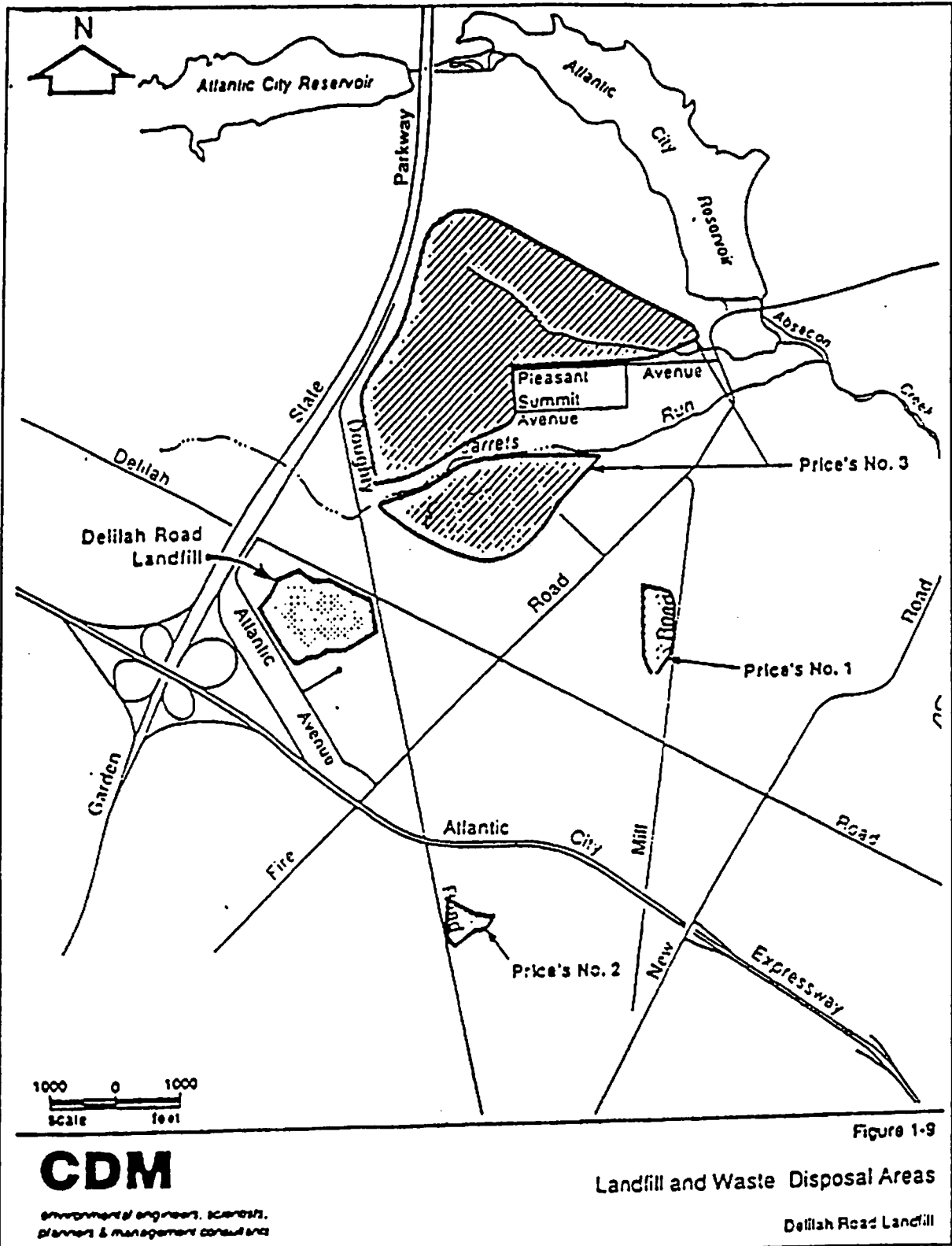


Figure 1 - General Site Location

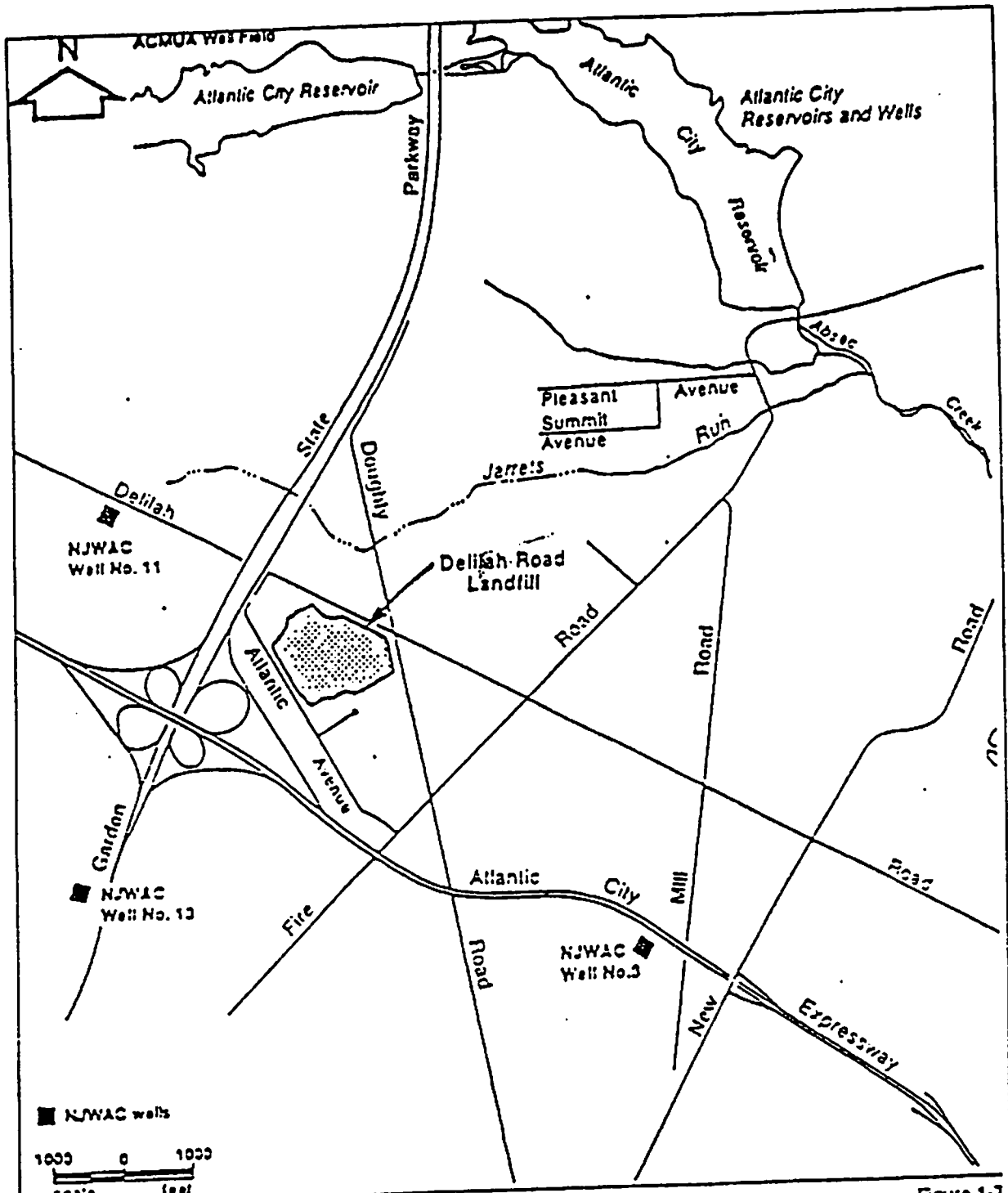


Figure 1-7

