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May 1996

EPA Superfund Record of Decision:

PJP Landfill Site, Hudson County, Jersey City, NJ 9/28/1995

RECORD OF DECISION

PJP Landfill Site

Jersey City, Hudson County, New Jersey

New Jersey Department of Environmental Protection
Site Remediation Program
Trenton, New Jersey

SEPTEMBER 28, 1995

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

PJP Landfill

Jersey City, Hudson County, New Jersey

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the PJP Landfill Site, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act, as amended, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision document is based on the administrative record file for this Site.

The United States Environmental Protection Agency concurs with the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the PJP Landfill Site, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial threat to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy represents the first and only planned operable unit for the PJP Landfill Site. It addresses contaminated surface soils on the Site and groundwater contamination in the underlying shallow and deep aquifers.

The major components of the selected remedy include:

1. Removal of all known and suspected buried drum materials and associated visibly contaminated soil;
2. Capping of the remaining landfill area of the site with a multi-layer, modified solid waste cap in accordance with NJDEP Bureau of Landfill Engineering Guidance with gas venting;
3. Extension of the existing gravel lined ditch around the perimeter of the site to collect the surface water runoff;

4. A passive or active gas venting system installed in the new portion of the cap. (If an active system is deemed necessary, however, both areas will be included);
5. Site fencing and institutional controls (e.g., declaration of environmental restriction and public information program);
6. Quarterly inspections and maintenance, and a re-evaluation of the previously capped area;
7. Replacement of the Sip Ave ditch with an alternate form of drainage;
8. Quarterly ground water monitoring to evaluate the reduction of contaminant concentrations over time;
9. Modeling to demonstrate the effectiveness of the cap by predicting the impact of ground water leachate migrating to the Hackensack River from the landfill;
10. Because contamination levels in the ground water are above the Class IIA Ground Water Quality Criteria (GWQC), a Classification Exemption Area (CEA)/Well Restriction Area (WRA) will be estabilshed; and
11. Implementation of a wetlands assessment and restoration plan. (The wetlands assessment will be performed prior to implementation of any of the remedial actions).

DECLARATION OF STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. The remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable, and it satisfies the statutory preference for remedies that employ treatment which reduces toxicity, mobility, or volume as their principal element.

Because this remedy will result in hazardous substances remaining on the Site above health-based levels (soil will be capped over), a review will be conducted within five years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment. This review will include an evaluation of the data and information obtained in connection with remedial components 6, 8, and 9 above, as well as other appropriate components of the selected remedy.

Robert C. Shinn Jr.
Commissioner

9/28/95
Date

RECORD OF DECISION
DECISION SUMMARY

PJP Landfill Site

Jersey City, Hudson County, New Jersey

New Jersey Department of Environmental Protection
Trenton, New Jersey

RECORD OF DECISION
RESPONSIVENESS SUMMARY

PJP Landfill Site

Jersey City, Hudson County, New Jersey

New Jersey Department of Environmental Protection
Site Remediation Program
Trenton, New Jersey

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ATTACHMENTS

SITE NAME, LOCATION, AND DESCRIPTION

The PJP Landfill Superfund Site is an inactive landfill located at 400 Sip Avenue, Jersey City (see figure 1). The Site occupies approximately 87 acres in Jersey City, Hudson County, New Jersey, and is identified on the Jersey City tax map (1977) as block 1639.1, lots 2A, 3, 4C, 5C, 7D; block 1639.2, lots 1C, 5C, 7 and 7E; block 1627.2 lot 1P; block 1627.1 lots 5A, 6A and parts of 2A, 3B and 4B. The Site is bordered on the north and west by the Hackensack River and on the southeast by Truck Routes 1 and 9. A recycling facility and a warehouse border the northeast side of the Site. The southwest side of the Site is boarded by several commercial trucking terminals. Multiple dwelling housing units are located northeast and southeast of the Site. The Pulaski Skyway, an elevated highway, passes over the Site. The Sip Avenue Ditch bisects the Site and conveys run-off from the PJP Landfill and Jersey City storm water/sewer into the Hackensack River (see figure 2).

SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Site was originally a salt meadow, a portion of which was condemned in 1932 for the construction of the Pulaski Skyway. The PJP Landfill Company operated a commercial landfill at the Site, accepting chemical and industrial waste from approximately 1970 to 1974.

From 1970 to 1985, subsurface fires (on the currently capped 45 acre area) which were attributed to spontaneous combustion of subsurface drums and decomposition of landfill materials, frequently burned at a 45-acre portion of the PJP Landfill and emitted large amounts of smoke. In 1977, the NJDEP issued an order to the PJP Landfill Company to properly cover and grade the landfill, and to remove wastes in contact with the Hackensack River and the Sip Avenue Ditch. The PJP Landfill Company did not comply with the order.

Throughout the early 1980s, NJDEP and the Hudson Regional Health Commission inspected the Site and conducted sampling and air monitoring. In December 1982, the Site was included on the EPA's National Priorities List (NPL), which identifies hazardous waste Sites that pose a significant threat to public health or the environment.

During 1985 and 1986, NJDEP conducted an Interim Remedial Measure (IRM) to extinguish the fires and cap the 45 acre area. The IRM resulted in the extinguishing of fires; excavation and recompaction of approximately 1,033,000 cubic yards of material; and the removal of grossly contaminated soils, cylinders and drums containing hazardous materials on approximately 45 of the 87 acres. These hazardous materials were properly disposed of off Site at secure landfills or hazardous waste incinerators. A fire break trench was installed and the 45 acre area was regraded, capped and seeded. A gas venting system was also installed on the 45-acre portion of the landfill. All subsurface fires have been out since the completion of the IRM in May 1986.

The NJDEP contracted ICF Technology, Inc. (ICF) in 1988 to perform an RI/FS on the entire 87 acres of the landfill. The Remedial Investigation (RI) was completed by ICF in 1990. The RI identified areas and levels of contamination at the Site. The study included a geographical investigation and a shock-sensitive drum investigation to determine the density and condition of buried drums, extent of landfill material, the shock sensitivity of drums, and drum markings. An FS was also performed, which developed and evaluated various remedial alternatives for addressing Site contamination.

In the summer of 1993, NJDEP implemented a plan to assist in the evaluation of the current impact the Site was having on the adjacent Hackensack River and on the deeper aquifer of concern beneath the fill material. The sampling effort consisted of the sampling of three shallow and three deep monitoring wells, and six surface water and sediment locations. Water and sediment samples collected from the Hackensack River were obtained upstream and downstream from the Site. Water and sediment samples from the Sip Avenue Ditch were obtained from the Ditch adjacent to Routes 1 and 9 and at the confluence of the ditch with the Hackensack River. The samples were analyzed for organic and inorganic chemical parameters. In addition, a series of bioassay (mysid shrimp chronic toxicity tests) were preformed using water collected from the Hackensack River, the Sip Avenue Ditch, and at the sediment sample locations and in the waters of the two wells with the highest levels of contamination was performed.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The RI report, FS report, and the Proposed Plan for the Site were released to the public for comment on August 2, 1994. These documents were made available to the public in the administrative record file at the NJDEP file room in, 401 East State Street, Trenton, NJ and the information repositories at:

Jersey City Public Library
472 Jersey Avenue
Jersey City, NJ 07302
(201)547-4516

Jersey City Municipal Building
Engineering Division
280 Grove Street
Jersey City, NJ 07302
(201)547-6852

On August 18, 1994, NJDEP conducted a public meeting at the Jersey City Municipal Building to inform local officials and interested citizens about the Superfund process, to discuss the findings of the RI and FS and the proposed remedial activities at the Site, and to respond to any questions from area residents and other attendees.

NJDEP responses to the comments received at the public meeting, and in writing during the public comment period, are included in the Responsiveness Summary section of this Record of Decision.

SCOPE AND ROLE OF RESPONSE ACTION

This ROD will address cleanup remedies for the Sip Avenue Ditch sediment, air and landfilled material which includes areas of buried drums and surrounding contaminated soil. A monitoring program will be established to determine whether additional actions may be necessary to mitigate the leaching of contaminants to ground water and surface water as well as to the Hackensack River. If a significant adverse impact is found, NJDEP and EPA will evaluate remedial alternatives and select an appropriate remedy in accordance with CERCLA and the NCP.

SUMMARY OF SITE CHARACTERISTICS

Site Geology and Hydrology
The PJP Landfill Site lies in the Piedmont physiograph province of Northeastern New Jersey. The bedrock of the Piedmont Lowlands consists of igneous and sedimentary rocks. The bedrock underlying the Site is the Brunswick Formation. This formation consists of fluvial and lacustrine reddish brown shales and some fine grained sandstone.

The Site is located on man-made fill deposits which are approximately 10 to 30 feet thick. The fill material is underlain by a discontinuous layer of peat. Under the peat layer is a layer of sand and silt. The bedrock at the landfill is approximately 60 to 90 feet below the surface.

The principal source of ground water in the area lies within the rocks of the Brunswick Formation. Ground water, which flows in a westwardly direction, is not used for potable water supply within the lower Hackensack Basin. However, due to industrial and commercial nature of the area it appears that the ground water is used for some commercial and industrial purposes. The area near the PJP Landfill is served by the Jersey City municipal water supply, which is the Boonton Reservoir.

Nature and Extent of Contamination
The RI identified contaminants above NJDEP current cleanup criteria in surface soils, subsurface soils (excluding test pits), test pits, sediments from the Sip Avenue Ditch, and air. The cleanup criteria, although not promulgated, are currently used in lieu of standards.

<u>Soil</u>
Arsenic was detected in the surface soils samples in concentrations greater than the NJDEP Soil Cleanup Criteria of 20 parts per million (ppm). In the subsurface soils (excluding the test pits which are discussed later in this Record of Decision), the following contaminants were detected at levels exceeding the cleanup criteria: Benzene (maximum concentration detected 1.6 ppm), bis(2-ethylhexyl)phthalate (maximum concentration detected 180 ppm) and chlorobenzene (maximum concentration detected 2.92 ppm).

Chemicals were detected more frequently, and in higher concentrations, in the test pits than were detected in samples from other media. Bis(2-ethylhexyl)phthalate (maximum concentration detected 33,100 ppm) and petroleum hydrocarbons were the predominant organic chemicals found in the subsurface soils of those that exceed the current NJDEP subsurface soil standards. Other predominant organic chemicals detected in the soils sampled from the test pits that exceed the NJDEP impact to ground water soil cleanup criteria are the following: benzene (maximum concentration detected 250 ppm), dieldrin (maximum concentration detected 200 ppm), tetrachloroethene (maximum concentration detected 41 ppm), and total xylenes (maximum concentrations detected 3900 ppm). Carcinogenic and non-carcinogenic polycyclic aromatic hydrocarbons (PAHs) and inorganic chemicals (metals) were also detected frequently in the subsurface soils.

Sip Avenue Ditch

The Sip Avenue Ditch sediment samples were compared to the National Oceanographic and Atmospheric Administration (NOAA) sediment screening guidelines. This guidance sets criteria for contaminants which may have potentially harmful biological effects to aquatic life. Sediment contaminants found in the Sip Avenue Ditch exceeded these screening guidelines. The highest concentrations found were total PAH (14.8 ppm for carcinogenic PAH; 30.1 ppm for noncarcinogenic PAH), antimony (93.8 ppm), cadmium (6.3 ppm), chromium (771 ppm), copper (34,000 ppm), lead (406 ppm), mercury (5.1 ppm), nickel (1,260 ppm), and zinc (9,830 ppm).

Landfill Gas Vent Samples

Landfill gas vent sample data obtained during the Remedial Investigation was used to approximate the total amount of contaminants discharged from the gas vent system in terms of pounds per hour. Eight of the forty-nine existing vents were sampled on three separate occasions, and used as representative vents for the entire system. The maximum flow rate from the forty-nine vents was used to calculate potential discharges (8.73 cubic feet per minute/cfm) and the maximum contaminant concentrations from the three sample rounds was used for each contaminant.

Discharge numbers were calculated for total emissions and toxic emissions. Using the average and maximum contaminant concentrations for the eight landfill gas vents, typical landfill emissions and the worst case scenario emissions were determined. The total emissions average of .43 lbs/hr, and maximum of 1.5 lbs/hr, respectively, are within the acceptable/allowable limit of 1.5 lbs/hr. Toxic emissions average of .07 lbs/hr is also within the acceptable/allowable limit of .1 lbs/hr while the toxic emissions maximum of .27 lbs/hr is slightly above the acceptable/allowable limit of .1 lbs/hr.

The NJDEP 1993 Sampling Effort

The monitor well analyses indicated that 11 compounds were detected in the three (3) ground water monitor wells at levels slightly above New Jersey's Ground Water Quality Criteria. Hackensack River water and sediment samples were collected upstream and downstream of the Site. Surface water samples obtained from the river indicated the presence of inorganics both upstream and downstream from the Site, such as iron, aluminum, copper and zinc. Sediment samples collected from the river indicated the presence of volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, and inorganics both upstream and downstream from the Site. Predominant chemicals detected in the sediments were polycyclic aromatic hydrocarbons (maximum concentration detected approximately 25 ppm), PCBs (maximum concentration detected approximately 360 ppb), lead (maximum concentration detected approximately 222 ppm), and mercury (maximum concentration detected approximately 2.7 ppm).

Contamination was also present in the Sip Ave ditch, both adjacent to Routes 1 & 9 and at the confluence of the ditch with the river. The ditch water and sediment samples adjacent to the highway were more contaminated than the sample obtained from the confluence of the ditch with the river. Chemicals detected in the water samples included volatile organics such as tetrachloroethene (detected at 44 ppb) and inorganics such as lead and zinc. Chemicals detected in the sediment samples included tetrachloroethene (detected at approximately 10 ppb), toluene (detected at approximately 4 ppb), numerous polycyclic aromatic hydrocarbons, and inorganics such as copper, lead and zinc.

All four (4) of the bioassay sampling locations in the river, the two monitor well sample locations, and the Sip Avenue Ditch location from the confluence of the ditch and the river showed significant mortality. The sampling location with the lowest percent mortality was from the Sip Avenue Ditch adjacent to Routes 1 and 9. This data indicates that potential adverse impacts on biota by these contaminated waters is likely occurring.

The Bedrock Aquifer Well sampling results indicate that all three well results are below New Jersey Ground Water Quality Standards. The sampling results indicate that none of the contaminants found in the wells exceed NJDEP's Ground Water Quality Criteria for Volatile Organics, Semi-Volatile Organics, and Pesticides.

SUMMARY OF SITE RISKS

Based upon the results of the RI, a baseline risk assessment was conducted to estimate the risks associated with current and future Site conditions. The baseline risk assessment estimates the human health and ecological risk which could result from the contamination at the Site if no remedial action were taken. The results from the 1993 NJDEP sampling effort were not incorporated into the baseline risk assessment for the Site, since the RI report predated the 1993 sampling event.

The following summarizes the finding of the Risk Assessment.

Human Health Risk Assessment

A four step process is utilized for assessing site-related human health risks for a reasonable maximum exposure scenario: *Hazard Identification* - identifies the contaminants of concern at the Site based on several factors such as toxicity, frequency of occurrence, and concentration; *Exposure Assessment* - estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways by which humans are potentially exposed (e.g., ingesting contaminated soil/water); *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); and *Risk Characterization* - summarizes the combined output of the exposure and toxicity assessments to provide a quantitative (e.g., one-in-a-million excess cancer risk) assessment of site-related risks. Normally, a baseline risk assessment evaluates the risk posed by a site in the absence of remediation. In the case of PJP Landfill, an Interim Remedial Measure has already been implemented prior to evaluating site-wide risk.

EPA conducted a baseline risk assessment to evaluate the potential risk to human health and the environment associated with the PJP Landfill Site in its current state. The Risk Assessment focused on contaminants in the soil, ground water, surface water, sediment, and air which are likely to pose significant risks to human health and the environment. A summary of the contaminants of concern in sampled matrices is provided in Table 5-15 for human health and the environmental receptors, respectively. The exposure pathways and populations evaluated are in Table 5-17. A total of nine exposure pathways were assessed under possible on-site current and future land-use conditions. The plausible maximum and average case scenarios were evaluated.

