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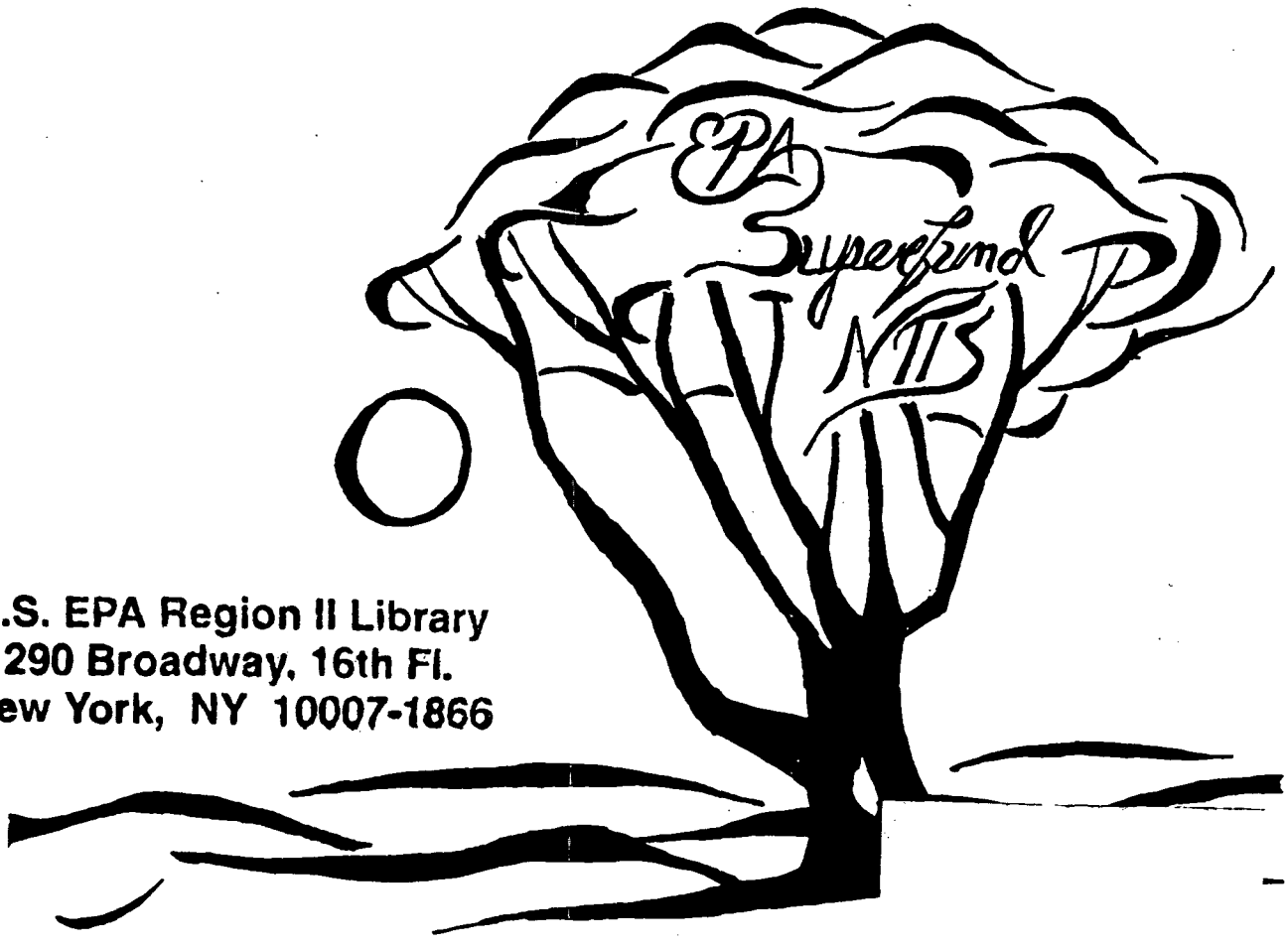
EPA Superfund Record of Decision:

Jackson County Township Landfill Site, NJ 9/26/1994



RECORD OF DECISION FACT SHEET
EPA REGION II

Site:

Site name: Jackson Township Landfill Site

Site location: Jackson Township, Ocean County, New Jersey

HRS score: 38.11 (August 8, 1982)

Listed on the NPL: December 1, 1982

Record of Decision:

Date signed: September 26, 1994

Selected remedy: No Action.

Lead:

NJDEP Enforcement

Primary Contact: Joseph Gowers, (212) 264-5386

Secondary Contact: Kimberly O'Connell, (212) 264-8127

Main PRPs: Jackson Township, (908) 928-1200

Waste:

Contaminated Media: Limited groundwater contamination existed at the site (chlorobenzene, lead). Levels in groundwater have declined over time due to natural attenuation. Contaminants were not found above levels of concern in soil boring samples collected from the site.

Waste origin: Municipal Landfilling

SUPERFUND RECORD OF DECISION

JACKSON TOWNSHIP LANDFILL SITE
JACKSON TOWNSHIP, OCEAN COUNTY
NEW JERSEY

PREPARED BY: N.J. DEPARTMENT OF ENVIRONMENTAL PROTECTION
SITE REMEDIATION PROGRAM
BUREAU OF FEDERAL CASE MANAGEMENT
SEPTEMBER 1994

JACKSON TOWNSHIP LANDFILL SITE
RECORD OF DECISION

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DECLARATION STATEMENT
RECORD OF DECISION
JACKSON TOWNSHIP LANDFILL SITE

Site Name and Location

Jackson Township Landfill Site
Jackson Township, Ocean County, New Jersey

Statement of Basis and Purpose

This decision document, prepared by the New Jersey Department of Environmental Protection (NJDEP) as lead agency, presents the selected remedy for the Jackson Township Landfill Site. The selected remedy was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Re-authorization Act of 1986 (SARA), the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), New Jersey Public Law 1993, c.139 (N.J.S.A. 58:10B), and the Pinelands Protection Act (N.J.S.A. 13:18A-1 et seq.). This decision document explains the factual and legal basis for selecting the remedy for this site. This decision is based on the administrative record for this site. The attached index identifies the items that comprise the administrative record.

The United States Environmental Protection Agency (USEPA), support agency for this site, concurs with the selected remedy and has provided a concurrence letter to that effect which is attached to the responsiveness summary section of this document.

Description of the Selected Remedy

This Record of Decision (ROD) sets forth the selected final remedy for the Jackson Township Landfill Site. The ROD addresses all environmental media and all operable units at the Site. The selected remedy is "No Further Action with Maintenance and Monitoring".

The selected remedy requires a five year review to assure complete compliance with CERCLA. This five year review will require documentation to confirm that the chosen remedy provides adequate protection of human health and the environment. This review will include ground water sampling and air monitoring.

This remedy complies with the NJDEP Ground Water Quality Standards, the Technical Regulations for Site Remediation, and the New Jersey Public Law P.L. 1993, c.139 (N.J.S.A. 58:10B) regulations. The levels of compounds and elements in the soils are consistent with the NJDEP Soil Cleanup Criteria as outlined in the NJDEP Soil Cleanup Criteria dated February 3, 1994.

Declaration of Statutory Determinations

The No Further Action remedy has been selected based on the results of the Baseline Risk Assessment, which has shown that no further action is necessary to protect human health and the environment.

Consistent with CERCLA requirements, a review will be conducted within five (5) years after execution of the ROD to ensure that the remedy continues to provide adequate protection of human health and the environment. In accordance with CERCLA, the NCP and state requirements, NJDEP has determined that no further action is necessary to ensure protection of public health and the environment at the Jackson Township Landfill Site. NJDEP has determined that its response at this site is complete. Therefore, the site now qualifies for inclusion on the "Construction Completion List".

Further Action Under New Jersey State Requirements

The New Jersey Solid Waste Regulations, N.J.A.C. 7:26-2 et seq., require that sanitary and solid waste landfills must be closed in accordance with a NJDEP approved solid waste landfill closure plan. The Jackson Township landfill will be closed as specified in a NJDEP approved solid waste landfill closure plan.

Signature

Date 9/27/94

Richard J. Gimello, Assistant Commissioner
Site Remediation Program
New Jersey Department of Environmental Protection

DECISION SUMMARY
RECORD OF DECISION
JACKSON TOWNSHIP LANDFILL SITE

Site Name, Location, and Description

The Jackson Township Landfill Site is located off Lakehurst Avenue in Jackson Township, Ocean County, New Jersey. The property is situated in a regional reserve known as the Pinelands. The Pinelands area is designated by the Pinelands Protection Act, N.J.S.A. 13:18A-1 et seq. The property is approximately 135 acres referenced as Block 32, Lot 61; Block 35, Lots 1 to 11, 21 to 27, and 31 to 37; Block 36, Lots 2, 3, and 23 to 31; Block 37, Lots 2, and 4 to 11; and Block 38, Lots 2 to 13. Of this area, approximately 20 acres were previously used for the disposal of various liquid, semi-liquid, and solid wastes. The site is surrounded by residential dwellings to the north, south, and west. To the east, the landfill borders large sand piles and a quarrying operation. **Figure 1** identifies the location of the site.

The landfill soils are comprised almost exclusively of sand. This is attributed to the previous owners activities - ilmenite mining. Ilmenite, an iron black opaque ore of titanium, was used as a source for paint pigments. Ilmenite mining consisted of dredging, extracting a sand slurry, dewatering, separation of the ore-bearing sand and the extraneous materials, and then final processing. Approximately 96% of the sand is returned, although without the fine ilmenite particles. This operation was conducted for eleven years, at depths estimated to be 40 feet below the undisturbed property surface. This process leaves soil (sand) which is extremely porous as a result of the mining operations.

The geology/hydrogeology at the site consists of sands which grade to silty sand and clay at increasing depth within the major water bearing formation, the Cohansey Formation. The Cohansey Formation has two integral water bearing zones in the area of the landfill, the Upper and Lower Cohansey Formation. Ground water flow in the Upper Cohansey is generally in a south-south-west direction. Lower Cohansey Formation water flow is generally toward the south.