CDM
 environmental engineers, scientists,
 planners & management consultants

Location of Public Water
 Supply Wells and Reservoirs
 Delilah Road Landfill

Figure 2.- Location of Public Water Supply Wells-

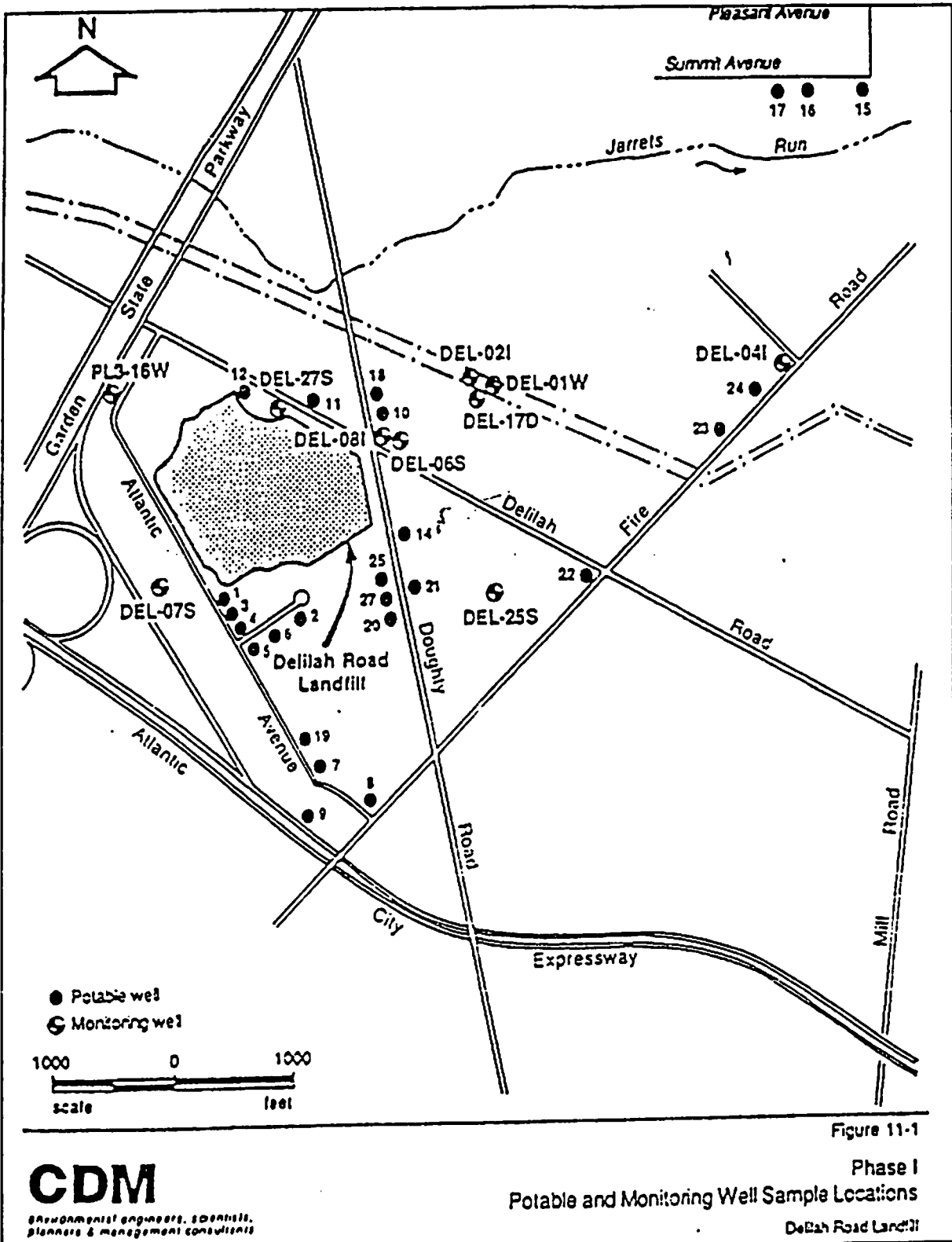