Under current EPA guidelines, the likelihood of carcinogenic (cancer-causing) and noncarcinogenic effects due to exposure to Site chemicals are considered separately. It was assumed that the toxic effects of the site-related chemicals would be additive. Thus, carcinogenic and noncarcinogenic risks associated with exposures to individual compounds of concern were summed to indicate the potential risks associated with mixtures of potential carcinogens and noncarcinogens, respectively.

Noncarcinogenic risks were assessed using a Hazardous Index (HI) approach, based on a comparison of expected contaminant intakes and safe levels of intake (Reference Doses). Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects. RfDs, which are expressed in units of milligrams/kilogram-day (mg/kg-day), are estimates of daily exposure levels for humans which are thought to be safe over a lifetime (including sensitive individuals). Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) are compared to the RfD to derive the hazard quotient for the contaminant in the particular medium. The HI is obtained by adding the hazard quotients for all compounds across all media that impact a particular receptor population.

An HI greater than 1.0 indicates that the potential exists for noncarcinogenic health effects to occur as a result of site-related exposures. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. The reference doses for the compounds of concern at the Site are presented in Table 5-19. A summary of the noncarcinogenic risks associated with these chemicals across various exposure pathways is found in Tables 5-24,5-25,5-26,5-27,5-29,5-30,5-31,5-35,5-36,5-37 and 5-39. The results of the baseline risk assessment indicated that the greatest risk associated with the Site under current conditions is the incidental ingestion and dermal absorption of chemicals in sediment by trespassing children wading in the Sip Avenue Ditch. The carcinogenic risk for children was estimated to be $4x10^{-5}$, which is within acceptable EPA guidelines.

For incidental ingestion/dermal absorption of Sip Ave Ditch sediments, the HI was calculated to be four. This was based on the plausible maximum scenario. Therefore noncarcinogenic effects may occur from this exposure route. Under an average case scenario, the HI is less than one.
Potential carcinogenic risks were evaluated using the cancer slope factors developed by EPA for the contaminants of concern. Cancer slope factors (SFs) have been developed by EPA's Carcinogenic Risk Assessment Verification Endeavor for estimating excess lifetime cancer risks associated with exposure

to potentially carcinogenic chemicals. SFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of 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 term "upper bound" reflects the conservative estimate of the risks calculated from the SF. Use of this approach makes the underestimation of the risk highly unlikely. The SF for the compounds of concern are presented in Table 5-19.

A qualitative risk assessment was performed for future land-use conditions. Although not likely, it is possible that land use at the Site could change in the future, resulting in additional exposure pathways that do not exist under current land-use conditions. The most plausible land-use change would be development of the landfill area as an industrial/commercial area. If the area were developed, on-site construction workers could be exposed via direct contact with contaminated sediments, subsurface soil, and materials in test pits. Generally, the concentrations of chemicals detected in test pits and subsurface soils are substantially higher than in sediments. Based on the substantially higher chemical concentrations in the subsurface soil and test pits, some of which are potentially carcinogenic, future workers exposed to these subsurface contaminants could be at significant risk. Inhalation exposures are estimated to be approximately equal to those estimated for trespassing children. For long-term exposures, this risk would probably be greater than the 10^{-4} to 10^{-6} range.

Environmental Risk Assessment

The Environmental Assessment provides a qualitative evaluation of the actual or potential impacts associated with the Site on plants and animals (other than people or domesticated species). The primary objectives of this assessment were to identify the ecosystems, habitats, and populations likely to be found at the Site and to characterize the contaminants, exposure routes and potential impacts on the identified environmental components. The environmental assessment evaluated potential impacts associated with chemicals in the surface soil, surface water (including chemicals released to surface water from ground water) and sediment. Potential exposures evaluated were terrestrial plants, terrestrial wildlife, and aquatic life.

The Environmental Assessment identified several endangered species and sensitive habitats in the vicinity of the Site. The Hackensack River is considered critical habitat for the short-nosed sturgeon, which is a State and federal endangered species. The Site is also within the current or historical range of several other State endangered or threatened species that inhabit coastal areas and/or marshes, including the Atlantic sturgeon, Atlantic tomcod, pied-billed grebe, great blue heron, northern harrier, Henslow's sparrow, short-billed marsh wren, and osprey.

Estuarine intertidal wetlands occur along the Hackensack River and the Sip Avenue Ditch, which are tidally influenced in association/with the Hackensack River. A palustrine emergent scrub/shrub wetland occurs in the southeast corner of the Site adjacent to the entrance road and Routes 1 and 9. Due to some areas receiving less fill material than others, depressed areas have formed, leaving an appearance of wetland like features.

The environmental assessment is summarized as follows:

Plants-- Plants can be exposed to chemicals in surface soil. Chemical-related impacts in plants are not expected to be significant. If chemical-related impacts are occurring, they are most likely limited to localized source areas such as the drum disposal area, since surface soil contamination is not believed to be widespread at the Site. Impacts in these isolated areas would be expected to have minor impacts on the plant community and habitat quality of the entire PJP Site. Chemical-related impacts in plants are most likely insignificant compared to other current and past (non-chemical) stresses on the plant community at the PJP Site, such as past grading and filling at the Site.

Terrestrial wildlife -- Potential impacts were evaluated for wildlife exposed to chemicals of potential concern. Some species could use the Sip Avenue Ditch or Hackensack River for drinking water, however, exposure in these species is not expected to be significant given the availability of other water sources nearby and the relatively large foraging area of these species. None of the chemicals of potential concern detected in surface water are expected to be acutely or chronically toxic at the low levels of exposure potentially experienced by wildlife.

Aquatic life -- Potential impacts on aquatic life were evaluated for chemicals in surface water and sediment. Surface water concentrations were compared with ambient water quality criteria developed by EPA or lowest-observed-effects levels. Sediment concentrations were compared with toxicity values derived from the available literature. There is a potential for food chain effects to occur via predation on aquatic species, since several of the contaminants of concern bioconcentrate (e.g., cadmium, mercury). Surface water and sediment concentrations for several chemicals in the Sip Avenue Ditch and in the Hackensack River exceeded their respective toxicity values, suggesting that aquatic life impacts may be occurring at the Site.

In summary, the environmental assessment concluded that chemical contamination from the Site is not expected to have significant impacts on plants or terrestrial wildlife, but may be impacting aquatic life.

Uncertainties

The procedures and inputs used to assess risks in this evaluation, as in all such assessments, are subject to a wide variety of uncertainties. In general, the main sources of uncertainty include:

- environmental chemistry sampling and analysis
- environmental parameter measurement
- fate and transport modeling
- exposure parameter estimation
- toxicological data

Uncertainty in environmental sampling arises in part from the potentially uneven distribution of chemicals in the media sampled. Consequently, there is significant uncertainty as to the actual levels present. Environmental chemistry-analysis error can stem from several sources including the errors inherent in the analytical methods and characteristics of the matrix being sampled.

There are also uncertainties in the risk assessment because the PJP Site is located in an industrial area. The Sip Avenue Ditch receives some runoff from Jersey City and during large storm events has received overflow sewage from the city. Regional pollution has resulted in the state prohibiting swimming or other consumptive uses of the Hackensack River.

Uncertainties in the exposure assessment are related to estimates of how often an individual would actually come in contact with the chemical of concern, the period of time over which such exposure would occur, and in the models used to estimate the concentrations of the chemicals of concern at the point of exposure.

Uncertainties in toxicological data occur in extrapolating both animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the Risk Assessment provides upper-bound estimates of the risks to populations near the Site, and is highly unlikely to underestimate actual risks related to the Site.

More specific information concerning public health risk, including a quantitative evaluation of the degree of risk associated with various exposure pathways, is presented in the Risk Assessment Report.

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in the ROD, may present an imminent and substantial endangerment to the public health, welfare, or the environment.

REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives are specific goals to protect human health and the environment. These objectives are based on available information, applicable or relevant and appropriate requirements (ARARs), and risk-based levels established in the risk assessment. The following remedial action objectives were established for cleanup activities at the Site:

- Eliminate exposure to contaminated sediments in the Sip Avenue Ditch.
- Prevent additional contaminant influx into the ground water via infiltration of rain water.
- Removal of contaminant sources that may impact ground water.

- Evaluate if future actions are necessary to mitigate the leaching of Site contaminants into the Hackensack River through the monitoring and modeling to check the effectiveness of the remedy. If a significant adverse impact is found, NJDEP and EPA will evaluate remedial alternatives and select an appropriate remedy in accordance with CERCLA and the NCP.

DESCRIPTION OF REMEDIAL ALTERNATIVES

The Comprehensive Environmental Response, Compensation, and Liability Act, as amended (CERCLA), requires that each selected Site remedy be protective of human health and the environment, be cost effective, comply with other applicable or relevant and appropriate requirements, and utilize permanent solutions, alternative treatment technologies, and resource recovery alternatives to the maximum extent practicable. In addition, the statute includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances.

The FS evaluates in detail several remedial alternatives for addressing the contamination associated with the PJP Landfill Site. These alternatives are:

Alternative LF-1: No Action
Alternative LF-2: Minimal Action
Alternative LF-3: Soil Cover
Alternative LF-4: Modified NJDEP Solid Waste Cap (Extending Existing Cap)
Alternative LF-5: NJDEP Hazardous Waste Cap
Alternative LF-6: RCRA Hazardous Waste Cap - Incorporating Existing Cap
Alternative LF-7: New RCRA Hazardous Waste Cap

The following two options are applicable to Alternatives LF-3 through LF-7:

OPTION 1: No Drum Removal
OPTION 2: Drum Removal (All known Buried Drum Areas and associated Soils)

As part of Alternatives LF-3 through LF-7: the Sip Avenue Ditch will be replaced with an alternative form of drainage, in order to maintain the integrity of the landfill cap and channel surface water runoff. Design details related to the Sip Avenue Ditch will be resolved in the remedial design phase of the Project. Alternatives will address issues such as protectiveness to ecological receptors, the fate of stormwater runoff, and the effectiveness in preventing contaminant migration to the Hackensack River. Potential alternatives include, but are not limited to, excavation of sediments and placement under the cap, burial in place, or some other form of containment or disposal.

In order to comply with federal wetland ARARs, the remedial design will also include: (a) a wetlands assessment to determine what wetlands were impacted/disturbed by contamination or remedial activities, and (b) a wetlands restoration plan to mitigate those areas found to have been impacted. The assessment will be conducted and the restoration plan prepared prior to remedial activities.

Under Alternative LF-2, LF-3, and LF-4, the existing landfill gas venting system will be sampled during the design phase to determine compliance with current State and Federal air quality standards. If, at that time, air emissions are not in compliance with the accepted maximum limits for Total Volatile Organics, the appropriate measures will be incorporated into the design phase to bring the Site into compliance with air requirements.

For alternatives LF-5, LF-6, and LF-7, the design phase will include a new landfill gas venting system that will be designed (active or passive) to comply (including treatment, if necessary) with State and Federal air quality standards.

In addition, because contamination levels in the ground water are above the Class IIA, Ground Water Quality Criteria (GWQC), each alternative includes a Classification Exemption Area (CEA)/Well Restriction Area (WRA).

This ROD presents alternatives, which are described in greater detail below. Implementation times given include the time necessary to construct and implement the remedy but do not include the time required for design or award of a contract for the performance of the work.

ALTERNATIVE LF-1: NO ACTION

Estimated Capital Cost: None
Annual Operation and Maintenance: None
Estimated Present Worth: None
Estimated Implementation Time: None

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and CERCLA require the evaluation of a No Action alternative to serve as a point of comparison with other remedial action alternatives. Under this alternative, no action would be taken to contain, treat, or control the contamination at the Site. The subsurface soil contamination would decrease over a long period of time through natural processes such as flushing and attenuation. This alternative does not include any measures to restrict access to the Site. Essentially, the Site would remain the same as it is today. Regular monitoring and a five year review to re-evaluate this alternative would be performed.

ALTERNATIVE LF-2: MINIMAL ACTION
Estimated Capital Cost: $209,000
Annual Operation and Maintenance: $105,000
Estimated Present Worth: $752,000
Estimated Implementation Time: None

Under this alternative, no remedial action would be performed at the Site to contain, treat, or control the contamination at the Site. However, institutional controls, such as deed restrictions to restrict future use of the Site and public information programs to increase public awareness of potential problems associated with the Site, would be implemented. In addition, although most of the Site is already fenced, the existing fence would be extended to restrict access and reduce the potential for direct exposure to sediment contamination. Long-term monitoring of soil, sediment and air quality would be performed for a minimum of five years to evaluate the migration of contaminants from the Site and to monitor the effects of natural attenuation.

A Site review would be instituted at the end of five years in order to reevaluate Site conditions. This includes an evaluation of what additional measures, if any, should be implemented based on the Site conditions.

ALTERNATIVE LF-3: SOIL COVER

Estimated Capital Cost: $16,368,000
Annual Operation and Maintenance: $291,000
Estimated Present Worth: $17,716,000
Estimated Implementation Time: 6 months

As described earlier, a 45-acre portion of the landfill was already excavated and capped with one foot of clay and one foot of soil during the completion of the IRM in 1986. Under this alternative, a two foot soil cover would be installed over the remaining, uncapped 42-acre area. The proposed soil cover design includes installation of a top soil layer over the uncapped area and vegetation to prevent soil erosion. Existing gas vents would be sampled and analyzed annually to monitor the gas releases to the atmosphere from the Site. If the gas poses a threat, treatment options would be developed and implemented. In addition, institutional controls and Site fencing would be implemented as described for Alternative LF-2 above.

The soil covered area would require quarterly inspections and maintenance, and a review and reevaluation of Site conditions after five years.

ALTERNATIVE LF-4: MODIFIED NJDEP SOLID WASTE CAP (Extending Existing Cap)

Estimated Capital Cost: $22,022,000
Annual Operation and Maintenance: $369,000
Estimated Present Worth: $[illegible]3,707,000
Estimated Implementation Time: 1.5 years

As described earlier, a 45-acre portion of the landfill was already excavated and capped with one foot of clay and one foot of soil during the IRM. Under this alternative, the remaining 42-acre area, under the Pulaski Skyway on the north side of the Sip Ave Ditch, would be capped with a multi-layer, modified solid waste type cap. The cap may combine several layers of cover materials, such as clean sand, soil and an impervious layer, such as a High Density Polyethylene (plastic) or clay liner but must maintain a minimum of 1x 10^{-7} impermeability to contain the contaminated solids. It may also include a top soil layer and vegetation to prevent soil erosion and to protect the clay/HDP from freeze-thaw effects. The existing gravel lined ditch along the southern border of the capped portion of the landfill would be incorporated into the design of surface water run-off controls.

The use of a passive or active gas venting system would be determined during the remedial design phase of the project. Periodic inspections of the cover installed during the IRM will be performed before and during the implementation of the remedial action and damaged or degraded areas will be repaired. A surface and ground water monitoring (quarterly) and modeling program will be implemented to evaluate the impacts ground water or leachate is having on the Hackensack River and to evaluate the reduction, if any, of contaminant concentrations and determine if natural attenuation is occurring at the Site. If a significant adverse impact is found, NJDEP and EPA will evaluate and implement hydraulic controls to mitigate those impacts. The Site would be reviewed at the end of five years in order to reevaluate Site conditions. The review would include an analysis of the ground and surface water monitoring data, evaluate the impact ground water or leachate is having on the Hackensack River. The review will also include an assessment of current residual health risks, and an evaluation of the effectiveness of site fencing to control access.

ALTERNATIVE LF-5: NJDEP HAZARDOUS W. TE LANDFILL CAP

Estimated Capital Cost: $35,029,000
Annual Operation and Maintenance: $369,000
Estimated Present Worth: $36,714,000
Estimated Implementation Time: 3 years

As described earlier, a 45-acre portion of the landfill was already excavated and capped with one foot of clay and one foot of soil during the completion of the IRM. Under this alternative, the existing 45-acre IRM cap would be left in place and a new multi-layer cap would be placed over the entire 87-acre area. The new cap would comply with the New Jersey Hazardous Waste Regulation (N.J.A.C. 7:26-10.8(i)) regarding closure and post closure requirements for hazardous waste landfills. The proposed cap would consist of a vegetative top soil cover, a sand drainage layer, a bedding layer and a liner system constructed of two synthetic liners. The existing gravel-lined ditch would be incorporated in the design to facilitate the collection of surface water run-off.

In addition, institutional controls and Site fencing would be implemented as described for Alternative LF-2 above. Regular monitoring and a five year review would also be required as described for Alternative LF-4 above.