Site History and Enforcement Activities

The Glidden Corporation owned the property until Jackson Township purchased it in 1972. Jackson Township began accepting municipal wastes at the landfill in April 1972 under state permit to receive sewage sludge, septic tank wastes and solid wastes. Landfill operations commenced in the western portion of the property with the landfill accepting bulk liquid and semi-liquid coffee wastes, household refuse, tree stumps, miscellaneous construction debris, junked cars, and liquid septage. According to landfill records, the average liquid disposal rate was approximately 8,000 gallons per day. Much of the liquid waste contained Volatile Organic contaminants such as methylene chloride. In 1977 there were multiple complaints

associated with the use of area ground water. Complaints included water quality problems including clarity, taste, and smell, as well as rashes, digestive tract irritation, and other medical problems alleged to have been caused through ground water use. Analysis ordered by the NJDEP concluded that a segment of the Cohansey aquifer and several domestic wells had been contaminated by hazardous substances disposed of at the Jackson Township Landfill. In 1978, NJDEP ordered Jackson Township to stop disposing of liquid wastes at the landfill. The NJDEP used Spill Fund monies to provide bottled potable water to residents impacted by the contamination. In 1980, a citizen lawsuit resulted in a municipal water system extension to properties affected, or potentially affected by the contaminants disposed of at the landfill. Individual septic systems remain.

The landfill was closed by order of the Superior Court of New Jersey in February 1980. The NJDEP filed a Verified Complaint requesting injunctive relief, statuary penalties, damages and costs against Jackson Township by authority of the Solid Waste Management Act (N.J.S.A. 13:1E-1 et. seq.) and the water quality legislation set forth in N.J.S.A 23:5-28. This complaint was amended in June 1982 to include additional regulatory violations.

In December 1981 and February 1982, sampling of twenty-two monitoring wells and eight domestic wells was performed. Sample analysis found that contamination was not detected, concentrations were below the method detection limits, or that established criteria were only slightly exceeded. In April and December of 1982, the NJDEP sampled seventeen shallow and deep monitoring wells at and in the vicinity of the landfill. With the exception of one deep well (well #207D), all organic compounds sampled for were either not detected or were detected below method detection limits. Inorganic compounds were detected in several wells but rarely exceeded established criteria. Further sampling in 1985 revealed similar results, again with one deep well showing isolated organic contamination, and several instances of inorganic contaminants.

In December 1982, the landfill was included on the National Priorities List of Superfund sites.

In 1983, the NJDEP approved the landfill closure plan submitted by Jackson Township consultants Fellow, Read and Associates Inc., in a series of documents dated between June 1, 1982 and October 19, 1982. However, the implementation of the approved closure plan was postponed pursuant to a 1988 Order for Consent Judgement pending the remedial investigation conclusion.

In 1985, the NJDEP issued a New Jersey Pollution Discharge Elimination System permit (NJPDES). This permit was issued in order to monitor the ground water affected by the site.

In 1988, the NJDEP and Jackson Township reached an agreement dictated by the Superior Court of New Jersey Chancery Division. This agreement is part of the administrative record and is referred to as the Judicial Consent Order (JCO). Pursuant to this JCO, Jackson

Township was to reimburse the NJDEP for Spill Fund monies spent by the NJDEP totalling $110,000. The JCO also required Jackson Township to arrange and fund an investigation and remediation of the landfill.

In 1989, the NJDEP and consultants to Jackson Township conducted a preliminary investigation of the site. Throughout 1989 and 1990, a Remedial Investigation was conducted in which air, surface water, ground water and soil studies were performed under the NJDEP and the USEPA guidance in accordance with the CERCLA and the NCP.

The NJDEP and USEPA approved the final Remedial Investigation in 1991. Jackson Township contracted Marc Associates, Inc. to conduct the Risk Assessment in 1991. Marc Associates, Inc. subcontracted the task to RAM TRAC, Inc.

RAM TRAC submitted a draft Risk Assessment in May 1992. This document and subsequent re-drafts were unacceptable. Therefore, the NJDEP required Jackson Township to re-contract the Risk Assessment phase to another company. In May 1993, Industrial Compliance Corporation Inc. submitted a draft Risk Assessment which was approved by the NJDEP and the USEPA in July 1993. Ground water sampling and air/gas monitoring was conducted again in October 1993. Results from this sampling fully support the No Further Action remedial selection.

Following the approval of the Risk Assessment, the NJDEP has been working with Jackson Township to fulfill Solid Waste Landfill closure requirements.

Highlights of Community Participation

The Remedial Investigation (RI) and Baseline Risk Assessment (BRA), for the Jackson Township Landfill site were forwarded to the public repositories in February 1994. The Proposed Plan was released to the public for comments on March 3, 1994. These documents were made available to the public for review at the NJDEP office (Trenton, New Jersey), the Jackson Township Municipal Complex (Jackson, New Jersey), and the Ocean County Library (Toms River, New Jersey). The notice of availability for these documents was published in the Tri-County News on March 3, 1994. The Asbury Park Press also published unofficial notification during the week of February 27, 1994. A public comment period on the documents was held from March 3, 1994 to April 1, 1994. In addition, a public meeting was held on March 23, 1994. At this meeting representatives from the NJDEP presented the preferred remedy and answered questions about the site. A response to comments received during this period and the public meeting is included in the Responsiveness Summary, which is part of this ROD.

Scope and Role of Response Action

The selected remedy for the site under the Superfund Regulatory Program is No Further Action.

This remedy is based on the fulfillment of all previous actions to minimize the potential for exposure of humans and the ecological receptors to contaminants. This determination was made because:

- The No Further Action remedy complies with the New Jersey regulations - NJDEP Ground Water Quality Standards (N.J.A.C. 7:9-6 et seq.), the Surface Water Quality Standards (N.J.A.C.7:9B et seq.), the Technical Regulations-for Site Remediation (N.J.A.C. 7:26E), and New Jersey Public Law P.L. 1993, c.139 (N.J.S.A. 58:10B). Further, the remedy satisfies the policy and parameters outlined in the NJDEP Soil Cleanup Criteria guidance.

- Based on the BRA, there is no current or future risk to public health greater than the carcinogenic risk range of 10^{-4} to 10^{-6}, or the non-carcinogenic Hazard Index criteria of one (1) established by USEPA which is not directly attributable to indigenous compounds. The risk is also acceptable pursuant to Public Law P.L. 1993, c.139 which requires the risk to be no greater than 1×10^{-6}. Therefore, based on the BRA, there is no unacceptable current or future risk to human health.

- An ecological evaluation was conducted which concluded that current and future site conditions do not pose a risk to the local ecological community.

- The entire site is surrounded by security fencing which restricts unauthorized access to the site.

- Private potable wells in the area potentially affected by previous site disposal are on a public water supply system.

- Ground water modelling and historical ground water sampling and analysis have demonstrated that ground water quality is in compliance with the New Jersey Ground Water Quality Standards and is improving due to natural attenuation.

Summary of Site Characteristics

A. Ground Water

A hydro-geologic study of the site during the RI field investigation was performed in 1987 and included the drilling of borings through the Upper and Lower Cohansey Formation, and the collection of soil samples to evaluate site stratigraphy and contaminant concentrations. Monitoring wells were installed through some of these borings in the Upper and Lower Cohansey Formations. The Lower Cohansey wells were screened just above the Kirkwood Formation. Ground water samples were collected from twenty-two (22) ground water monitoring wells at and around the site. These wells were analyzed for Target Compound

List/Target Analyte List (TCL/TAL) parameters. **Figure 2** identifies the locations of the ground water monitor wells. Five (5) compounds were detected above the New Jersey Ground Water Quality Standards. These compounds were: chlorobenzene (29 ug/L), aluminum (3340 ug/L), iron (100,000 ug/L), lead (47.9 ug/L), and manganese (327 ug/L). Over several years of sampling, it has been determined that overall, contaminant concentrations in the ground water have declined due to natural attenuation. As noted in a subsequent section of this document, risk levels associated with these compounds were determined to be within the required contaminant exposure risk level range established by the USEPA of 1×10^{-4} to 1×10^{-6}. In accordance with USEPA guidance documents and the BRA, there is no current or future unacceptable risk to public health or the environment related to ground water exposures as discussed in the Summary of Site Risks section of this ROD. The New Jersey Public Law P.L. 1993, c.139 (N.J.S.A. 58:10B) risk level of 1×10^{-6} is exceeded due to indigenous compounds and not contaminants emanating from the landfill.

NJDEP analysis of ground water samples taken from monitoring wells located downgradient of the site property line has revealed that there is consistency in the compounds detected and the levels at which those compounds were detected between compounds found at the site, upgradient of the site, and downgradient of the site. From this analysis, the NJDEP has determined that the Jackson Township Landfill Site is not a significant source of ground water contamination.

B. Surface Water

Surface water sampling was conducted in the Ridgeway Branch and the Obhanan-Ridgeway Branch, both tributaries to the Toms River located approximately 4500 feet south of the deposited liquid wastes. A total of four samples were taken, one upgradient, one downgradient of the site, one within the area most expected to be impacted by the disposal practices at Jackson Township Landfill in the Ridgeway, and one sample adjacent to the middle sample near the intersection of the Ridgeway and Obhanan-Ridgeway branches. Samples were analyzed for Target Compound List compounds plus thirty additional compounds.

The surface water sample analytical data confirmed that no site related compounds were detected above the promulgated Federal or State Surface Water Quality Criteria. Based on the amount of contamination found in the stream, the NJDEP and USEPA have determined that the contaminants in the Ridgeway Branch cannot be solely attributed to the Jackson Township Landfill but also to the use of septic tanks and naturally occurring compounds indigenous to the region. **Figure 2** identifies the locations of the surface water samples.

C. Surface/Subsurface Soil

Nine (9) individual soil borings were installed. Six (6) of these borings were installed in the former landfill area. The remaining three (3) borings were installed in areas known to be inactive areas of the site. The samples were analyzed for volatile and semi-volatile organic compounds, pesticides, polychlorinated biphenyls, inorganic chemicals, and total petroleum hydrocarbons. No contaminants were found to exceed the NJDEP Soil Cleanup Criteria dated February 8, 1994. **Figure 3** identifies the locations of the surface/subsurface soil samples.