Figure 3 - Phase I Potable and Monitoring Well Locations

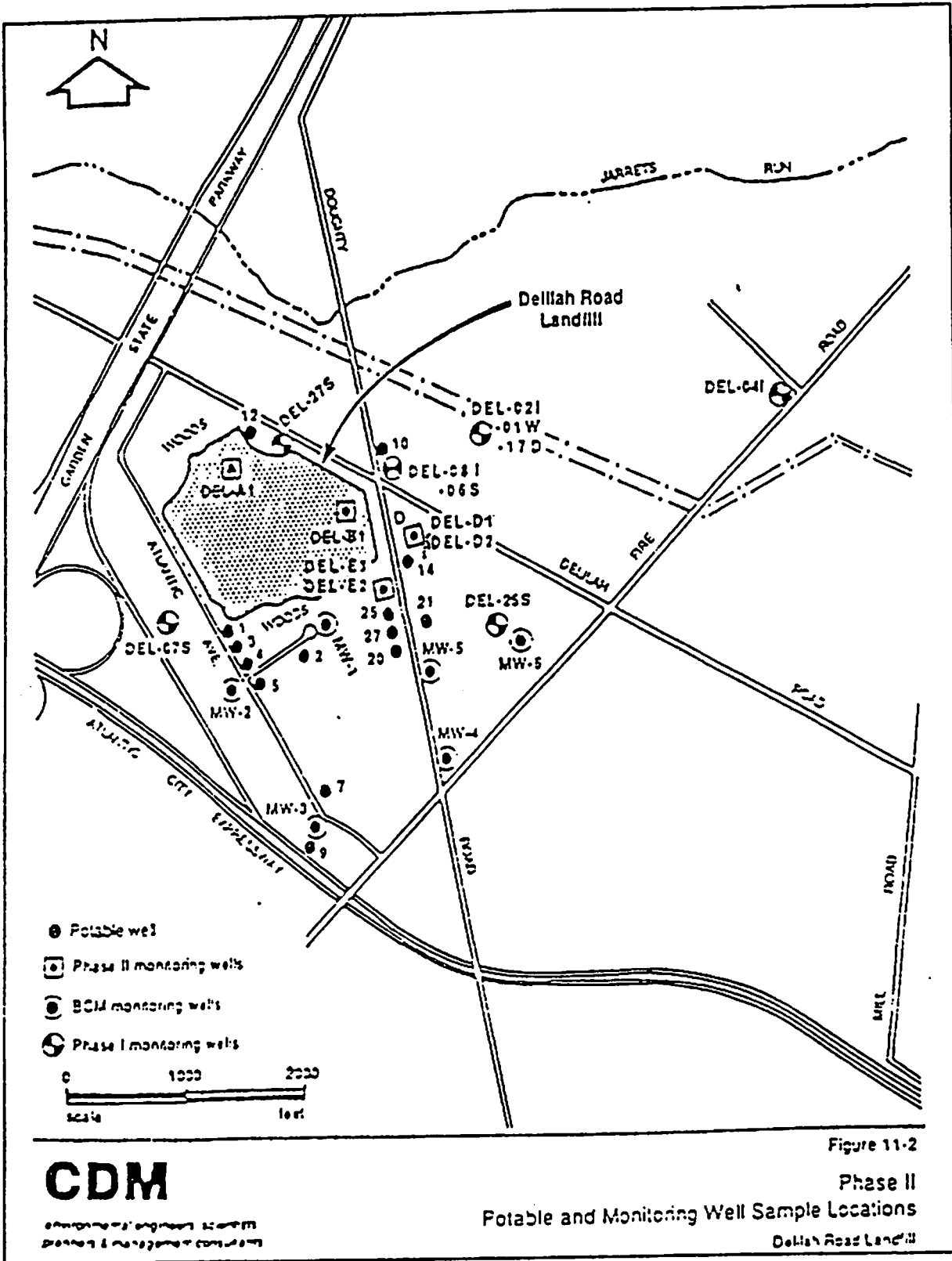


Figure 4 - Phase 2 Potable