ALTERNATIVE LF-6: RCRA HAZARDOUS WASTE CAP - INCORPORATING IRM CAP

Estimated Capitol Cost: $44,226,000
Annual Operation and Maintenance: $369,000
Estimated Present Worth: $45,911,000
Estimated Implementation Time: 3 years

As described earlier, a 45-acre portion of the landfill was already excavated and capped with one foot of clay and one foot of soil during the completion of the IRM. Under this alternative, the existing IRM cap would be upgraded and incorporated into a Resource Conservation and Recovery Act (RCRA) cap, which would be installed over the remaining approximate 42-acre area. The RCRA cap is a multi-layer cap that combines several layers of cover materials such as soil, synthetic membranes, and clay to provide erosion and moisture control, in addition to containing the contaminated solids. The entire Site would be graded for proper drainage and seeded with grass for erosion control. The existing gravel-lined ditch would be incorporated in the design to aide in the collection of surface water run-off.

This alternative includes institutional controls and site fencing as described in Alternative LF-2. Regular monitoring and a five year review would also be required as described for Alternative LF-4.

ALTERNATIVE LF-7: NEW RCRA HAZARDOUS WASTE CAP

Estimated Capital Cost: $47,879,00
Annual Operation and Maintenance: $369,000
Estimated Present Worth: $49,564,00
Estimated Implementation Time: 3 years

Under this Alternative, the existing IRM cap would be removed, graded, and used as the first layer of fill. A new RCRA cap would be placed over the entire 87 acre Site. As described in Alternative LF-6, the RCRA cap is a multi-layer cap that combines several layers of cover materials such as soil, synthetic membranes, and clay to provide erosion and moisture control, in addition to containing the contaminated solids. The entire Site would be graded for proper drainage and seeded with grass for erosion control. The existing gravel-lined ditch would be incorporated in the design to aide in the collection of surface water run-off.

This alternative includes institutional controls and Site fencing as described for Alternative LF-2. Regular monitoring and maintenance and a five year review would also be required as described for Alternative LF-4.

The following two options apply to alternative LF-3 to LF-7:

OPTION 1: NO DRUM REMOVAL

Estimated Capital Cost: NONE
Annual Operation and Maintenance: NONE
Estimated Present Worth: NONE
Estimated Implementation Time: NONE

Under this alternative, no excavation and removal of known buried drums and associated contaminants would be performed prior to capping.

OPTION 2: DRUM REMOVAL (EXCAVATION AND REMOVAL OF ALL KNOWN AND SUSPECTED BURIED DRUMS AND ASSOCIATED SOILS)

Estimated Capital Cost: $514,000*
Annual Operation and Maintenance: NONE
Estimated Present Worth: $515,000
Estimated Implementation Time: 6 months

* The figure is only a rough estimate: the actual cost will depend on the number of drums encountered.

The excavation and removal of all known and suspected buried drums and associated contaminated soils prior to capping is an additional, separate option that could be used in conjunction with any or all of the containment Alternatives LF-3 through LF-7. Under this option, excavation would be initiated at two (2) test pit (TP) cluster locations (see figures 3 and 4), which includes TP-10 through TP-17 and TP-19 until ground water is encountered, the fill area depth limit is reached, or until no more drums are found. All excavated drums and visually contaminated soils would be sampled and tested. Contaminated materials would be shipped off-site for proper disposal. The Site would be regraded after drums were removed prior to installation of the selected cap.

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

In accordance with the NCP, a detailed analysis of each remedial alternative was conducted with respect to each of the nine criteria described below. This section discusses and compares the performance of the remedial alternatives considered against these criteria. All selected alternatives must at least attain the Threshold Criteria. The selected alternative should provide the best balance among the nine criteria. The Modifying Criteria were evaluated following the public comment period.

During the detailed evaluation of remedial alternatives, each alternative was assessed utilizing nine evaluation criteria as set forth in the NCP. These criteria were developed to address the requirements of Section 121 of CERCLA to ensure all important considerations are factored into remedy selection decisions.

<u>Threshold Criteria</u>

1. **Overall Protection of Human Health and the Environment** addresses whether or not an alternative provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. **Compliance with Applicable and Relevant and Appropriate Requirements (ARARs)** addresses whether or not an alternative will meet all of the ARARs of the Federal and State environmental statutes or provide a basis for invoking a waiver.

<u>Primary Balancing Criteria</u>

3. **Long-term Effectiveness and Permanence** refers to the magnitude of residual risk and the ability of an alternative to maintain reliable protection of human health and the environment over time once remedial objectives have been met.

4. **Reduction of Toxicity, Mobility, or Volume** addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity,

mobility, or volume of the hazardous substances as a principal element.

5. **Short-term Effectiveness** refers to the period of time that is needed to achieve protection, as well as the alternative's potential to create adverse impacts on human health and the environment that may result during the construction and implementation period.

6. **Implementability** is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular alternative.

7. **Cost** includes estimated capital and operation and maintenance costs, and the present worth costs.

<u>Modifying Criteria</u>

8. **Support Agency acceptance** indicates whether, based on its review of the RI and FS reports and the ROD, the support agency opposes, and/or has identified any reservations with the preferred alternative.

9. **Community acceptance** refers to the public's general response to the alternatives described in the ROD and the RI/FS reports. Responses to public comments are addressed in the Responsiveness Summary of this Record of Decision.

A comparative analysis of these alternatives, based upon the evaluation criteria noted above, is presented below.

Overall Protection of Human Health and the Environment

Except for the No Action and Minimal Action alternatives, all of the containment alternatives, LF-3 through LF-7, would minimize the potential human and ecological risk. These alternatives would also minimize precipitation infiltration to the waste, thereby reducing the potential for contamination migration. The Sip Avenue ditch sediments would be isolated from future exposure potential.

However, capping would result in the loss or alteration of terrestrial and aquatic wildlife habitats in the PJP Landfill area. Some estuarine emergent wetlands would be capped as part of the proposed actions. Shallow water aquatic habitat in the Sip Avenue ditch would be lost as a result of the proposed filling. These actions generally could result in a loss of some wetland-associated species from the immediate Site area and in the loss of aquatic life from the ditch area. Terrestrial species adapted to grass/field environments are likely to inhabit the area once vegetation has been established on the cap. In order for the capping alternatives LF-3 through LF-7 to meet this criterion, wetlands mitigation activities (i.e. restoration, land banking) would have to be implemented at the Site.

Option 2: Removal of Drums, in conjunction with any of the capping alternatives, would provide protection of human health and the environment by reducing on-site contaminant concentrations and potential impacts to ground water quality.

Compliance with ARARs

Actions taken at any Superfund site must achieve ARARs of federal and state laws or provide grounds for waiving these requirements. The No Action, Minimal Action, and LF-3: Soil Cover alternatives do not comply with federal and state ARARs which regulate the closure and capping of either solid waste or hazardous waste landfills.

The No Action, Minimal Action, and capping alternatives do not address contamination in Sip Avenue Ditch sediments which are at levels in exceedance of the criteria set forth in NOAA sediment screening criteria. However, the capping alternatives all provide for replacement of the Sip Ave ditch with an alternative form of drainage, and would also provide protection from rainwater infiltration, thus reducing potential migration of subsurface contaminants into the ground water.

As part of the IRM in 1986 an estimated 10,000 drums (4,700 intact and 5,000 with contaminated soil) were disposed of off-site. ARAR compliance would be aided by Option 2 in conjunction with any of the capping alternatives.

Because No Action and Minimal Action alternatives do not meet both threshold requirements of overall protection of human health and the environment or compliance with ARARs, they will not be discussed further in the evaluation of alternatives.

Long-Term Effectiveness and Permanence

The capping alternatives would promote surface water run-off; cap implementability will offset the need for ground water collection and treatment. Ground water data has shown a significant reduction in contaminant concentration on the IRM capped portion of the landfill. This fact suggest that by implementing one of the capping alternatives the natural attenuation of ground water would be enhanced, while at the same time isolating the Sip Avenue Ditch sediments from future exposure potential. However, the capping alternatives do vary in permeability. The least permeable cap will provide the least migration of landfill contaminants off-site. Alternative LF-7, New RCRA Hazardous Waste Cap, has the least permeability while LF-3, Soil Cover, has the greatest.

Option 2 : Drum Removal in conjunction with a capping selection is the most effective in the long-term and the most permanent because the most concentrated areas of contamination would be permanently removed (in addition to the estimated 10,000 drums that were previously removed) from the Site and contaminated materials would then be shipped off-site for proper disposal.

Short-Term Effectiveness

In general, effective alternatives which can be implemented quickly with little risk to human health and the environment are favored under this criterion. The capping alternatives without the excavation option have high short-term effectiveness because they could be implemented relatively quickly (within three years) and would have relatively minor short-term risks to nearby workers, residents and commuters.

Construction of any of the capping alternatives would involve some excavation and handling of contaminated soils during the initial Site regrading, but exposure could be reduced through the use of suitable protective clothing and equipment. Exposure of the surrounding community through fugitive dust emissions could be easily controlled using good construction practices and air monitoring. Short-term risks to the community, workers, or the environment are expected to be minor.

However, Option 2 Drum Removal provides potentially increased hazardous conditions for the workers, community, commuters on the Pulaski Skyway, and the environment. However, this short term risk can be mitigated with proper health and safety, community awareness and air monitoring. Potential risks associated with the drum removal will be addressed during the design phase of the project via a site specific health and safety plan and an emergency response plan.

Reduction of Toxicity, Mobility or Volume

The capping alternatives without the excavation option would reduce mobility by preventing the migration of contaminants into the air and off-site run-off via erosion. The cap would also reduce leaching of contaminants into ground water. However, these alternatives alone would not reduce toxicity or volume of the contaminants.

Option 2 Drum Removal, which consists of the excavation and removal of all known and suspected buried drums and associated soils would reduce the toxicity, mobility and volume of the contaminated material in the site itself. Option 2 would result in the reduction of the volume of contaminants. In addition, the capping alternative would further reduce the mobility of any contaminants remaining on Site after excavation.

Implementation

All of the alternatives are fairly easily implementable from an engineering standpoint. The capping alternatives without the excavation option are easy to implement with the technology, equipment and resources being established and readily available. The RCRA Hazardous Waste Cap alternatives would take longer than the Solid Waste Cap alternative due to the multiple layer construction.

Option 2 Drum Removal is feasible, however, the implementation would present some difficulty due to the potential health and safety hazards. Again, these concerns can be mitigated. This option would also add to the length of time required to implement the remedy.

Cost

The capping alternatives are all the same order of magnitude, with the least expensive being the Solid Waste Cap and the most expensive being the New RCRA and NJDEP Hazardous Waste Caps.

Option 2: Drum Removal increases the cost of each of the capping alternatives. Although subsurface contamination is not a current risk pathway, the excavation and removal option affords a degree of long-term effectiveness and permanence by excavation, removal and off-site treatment of buried drums and associated highly contaminated visibly stained soil. In addition, this option would minimize any future ground water contamination which may occur as the result of wastes contained in these known areas. Therefore, the cost of the value added from the reduction of subsurface contaminants may be warranted by reducing and possibly eliminating the need for long term ground water treatment.

Support Agency Acceptance

The United States Environmental Protection Agency supports the selected remedy presented in this Record of Decision.

Community Acceptance

Community acceptance was evaluated after the close of the public comment period. Written comments received during the public comment period, as well as verbal comments during the public meeting on August 18, 1994, were evaluated.

The majority of comments received during the public comment period originated from the potentially responsible parties (PRPs). Their comments focused on the definition of landfill boundaries, the appropriateness of the preferred cap with respect to scope and effectiveness, as well as future use. Concerns were also raised during the public meeting regarding how reasonable risk is determined and the impact this remediation may have on currently operating facilities in the vicinity of the landfill. The PRPs were concerned that a portion of the landfill area (as it was depicted in the FS drawings) was not a part of the PJP landfill site.

The responses to these and other comments are addressed in the Responsiveness Summary. Comments received during the public comment period indicated that the local residents were mostly satisfied with the preferred alternatives for the soil and ground water.

SELECTED REMEDY

NJDEP and EPA have determined after reviewing the alternatives and public comments, that Alternative LF-4 with Option 2 is the appropriate remedy for the Site, Because it best satisfies the requirements of CERCLA §121, 42 U.S.C.§9621, and the NCP's nine evaluation criteria for remedial alternatives, 40 CFR §300.430(e)(9).

Alternative LF-4: Modified NJDEP Solid Waste Cap (extending existing cap): $22,022,000, replacement of the Sip Ave ditch with an alternate form of drainage, and Option 2: Drum Removal (Excavation and Removal of All Known and Suspected Buried Drums and associated contaminated soil): $514,000, is the most appropriate remedy for the PJP Landfill Site.

The major components of the selected remedy include the following:

- Removal of all known and suspected buried drums and associated visibly contaminated soil;
- Capping the remaining landfill area of Site with a multi-layer, modified solid waste type cap;
- Extending the existing gravel lined ditch around the perimeter of the Site to collect the surface water runoff;
- A passive gas or active venting system installed in the new portion of the cap. However, if an active system is deemed necessary, both areas will be included;
- Site fencing and institutional controls (e.g., deed restrictions and public information program);
- Periodic inspections of the cover installed during the IRM must be performed before and during the implementation of the remedial action. If the cover is damaged or degraded, then at least 1 additional foot of topsoil should be spread over the previously installed cover.
- Replacing the Sip Ave ditch with an alternate form of drainage;
- Quarterly ground water and surface water monitoring to evaluate the reduction of contaminant concentrations over time; if a significant adverse impact is found, NJDEP and EPA will evaluate remedial alternatives and select an appropriate remedy in accordance with CERCLA and the NCP.
- Because contamination levels in the ground water are above the Class IIA GWQC, a CEA/WRA will be established;
- Implementation of a wetlands assessment and restoration plan. The wetlands assessment will be performed before any of the remedial actions are begun.

The multi-layer cap would comply with NJDEP sanitary landfill closure requirements. Since removal of all known and suspected buried drum material and associated visibly contaminated soils would remove the significant hazardous waste known to be deposited in the landfill, closure utilizing a RCRA hazardous waste cap is not necessary. Based on the results of the baseline risk assessment the Site does not currently present an immediate risk to human health and the environment via the groundwater or surface water exposure pathways. Therefore, NJDEP and EPA determined it was appropriate to monitor and evaluate groundwater and surface water for a 5 year period, and then assess what additional measures, if any, should be implemented. The use of a passive or active gas venting system would be determined during the remedial design phase of the project.

The capped area would require quarterly inspections and replacements, as necessary, of grass, seed and topsoil. Ground water and surface water monitoring will be performed quarterly to evaluate the reduction of contaminant concentrations and to determine if natural attenuation is occurring at the Site. The Site would be reviewed for five years in order to evaluate effectiveness of the remedy. The review will also include an assessment of current residual health risks, an evaluation of the effectiveness of the Site fencing to control access, and an evaluation of what additional remedial measures, if any, should be implemented based on the reviewed Site conditions.

The selected alternative provides the best balance among alternatives with respect to the evaluation criteria. NJDEP and EPA believe that the selected alternative would be protective of human health and the environment, would comply with the Remedial Action Objectives, would be cost-effective, and would utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

The excavation and removal of drums and surrounding highly contaminated soil is protective of human health and the environment. The selected alternative has a favorable short-term effectiveness because it could be implemented relatively quickly. The selected alternative also, provides for long-term effectiveness and permanence by removing and treating the highly contaminated materials from disposal areas. The long-term effectiveness and permanence of the alternative outweigh short-term risks associated with excavation.

Remedial Investigation and subsequent sampling results indicate that contaminants' concentrations in the shallow aquifer are reducing over time. Ground water contamination in the deep aquifer is at concentrations below any level of concern at the present time.

Implementation of the selected alternative (i.e., capping and drum removal) will reduce the leaching of contaminants into ground water. The five year ground water and surface water monitoring program and the model will enable NJDEP and EPA to reevaluate Site conditions and determine the effectiveness of the remedy selected. If a significant adverse impact is found, NJDEP and EPA will evaluate remedial alternatives and select an appropriate remedy in accordance with CERCLA and the NCP.

The preferred alternative provides protection to human health by preventing direct contact with the contaminated material, and by preventing the migration of contaminants by reducing infiltration and erosion. Moreover, the combination of this alternative and the excavation and removal of drums and surrounding contaminated soil option, would satisfy the statutory preference for remedies which utilize treatment as a principal element.