D. Sediment

Sediment samples were collected at points corresponding to the surface water samples. Contaminant concentrations appeared to be similar upgradient, and downgradient of the site. In accordance with the NJDEP "Guidance For Sediment Quality Evaluations" criteria and human and health based parameters calculated in the BRA, none of the compounds detected were determined to be above the guidance criteria or at concentrations of concern as determined in the BRA. The "Summary of Site Risks" section of this ROD incorporates further information on the compounds detected and the associated exposure risks. **Figure 2** identifies the locations of the sediment samples.

E. Air

Air samples were taken surrounding the landfill and in areas of disposal. This sampling revealed that methane was almost exclusively confined to areas of disposal. The levels were determined to be acceptable and below concentrations of concern. No other volatile organic compounds were found to be emanating to the atmosphere from the landfill. The low level of methane found is most likely due to the porosity of the landfill cover and the age of the disposed material. It has been concluded that methane easily exits the disposal areas with limited restriction. This limited restriction, combined with the relatively rapid decomposition of the solid wastes, particularly sewerage, has allowed for methane production to dissipate quickly over time.

Summary of Site Risks

Based upon the results of the RI, a BRA was conducted to estimate the risks to human health and the environment associated with current and future site conditions under hypothetical reasonable maximum exposure scenarios. The BRA estimated the human health and ecological risks which could potentially result from the site if no further remedial actions were taken.

A. Human Health Risk Assessment

A four step process is utilized for assessing site-related human health risks for a reasonable maximum exposure scenario:

- o Hazard Identification--identifies the chemicals of concern at the site based on several factors such as toxicity, frequency of occurrence, and concentration.

- o Exposure Assessment--estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways (e.g., ingesting contaminated well water) by which humans are potentially exposed.

- o Toxicity Assessment--determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response).

- o Risk Characterization--summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative (e.g., one-in-a-million excess cancer risk) assessment of site-related risks.

Hazard Identification

Chemicals of concern were selected based upon the frequency of detection in each medium (e.g., soil, ground water, surface water and sediment), adequacy and representativeness of the analytical results, toxicity, comparison to site or area-specific background concentrations, and comparison to lab results for blank samples. The chemicals of concern for each medium include metals (including aluminum, antimony, arsenic, barium, beryllium, chromium, cobalt, cyanide, lead, mercury, nickel, silver and vanadium), volatile organic compounds (including acetone, benzene, carbon disulfide, chlorobenzene, freon-1,1,3 and toluene), semi-volatile organic compounds (including 1,2,4-trichlobenzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 2-methylnaphthalene, 4-chloroanaline, 4-methylphenol, acenaphthene, acenapthylene, anthracene, benzoic acid, bis(2-ethylhexyl) phthalate, butyl benzyl phthalate, chrysene, di-n-butyl phthalate, diethylphthalate, fluoroanthene, naphthalene, phenanthrene, and pyrene), pesticides (DDT and TPHC), and a polychlorinated biphenyl compound (arochlor-1242). A summary of all contaminants detected in all ground water monitor wells, surface water, soil and sediment is provided below and in greater detail in **Table 1**. **Table 2** provides a summary of the depth of the monitor wells associated with the site.

CONTAMINANT OF CONCERN	GROUND WATER	SOIL	SEDIMENT	SURFACE WATER
METALS				
ALUMINUM	yes	yes	yes	yes
ANTIMONY	yes		yes	
ARSENIC		yes		
BARIUM	yes	yes	yes	yes
BERYLLIUM		yes		
CHROMIUM	yes	yes	yes	yes
COBALT		yes		
CYANIDE		yes	yes	
LEAD	yes	yes	yes	
MERCURY		yes		
NICKEL		yes		
SILVER				yes
VANADIUM	yes	yes	yes	
VOLATILE ORGANIC COMPOUNDS				
ACETONE		yes		
BENZENE			yes	
CARBON DISULFIDE	yes	yes	yes	
CHLOROBENZENE	yes			
FREON-1,1,3		yes		
TOLUENE		yes	yes	
SEMI-VOLATILE ORGANIC COMPOUNDS				
1,2,4-TRICHLOROBENZENE		yes		
1,2-DICHLOROBENZENE		yes		
1,3-DICHLOROBENZENE		yes		
1,4-DICHLOROBENZENE		yes		
2-METHYLNAPHTHALENE		yes		
4-CHLOROANALINE		yes		
4-METHYLPHENOL			yes	
ACENAPHTHENE		yes		
ACENAPTHYLENE			yes	

CONTAMINANT OF CONCERN	GROUND WATER	SOIL	SEDIMENT	SURFACE WATER
ANTHRACENE			yes	
BENZOIC ACID		yes	yes	
BIS(2-ETHYLHEXL) PHTHALATE		yes	yes	
BUTYL BENZYL PHTHALATE		yes	yes	
CHRYSENE			yes	
DI-N-BUTYL PHTHALATE		yes	yes	
DIETHYLPHTHIALATE		yes	yes	
FLUOROANTHENE	yes		yes	
NAPHTHALENE		yes		
PHENANTHRENE		yes	yes	
PYRENE		yes	yes	
PESTICIDES-				
DDT			yes	
TOTAL PETROLEUM HYDROCARBONS (TPHC)		yes		
POLYCHLORINATED BIPHENYL COMPOUND				
AROCHLOR-1242		yes		

Exposure Assessment

Potential human health effects associated with exposure to the chemicals of concern were estimated quantitatively through the development of hypothetical exposure pathways. These pathways were developed to reflect the potential for exposure to chemicals of concern based on the current uses and potential future uses. The assumptions for exposure frequency and duration and the equations to calculate exposure concentrations along with the resulting exposure point concentrations using the reasonable maximum exposure scenario are presented and discussed in the BRA.

Under current site conditions, exposure to chemicals of concern might potentially occur via inhalation, ingestion and direct contact with surface soil, and ingestion, inhalation (as a result of showering) and direct contact with ground water. Off-site exposure to chemicals of concern from the Jackson Township Landfill were calculated by studying the surface water and sediments and by evaluating direct contact with surface water, as well as ingestion and direct contact with sediment.

Populations which are potentially exposed to surface water, surface soil, sediment and air under current site conditions considered in the BRA include current off-site residents, trespassers, future on-site recreational populations and future residents. Off-site residents were assumed to inhale chemicals of concern which are incorporated in dust particles, volatile chemicals of concern which could be released during showering/bathing, as well as drink from local wells which would be assumed to be contaminated with chemicals of concern. In addition, children were assumed to be exposed to sediment and surface water during play. A trespasser was assumed to inhale chemicals of concern in air-borne dusts and to be directly exposed to chemicals of concern in surface soil through direct contact and ingestion. A future on-site resident was assumed to inhale air-borne dust particles containing chemicals of concern and from ingestion of soil and ground water (showering/bathing and drinking), and inhalation of volatile chemicals of concern released during showering/bathing. Children were evaluated by calculating future on-site use. These children were assumed to be exposed to chemicals of concern in the soil through ingestion, inhalation of air-borne particles and direct contact. A summary of all potential exposure pathways for all media is included in **Table 3**.

Toxicity Assessment

Cancer potency factors (CPFs) and reference doses (RfDs) have been developed by USEPA for estimating excess lifetime cancer risks which may result from exposure to carcinogenic chemicals of concern at the site and for indicating non-carcinogenic adverse health effects from chemicals of concern at the site, respectively. The BRA presents and discusses these numerical factors used for the calculation of human health risks at the site. A reference calculation of exposure point concentrations of the chemicals of concern in ground water, surface water, soil, and sediment is included in **Tables 4** through 7.

Cancer Potency Factor - (Also known as slope factor) is a quantitative assesment of the excess lifetime cancer risk associated with exposure to potentially carcinogenic (cancer causing) chemicals. Cancer potency factors (CPFs) are expressed in units of milligrams per kilogram per day (mg/kg-day)$^{-1}$ and are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to generate an "upper-bound" estimate of the excess lifetime cancer risk associated with exposure to the compound at that intake level. The upper-bound reflects the conservative estimate of the risks calculated from the CPF.

Reference Doses (RfDs) - Developed by EPA to indicate the potential for adverse health effects, these are estimates of daily exposure levels for humans expressed in units of milligrams per kilogram per day (mg/kg-day) which are thought to be safe over a lifetime (including sensitive individuals).

Hazard Index (HI) - a quantitative criteria used to assess the non-carcinogenic adverse health effects which occur as a result of site-related exposures to chemicals of concern. A Hazard Index greater than 1.0 indicates that the potential exist for non-carcinogenic adverse health effects to occur as a result of site-related exposures.

Risk Characterization

Under current Federal guidelines, excess carcinogenic risk from contaminant exposure within the range of 10^{-4} to 10^{-6}, calculated over the individual's lifetime is considered acceptable. This can be interpreted to mean that an individual may have a one in ten thousand to a one in a million increased chance of developing cancer as a result of a site related exposure to a carcinogen using standard exposure conditions. As a requirement of New Jersey Public Law P.L. 1993, c.139 (N.J.S.A. 58:10B), the risk must be limited to 1 x 10^{-6} and the non-carcinogenic effect shall not exceed a Hazard Index of one (1.0).

The results of the baseline risk assessment indicate that the soils and ground water at the site do not pose an unacceptable risk to human health. The calculated excess lifetime cancer risks for soil exposure, using the reasonable maximum exposure, ranged from 9.9 x 10^{-8} (less than ten additional cancers per one hundred million persons over a lifetime) for the adult resident lifetime cancer risk associated with off-site inhalation of site soil to 5 x 10^{-6} (five additional cancers per one million persons) for the hypothetical future child resident lifetime cancer risk associated with direct exposure to on-site soil. These calculated risk numbers are within the USEPA's range of 1 x 10^{-4} to 1 x 10^{-6}, however, New Jersey Public Law P.L. 1993, c.139 (N.J.S.A. 58:10B) defines an acceptable risk to be no greater than 1 x 10^{-6}. The Risk Assessment calculated three separate scenarios for which the risk was above the one per million New Jersey requirement. In researching the reasons for risk in excess of New Jersey requirements, it was determined that two compounds were responsible. These were arsenic and arochlor-1242. According to the Remedial Investigation report, there was only one soil sample which showed arsenic levels high enough to cause the excess cancer risk. This was soil sample 1D (approximately 20 feet deep) which had 4.7 mg/kg of arsenic reported. This is well below the NJDEP soil cleanup criteria of 20 mg/kg. Arochlor 1242 was also detected in only one sample (at approximately 3 feet deep) at 0.46 mg/kg. This is below the NJDEP soil cleanup criteria of 0.49 mg/kg.