and Monitoring Well Locations

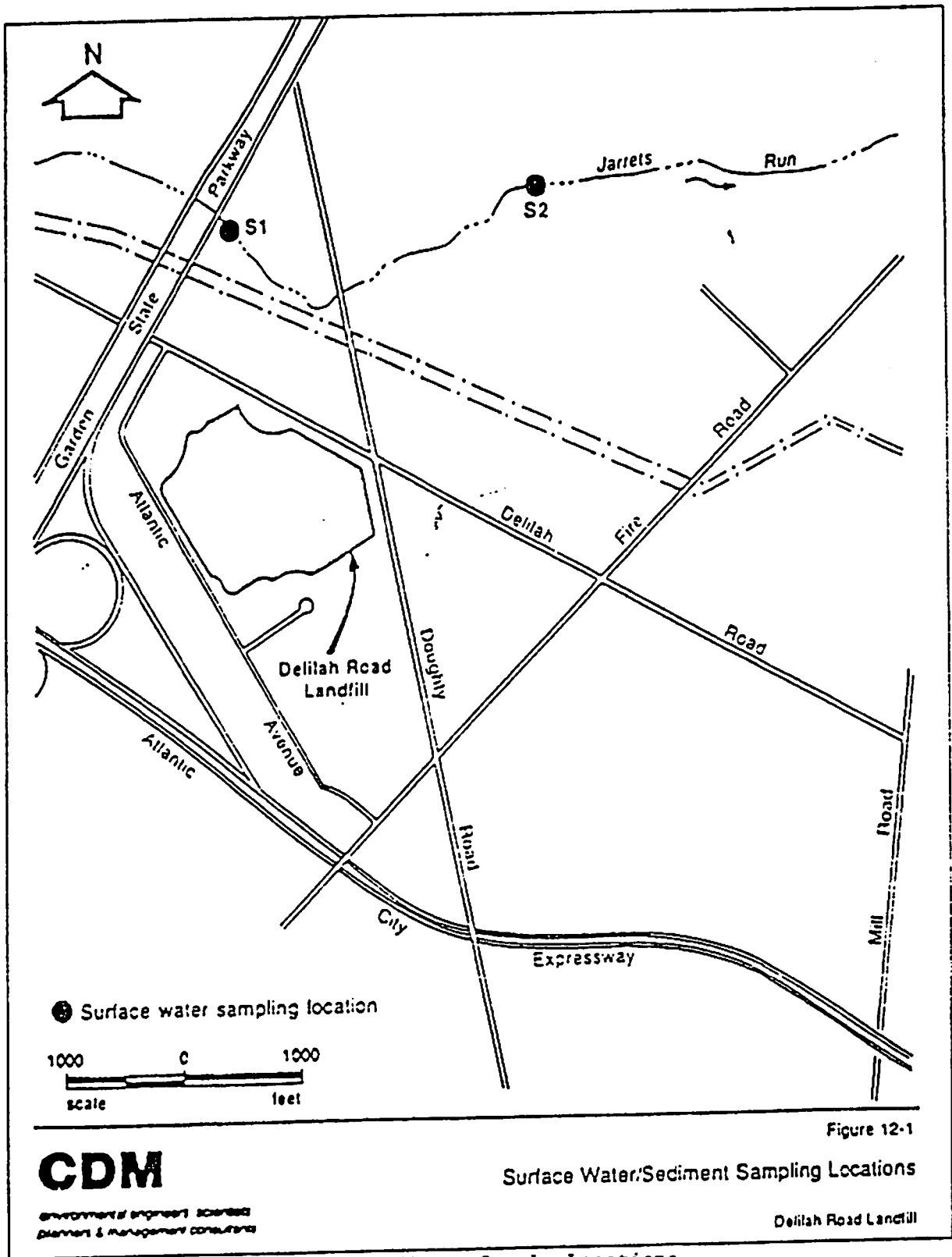


Figure 5 - Surface Water and Sediment Sample Locations