NJDEP realizes the inherent short-term risks associated with excavation and removal of contaminated drums and surrounding soil. For this reason, NJDEP would implement a comprehensive Site Health and Safety Plan to mitigate the short-term risks to nearby workers, residents, and commuters.

Maintaining the level of risk reduction afforded by the proposed remedy depends on preserving the long-term integrity of the cap and enforcement of institutional controls. Institutional controls would include use restrictions to restrict future use of the Site and public information programs to increase the public awareness of potential problems associated with the Site. The NJDEP Solid Waste Cap has proven to be a very effective and reliable remedial technology. Implementing the NJDEP Solid Waste Cap also presents few short-term risks. In addition, the NJDEP Solid Waste Cap with the incorporation of the existing IRM cap provides the maximum protection to human health and the environment at a reasonable cost.

STATUTORY DETERMINATIONS

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete, the selected remedial action for the PJP Landfill Site must comply with applicable, or relevant and appropriate environmental standards established under federal and state environmental laws unless a statutory waiver is justified. The selected remedy also must be cost effective and utilize permanent solutions and alternative treatment technologies or resource-recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes. The following sections discuss how the selected remedy meets these statutory requirements.

Protection of Human Health and the Environment

The selected remedy is protective of human health and the environment, as it effectively addresses the principal threats posed by the Site, namely:
<u>Chemical-specific ARARs:</u>

- Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs): (40 CFR Part 141)
- Clean Water Act Water Quality Criteria (WQC): (40 CFR Part 131)
- RCRA Maximum Concentration Limits (MCLs): (40 CFR 264)
- RCRA Land Disposal Restrictions: (40 CFR 268)
- New Jersey Safe Drinking Water Act MCLs: (NJAC: 7:10-16)
- New Jersey Water Pollution Control Act Standards for Groundwater: (NJAC: 7:9-6)
- New Jersey Water Pollution Discharge Elimination System: (NJAC: 7:14A)

- New Jersey Surface Water Quality Standards:
  (NJAC 7:9-4.1)

Location-specific ARARs:

- Clean Water Act, Section 404:
  (33 USC 466)
- Executive Orders on Floodplain Management and Protection of Wetlands:
  (E.O. 11988, 11990)
- EPA/COE Memorandum of Agreement on Wetlands Protection
- Fish and Wildlife Coordination Act:
  (16 USC 661)
- Endangered Species Act:
  (16 USC 1531)
- National Historic Preservation Act:
  (16 USC 470)
- New Jersey Flood Hazard Area Control Act:
  (NJSA 58:6A-50)
- New Jersey Freshwater Wetlands Protection Act:
  (NJSA 13:9B-1)
- New Jersey Freshwater Wetlands Transition Area Rules:
  (NJAC 7:7)
- New Jersey Freshwater Wetlands Protection Rules:
  (NJAC 7:7A)
- New Jersey Stream Encroachment Regulations:
  (NJAC 7:13-1.1)

Action-specific ARARs:

- Clean Water Act Water Quality Criteria (WQC):
  (40 CFR Part 131)
- RCRA Land Disposal Restrictions:
  (40 CFR 268)
- Clean Air Act National Ambient Air Quality Standards:
  (40 CFR Part 50)
- OSHA General Industry Standards:
  (29 CFR 1910)

- **OSHA Safety and Health Standards:**
  (29 CFR 1926)

- **OSHA Record Keeping, Reporting, and Related Regulations:**
  (29 CFR 1904)

- **RCRA Standards for Generators of Hazardous Waste:**
  (40 CFR 262.1)

- **RCRA Standards for Transporters of Hazardous Waste:**
  (40 CFR 263.11, 263.20-21, and 263.30-31)

- **RCRA Standards for Owners/Operators of Permitted Hazardous Waste Facilities:**
  (40 CFR 264.10-264.18)

- **RCRA - Preparedness and Prevention:**
  (40 CFR 264.30-31)

- **RCRA - Contingency Plan and Emergency Procedures:**
  (40 CFR 264.50-264.56)

- **RCRA - Groundwater Protection:**
  (40 CFR 264.90-264.109)

- **RCRA - Standards for Excavation and Fugitive Dust:**
  (40 CFR 264.251-264.254)

- **RCRA - Miscellaneous Units:**
  (40 CFR 264.600-264.999)

- **RCRA - Closure and Post-Closure**
  (40 CFR 264.110-264.120)

- **DOT Rules for Transportation of Hazardous Materials:**
  (49 CFR 107, 171.1-172.558)

- **New Jersey Hazardous Waste Manifest System Rules:**
  (NJAC 7:26)

- **New Jersey Hazardous Waste Treatment Storage and Disposal Facility Permitting Requirements:**
  (NJAC 7:26)

- **New Jersey Water Pollution Discharge Elimination System:**
  (NJAC: 7:14A)

- **New Jersey Surface Water Quality Standards:**
  (NJAC 7:9-4.1)

- **New Jersey Clean Air Act:**
  (NJSA 26:2C)

- New Jersey Air Pollution Control Act: (NJAC 7:27-5, 13, 16, and 17)

Cost-Effectiveness

Of the alternatives which most effectively address the threats posed by Site contamination, the selected remedy provides for overall effectiveness in proportion to its cost. The estimated total project cost, including both the selected capping alternative and drum removal, is $22,536,000.

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

Capping the Site would provide protection from rainwater infiltration, thus reducing potential migration of subsurface contaminants into ground water. This will significantly reduce the toxicity, mobility and volume of the contaminants, and offer a permanent solution to the risks posed by surface soils.

Preference for Treatment as a Principal Element

In keeping with the statutory preference for treatment as a principal element of the remedy, the remedy provides for the excavation and removal of known buried drums and associated contaminants, which, would be shipped off-site for disposal, possibly by incineration.

The treatment of landfill material, however, is not practicable, because of the size of the landfill and because the identified on-site hot spots that represented the major sources of contamination were removed during the IRM.

DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the Site was released to the public on August 2, 1995. The Proposed Plan identified the preferred alternatives for groundwater and soil remediation. EPA reviewed all written and verbal comments received during the public comment period. Upon review of these comments, DEP determined that no significant changes to the selected remedy, as it was originally identified in the Proposed Plan, were necessary.