Three scenarios were evaluated to determine human health risk. These were as follows:

The future adult resident scenario evaluates the excess lifetime cancer risk associated with direct exposure to on-site soil. The cancer risk was determined to be 3 x 10^{-6}, where 53% of the calculated risk was due to arsenic and 40% due to arochlor-1242.

The future child resident scenario evaluates the lifetime cancer risk associated with direct exposure to on-site soil. The cancer risk was determined to be 5 x 10^{-6} (as noted above), where 56% of the calculated risk was due to arsenic and 28% of the calculated risk was due to arochlor-1242.

The last scenario evaluated was for that of the future on-site recreational child. The cancer risk was determined to be 2 x 10^{-6} where 47% of the risk was due to arsenic and 28% due to arochlor-1242. Although the risk for a direct contact to soil exceeds the acceptable

NJDEP health risk level (one in one million) a result of arsenic in soil, the arsenic level was clearly determined to be characteristic of the regional natural background levels. The NJDEP and USEPA have determined that there is no unacceptable quantified cancer risk calculated for all potential exposure scenarios associated with surface water, ground water, or sediments.

Current federal guidelines and New Jersey Public Law P.L. 1993, c.139 (N.J.S.A. 58:10B) define acceptable exposures for non-carcinogens as a maximum health Hazard Index of 1.0. A hazard index greater than one (1.0) indicates that the exposure level exceeds the protective level for that particular chemical.

After calculating hazard indices for both child and adult receptors of each of the media (ground water, surface water, sediment and soils), only one type of receptor in one medium was determined to be potentially at risk. The hazard index for the future adult resident drinking ground water was calculated to be 1.73. Over 90% (1.59) of this hazard index was due to antimony. Antimony was detected in two of twenty two ground water monitoring wells. The first, well number 202, is considered up gradient of the disposal areas. The other ground water monitor well, well 302, is located off-site and side-gradient of the site. Well 302 is therefore outside the area which would be impacted by disposal on site. In addition, antimony was not detected in any of the soil samples taken on or in the vicinity of the landfill. Antimony was detected in the blank sample associated with the samples from Well 302. (Blank samples are laboratory provided samples which are taken to the site and are exposed to all aspects of the sampling. Contamination evident in blank samples are usually the result of sampling/analytical error and are not associated with the site.) It is the NJDEP's conclusion that the antimony in samples collected from these wells is not indicative of the landfill operation, but is more likely due to regional natural background levels, or the result of laboratory or field sample contamination.

The results of the BRA indicate that the current and potential future risks, both carcinogenic and non-carcinogenic, associated with the chemicals of concern for all media at the site are within or below acceptable levels. The risks that are prevalent at the site are on the property and are attributed to naturally occurring substances. **Table 8** represents the summary of human non-carcinogenic and carcinogenic risks for current and hypothetical future site conditions.

B. Ecological Risk Assessment

Through the use of the USEPA's guidance document; The Risk Assessment Guidance for Superfund - Volume II: Environmental Evaluation Manual and its supplements, impacts to the ecology of the site and its surroundings were identified and estimated. This was performed through a four-step process based on maximum contaminant exposure scenarios. The steps are: *Problem Formulation* - a qualitative evaluation of contaminant release, migration, and fate; identification of contaminants of concern, receptors, exposure pathways,

and known ecological effects of the contaminants; and selection of endpoints for further study. *Exposure Assessment*--a quantitative evaluation of contaminant release, migration, and fate; characterization of exposure pathways and receptors; and measurement or estimation of exposure point concentrations. *Ecological Effects Assessment*--literature reviews, field studies, and toxicity tests, linking contaminant concentrations to effects on ecological receptors. *Risk Characterization*--measurement or estimation of both current and future adverse effects.

The objective of the environmental assessment was to evaluate the potential environmental effects that the landfill has had on the local ecology. The assessment was a qualitative appraisal of the actual or potential effects associated with the existence of the landfill. A number of State, Federal, and Local government agencies, private organizations, and local experts were contacted to obtain information on the flora, fauna, aquatic biota, historical water quality data, soils, topography, and listed threatened, endangered, or sensitive species in the area of the site. The environmental assessment evaluated the following nine criteria: wetlands/water resources; floodplains; presence of endangered and threatened species/critical habitats; cultural resources; wild and scenic rivers; wilderness areas; significant agricultural lands; coastal zones; and coastal barriers.

As determined from this evaluation of the site, no visual evidence of impacts on plant or animal species was determined for the site or wetland areas surrounding the site. No federal or state listed endangered species were observed on the site, although some listed or endangered species have been recorded as being in the area. The most likely exposure pathways for the flora were determined to be uptake via water and sediments in the wetlands in the vicinity of the site. The most likely exposure pathways for fauna were determined to be ingestion of surface water and sediment in the wetlands, and dermal adsorption from water in the wetlands.

Surface water runoff from the site is minimal to non-existent due to the nature of the soils. To further assess potential ecological impacts, surface water and sediment quality data for samples obtained from the off-site stream, were compared to state and federal ambient surface water quality criteria and state sediment criteria. These criteria were developed to be protective of ecological systems. This comparative assessment showed that the constituents detected in surface water samples were below the applicable criteria and that the constituents detected in surface water samples were found at concentrations typical of background concentrations in the area, particularly in light of the regional use of septic systems for the disposal of residential sewage.

The NJDEP and USEPA have determined that the disposal practices and resulting releases at this site have not resulted in impact and degradation to any of the nine criteria and therefore the Jackson Township landfill site does not appear to be impacting the local ecological community.

Description of the "No Further Action" Remedy

The NJDEP has selected the No Further Action with Maintenance and Monitoring remedy for the Jackson Township Landfill Site. This remedy will result in contaminants remaining on-site, therefore, a review will be conducted within five years after signing the Record of Decision to ensure that no further action continues to provide adequate protection of human health and the environment. Based on the findings of the Remedial Investigations and the Risk Assessment, the NJDEP and the USEPA have concluded that conditions at the site pose no current or potential threat to human health and the environment. The NJDEP and the USEPA recommend "No Further Action" under the Superfund program for the Jackson Township Landfill site because of the following:

- Based on the Risk Assessment, soil contamination poses no risk above the USEPA acceptable carcinogenic risk range. While the NJDEP carcinogenic risk range was exceeded, the exceedence was based on the existence of Arsenic at 4.7 mg/kg, below the NJDEP Soil Cleanup Criteria of 20 mg/kg.

- The Hazard Index calculated for the site exceeds the NJDEP and USEPA criteria based solely on antimony in the ground water. According to on-site data, the source of the antimony is likely from natural deposits.

- NJDEP Ground Water Quality Standards are exceeded in only a few instances in the ground water at the site with no contamination at the property boundary line consistently higher than wells upgradient of the site. Based on multiple ground water sampling events extending from 1981 to 1993, it has been determined that contaminant levels are decreasing through natural attenuation.

Further Action Under State Regulations

The NJDEP is confident that the "No Further Action" remedy under the Superfund program is protective of human health and the environment. Pursuant to the 1988 Order for Consent Judgement, the final landfill closure would be postponed until remedial investigations were concluded. In addition, State regulations require closure of the Jackson Township Landfill site. The final closure of the Jackson Township Landfill site will be conducted in a manner consistent with the NJDEPE Solid Waste Landfill Closure requirements thereby satisfying all necessary regulatory requirements for the Jackson Township Landfill.

Documentation of Significant Changes

There is no change from the Preferred Remedy described in the Proposed Plan and the selected remedy described in this ROD.

ADMINISTRATIVE RECORD INDEX
JACKSON TOWNSHIP LANDFILL SUPERFUND SITE
JACKSON TOWNSHIP, OCEAN COUNTY, NEW JERSEY

1. Order of Consent Judgement (OCJ) issued by the Supreme Court of New Jersey, Chancery Division, Ocean County to Jackson Township and Kenneth Wickham to be enforced by the New Jersey Department of Environmental Protection (NJDEP), 1988.

2. Preliminary Investigation Summary Report for the Legler Landfill, Jackson Township, Ocean County, New Jersey prepared by Fellow, Read & Associates, Inc. June 8, 1989.

3. Phase 1 Remedial Investigation Summary Report for the Jackson Township Landfill, Jackson Township, Ocean County, New Jersey. Submitted November 30, 1990 revised via addendum dated May 1, 1991.

4. Community Relations Plan for Jackson Township Landfill Site, NJDEP, April 1989.

5. Risk Assessment Report, Industrial Compliance, July 15, 1993.

6. Proposed Plan, NJDEP, March 1994.

7. March 23, 1994 Public Meeting Proceedings Transcript, L.B.S., Inc., March 1994.

USEPA LETTER OF CONCURRENCE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II

JACOB K. JAVITS FEDERAL BUILDING

NEW YORK, NEW YORK 10278-0012

SEP 26 1994

Robert C. Shinn, Jr., Commissioner
State of New Jersey
Department of Environmental Protection
401 East State Street, CN 402
Trenton, New Jersey 08625-0402

Re: Record of Decision
Jackson Township Landfill Site
Jackson Township, Ocean County, New Jersey

Dear Commissioner Shinn:

The United States Environmental Protection Agency, Region II (EPA) has reviewed the draft Record of Decision (ROD) dated September 1994, for the Jackson Township Landfill Site (Site) located in Jackson Township, Ocean County, New Jersey.

EPA concurs with the "No Action" alternative, and has determined that, based on the administrative record for the Site, the draft ROD is consistent with Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, (CERCLA), 42 U.S.C. Section 9601 et seq. This finding shall not affect EPA's right to conduct five-year reviews of the Site, or to take or require appropriate action pursuant to such review, in accordance with Section 121(c) of CERCLA and EPA further reserves the right to take response and enforcement actions pursuant to Sections 104, 106 and 107 of CERCLA.