APPENDIX I

FIGURES

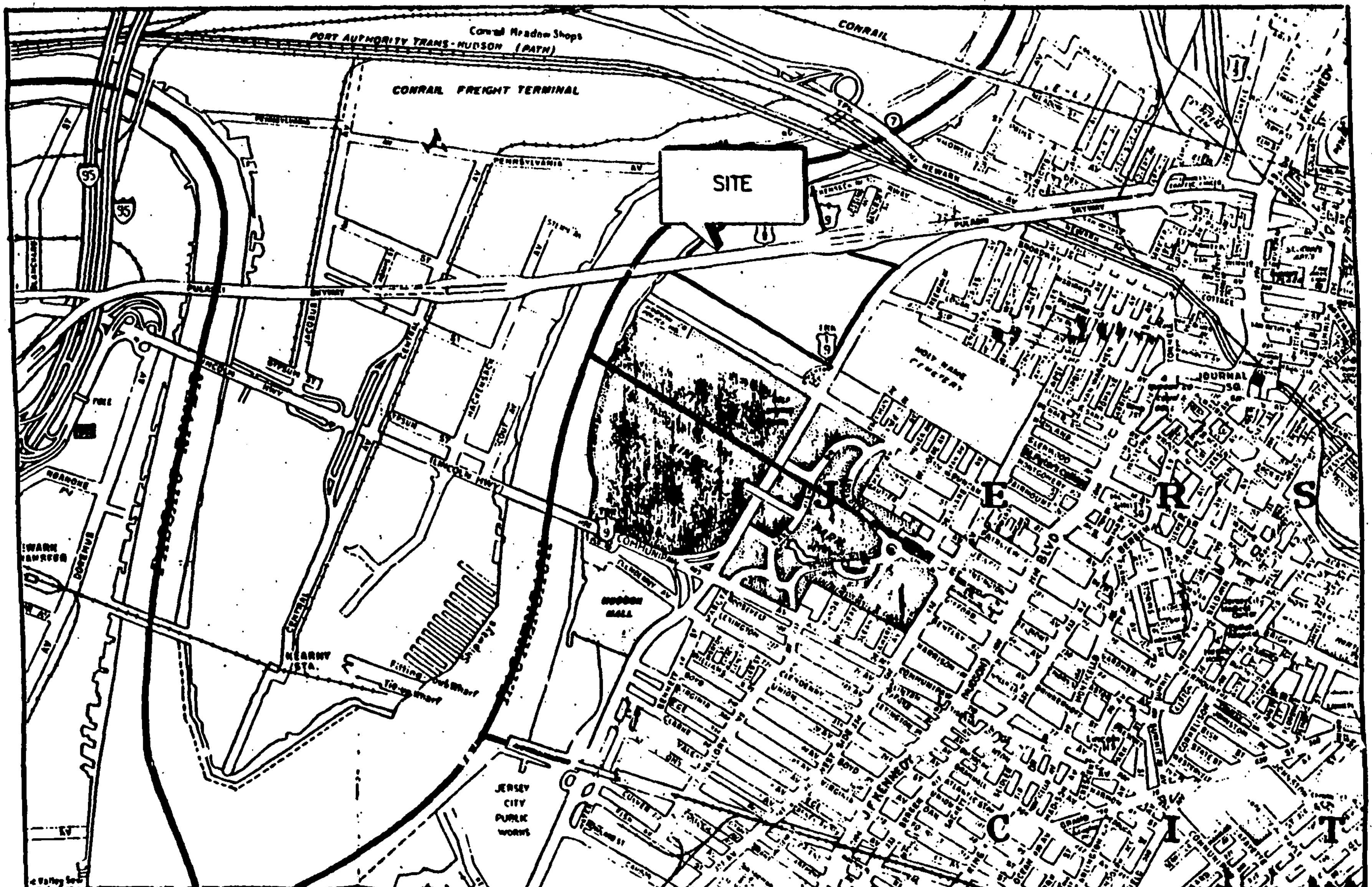

Figure 1
Site Location Map

PJP LANDFILL, JERSEY CITY, NEW JERSEY
ICF TECHNOLOGY, INC

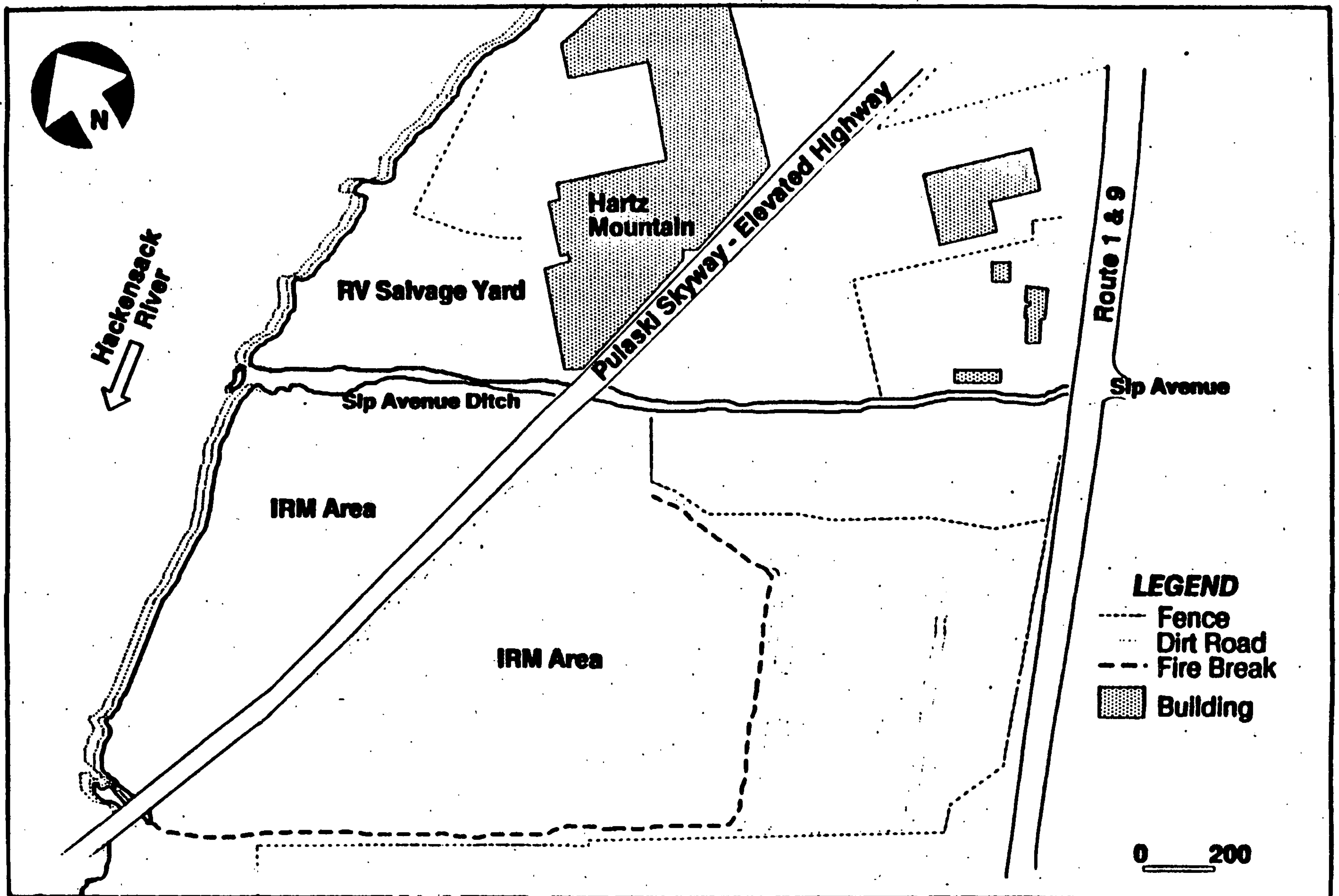

Figure
Site Map

PJP LANDFILL, JERSEY CITY, NEW JERSEY

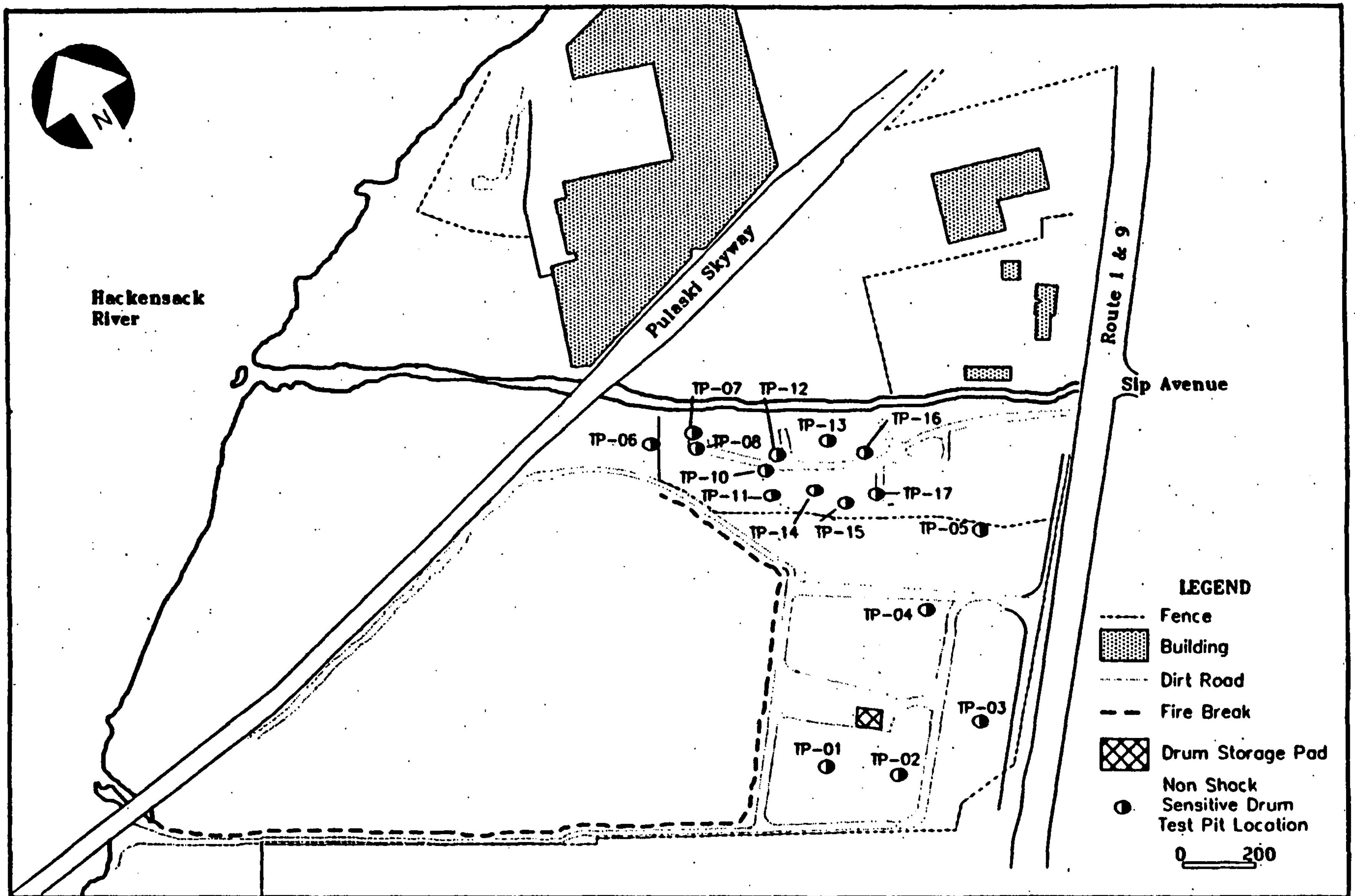

FIGURE 3
Non Shock Sensitive Test Pit Locations

PJP LANDFILL, JERSEY CITY, NEW JERSEY
ICF TECHNOLOGY, INC

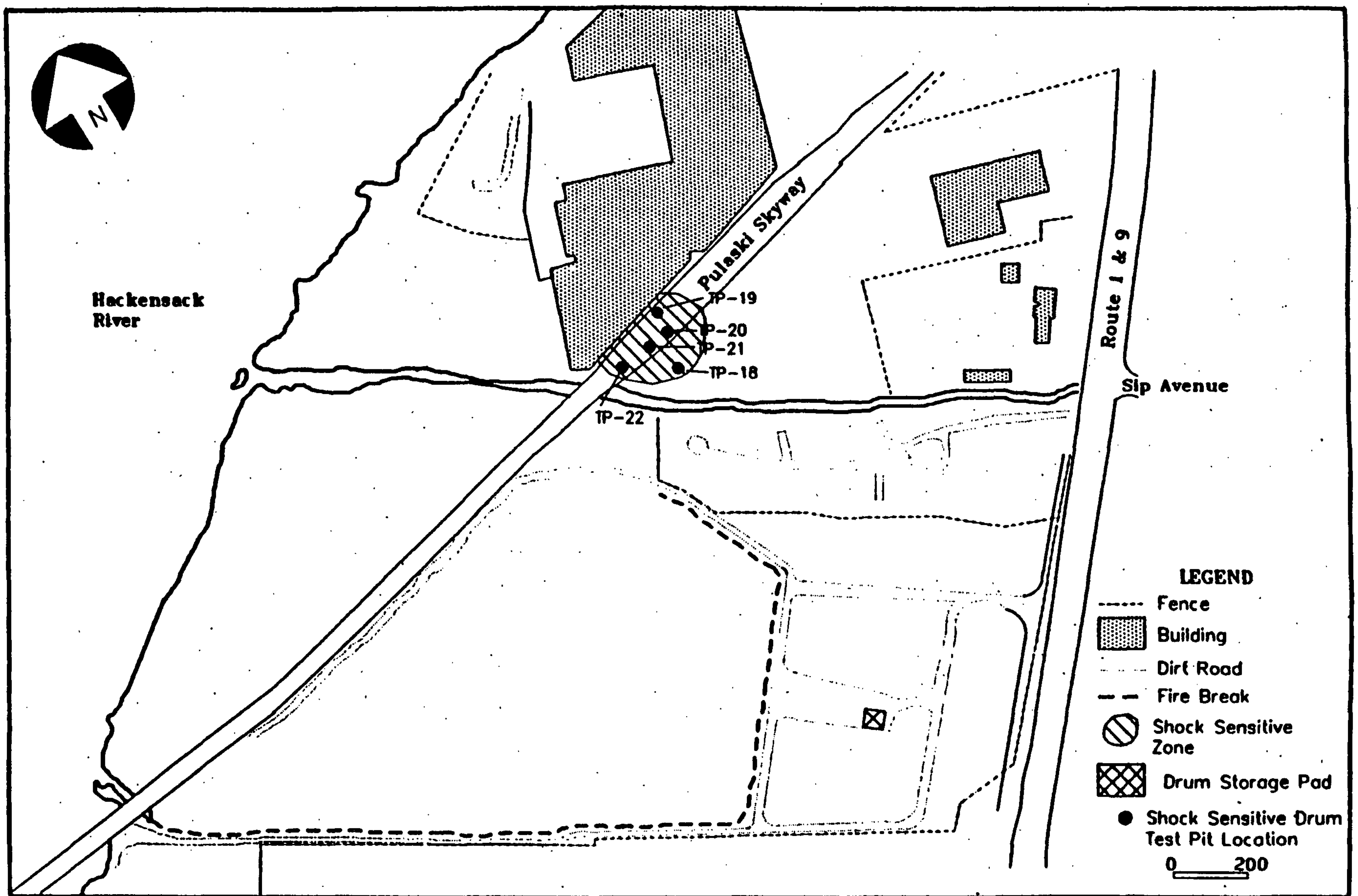

FIGURE 4
Shock Sensitive Test Pit Locations

PJP LANDFILL, JERSEY CITY, NEW JERSEY
ICF TECHNOLOGY, INC

APPENDIX II

TABLES

Table #	Identification
5-15	Summary Of Chemical Potential Concern At The PJP Landfill Site
5-17	Summary of Exposure Pathways To Be Evaluated For The PJP Landfill Site
5-24	Potential Exposures And Risks Associated With Incidental Ingestion And Dermal Absorption Of Chemical In Surface Soils By Children Trespassing On The Landfill (Current Land Use)
5-25	Potential Exposures And Risks Associated With Incidental Ingestion And Dermal Absorption By Children Of Chemicals In Sediment From The Hackensack River Above The Sip Avenue Ditch (Current Land Use)
5-26	Potential Exposures And Risks Associated With Incidental Ingestion And Dermal Absorption By Children Of Chemicals In Sediment From The Hackensack River Above The Sip Avenue Ditch (Current Land Use)
5-27	Exposure And Risks Associated With Incidental Ingestion And Dermal Absorption By Children Of Chemicals In Sediment From The Hackensack River Downgradient Of The Ditch At The Western Corner Of The Capped Landfill (Current Land Use)
5-29	Potential Exposures And Risks Associated With Dermal Absorption By Children Of Chemicals In Surface Water In The Sip Avenue Ditch (Current Land Use)
5-30	Potential Exposures And Risks Associated With Incidental Ingestion and Dermal Absorption By Children Of Chemicals In Surface Water In the Hackensack River Above The Sip Avenue Ditch (Current Land Use)
5-31	Potential Exposures And Risks Associated With Incidental Ingestion And Dermal Absorption By Children Of Chemicals In Surface Water In the Hackensack River Downgradient Of The Ditch At The Wester Corner Of The Capped Landfill (Current Land Use)
5-35	Potential Exposures and Risks Associated With Inhalation Of Volatile Chemicals By Trespassing Children (Current Land Use)
5-36	Potential Exposures And Risks Associated With Inhalation Of Volatile Chemicals By Nearby Residents (Current Land Use)
5-37	Potential Exposures And Risks Associated With Inhalation of Volatile Chemicals By Nearby Residents (Current Land Use)

5-39 Potential Exposures And Risks Associated With Ingestion Of Chemicals In Groundwater (Hypothetical Future Land Use)

Table 5-15
SUMMARY OF CHEMICALS OF POTENTIAL CONCERN AT THE PJP LANDFILL SITE

Chemical	Surface Soil	Subsurface Soil	Test Pits	Groundwater	Surface Water			Sediment			Air
					Ditch	River Above Ditch	West of Landfill	Ditch	River Above Ditch	West of Landfill	
Organic:											
Acetone						X					
Aldrin			X								
alpha-BHC		X	X								
Benzene		X	X	X	X	X		X	X	X	X
Benzyl alcohol				X	X						
Bis(2-chloroethyl)ether		X	X	X	X						
Bis(2-chloroisopropyl)ether				X	X						
Bis(2-ethylhexyl)phthalate	X	X	X		X			X	X	X	
2-Butanone										X	
Carbon tetrachloride			X								
Chlordane	X				X						
Chlorobenzene											X
Chloroethane				X							
Chloroform	X		X	X	X			X	X		X
DDT		X	X								
Di-n-butylphthalate							X			X	
Di-n-octylphthalate	X	X	X	X				X		X	
1,4-Dichlorobenzene		X	X								
3,3'-Dichlorobenzidine		X									
1,1-Dichloroethane			X								X
1,2-Dichloroethane	X		X								
1,1-Dichloroethene			X								
trans-1,3-Dichloropropene		X									
Dieldrin			X								
2,4-Dimethylphenol		X		X							
Dimethylphthalate	X										
Dioxin			X								
Endosulfan sulfate	X	X	X					X			
Endrin	X										
Ethylbenzene					X					X	
Heptachlor			X								
Heptachlor epoxide		X									
2-Hexanone		X	X								
Methylene chloride		X	X	X				X			X
3-Nitroaniline		X									
4-Nitroaniline		X									
n-Nitrosodiphenylamine			X		X			X	X		
n-Nitroso-dipropylamine									X		
PAH--cPAH	X	X	X					X	X	X	
PAH--ncPAH										X	
PCBs			X								
Petroleum hydrocarbons	X	X	X	X	X			X	X	X	
Phenols (total)				X	X						
Tetrachloroethene	X		X					X			X
Toluene											X
1,1,1-Trichloroethane										X	X
Trichloroethene	X		X								
Vinyl acetate				X							
Vinyl chloride			X								X
Xylenes											X

Table 5-15 (Continued)

SUMMARY OF CHEMICALS OF POTENTIAL CONCERN AT THE PJP LANDFILL SITE

Chemical	Surface Soil	Subsurface Soil	Test Pits	Groundwater	Surface Water: Ditch	Surface Water: River Above Ditch	Surface Water: West of Landfill	Sediment: Ditch	Sediment: River Above Ditch	Sediment: West of Landfill
Inorganic:										
Aluminum			X	X	X	X	X			
Antimony	X	X	X	X				X	X	
Arsenic	X	X	X	X	X			X	X	
Barium		X		X	X	X	X	X	X	
Beryllium			X			X		X		
Cadmium	X			X					X	
Calcium	X	X	X		X	X	X	X	X	
Chloride				X	X	X				
Chromium			X	X	X	X	X			
Cobalt			X		X			X		
Copper			X	X		X	X	X		
Iron		X	X	X	X	X	X	X		
Lead		X	X	X	X				X	
Magnesium		X	X		X	X	X	X	X	
Manganese				X	X	X	X			
Mercury	X	X		X	X	X	X	X	X	X
Nickel				X	X			X		
Potassium				X	X	X	X			
Selenium										X
Sodium				X	X	X	X	X	X	
Sulfate				X	X	X				
Thallium				X						
Vanadium					X					
Zinc				X	X	X	X	X		

TABLE 5-17

SUMMARY OF EXPOSURE PATHWAYS TO BE EVALUATED FOR THE PJP LANDFILL SITE

Potentially Exposed Population	Exposure Pathway
Current Land Use:	
Trespassing children playing on the landfill remediation/staging area	Dermal absorption and incidental ingestion of surface soil
	Inhalation of chemicals released from landfill vents
Trespassing children wading in the Sip Avenue Ditch	Dermal absorption of chemicals in Sip Avenue Ditch sediment and surface water, and incidental ingestion of chemicals in sediment
Trespassing children swimming in the Hackensack River near the site	Dermal absorption and incidental ingestion of chemicals in Hackensack River surface water and sediment
Workers	Inhalation of chemicals released from landfill vents and dispersed offsite to adjacent businesses
Residents	Inhalation of chemicals released from landfill vents and dispersed offsite to nearby apartment buildings
Hypothetical Future Use:	
Residents	Ingestion of groundwater from the shallow and deep aquifers (combined)
Workers	Dermal absorption and incidental ingestion of surface and subsurface soil and test pit material. (Qualitative evaluation only.)
	Inhalation of chemicals released from landfill vents. (Qualitative evaluation only.)

TABLE 5-24

POTENTIAL EXPOSURES AND RISKS ASSOCIATED WITH INCIDENTAL INGESTION AND DERMAL ABSORPTION OF CHEMICALS IN SURFACE SOILS BY CHILDREN TRESPASSING ON THE LANDFILL (CURRENT LAND USE)

POTENTIAL CARCINOGENS

Chemical	Soil Concentration (a) (mg/kg)		Quantity of Chemical Ingested and Absorbed (b) (mg/kg-day)		Quantity of Chemical Absorbed Dermally (c) (mg/kg-day)		Combined Chronic Daily Intake (CDI) (d) (mg/kg-day)		Potency Factor (e) (mg/kg-day)-1	Lifetime Upper Bound Excess Cancer Risk (f)	
	Geometric Mean	Maximum	Average Case	Plausible Maximum Case	Average Case	Plausible Maximum Case	Average Case	Plausible Maximum Case		Average Case	Plausible Maximum Case
Arsenic	1.00E+01	2.91E+01	3.84E-07	5.29E-06	1.09E-08	3.09E-06	3.75E-07	8.39E-06	2.0E+00	7E-07	2E-05
Bis(2-ethylhexyl)phthalate	1.70E+01	1.40E+02	8.27E-08	1.27E-05	5.56E-09	1.49E-05	9.83E-08	2.76E-05	1.4E-02	1E-09	4E-07
Chlordane	4.[illegible]E-02	5.65E-02	2.60E-10	5.14E-09	5.[illegible]-11	4.01E-09	3.[illegible]E-10	9.[illegible]E-09	1.3E+00	4E-10	1E-08
Chloroform	7.70E-03	7.10E-02	2.80E-10	1.29E-08	2.10E-[illegible]	6.29E-08	4.90E-10	7.[illegible]E-08	6.1E-03	3E-12	[illegible]-10
1,2-Dichloroethane	5.20E-03	1.90E-02	1.89E-10	3.45E-09	1.42E-10	1.68E-08	3.31E-10	2.03E-08	9.1E-02	3E-11	2E-09
PAH--cPAH	1.00E+00	2.40E+00	5.45E-09	2.18E-07	9.82E-10	1.70E-07	6.44E-09	3.88E-07	1.2E+01	7E-08	4E-06
Tetrachloroethene	1.05E-02	1.50E-01	3.82E-10	2.73E-08	2.86E-10	1.33E-07	6.68E-10	1.60E-07	5.1E-02	3E-11	8E-09
Trichloroethene	7.40E-03	6.70E-02	2.69E-10	1.22E-08	2.02E-10	5.94E-08	4.71E-10	7.16E-08	1.1E-02	5E-12	8E-10
TOTAL	---	---	---	---	---	---	---	---	---	8E-07	2E-05

NONCARCINOGENS

Chemical	Soil Concentration (a) (mg/kg)		Quantity of Chemical Ingested and Absorbed (b) (mg/kg-day)		Quantity of Chemical Absorbed Dermally (c) (mg/kg-day)		Combined Chronic Daily Intake (CDI) (d) (mg/kg-day)		Reference Dose (RfD) (e) (mg/kg-day)	Ratio CDI:RfD (g)	
	Geometric Mean	Maximum	Average Case	Plausible Maximum Case	Average Case	Plausible Maximum Case	Average Case	Plausible Maximum Case		Average Case	Plausible Maximum Case
Antimony	2.07E+01	3.93E+01	8.78E-06	8.34E-05	2.63E-07	4.88E-05	9.04E-06	1.32E-04	4.0E-04	2E-02	3E-01
Arsenic	1.00E+01	2.91E+01	4.24E-06	6.17E-05	1.27E-07	3.61E-05	4.37E-06	9.78E-05	1.0E-03	4E-03	1E-01
Bis(2-ethylhexyl)phthalate	1.70E+01	1.40E+02	1.08E-06	1.48E-04	6.49E-08	1.74E-04	1.15E-06	3.22E-04	2.0E-02	6E-05	2E-02
Cadmium	5.80E+00	2.81E+01	2.38E-06	5.96E-05	7.13E-08	3.49E-05	2.45E-06	9.45E-05	1.0E-03	2E-03	9E-02
Chlordane	4.77E-02	5.65E-02	3.04E-09	5.99E-08	6.07E-10	4.67E-08	3.64E-09	1.07E-07	6.0E-05	6E-05	2E-03
Chloroform	7.70E-03	7.10E-02	3.27E-09	1.51E-07	2.45E-09	7.34E-07	5.72E-09	8.85E-07	1.0E-02	6E-07	9E-05
Endrin	1.16E-01	7.50E-01	7.38E-09	7.95E-07	1.48E-09	6.20E-07	8.86E-09	1.42E-06	3.0E-04	3E-05	5E-03
Mercury	6.00E-01	1.70E+00	2.55E-07	3.61E-06	7.64E-09	2.11E-06	2.62E-07	5.72E-06	3.0E-04	9E-04	2E-02
Tetrachloroethene	1.05E-02	1.50E-01	4.45E-09	3.18E-07	3.34E-09	1.55E-06	7.79E-09	1.87E-06	1.0E-02	8E-07	2E-04
Trichloroethene	7.40E-03	6.70E-02	3.14E-09	1.42E-07	2.35E-09	6.93E-07	5.49E-09	8.35E-07	7.3E-03	7E-07	1E-04
HAZARD INDEX	---	---	---	---	---	---	---	---	---	<1 (3E-2)	<1 (6E-1)

(a) Concentrations as reported in Table 5-2.
(b) See text for methodology. Calculated using equation 1 and assumptions presented in Table 5-23.
(c) See text for methodology. Calculated using equation 2 and assumptions presented in Table 5-23.
(d) Sum of ingestion and dermal intakes.
(e) Reported previously in Table 5-19.
(f) Calculated by multiplying the CDI by the potency factor.
(g) Calculated by dividing the CDI by the RfD.

TABLE 5-25

POTENTIAL EXPOSURES AND RISKS ASSOCIATED WITH INCIDENTAL INGESTION AND DERMAL ABSORPTION BY CHILDREN OF CHEMICALS IN SEDIMENT FROM THE SIP AVENUE DITCH (CURRENT LAND USE)

POTENTIAL CARCINOGENS

Chemical	Sediment Concentration (a) (mg/kg) Geometric Mean	Sediment Concentration (a) (mg/kg) Maximum	Quantity of Chemical Ingested and Absorbed (b) (mg/kg-day) Average Case	Quantity of Chemical Ingested and Absorbed (b) (mg/kg-day) Plausible Maximum Case	Quantity of Chemical Absorbed Dermally (c) (mg/kg-day) Average Case	Quantity of Chemical Absorbed Dermally (c) (mg/kg-day) Plausible Maximum Case	Combined Chronic Daily Intake (CDI) (d) (mg/kg-day) Average Case	Combined Chronic Daily Intake (CDI) (d) (mg/kg-day) Plausible Maximum Case	Potency Factor (e) (mg/kg-day)-1	Lifetime Upper Bound Excess Cancer Risk (f) Average Case	Lifetime Upper Bound Excess Cancer Risk (f) Plausible Maximum Case
Arsenic	8.70E+00	2.01E+01	3.16E-07	3.05E-06	1.03E-08	2.33E-06	3.27E-07	5.37E-06	2.0E+00	7E-07	1E-05
Benzene	1.94E-01	5.82E-01	7.05E-09	8.82E-08	5.73E-09	5.62E-07	1.28E-08	6.50E-07	2.9E-02	4E-10	2E-08
Bis(2-ethylhexyl)phthalate	1.64E+01	5.90E+01	8.94E-08	4.47E-06	5.81E-09	6.84E-06	9.53E-08	1.13E-05	1.4E-02	1E-09	2E-07
Chloroform	3.81E-01	1.64E+00	1.39E-08	2.48E-07	1.13E-08	1.58E-06	2.51E-08	1.83E-06	6.1E-03	2E-10	1E-08
Methylene chloride	1.79E+01	2.30E+01	6.51E-07	3.48E-06	5.29E-07	2.22E-05	1.18E-06	2.57E-05	7.5E-03	9E-09	2E-07
n-Nitrosodiphenylamine	3.30E-01	3.30E-01	1.20E-08	5.00E-08	9.75E-09	3.19E-07	2.17E-08	3.69E-07	4.9E-03	1E-10	2E-09
PAH--cPAH	4.77E+00	1.48E+01	2.60E-08	1.12E-06	5.07E-09	1.14E-06	3.11E-08	2.26E-06	1.2E+01	4E-07	3E-05
Tetrachloroethene	2.79E-01	1.00E+00	1.01E-08	1.52E-07	8.24E-09	9.66E-07	1.84E-08	1.12E-06	5.1E-02	9E-10	6E-08
TOTAL	---	---	---	---	---	---	---	---	---	1E-06	4E-05

NONCARCINOGENS

Chemical	Sediment Concentration (a) (mg/kg) Geometric Mean	Sediment Concentration (a) (mg/kg) Maximum	Quantity of Chemical Ingested and Absorbed (b) (mg/kg-day) Average Case	Quantity of Chemical Ingested and Absorbed (b) (mg/kg-day) Plausible Maximum Case	Quantity of Chemical Absorbed Dermally (c) (mg/kg-day) Average Case	Quantity of Chemical Absorbed Dermally (c) (mg/kg-day) Plausible Maximum Case	Combined Chronic Daily Intake (CDI) (d) (mg/kg-day) Average Case	Combined Chronic Daily Intake (CDI) (d) (mg/kg-day) Plausible Maximum Case	Reference Dose (RfD) (e) (mg/kg-day)	Ratio CDI:RfD (g) Average Case	Ratio CDI:RfD (g) Plausible Maximum Case
Antimony	3.07E+01	9.38E+01	1.30E-05	1.66E-04	4.23E-07	1.27E-04	1.34E-05	2.93E-04	4.0E-04	3E-02	7E-01
Arsenic	8.70E+00	2.01E+01	3.69E-06	3.55E-05	1.20E-07	2.72E-05	3.81E-06	6.27E-05	1.0E-03	4E-03	6E-02
Barium	2.06E+02	6.83E+02	8.74E-05	1.21E-03	2.84E-06	9.24E-04	9.02E-05	2.13E-03	5.0E-02	2E-03	4E-02
Beryllium	3.30E+00	2.58E+01	1.40E-06	4.56E-05	4.55E-08	3.49E-05	1.45E-06	8.05E-05	5.0E-03	3E-04	2E-02
Bis(2-ethylhexyl)phthalate	1.64E+01	5.90E+01	1.04E-06	5.21E-05	6.78E-08	7.98E-05	1.11E-06	1.32E-04	2.0E-02	6E-05	7E-03
Chloroform	3.81E-01	1.64E+00	1.62E-07	2.90E-06	1.31E-07	1.85E-05	2.93E-07	2.14E-05	1.0E-02	3E-05	2E-03
Copper	7.52E+02	3.40E+04	3.19E-04	6.01E-02	1.04E-05	4.60E-02	3.29E-04	1.06E-01	3.7E-02	9E-03	3E+00
Mercury	9.00E-01	5.10E+00	3.82E-07	9.01E-06	1.24E-08	6.90E-06	3.94E-07	1.59E-05	3.0E-04	1E-03	5E-02
Methylene chloride	1.79E+01	2.30E+01	7.59E-06	4.07E-05	6.17E-06	2.59E-04	1.38E-05	3.00E-04	6.0E-02	2E-04	5E-03
Nickel	5.64E+01	1.26E+03	2.39E-05	2.23E-03	7.78E-07	1.70E-03	2.47E-05	3.93E-03	2.0E-02	1E-03	2E-01
Tetrachloroethene	2.79E-01	1.00E+00	1.18E-07	1.77E-06	9.62E-08	1.13E-05	2.15E-07	1.30E-05	1.0E-02	2E-05	1E-03
Zinc	7.72E+02	9.83E+03	3.27E-04	1.74E-02	1.06E-05	1.33E-02	3.38E-04	3.07E-02	2.0E-01	2E-03	2E-01
HAZARD INDEX	---	---	---	---	---	---	---	---	---	<1 (5E-2)	>1 (4)

(a) Concentrations as reported in Table 5-11.
(b) See text for methodology. Calculated using equation 1 and assumptions presented in Table 5-23 and in the text.
(c) See text for methodology. Calculated using equation 2 and assumptions presented in Table 5-23 and in the text.
(d) Sum of ingestion and dermal intakes.
(e) Reported previously in Table 5-19.
(f) Calculated by multiplying the CDI by the potency factor.
(g) Calculated by dividing the CDI by the RfD.

TABLE 5-26

POTENTIAL EXPOSURES AND RISKS ASSOCIATED WITH INCIDENTAL INGESTION AND DERMAL ABSORPTION BY CHILDREN OF CHEMICALS IN SEDIMENT FROM THE HACKENSACK RIVER ABOVE THE SIP AVENUE DITCH (CURRENT LAND USE)

POTENTIAL CARCINOGENS

Chemical	Sediment Concentration (a) (mg/kg)		Quantity of Chemical Ingested and Absorbed (b) (mg/kg-day)		Quantity of Chemical Absorbed Dermally (c) (mg/kg-day)		Combined Chronic Daily Intake (CDI) (d) (mg/kg-day)		Potency Factor (e) (mg/kg-day)-1	Lifetime Upper Bound Excess Cancer Risk (f)	
	Geometric Mean	Maximum	Average Case	Plausible Maximum Case	Average Case	Plausible Maximum Case	Average Case	Plausible Maximum Case		Average Case	Plausible Maximum Case
Arsenic	1.77E+01	8.34E+01	8.44E-07	9.61E-06	2.09E-08	7.35E-06	6.65E-07	1.70E-05	2.0E+00	1E-06	3E-05
Benzene	1.00E-03	1.00E-03	3.64E-11	1.52E-10	2.95E-11	9.66E-10	6.59E-11	1.12E-09	2.9E-02	2E-12	3E-11
Bis(2-ethylhexyl)phthalate	1.11E+00	4.70E+00	6.05E-09	3.56E-07	3.94E-10	5.45E-07	6.45E-09	9.01E-07	1.4E-02	9E-11	1E-08
Chloroform	6.00E-03	1.40E-02	2.18E-10	2.12E-09	1.77E-10	1.35E-08	3.95E-10	1.56E-08	6.1E-03	2E-12	1E-10
n-Nitroso-dipropylamine	4.13E-01	5.70E-01	1.50E-08	8.64E-08	1.22E-08	5.51E-07	2.72E-08	6.37E-07	7.0E+00	2E-07	4E-06
n-Nitrosodiphenylamine	1.60E-01	1.60E-01	5.82E-09	2.42E-08	4.73E-09	1.55E-07	1.05E-08	1.79E-07	4.9E-03	5E-11	9E-10
PAH--cPAH	4.91E+00	5.89E+01	2.68E-08	4.46E-06	5.22E-09	4.55E-06	3.20E-08	9.01E-06	1.2E+01	4E-07	1E-04
TOTAL	---	---	---	---	---	---	---	---	---	2E-06	1E-04

NONCARCINOGENS

Chemical	Sediment Concentration (a) (mg/kg)		Quantity of Chemical Ingested and Absorbed (b) (mg/kg-day)		Quantity of Chemical Absorbed Dermally (c) (mg/kg-day)		Combined Chronic Daily Intake (CDI) (d) (mg/kg-day)		Reference Dose (RfD) (e) (mg/kg-day)	Ratio CDI:RfD (g)	
	Geometric Mean	Maximum	Average Case	Plausible Maximum Case	Average Case	Plausible Maximum Case	Average Case	Plausible Maximum Case		Average Case	Plausible Maximum Case
Antimony	1.89E+01	2.20E+01	8.02E-06	3.89E-05	2.61E-07	2.97E-05	8.28E-06	6.86E-05	4.0E-04	2E-02	2E-01
Arsenic	1.77E+01	8.34E+01	7.51E-06	1.12E-04	2.44E-07	8.57E-05	7.75E-06	1.98E-04	1.0E-03	8E-03	2E-01
Barium	1.72E+02	8.17E+02	7.30E-05	1.09E-03	2.37E-06	8.34E-04	7.53E-05	1.92E-03	5.0E-02	2E-03	4E-02
Bis(2-ethylhexyl)phthalate	1.11E+00	4.70E+00	7.06E-08	4.15E-06	4.59E-09	6.36E-06	7.52E-08	1.05E-05	2.0E-02	4E-06	5E-04
Cadmium	3.10E+00	5.00E+00	1.32E-06	8.84E-08	4.27E-08	8.76E-06	1.36E-06	1.56E-05	1.0E-03	1E-03	2E-02
Chloroform	6.00E-03	1.40E-02	2.55E-09	2.47E-08	2.07E-09	1.58E-07	4.61E-09	1.83E-07	1.0E-02	5E-07	2E-05
Mercury	1.60E+00	9.00E+00	6.79E-07	1.59E-05	2.21E-08	1.22E-05	7.01E-0	2.81E-05	3.0E-04	2E-03	9E-02
HAZARD INDEX	---	---	---	---	---	---	---	---	---	<1 (3E-2)	<1 (5E-1)

(a) Concentrations as reported in Table 5-12.
(b) See text for methodology. Calculated using equation 1 and assumptions presented in Table 5-23 and in the text.
(c) See text for methodology. Calculated using equation 2 and assumptions presented in Table 5-23 and in the text.
(d) Sum of ingestion and dermal intakes.
(e) Reported previously in Table 5-19.
(f) Calculted by multiplying the CDI by the potency factor.
(g) Calculated by dividing the CDI by the RfD.

TABLE 5-27

POTENTIAL EXPOSURES AND RISKS ASSOCIATED WITH INCIDENTAL INGESTION AND DERMAL ABSORPTION BY CHILDREN OF CHEMICALS IN SEDIMENT FROM THE HACKENSACK RIVER DOWNGRADIENT OF THE DITCH AT THE WESTERN CORNER OF THE CAPPED LANDFILL (CURRENT LAND USE)

POTENTIAL CARCINOGENS

Chemical	Sediment Concentration (a) (mg/kg)	Quantity of Chemical Ingested and Absorbed (b) (mg/kg-day)		Quantity of Chemical Absorbed Dermally (c) (mg/kg-day)		Combined Chronic Daily Intake (CDI) (d) (mg/kg-day)		Potency Factor (e) (mg/kg-day)-1	Lifetime Upper Bound Excess Cancer Risk (f)	
		Average Case	Plausible Maximum Case	Average Case	Plausible Maximum Case	Average Case	Plausible Maximum Case		Average Case	Plausible Maximum Case
Benzene	8.00E-01	2.91E-08	1.21E-07	2.36E-08	7.73E-07	5.27E-08	8.94E-07	2.9E-02	2E-09	3E-08
Bis(2-ethylhexyl)phthalate	4.90E+01	2.67E-07	3.71E-06	1.74E-08	5.68E-06	2.85E-07	9.39E-06	1.4E-02	4E-09	1E-07
PAH--cPAH	1.08E+01	5.89E-08	8.18E-07	1.15E-08	8.34E-07	7.04E-08	1.65E-06	1.2E+01	8E-07	2E-05
TOTAL	---	---	---	---	---	---	---	---	8E-07	2E-05

NONCARCINOGENS

Chemical	Sediment Concentration (a) (mg/kg)	Quantity of Chemical Ingested and Absorbed (b) (mg/kg-day)		Quantity of Chemical Absorbed Dermally (c) (mg/kg-day)		Combined Chronic Daily Intake (CDI) (d) (mg/kg-day)		Reference Dose (RfD) (e) (mg/kg-day)	Ratio CDI:RfD (g)	
		Average Case	Plausible Maximum Case	Average Case	Plausible Maximum Case	Average Case	Plausible Maximum Case		Average Case	Plausible Maximum Case
Bis(2-ethylhexyl)phthalate	4.90E+01	3.12E-06	4.33E-05	2.03E-07	6.63E-05	3.32E-06	1.10E-04	2.0E-02	2E-04	5E-03
2-Butanone	4.40E+01	1.87E-05	7.78E-05	1.52E-05	4.96E-04	3.38E-05	5.74E-04	5.0E-02	7E-04	1E-02
Di-n-butylphthalate	9.80E-01	4.16E-07	1.73E-06	3.38E-07	1.10E-05	7.54E-07	1.28E-05	1.0E-01	8E-06	1E-04
Ethylbenzene	5.50E+00	2.33E-06	9.72E-06	1.90E-06	6.20E-05	4.23E-06	7.17E-05	1.0E-01	4E-05	7E-04
Mercury	2.00E-01	8.48E-08	3.54E-07	2.76E-09	2.70E-07	8.76E-08	6.24E-07	3.0E-04	3E-04	2E-03
PAH--ncPAH	1.85E+01	1.18E-06	1.63E-05	7.65E-07	4.17E-05	1.94E-06	5.80E-05	4.0E-01	5E-06	1E-04
Selenium	5.00E-01	2.12E-07	8.84E-07	6.89E-09	6.76E-07	2.19E-07	1.56E-06	3.0E-03	7E-05	5E-04
1,1,1-Trichloroethane	1.30E+00	5.51E-07	2.3[illegible]E-06	4.48E-07	1.46E-05	1.00E-06	1.69E-05	9.0E-02	1E-05	2E-04
HAZARD INDEX	---	---	---	---	---	---	---	---	<1 (1E-3)	<1 (2E-2)

(a) Concentrations as reported in Table 5-13.
(b) See text for methodology. Calculated using equation 1 and assumptions presented in Table 5-23 and in the text.
(c) See text for methodology. Calculated using equation 2 and assumptions presented in Table 5-23 and in the text.
(d) Sum of ingestion and dermal intakes.
(e) Reported previously in Table 5-19.
(f) Calculated by multiplying the CDI by the potency factor.
(g) Calculated by dividing the CDI by the RfD.