Sincerely,

William J. Muszynski, P.E.
Deputy Regional Administrator

RESPONSIVENESS SUMMARY

JACKSON TOWNSHIP LANDFILL SITE
JACKSON TOWNSHIP, OCEAN COUNTY
NEW JERSEY

Comment Period: March 3, 1994 through April 1, 1994

RECORD OF DECISION
RESPONSIVENESS SUMMARY
JACKSON TOWNSHIP LANDFILL SUPERFUND SITE

OUTLINE:

This Responsiveness Summary is Divided into the following sections:

A. Overview

B. Background on Community Involvement and Concerns

C. Summary of Comments Received During the Public Meeting and Comment Period and NJDEP Responses

D. Community Relations Activities at the Jackson Township Landfill Superfund Site

A. OVERVIEW

This is a summary of the public's questions and comments regarding the Proposed Plan for No Further Action under the Superfund Guidelines at the Jackson Township Landfill Site and the New Jersey Department of Environmental Protection (NJDEP) responses to those comments.

The public comment period extended from March 3, 1994 through April 1, 1994 and provided interested parties the opportunity to comment on the Proposed Plan and the Remedial Investigation/Baseline Risk Assessment (RI/BRA) Reports for the Jackson Township Landfill Site. On March 23, 1994 at 7:00 PM, during the comment period, the NJDEP held a public meeting at the Jackson Township Municipal Building to discuss the reports and preferred remedy.

On the basis of information contained in the RI and BRA Reports, NJDEP and the United States Environmental Protection Agency (USEPA) recommended No Further Action under the Superfund Program for the Jackson Township Landfill Site.

B. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

The Jackson Township Landfill property is situated in a regional reserve known as the Pinelands. The Pinelands area is designated by the Pinelands Protection Act, N.J.S.A. 13:18A-1 et seq.

Prior to 1972, the Glidden Corporation carried out ilmenite (very common black mineral iron titanate) mining activities at the site for eleven years before selling the property to Jackson Township. The township commenced landfill operations in the western portion of the property in April of 1972. The landfill accepted bulk liquid and semi-liquid coffee wastes, household refuse, tree stumps, construction debris, junked cars and liquid septage. The Jackson Township Landfill is surrounded by various residential housing developments. Community concern about the water led to testing in 1977 by the township which concluded that several domestic wells had been contaminated by landfill activities. NJDEP ordered Jackson Township to stop disposing of liquid waste in 1978. In response to the concerns of the public, the landfill was closed by court order in 1980. In 1980, a citizen lawsuit resulted in a municipal water system extension to the affected properties. Sampling in 1981, 1982 and 1985 indicated only isolated contamination in wells in the vicinity of the landfill.

The landfill was included on the National Priorities List of Superfund sites in December of 1982. In 1988, NJDEP and Jackson Township entered a Judicial Consent Order requiring the township to fund an investigation and remediation of the landfill. In 1989 and 1990, the Remedial Investigation was conducted by Fellows, Reed and Associates. In 1991, MARC Associates was retained by Jackson Township as a consultant and to continue with the Risk Assessment and the Remedial Investigation.

Presently, the revised closure plan is being developed, and will be reviewed by NJDEP. Once the plan is completed and implemented the landfill will be officially closed.

C. SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND NJDEP RESPONSES

Concerns raised during the Jackson Township Landfill Superfund Site Public Meeting held on March 23, 1994 and during the public comment period from March 3, 1994 through April 1, 1994, are summarized below. The comments are grouped in the following categories:

- **Potable Wells and Site Monitoring Well Issues**

- **Responsibility for Closure Costs**

- **Other Questions and Issues**

POTABLE WELLS AND SITE MONITORING WELL ISSUES:

1. **What are the safety precautions/procedures/regulations for well sealing?**

   As elaborated in subchapter 9, NJAC 7:9-9.1, the NJDEP may order the decommissioning of any well due to abandonment, improper maintenance, contamination, and/or well construction in violation of any provision of NJAC 7:10-12 et seq.

   Pursuant to these regulations the NJDEP requires property owners or well owners to submit information to register an inactive well. In order for a well to be registered as inactive, an owner shall hire a New Jersey licensed master well driller to inspect it.

2. **Will monitoring wells be sealed as part of the closure?**

   As part of the Superfund Regulations the Jackson Township Landfill will be re-evaluated in five years to insure that the final alternative is protective of human health and the environment and has resulted in no further contamination. At that time the NJDEP will determine whether all of the remaining "monitoring" wells will be sealed according to New Jersey well closure requirements.

3. **Will residential wells be sealed as part of the closure?**

Pursuant to N.J.A.C. 7:10-10.1 et seq., residential wells should not be used at residences which are supplied with public water unless they are permitted for such use. Residential wells may be used for non-potable purposes provided the physical connection is consistent with N.J.A.C. 7:10-10.1 et seq. The NJDEP has delegated the enforcement of these regulations to the counties. There are no restrictions on the use of ground water in the Legler area.

4. **There is an indication that there are monitoring wells now along the Ridgeway Branch. *Will they remain there through the closure procedure?***

Yes. The monitoring wells will remain for at least five years.

5. **Where is the data on these monitoring wells?**

The data is in the Remedial Investigation Report, November 30th, 1990. This report is available at the following locations:

Jackson Township Municipal Building
RD 4, Box 1000
Jackson, NJ 08527
(908) 928-1200

Ocean County Library
101 Washington Street
Toms River, NJ 08753
(908) 349-6200

New Jersey Department of Environmental Protection
Bureau of Community Relations - 6th floor
401 East State Street
Trenton, NJ 08625
(609) 984-3081

6. **Is there going to be ground water monitoring on the whole site?**

Yes. According to the Superfund guidelines there will be "ground water" monitoring on the site during at least the next five years.

7. **Will there be guidelines set for testing the monitoring wells?**

The guidelines will be the same as in the initial sampling. See section 2-6 of the 1990 Remedial Investigation (RI) Report for limits and parameters taken during the sampling.

8. **Was the Antimony found in filtered or unfiltered samples?**

Antimony was found in the unfiltered samples.

9. **Is the Jackson Township Site having an impact on the Shady Oak Trailer Parks water supply (located East of the landfill), or is Shady Oak's water supply, namely three wells, a separate issue that needs further investigation by the township, county or NJDEP?**

Shady Oak is on public water supplied by municipal wells located near the mobile home park. Sampling performed in October 1993 by the NJDEP because of a resident complaint revealed that no contaminants have been found above the MCL standards. In previous permit required sampling, one well had been found to have a slightly higher level of Nitrate, and is no longer in use. Nitrate is a commonly occurring compound in the Pine Barrens.

10. **If these water conditions did not come from the landfill site, then where did these conditions come from?**

According to previous sampling in October 1993, there is no contamination in the Shady Oak Trailer Park's water supply.

11. **If the contamination is from the landfill, will we find higher levels of these pollutants in the future?**

Based on ground water sampling done in 1981, 1982, 1985, 1990 and 1993 the NJDEP has determined contaminant levels are dropping significantly at the Jackson Township Landfill. This historical sampling has led the NJDEP and USEPA to conclude that the contaminant sources at the landfill are abating. This decrease in contaminant concentration is due to natural attenuation. The 1993 Baseline Risk Assessment determined that the contaminant levels in the ground water in 1990 did not pose an unacceptable risk to human health and the environment.

12. **It was my understanding that the Legler section of wells were all ordered to be sealed by the state during the Legler investigation in the late 1970's and early 1980's. This apparently was overlooked and never enforced. Many of these wells are 4" cased wells into the Cohansey Formation, however, there are at least six double cased wells which go into the**

Englishtown Formation at depths of over 550'. If the ground water was as contaminated as first alleged, the residents who were awarded the 15.6 million dollars should have had these wells sealed.

A thorough search at NJDEP and Ocean County files have revealed that no such order was issued by the state, county or township however, the residents were advised not to use their wells. Most residents chose to cap their wells. Several residents are known to have sealed their wells. There is no record of anyone on public water using a well for potable purposes.

Residents using public water supplies are free to use private wells provided they meet all of the requirements of NJAC 7:10 - 10:1 et seq. Specifically those requirements which protect the public water supply from an unapproved source. These regulations mandate residents to obtain a permit. Permits are renewed annually on April 1st of each year. This is in NJAC 7:9-9:1 (refer to question 1). For NJDEP information on these permits, public water supply requirements, or private ground water well requirements, please feel free to write the:

Department of Environmental Protection
Bureau of Safe Drinking Water
CN 426
401 East State Street
Trenton, New Jersey 08625

13. One ruling which I believe was made that as residents sold their property they would be responsible for sealing their wells. I do not believe this is being enforced.

As stated in the response to the previous question (#12) no such requirement could be found in the public records. The requirements to seal wells is specified in NJAC 7:9-9.1, 7:10-12 et seq. or pursuant to requirements stipulated by the Ocean County or Jackson Township. Potable wells are under the jurisdiction of the counties and townships.

14. The private wells not only pose a threat to future residents who may not realize these wells exist but also if there is any contamination left in the area it opens up a possible channel to aquifers which are being used as potable supplies to residents not supplied with public water.

In the ground water investigation, numerous analyses have been done over the last several years (See question #11) both up and down gradient of the site. These sampling events have revealed no contaminants above the promulgated Federal and State water quality criteria which pose an unacceptable risk to human health and the environment.

RESPONSIBILITY FOR CLOSURE COSTS:

1. There is no estimate on the amount of money the closure will take, and since it is a Jackson Township funded project (at taxpayer cost), is there community input as to the amount of money spent when you're essentially calling it a clean landfill?

There is money budgeted for the closure of the Jackson Township Landfill site. If there is a hearing regarding this budget it will be made known through a public notice similar to that provided for the Proposed Plan hearing.

2. How can I request a hearing for the closure under the Solid Waste Permit Procedure?

Unless the existing closure plan is changed or modified in any way a hearing will not take place. Since "No Further Action" under the Superfund Program is the proposed plan a hearing usually is not held. If there is a change a hearing will be held by the DEPE's Division of Solid Waste Management. Hearings are public noticed and notices will be sent to participants in the proposed plan public meeting and residents who have provided comments.

OTHER QUESTIONS AND ISSUES:

1. Is there a fence currently around all four sides of the landfill?

Yes.

2. Where did the contamination go?

Based on multiple sampling events and detailed studying of the site-related conditions, the DEPE has determined that a vast majority of the contamination has dissipated due to the nature of the contaminants, biodegradation, movement of ground water, or physical properties of the site and its surroundings. The NJDEP believes that most of the contamination has naturally attenuated.