TABLE 5-29

POTENTIAL EXPOSURES AND RISKS ASSOCIATED WITH DERMAL ABSORPTION BY CHILDREN
OF CHEMICALS IN SURFACE WATER IN THE SIP AVENUE DITCH
(CURRENT LAND USE)

POTENTIAL CARCINOGENS

Chemical	Surface Water Concentration (a) (mg/l) Geometric Mean	Surface Water Concentration (a) (mg/l) Maximum	Chronic Daily Intake (CDI) (b) (mg/kg-day) Average Case	Chronic Daily Intake (CDI) (b) (mg/kg-day) Plausible Maximum Case	Potency Factor (c) (mg/kg-day)-1	Lifetime Upper Bound Excess Cancer Risk (d) Average Case	Lifetime Upper Bound Excess Cancer Risk (d) Plausible Maximum Case
Arsenic	1.70E-03	4.50E-03	1.09E-09	1.96E-08	2.0E+00	2E-09	4E-08
Benzene	5.50E-03	1.60E-01	3.52E-09	6.98E-07	2.9E-02	1E-10	2E-08
Bis(2-chloroethyl)ether	1.24E-02	4.40E-02	7.94E-09	1.92E-07	1.1E+00	9E-09	2E-07
Bis(2-chloroisopropyl)ether	1.11E-02	2.10E-02	7.10E-09	9.16E-08	7.0E-02	5E-10	6E-09
Bis(2-ethylhexyl)phthalate	2.35E-02	1.70E-01	1.50E-08	7.42E-07	1.4E-02	2E-10	1E-08
Chlordane	4.00E-04	1.60E-03	2.56E-10	6.98E-09	1.3E+00	3E-10	9E-09
Chloroform	4.20E-03	1.00E-02	2.69E-09	4.36E-08	6.1E-03	2E-11	3E-10
n-Nitrosodiphenylamine	9.20E-03	1.30E-02	5.89E-09	5.67E-08	4.9E-03	3E-11	3E-10
TOTAL	---	---	---	---	---	1E-08	3E-07

NONCARCINOGENS

Chemical	Surface Water Concentration (a) (mg/l) Geometric Mean	Surface Water Concentration (a) (mg/l) Maximum	Chronic Daily Intake (CDI) (b) (mg/kg-day) Average Case	Chronic Daily Intake (CDI) (b) (mg/kg-day) Plausible Maximum Case	Reference Dose (RfD) (c) (mg/kg-day)	Ratio CDI:RfD (e) Average Case	Ratio CDI:RfD (e) Plausible Maximum Case
Arsenic	1.70E-03	4.50E-03	1.27E-08	2.29E-07	1.0E-03	1E-05	2E-04
Barium	2.15E-01	1.56E+00	1.61E-06	7.94E-05	5.0E-02	3E-05	2E-03
Bis(2-chloroisopropyl)ether	1.11E-02	2.10E-02	8.29E-08	1.07E-06	4.0E-02	2E-06	3E-05
Bis(2-ethylhexyl)phthalate	2.35E-02	1.70E-01	1.75E-07	8.65E-06	2.0E-02	9E-06	4E-04
Chlordane	4.00E-04	1.60E-03	2.99E-09	8.14E-08	6.0E-05	5E-05	1E-03
Chloroform	4.20E-03	1.00E-02	3.14E-08	5.09E-07	1.0E-02	3E-06	5E-05
Chromium	1.85E-02	5.70E-02	1.38E-07	2.90E-06	5.0E-03	3E-05	6E-04
Ethylbenzene	1.05E-02	4.10E-01	7.84E-08	2.09E-05	1.0E-01	8E-07	2E-04
Manganese	2.11E-01	8.20E-01	1.58E-06	4.17E-05	2.0E-01	8E-06	2E-04
Mercury	2.00E-04	7.00E-04	1.49E-09	3.56E-08	[illegible].0E-04	5E-06	1E-04
Nickel	1.99E-02	9.00E-02	1.49E-07	4.58E-06	2.0E-02	7E-06	2E-04
Vanadium	1.0[illegible]-02	3.10E-02	7.62E-08	1.58E-06	7.0E-03	1E-05	[illegible]-04
Zinc	2.28E-01	2.31E-01	1.70E-06	1.18E-05	2.0E-01	9E-06	6E-05
HAZARD INDEX	---	---	---	---	---	<1 (2E-4)	<1 (5E-3)

(a) Concentrations as reported in Table 5-8.
(b) See text for methodology. Calculated using equation 4 and assumptions presented in Table 5-28.
(c) Reported previously in Table 5-19.
(d) Calculated by multiplying the CDI by the potency factor.
(e) Calculated by dividing the CDI by the RfD.

TABLE 5-30

POTENTIAL EXPOSURES AND RISKS ASSOCIATED WITH INCIDENTAL INGESTION AND DERMAL ABSORPTION BY CHILDREN OF CHEMICALS IN SURFACE WATER IN THE HACKENSACK RIVER ABOVE THE SIP AVENUE DITCH (CURRENT LAND USE)

POTENTIAL CARCINOGENS

Chemical	Surface Water Concentration (a) (mg/l)		Quantity of Chemical Ingested and Absorbed (b) (mg/kg-day)		Quantity of Chemical Absorbed Dermally (c) (mg/kg-day)		Combined Chronic Daily Intake (CDI) (d) (mg/kg-day)		Potency Factor (e) (mg/kg-day)-1	Lifetime Upper Bound Excess Cancer Risk (f)	
	Geometric Mean	Maximum	Average Case	Plausible Maximum Case	Average Case	Plausible Maximum Case	Average Case	Plausible Maximum Case		Average Case	Plausible Maximum Case
Benzene	3.40E-03	9.00E-03	3.09E-08	3.41E-07	1.03E-08	1.13E-07	4.12E-08	4.54E-07	2.9E-02	1E-09	1E-08

NONCARCINOGENS

Chemical	Surface Water Concentration (a) (mg/l)		Quantity of Chemical Ingested and Absorbed (b) (mg/kg-day)		Quantity of Chemical Absorbed Dermally (c) (mg/kg-day)		Combined Chronic Daily Intake (CDI) (d) (mg/kg-day)		Reference Dose (RfD) (e) (mg/kg-day)	Ratio CDI:RfD (g)	
	Geometric Mean	Maximum	Average Case	Plausible Maximum Case	Average Case	Plausible Maximum Case	Average Case	Plausible Maximum Case		Average Case	Plausible Maximum Case
Acetone	6.80E-02	6.80E-02	7.21E-06	3.00E-05	2.40E-06	1.00E-05	9.61E-06	4.00E-05	1.0E-01	1E-04	4E-04
Barium	7.01E-02	2.64E-01	7.43E-06	1.17E-04	2.47E-06	3.88E-05	9.91E-06	1.55E-04	5.0E-02	2E-04	3E-03
Beryllium	8.00E-04	1.00E-03	8.48E-08	4.42E-07	2.82E-08	1.47E-07	1.13E-07	5.89E-07	5.0E-03	2E-05	1E-04
Chromium	1.55E-02	3.30E-02	1.64E-06	1.46E-05	5.47E-07	4.85E-06	2.19E-06	1.94E-05	5.0E-03	4E-04	4E-03
Copper	1.77E-02	8.80E-02	1.88E-06	3.89E-05	6.25E-07	1.29E-05	2.50E-06	5.18E-05	3.7E-02	7E-05	1E-03
Manganese	1.55E-01	3.78E-01	1.64E-05	1.67E-04	5.47E-06	5.56E-05	2.19E-05	2.23E-04	2.0E-01	1E-04	1E-03
Mercury	3.00E-04	6.00E-04	3.18E-08	2.65E-07	1.06E-08	8.82E-08	4.24E-08	3.53E-07	3.0E-04	1E-04	1E-03
Zinc	2.04E-01	2.13E-01	2.16E-05	9.41E-05	7.20E-06	3.13E-05	2.88E-05	1.25E-04	2.0E-01	1E-04	6E-04
HAZARD INDEX	---	---	---	---	---	---	---	---	---	<1 (1E-3)	<1 (1E-2)

(a) Concentrations as reported in Table 5-9.
(b) See text for methodology. Calculated using equation 3 and assumptions presented in Table 5-28.
(c) See text for methodology. Calculated using equation 4 and assumptions presented in Table 5-28.
(d) Sum of ingestion and dermal intakes.
(e) Reported previously in Table 5-19.
(f) Calculted by multiplying the CDI by the potency factor.
(g) Calculated by dividing the CDI by the RfD.

TABLE 5-31

POTENTIAL EXPOSURES AND RISKS ASSOCIATED WITH INCIDENTAL INGESTION AND DERMAL ABSORPTION BY CHILDREN OF CHEMICALS IN SURFACE WATER IN THE HACKENSACK RIVER DOWNGRADIENT OF THE DITCH AT THE WESTERN CORNER OF THE CAPPED LANDFILL (CURRENT LAND USE)

NONCARCINOGENS

Chemical	Surface Water Concentration (a) (mg/kg)	Quantity of Chemical Ingested and Absorbed (b) (mg/kg-day)		Quantity of Chemical Absorbed Dermally (c) (mg/kg-day)		Combined Chronic Daily Intake (CDI) (d) (mg/kg-day)		Reference Dose (RfD) (e) (mg/kg-day)	Ratio CDI:RfD (f)	
		Average Case	Plausible Maximum Case	Average Case	Plausible Maximum Case	Average Case	Plausible Maximum Case		Average Case	Plausible Maximum Case
Barium	2.80E-02	2.97E-06	1.24E-05	9.88E-07	4.12E-06	3.96E-06	1.65E-05	5.0E-02	8E-05	3E-04
Chromium	1.20E-02	1.27E-06	5.30E-06	4.24E-07	1.76E-06	1.70E-06	7.07E-06	5.0E-03	3E-04	1E-03
Copper	5.00E-03	5.30E-07	2.21E-06	1.76E-07	7.35E-07	7.07E-07	2.94E-06	3.7E-02	2E-05	8E-05
Di-n-butylphthalate	1.20E-02	1.27E-06	5.30E-06	4.24E-07	1.76E-06	1.70E-06	7.07E-06	1.0E-01	2E-05	7E-05
Manganese	1.15E-01	1.22E-05	5.08E-05	4.06E-06	1.69E-05	1.63E-05	6.77E-05	2.0E-01	8E-05	3E-04
Mercury	1.00E-03	1.06E-07	4.42E-07	3.53E-08	1.47E-07	1.41E-07	5.89E-07	3.0E-04	5E-04	2E-03
Zinc	2.16E-01	2.29E-05	9.54E-05	7.62E-06	3.18E-05	3.05E-05	1.27E-04	2.0E-01	2E-04	6E-04
HAZARD INDEX	---	---	---	---	---	---	---	---	<1 (1E-3)	<1 (5E-3)

(a) Concentrations as reported in Table 5-10.
(b) See text for methodology. Calculated using equation 3 and assumptions presented in Table 5-28.
(c) See text for methodology. Calculated using equation 4 and assumptions presented in Table 5-28.
(d) Sum of ingestion and dermal intakes.
(e) Reported previously in Table 5-19.
(f) Calculated by dividing the CDI by the RfD.

TABLE 5-35

POTENTIAL EXPOSURES AND RISKS ASSOCIATED WITH INHALATION OF VOLATILE CHEMICALS BY TRESPASSING CHILDREN (CURRENT LAND USE)

POTENTIAL CARCINOGENS

Chemical	Estimated Air Concentration (a) (mg/m3)		Chronic Daily Intake (CDI) (b) (mg/kg-day)		Potency Factor (c) (mg/kg-day)-1	Lifetime Upper Bound Excess Cancer Risk (d)	
	Average	Maximum	Average Case	Plausible Maximum Case		Average Case	Plausible Maximum Case
Benzene	1.31E-05	6.74E-04	1.10E-08	5.02E-06	2.9E-02	3E-10	1E-07
Chloroform	1.89E-07	2.02E-05	1.58E-10	1.51E-07	8.1E-02	1E-11	1E-08
Methylene chloride	4.21E-07	7.66E-05	3.52E-10	5.71E-07	1.4E-02	5E-12	8E-09
Tetrachloroethene	9.68E-07	2.91E-04	8.10E-10	2.17E-06	3.3E-03	3E-12	7E-09
Trichloroethene	7.74E-07	2.91E-04	6.47E-10	2.17E-06	4.6E-03	3E-12	1E-08
Vinyl Chloride	1.50E-06	8.57E-04	1.25E-09	6.39E-06	2.9E-01	4E-10	2E-06
TOTAL	---	---	---	---	---	7E-10	2E-06

NONCARCINOGENS

Chemical	Estimated Air Concentration (a) (mg/m3)		Chronic Daily Intake (CDI) (b) (mg/kg-day)		Reference Dose (RfD) (c) (mg/kg-day)	Ratio CDI:RfD (e)	
	Average	Maximum	Average Case	Plausible Maximum Case		Average Case	Plausible Maximum Case
Chlorobenzene	2.61E-06	7.96E-05	2.55E-08	6.92E-06	5.0E-03	5E-06	1E-03
1,1-Dichloroethane	6.29E-07	2.51E-04	6.14E-09	2.18E-05	1.0E-01	6E-08	2E-04
Methylene chloride	4.21E-07	7.66E-05	4.11E-09	6.66E-06	8.6E-01	5E-09	8E-06
Toluene	7.74E-06	1.44E-03	7.55E-08	1.25E-04	5.7E-01	1E-07	2E-04
1,1,1-Trichloroethane	2.08E-07	1.44E-04	2.03E-09	1.25E-05	3.0E-01	7E-09	4E-05
Xylenes	1.98E-05	4.81E-03	1.93E-07	4.18E-04	4.0E-01	5E-07	1E-03
HAZARD INDEX	---	---	---	---	---	<1 (6E-6)	<1 (3E-3)

(a) Concentrations as reported in Table 5-18.
(b) See text for methodology. Calculated using equation 5 and assumptions presented in Table 5-32.
(c) Reported previously in Table 5-19.
(d) Calculted by multiplying the CDI by the potency factor.
(e) Calculated by dividing the CDI by the RfD.