3. Will the landfill be re-opened?

No. Jackson Township is required to close the landfill under the NJDEP Solid Waste Management Act.

4. There was an incident in Brick Township where combustible gas was found off-site due to the frozen ground and cold temperatures. Two firemen were called to a house where a combustible gas formed in an off-site basement. This happened because of the cap that was put on the landfill. People were told to move and construction was stopped. I don't want to see this here. What is being done to be sure the incident doesn't happen again?

Currently methane has not been found to travel off the Jackson Township Landfill Site. NJDEP has determined that this is due to the make up of the on- site soil which allows the gas to percolate unobstructed. The Final Closure Plan from the Division of Solid Waste will address this issue in detail in order to satisfy the solid waste regulation requirements, NJAC 7:26-2A.9.

5. Is there a time limit to close the landfill and what will be the time limit? Will it take five years?

Yes. There will be a time limit on the final closure plan. The exact time frame can not be set, it is expected that Jackson Township will be requesting DEP approval of a revised closure plan. The initial closure plan of March 23, 1983 is pending until revisions from Jackson Township authorities are approved. Once approved, the landfill closure plan will detail a regulated closure schedule.

6. What are the extra space plans for the future?

The Deputy Mayor of Jackson Township stated they (Jackson Township) have no plans for the site. Jackson has no plans for low-income housing, parks, or a golf course. Some time in the future there will be some utilization for the property but not any of the three uses mentioned. Based on the findings at the Remedial Investigation and the Baseline Risk Assessment, the NJDEP and USEPA have limited authority under the Superfund regulations to limit Jackson Township use of this property.

7. Why is a RCRA type action not considered an ARAR action under the Superfund Actions and why have you decided to split them?

Jackson Township Landfill has never been a RCRA hazardous waste site but is a solid waste landfill. Jackson Township Site is under Superfund Regulation which means RCRA is an ARAR under that regulation, however, because no hazardous waste was found, a solid waste landfill closure is appropriate.

D. COMMUNITY RELATIONS ACTIVITIES AT THE JACKSON TOWNSHIP LANDFILL SITE

NJDEP established information repositories at the following locations:

Jackson Township Municipal Building
RD 4, Box 1000
Jackson, NJ 08527
(908) 928-1200

Ocean County Library
101 Washington Street
Toms River, NJ 08753
(908) 349-6200

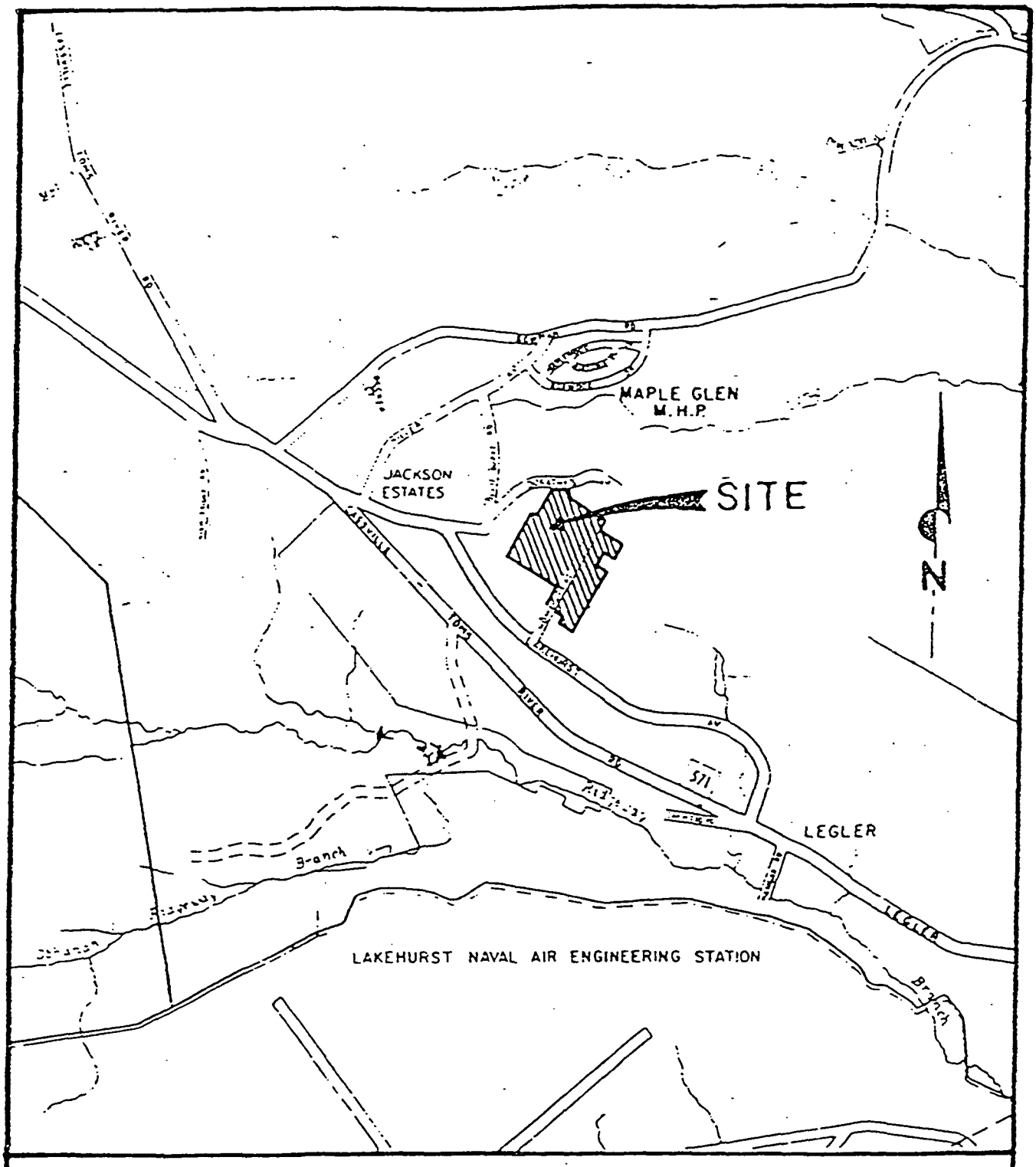
New Jersey Department of Environmental Protection
Bureau of Community Relations - 6th floor
401 East State Street
Trenton, NJ 08625
(609) 984-3081

NJDEP prepared a Community Relations Plan (April 1989)

NJDEP held a public meeting in Jackson Township to discuss the Initiation of the Remedial Investigation/Feasibility Study on September 5, 1989.

The Remedial Investigation and the Risk Assessment were completed in 1993.

NJDEP held a public meeting in Jackson to discuss the recommended alternative of No Further Action under the Superfund Program on March 23, 1994.



SITE LOCATION MAP

JACKSON TOWNSHIP LANDFILL
JACKSON TOWNSHIP, NEW JERSEY

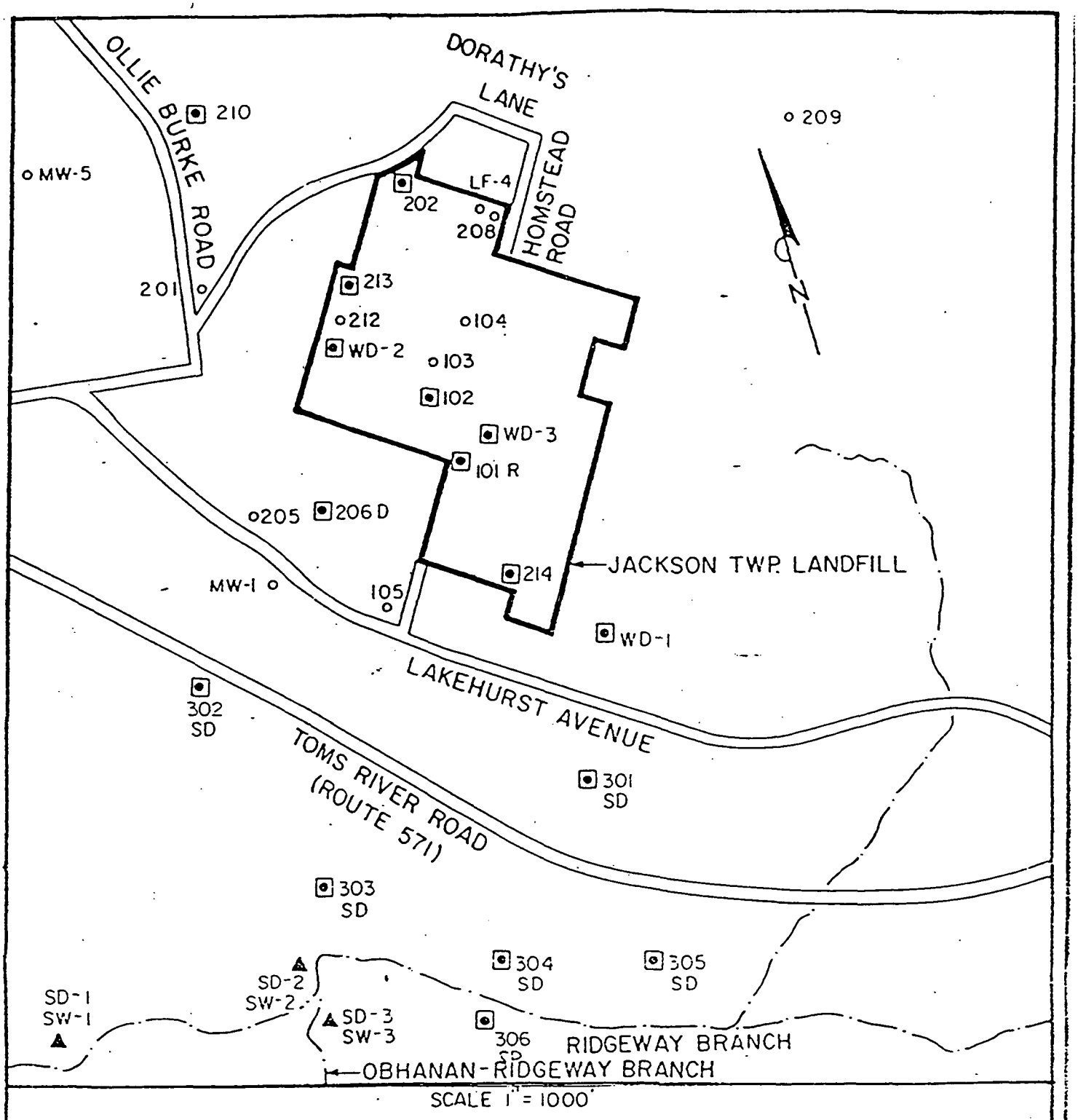
0 5,000 10,000 Ft.

SCALE (APPROX.)

SOURCE:
HAGSTROM MAP OF
OCEAN COUNTY, N J

FELLOWS, READ & ASSOCIATES INC. FIGURE 1

DATE: 11-30-90



SCALE 1" = 1000'

LEGEND

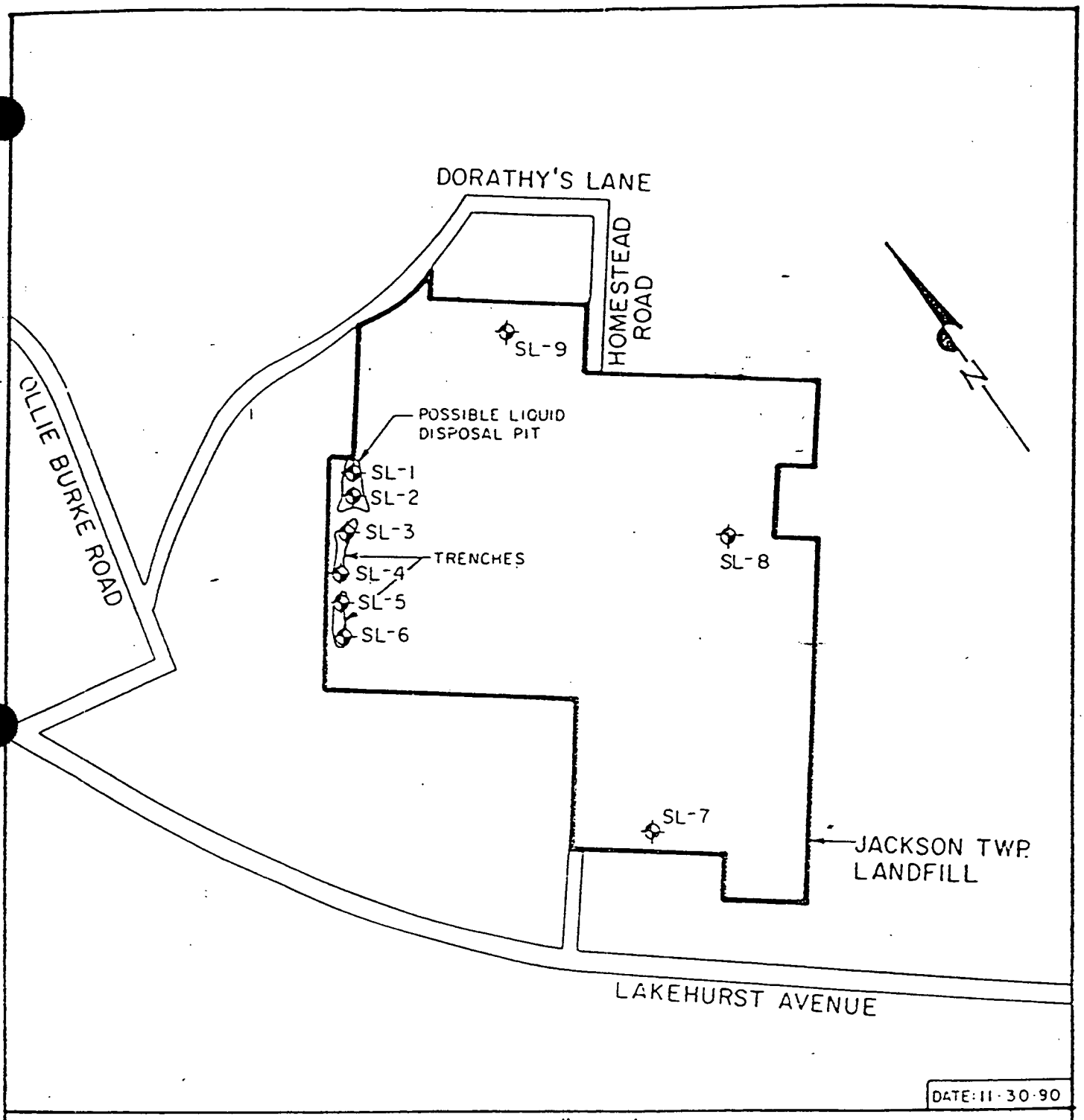
- ⊙ MONITORING WELLS SAMPLED
- o MONITORING WELLS NOT SAMPLED
- S - SHALLOW
- D - DEEP
- R - REPLACED
- ▲ SURFACE WATER AND SEDIMENT SAMPLE
- SD - SEDIMENT SAMPLE
- SW - SURFACE WATER SAMPLE

DATE: 11-30-90

JACKSON TOWNSHIP LANDFILL
JACKSON TOWNSHIP, NEW JERSEY

FELLOWS, READ AND ASSOCIATES, INC.
TOMS RIVER, NEW JERSEY

FIGURE 2
CURRENT
MONITORING WELL LOCATIONS



SCALE 1" = 600'

LEGEND

⊕ SOIL BORING LOCATION

JACKSON TOWNSHIP LANDFILL JACKSON TOWNSHIP, NEW JERSEY	FIGURE 3 SOIL BORING LOCATIONS
FELLOWS, READ AND ASSOCIATES, INC. TOMS RIVER, NEW JERSEY	

Table 1

Summary of the Chemicals of Interest and Range of Detected Concentrations

Chemical	Groundwater (mg/L)	Surface Water (mg/L)	Soil (mg/kg)	Sediment (mg/kg)
Volatiles				
Acetone	-	-	0.008-0.44	-
Benzene	-	-	-	0.011-0.014
Carbon disulfide	0.013-0.033	-	0.017	0.048-0.24
Chlorobenzene	0.008-0.029	-	-	-
Freon- 1,1,3	-	-	0.011-0.021	-
Toluene	-	-	0.006	0.034-0.048
Semi-volatiles				
1,2,4-Trichlorobenzene	-	-	0.29	-
1,2-Dichlorobenzene	-	-	0.25	-
1,3-Dichlorobenzene	-	-	0.31	-
1,4-Dichlorobenzene	-	-	0.35	-
2-Methylnaphthalene	-	-	0.08	-
4-Chloroaniline	-	-	0.13	-
4-Methylphenol	-	-	-	0.11-0.5
Acenaphthene	-	-	0.072	-
Acenapthylene	-	-	-	0.059
Anthracene	-	-	-	0.05-0.056
Benzoic acid	-	-	0.066-0.19	0.18-0.53
Bis (2-ethylhexyl) phthalate	-	-	0.14-3.4	0.4-2.2
Butyl benzyl phthalate	-	-	0.099-0.78	0.59-1.7
Chrysene	-	-	-	0.47
Di-N-butyl phthalate	-	-	0.12-2.2	6.2-9.1
Diethylphthalate	0.001-0.005	-	-	0.053
Fluoranthene	-	-	0.019-0.13	1-1.5
Naphthalene	-	-	0.12	-
Phenanthrene	-	-	0.17	0.34-0.79
Pyrene	-	-	0.032-0.12	0.92-0.99
Pesticides/TPHC	-	-		
Aroclor-1242	-	-	0.46	-
DDT	-	-	-	0.086
TPHC	-	-	0.0512-1.21	-

Table 1 (cont'd)

Chemical	Groundwater (mg/L)	Surface Water (mg/L)	Soil (mg/kg)	Sediment (mg/kg)
Metals/Inorganics				
Aluminum	0.057-3.340	0.03598-0.434	309-22,900	328-1170
Antimony	0.032.-0.034.	-	-	14.4-18.8
Arsenic	-	-	1.4-4.7	-
Barium	0.0068-0.107	0.0017-0.0241	1-44	3.7-19.4
Beryllium	-	-	0.79	-
Chromium	0.0062-0.0313	0.00305-0.0072	4.3-73.2	4.3
Cobalt	-	-	3.8	-
Cyanide	-	-	5	5.5
Lead	0.0037-0.0479	-	1.7-65.2	14.1-44.1
Mercury	-	-	0.23-0.27	-
Nickel	-	-	9-37.9	-
Silver	-	0.0019-0.0078		2
Vanadium	0.0062-0.0098	-	1.7-74.8	4.5-7.8

- not a chemical of interest for reasons described in Sections 2.2, 2.3, 2.4, and 2.5 or because of lack of detection

Table 2

GROUNDWATER MONITORING WELL CONSTRUCTION DATA
JACKSON TOWNSHIP LANDFILL

Well	Date Installed	Ground Surface Elev. (Ft.) AMSL	Depth Drilled (Ft.)	Screen Depth (Ft.)	Setting Elev. (Ft.) AMSL	Top of Casing (Ft.) AMSL	Depth to Top (1) of Screen from Top of Casing (Ft.)	Length of Screen (Ft.)
WD-1	11/17/82	103.6	80	45-65	38.71-58.71	105.71	47.00	20.00
WD-2	11/18/82	120.7	80	39-59	60.52-80.52	121.52	41.00	20.00
WD-3	11/22/82	126.0	72	44-64	61.6-81.6	127.60	46.00	20.00
101-R	8/15/90	124.00	40	32-47	93.57-103.57	126.57	32.00	15.00
102	9/18/80	120.08	60	55-60	58.08-63.08	120.08	57.00	5.00
202	7/24/81	119.5	52	45-50	69.56-74.56	121.56	47.00	5.00
206D	8/06/81	121.0	52	45-50	70.8-75.58	122.58	47.00	5.00
210	7/31/81	124.7	52	41-46	70.71-83.71	126.71	43.00	5.00
213	8/24/81	119.3	52	40-45	74.45-79.45	121.45	42.00	5.00
214	8/06/81	117.4	52	43-48	69.07-74.07	119.07	45.00	5.00
301S	7/29/90	93.6	21	6-21	73.09-88.09	96.09	8.00	15.00
301D	7/24/90	94.0	67	57-67	26.84-36.84	95.84	59.00	10.00
302S	7/10/90	96.4	23	8-23	73.34-88.34	98.34	10.00	15.00
302D	7/19/90	96.5	70	60-70	26.35-36.69	98.39	62.00	10.00
303S	7/06/90	83.1	17	2-17	65.13-80.13	85.13	5.00	15.00
303D	7/20/90	83.5	65	55-65	18.95-28.79	85.79	57.00	10.00
304S	7/17/90	89.7	27	12-27	62.96-77.92	91.92	14.00	15.00
304D	7/25/90	89.6	70	60-70	19.92-29.92	91.44	62.00	10.00
305S	7/19/90	82.4	19	4-19	63.42-78.42	84.42	6.00	15.00
305D	7/26/90	82.2	63	53-63	23.42-33.42	84.42	51.00	10.00
306S	7/24/90	75.5	18	3-18	57.63-72.53	77.63	5.00	15.00
306D	7/30/90	75.3	60	50-60	15.59-25.59	77.59	10.00	10.00

AMSL - Above Mean Sea Level
Ft. - Feet
(1) Highest Point of PVC Casing

Table 3
Potential Exposure Pathways

Potentially Exposed Population	Exposure Medium, Route, and Exposure Point	Pathway Selected for Examination?	Reason for Selection or Exclusion
Current Off-Site Residents			
	Groundwater		
	Ingestion of groundwater from local wells located off-site	No	Nearby residents are supplied with public water.
	Inhalation of volatile chemicals released during showering/bathing.	No	
	Dermal absorption of chemicals in groundwater during showering/bathing	No	
	Soil		
	Inhalation of particulate phase chemicals released on-site	Yes	The site is not vegetated. This allows site soils to be entrained by the wind.
	Sediment		
	Incidental ingestion while at play	Yes	Children may play in streams receiving site runoff
	Dermal contact with sediment while at play	Yes	Children may play in streams receiving site runoff
	Surface Water		
	Dermal contact with water while at play	Yes	Children may play in streams receiving site runoff
Current Trespasser			
	Soil		
	Incidental ingestion of site soils	Yes	Persons may be exposed to soil during unauthorized activities at the site
	Dermal contact with site soils	Yes	Persons may be exposed to soil during unauthorized activities at the site
	Inhalation of particulate produced on-site	Yes	The site is not vegetated. This allows site soils to be entrained by the wind.

Table 3 (cont'd)

Potentially Exposed Population	Exposure Medium, Route, and Exposure Point	Pathway Selected for Examination?	Reason for Selection or Exclusion
Future On-Site Residents			
	Soil		
	Incidental ingestion of site soils	Yes	
	Dermal contact with site soils	Yes	
	Inhalation of particulate produced on-site	Yes	
Future On-Site Residents (cont'd)			
	Groundwater		
	Ingestion of groundwater from on-site wells	Yes	Future use of site groundwater cannot be absolutely precluded for the hypothetical future on-site resident.
	Inhalation of volatile chemicals released during showering/bathing.	Yes	
	Dermal absorption of chemicals in groundwater during showering/bathing	Yes	
Future On-Site Recreational Population			
	Soil		
	Incidental ingestion of site soils	Yes	Children at play may ingest soil
	Dermal contact with site soils	Yes	Children at play may contact soil
	Inhalation of particulate produced on-site	Yes	Children at play may inhale dust particles

Table 4

Exposure Point Concentrations for Groundwater

Chemical	Arithmetic Mean Concentration (mg/L)	Maximum Detected Concentration (mg/L)	95% Upper Confidence Limit Concentration (mg/L)	Reasonable Maximum Exposure Concentration (mg/L)
Volatiles				
Carbon disulfide	0.00520	0.033	0.00650	0.00650
Chlorobenzene	0.00425	0.029	0.00502	0.00502
Semi-Volatiles				
Diethylphthalate	0.00495	0.00500	0.00597	0.00500
Metals				
Aluminum	0.834	3.34	1.58	1.58
Antimony	0.0167	0.034	0.0182	0.0182
Barium	0.0417	0.107	0.0696	0.0696
Chromium	0.00787	0.031	0.0114	0.0114
Lead	0.0113	0.048	0.0288	0.0288
Vanadium	0.00399	0.010	0.00468	0.00468

Table 5

Exposure Point Concentrations for Surface Water

Chemical	Arithmetic Mean Concentration (mg/L)	Maximum Detected Concentration (mg/L)	95% Upper Confidence Limit Concentration (mg/L)	Reasonable Maximum Exposure Concentration (mg/L)
Metals				
Aluminum	0.298	0.434	286	0.434
Barium	0.0134	0.0241	12.4	0.0241
Chromium	0.00409	0.007	0.0112	0.00657
Lead	0.00335	0.004	0.0120	0.004
Silver	0.00338	0.00780	0.0390	0.00780

Table 6

Exposure Point Concentrations for Soil

Chemical	Arithmetic Mean Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	95%-Upper Confidence Limit Concentration (mg/kg)	Reasonable Maximum Exposure Concentration (mg/kg)
Volatiles				
Acetone	0.0365	0.440	0.0646	0.0646
Carbon disulfide	0.00407	0.017	0.00524	0.0050
Toluene	0.00337	0.006	0.00399	0.00399
Freon 1,1,3	0.00553	0.021	0.00800	0.00800
Semi-Volatiles				
1,2,4-Trichlorobenzene	0.196	0.290	0.213	0.213
1,2-Dichlorobenzene	0.192	0.250	0.205	0.205
1,3-Dichlorobenzene	0.196	0.310	0.213	0.213
1,4-Dichlorobenzene	0.198	0.350	0.218	0.218
2-Methylnaphthalene	0.180	0.080	0.205	0.080
4-Chloroaniline	0.184	0.130	0.197	0.130
Acenaphthene	0.180	0.072	0.208	0.072
Benzoic acid	0.814	0.190	1.54	0.190
Bis (2-ethylhexyl) phthalate	0.880	3.40	3.42	3.40
Butyl benzyl phthalate	0.206	0.780	0.397	0.397
Di-N-butyl phthalate	0.268	2.200	0.372	0.372
Fluoranthene	0.145	0.130	0.289	0.130
Naphthalene	0.183	0.120	0.198	0.120
Phenanthrene	0.186	0.170	0.197	0.170
Pyrene	0.175	0.120	0.207	0.120
Pesticides/TPHC				
Aroclor-1242	0.0930	0.460	0.136	0.136
TPHC	0.270	1.21	0.476	0.476
Metals				
Aluminum	2518	22,900	4797	4797
Arsenic	1.01	4.70	1.42	1.42
Barium	8.57	44.0	18.6	18.6
Beryllium	0.105	0.79	0.129	0.129
Chromium	19.9	73.2	39.1	39.1
Cobalt	1.1	3.80	1.31	1.31
Cyanide	0.643	5.00	0.818	0.818
Lead	11.4	65.2	22.2	22.2
Mercury	0.0800	0.27	0.104	0.104
Nickel	6.04	37.9	11.2	11.2
Vanadium	9.77	74.8	16.0	16.0

Table 7

Exposure Point Concentrations for Sediment

Chemical	Arithmetic Mean Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	95% Upper Confidence Limit Concentration (mg/kg)	Reasonable Maximum Exposure Concentration (mg/kg)
Volatiles				
Benzene	0.00925	0.014	0.0289	0.014
Carbon disulfide	0.131	0.240	464,000	0.240
Toluene	0.00725	0.007	0.0142	0.007
Semi-Volatiles				
4-Methylphenol	0.271	0.500	2.91	0.500
Acenaphthylene	0.395	0.059	0.497	0.059
Anthracene	0.309	0.056	35.1	0.056
Benzoic acid	1.03	0.530	294	0.530
Bis (2-ethylhexyl) phthalate	1.18	2.20	9.09	2.20
Butyl benzyl phthalate	0.845	1.70	5.53	1.70
Chrysene	0.413	0.470	0.546	0.470
Di-N-butyl phthalate	7.85	9.10	10.0	9.10
Diethylphthalate	0.291	0.053	28.8	0.053
Fluoranthene	0.670	1.50	6.89	1.50
Phenanthrene	0.493	0.790	1.15	0.790
Pyrene	0.543	0.990	1.90	0.990
Pesticides				
4,4'-DDT	0.0566	0.086	1.05	0.086
Metals				
Aluminum	682	1170	3920	1170
Antimony	14.6	18.8	41.2	18.8
Barium	8.78	19.4	108	19.4
Chromium	2.25	4.30	10.0	4.30
Cyanide	2.09	5.50	109	5.50
Silver	1.24	2.00	3.11	2.00
Vanadium	3.79	7.80	164	7.80

Table 8

Summary of Noncarcinogenic and Carcinogenic Risks for Current and Hypothetical Future Site Conditions

Potentially Exposed Population	Exposure Media, Pathways, and Points of Exposure	Hazard Index*	Lifetime Cancer Risk*
Current Off-Site Residents			
	Soil		
	• Inhalation of dust transported off-site	1.4E-3	1E-7
	Sediment		
	• Incidental ingestion while at play	2.2E-2	2E-7
	• Dermal absorption while at play	8.1E-2	7E-7
	Surface Water		
	• Dermal absorption while at play	4.5E-4	-
Current Trespasser			
	Soil		
	• Incidental ingestion of site soils	5.8E-3	3E-7
	• Dermal absorption	2.3E-2	2E-7
	• Inhalation of dusts	1.7E-9	3E-9
Future On-Site Adult Resident			
	Soil		
	• Incidental ingestion of site soils	1.2E-2	2E-6
	• Dermal absorption	2.0E-2	8E-7
	• Inhalation of dusts	1.4E-3	1E-7
	Groundwater		
	• Ingestion	1.4E+0	-
	• Dermal absorption while showering/bathing	3.5E-1	-
	• Inhalation of volatile chemicals released during showering/bathing	8.5E-3	-
Future On-Site Child Resident			
	Soil		
	• Incidental ingestion of site soils	1.1E-1	5E-6
	• Dermal absorption	4.5E-2	4E-7
	• Inhalation of dusts	2.6E-8	5E-8
Future On-Site Recreational Child			
	Soil		
	• Incidental ingestion of site soils	3.7E-2	2E-6
	• Dermal absorption	3.6E-2	3E-7
	• Inhalation of dusts	4.0E-9	7E-9

*Reasonable maximum exposure (RME) case risk estimates