TABLE 5-36

POTENTIAL EXPOSURES AND RISKS ASSOCIATED WITH INHALATION OF VOLATILE CHEMICALS BY NEARBY WORKERS (CURRENT LAND USE)

POTENTIAL CARCINOGENS

Chemical	Estimated Air Concentration (a) (mg/m3)		Chronic Daily Intake (CDI) (b) (mg/kg-day)		Potency Factor (c) (mg/kg-day)-1	Lifetime Upper Bound Excess Cancer Risk (d)	
	Average	Maximum	Average Case	Plausible Maximum Case		Average Case	Plausible Maximum Case
Benzene	6.11E-06	4.15E-05	8.61E-08	4.34E-06	2.9E-02	2E-09	1E-07
Chloroform	8.83E-08	5.99E-07	1.24E-09	6.27E-08	8.1E-02	1E-10	5E-09
Methylene chloride	1.97E-07	1.34E-06	2.78E-09	1.40E-07	1.4E-02	4E-11	2E-09
Tetrachloroethene	4.53E-07	3.07E-06	6.38E-09	3.21E-07	3.3E-03	2E-11	1E-09
Trichloroethene	3.62E-07	2.46E-05	5.10E-09	2.57E-06	4.6E-03	2E-11	1E-08
Vinyl Chloride	7.02E-07	4.76E-06	9.89E-09	4.98E-07	2.9E-01	3E-09	1E-07
TOTAL	---	---	---	---	---	6E-09	3E-07

NONCARCINOGENS

Chemical	Estimated Air Concentration (a) (mg/m3)		Chronic Daily Intake (CDI) (b) (mg/kg-day)		Reference Dose (RfD) (c) (mg/kg-day)	Ratio CDI:RfD (e)	
	Average	Maximum	Average Case	Plausible Maximum Case		Average Case	Plausible Maximum Case
Chlorobenzene	1.22E-06	8.30E-06	1.34E-07	2.03E-06	5.0E-03	3E-05	4E-04
1,1-Dichloroethane	2.94E-07	2.00E-06	3.22E-08	4.88E-07	1.0E-01	3E-07	5E-06
Methylene chloride	1.97E-07	1.34E-06	2.16E-08	3.27E-07	8.6E-01	3E-08	4E-07
Toluene	3.62E-06	2.46E-05	3.97E-07	6.01E-06	5.7E-01	7E-07	1E-05
1,1,1-Trichloroethane	9.73E-08	6.61E-07	1.07E-08	1.61E-07	3.0E-01	4E-08	5E-07
Xylenes	9.28E-06	6.30E-05	1.02E-06	1.54E-05	4.0E-01	3E-06	4E-05
HAZARD INDEX	---	---	---	---	---	<1 (3E-5)	<1 (5E-4)

(a) Concentrations as reported in Table 5-18.
(b) See text for methodology. Calculated using equation 5 and assumptions presented in Table 5-33.
(c) Reported previously in Table 5-19.
(d) Calculted by multiplying the CDI by the potency factor.
(e) Calculated by dividing the CDI by the RfD.

TABLE 5-37

POTENTIAL EXPOSURES AND RISKS ASSOCIATED WITH INHALATION OF VOLATILE CHEMICALS BY NEARBY RESIDENTS (CURRENT LAND USE)

POTENTIAL CARCINOGENS

Chemical	Estimated Air Concentration (a) (mg/m3) Average	Estimated Air Concentration (a) (mg/m3) Maximum	Chronic Daily Intake (CDI) (b) (mg/kg-day) Average Case	Chronic Daily Intake (CDI) (b) (mg/kg-day) Plausible Maximum Case	Potency Factor (c) (mg/kg-day)-1	Lifetime Upper Bound Excess Cancer Risk (d) Average Case	Lifetime Upper Bound Excess Cancer Risk (d) Plausible Maximum Case
Benzene	2.51E-07	3.50E-07	4.93E-09	4.56E-08	2.9E-02	1E-10	1E-09
Chloroform	3.63E-09	5.06E-09	7.13E-11	6.60E-10	8.1E-02	6E-12	5E-11
Methylene chloride	8.09E-09	1.13E-08	1.59E-10	1.47E-09	1.4E-02	2E-12	2E-11
Tetrachloroethene	1.86E-08	2.59E-08	3.66E-10	3.38E-09	3.3E-03	1E-12	1E-11
Trichloroethene	1.49E-08	2.08E-08	2.93E-10	2.71E-09	4.6E-03	1E-12	1E-11
Vinyl Chloride	2.88E-08	4.02E-08	5.66E-10	5.24E-09	2.9E-01	2E-10	2E-09
TOTAL	---	---	---	---	---	3E-10	3E-09

NONCARCINOGENS

Chemical	Estimated Air Concentration (a) (mg/m3) Average	Estimated Air Concentration (a) (mg/m3) Maximum	Chronic Daily Intake (CDI) (b) (mg/kg-day) Average Case	Chronic Daily Intake (CDI) (b) (mg/kg-day) Plausible Maximum Case	Reference Dose (RfD) (c) (mg/kg-day)	Ratio CDI:RfD (e) Average Case	Ratio CDI:RfD (e) Plausible Maximum Case
Chlorobenzene	5.02E-08	7.00E-08	7.67E-09	2.13E-08	5.0E-03	2E-06	4E-06
1,1-Dichloroethane	1.21E-08	1.69E-08	1.85E-09	5.14E-09	1.0E-01	2E-08	5E-08
Methylene chloride	8.09E-09	1.13E-08	1.24E-09	3.44E-09	8.6E-01	1E-09	4E-09
Toluene	1.49E-07	2.08E-07	2.28E-08	6.33E-08	5.7E-01	4E-08	1E-07
1,1,1-Trichloroethane	4.00E-09	5.58E-09	6.12E-10	1.70E-09	3.0E-01	2E-09	6E-09
Xylenes	3.81E-07	5.32E-07	5.82E-08	1.62E-07	4.0E-01	1E-07	4E-07
HAZARD INDEX	---	---	---	---	---	<1 (2E-6)	<1 (5E-6)

(a) Concentrations as reported in Table 5-18.
(b) See text for methodology. Calculated using equation 3 and assumptions presented in Table 5-34.
(c) Reported previously in Table 5-19.
(d) Calculted by multiplying the CDI by the potency factor.
(e) Calculated by dividing the CDI by the RfD.

TABLE 5-39

POTENTIAL EXPOSURES AND RISKS ASSOCIATED WITH INGESTION OF CHEMICALS IN GROUNDWATER (HYPOTHETICAL FUTURE LAND USE)

POTENTIAL CARCINOGENS

Chemical	Groundwater Concentration (a) (mg/l) Geometric Mean	Groundwater Concentration (a) (mg/l) Maximum	Chronic Daily Intake (CDI) (b) (mg/kg-day) Average Case	Chronic Daily Intake (CDI) (b) (mg/kg-day) Plausible Maximum Case	Potency Factor (c) (mg/kg-day)-1	Lifetime Upper Bound Excess Cancer Risk (d) Average Case	Lifetime Upper Bound Excess Cancer Risk (d) Plausible Maximum Case
Arsenic	4.70E-03	4.81E-02	1.16E-05	5.89E-04	2.0E+00	2E-05	1E-03
Benzene	6.10E-03	5.80E-01	1.50E-05	7.10E-03	2.9E-02	4E-07	2E-04
Bis(2-chloroethyl)ether	9.20E-03	2.00E-01	2.27E-05	2.45E-03	1.1E+00	2E-05	3E-03
Bis(2-chloroisopropyl)ether	8.90E-03	1.02E-01	2.19E-05	1.25E-03	7.0E-02	2E-06	9E-05
Chloroform	2.80E-03	1.00E-02	6.90E-06	1.22E-04	6.1E-03	4E-08	7E-07
Methylene chloride	2.79E-02	5.60E-02	6.88E-05	6.86E-04	7.5E-03	5E-07	5E-06
TOTAL	---	---	---	---	---	5E-05	4E-03

NONCARCINOGENS

Chemical	Groundwater Concentration (a) (mg/l) Geometric Mean	Groundwater Concentration (a) (mg/l) Maximum	Chronic Daily Intake (CDI) (b) (mg/kg-day) Average Case	Chronic Daily Intake (CDI) (b) (mg/kg-day) Plausible Maximum Case	Reference Dose (RfD) (c) (mg/kg-day)	Ratio CDI:RfD (e) Average Case	Ratio CDI:RfD (e) Plausible Maximum Case
Antimony	5.18E-02	1.13E-01	9.93E-04	3.23E-03	4.0E-04	2E+00	8E+00
Arsenic	4.70E-03	4.81E-02	9.01E-05	1.37E-03	1.0E-03	9E-02	1E+00
Barium	5.99E-01	1.74E+00	1.15E-02	4.97E-02	5.0E-02	2E-01	1E+00
Bis(2-chloroisopropyl)ether	8.90E-03	1.02E-01	1.71E-04	2.91E-03	4.0E-02	4E-03	7E-02
Cadmium	2.80E-03	2.30E-02	5.37E-05	6.57E-04	5.0E-04	1E-01	1E+00
Chloroform	2.80E-03	1.00E-02	5.37E-05	2.86E-04	1.0E-02	5E-03	3E-02
Chromium	2.77E-02	1.35E+00	5.31E-04	3.86E-02	5.0E-03	1E-01	8E+00
Copper	2.31E-02	8.56E-01	4.43E-04	2.45E-02	3.7E-02	1E-02	7E-01
Manganese	5.82E-01	4.19E+00	1.12E-02	1.20E-01	2.0E-01	6E-02	6E-01
Mercury	4.00E-04	2.27E-02	7.67E-06	6.49E-04	3.0E-04	3E-02	2E+00
Methylene chloride	2.79E-02	5.60E-02	5.35E-04	1.60E-03	6.0E-02	9E-03	3E-02
Nickel	2.61E-02	2.10E-01	5.01E-04	6.00E-03	2.0E-02	3E-02	3E-01
Thallium	2.10E-03	1.32E-02	4.03E-05	3.77E-04	7.0E-03	6E-03	5E-02
Zinc	2.11E-01	4.18E+00	4.05E-03	1.19E-01	2.0E-01	2E-02	6E-01
HAZARD INDEX	---	---	---	---	---	>1 (3)	>1 (20)

(a) Concentrations as reported in Table 5-7.
(b) See text for methodology. Calculated using equation 6 and assumptions presented in text.
(c) Reported previously in Table 5-19.
(d) Calculted by multiplying the CDI by the potency factor.
(e) Calculated by dividing the CDI by the RfD.

APPENDIX III

ADMINISTRATIVE RECORD INDEX

Items Sent To Repository For PJP Landfill:

1.	Report of Health Effects Advisory Committee	12/7/88
2.	Community Respiratory Status Relative to Burning Landfill	12/7/88
3.	NJ Bill 2661	12/7/88
4.	Supplement to Directive and Notice to Insurers Directive	5/17/88
5.	Community Relations Plan/Transcript of 12/7/88 Public Meeting	10/20/89
6.	HASP, FSP-QAPP	12/15/89
7.	RI Report Appendices A-S	12/5/91
8.	Background Investigation Report	11/21/91
9.	Buried Drum Investigation Report (Appendix A)	11/21/91
10.	Phase I RI	11/21/9
11.	Phase I, II & III FS	
12.	PJP Landfill - Interim Remedial Measures Health & Safety Volume I & II	
13.	Site Characterization Study Siegel Property	10/84
14.	Work Plan for Handling Hazardous Waste Drums and Other Containers	10/17/85
15.	PJP Landfill Interim Remedial Measure - Final Design Report	5/85
16.	PJP Landfill - Interim Remedial Measure - Final Report	
17.	PJP Landfill PRP Steering Committee - Comments of the Phase I Remedial Investigation for the PJP Landfill Site	1/92
18.	Volume 1 - Case Narrative - Characterization of Landfill Gases at PJP	
19.	D'Annunzio Associates - Project Plan including Health Safety Plan and Drum Handling Plan	
20.	D'Annunzio Associates - Fire & Hazardous Situation Contract	

21.	Final Report - PJP Landfill Bedrock Monitoring Well Information	
22.	Work Plan and Health and Safety Plan - PJP Landfill	8/11/93
23.	Chronic Bio Monitoring Report	12/7/93
24.	Field Sampling Episode Report - PJP Landfill	11/4&5/93
25.	PJP - Summary of November 1993 Sampling of Surface Water and Sedimentation	
26.	Letter "Notifying Potential Liability"	8/10/94
27.	Letter "Directive & Notice to Insurer Number Two"	8/22/89
28.	Letter "PJP Landfill Supplement to directive and Notice to Insurer Number One and Demand For Payment and its amendment	3/17/89
29.	Letter "Multi-Site Directive and Notice to Insure"	5/7/90
30.	Record of Decision for PJP Landfill Superfund Site, NJDEP	9/28/95
31.	Maps, Surveys and Slides of PJP Landfill Superfund Site, Various dates (only located in NJDEP's Repository)	

APPENDIX IV

EPA's LETTER OF CONCURRENCE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY - REGION II
290 BROADWAY
NEW YORK, NEW YORK 10007-1866

SEP 27 1995

Honorable Robert C. Shinn, Jr.
Commissioner
State of New Jersey
Department of Environmental Protection
401 East State Street
Trenton, New Jersey 08625

Re: EPA Concurrence of Selected Remedy
for PJP Landfill Superfund Site

Dear Commissioner Shinn:

This is to notify you that the Environmental Protection Agency (EPA) has reviewed the Record of Decision prepared by the New Jersey Department of Environmental Protection (NJDEP) for the PJP Landfill site. Based on this review, EPA concurs with the selected remedy to address contaminated surface soils and ground water at the site.

The major components of the selected remedy include the following:

- Removal of all known and suspected buried drum materials and associated visibly contaminated soil;
- Capping of the exposed landfill area of the site with a multi-layer, modified solid waste cap in accordance with NJDEP guidance;
- Installation of an appropriate gas venting system;
- Extension of the existing gravel-lined ditch around the perimeter of the site to collect surface water runoff;
- Replacement of the Sip Avenue ditch with an alternate form of drainage;
- Site fencing and institutional controls (e.g., land use restrictions and classification exemption/well restriction area);
- Routine inspections, maintenance and a reevaluation of the previously capped area of the landfill;
- Ground water and surface water monitoring to evaluate the reduction of contaminant concentrations over time and otherwise ensure the effectiveness of the remedy;
- Modeling to demonstrate the effectiveness of the cap in reducing the migration of ground water leachate from the landfill to the Hackensack River; and
- Implementation of a wetlands assessment and restoration plan.

In addition to the remedial components identified above, the Comprehensive Environmental Response, Compensation and Liability Act, as amended, requires that the site be reviewed every five years because contaminants will remain on the site above health-based levels. The purpose of these reviews is to ensure that the selected remedy continues to provide adequate protection of human health and the environment. Further, if monitoring indicates that the landfill cap alone is not effective in reducing the migration of contaminants to ground and surface waters, additional remedial actions may be necessary.

We look forward to a continued cooperative working relationship with the Department to address the environmental concerns at this and other Superfund sites in New Jersey. If you have any questions regarding this concurrence letter, please do not hesitate to contact me at (212) 637-5000, or have your staff contact John Frisco, Deputy Director for New Jersey Programs, at (212) 637-4400.

Sincerely,

Jeanne M. Fox
Regional Administrator

RECORD OF DECISION
RESPONSIVENESS SUMMARY

PJP Landfill Site

Jersey City, Hudson County, New Jersey

New Jersey Department of Environmental Protection
Site Remediation Program
Trenton, New Jersey

Responsiveness Summary
PJP Landfill Superfund Site

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 Comment Period and NJDEP/USEPA Responses

- **I. Landfill Definition and Characteristics and Liability Issues**
- **II. Drums Found at Landfill**
- **III. Site Affects on Sip Avenue Ditch/Hackensack River/Newark Bay**
- **IV. Reuse of Site and Affect of Remediation on Adjacent Properties**
- **V. Recent Illegal Dumping at Site**
- **VI. Costs**
- **VII. Site Risk Issues**
- **VIII. Wetlands Issues**
- **IX. Interim Remedial Measures/Landfill Fires**
- **X. NJDEP Proposed Cap/Landfill Gas System**

A. Overview

This is a summary of the public's comments and questions regarding the Proposed Plan for remediation of the PJP Landfill Superfund site and the New Jersey Department of Environmental Protection's (NJDEP) responses to those comments.

A public comment period was held from August 2, 1994 through September 30, 1994 and was extended, at the request of potential responsible parties, until October 14, 1994. The purpose of the public comment period was to provide interested parties with the opportunity to comment on a Proposed Plan for remediation of the PJP Landfill site. During the public comment period, NJDEP held a public meeting on August 18, 1994 at 7 p.m. at the Jersey City Municipal Building to discuss results of the Remedial Investigation and Feasibility Study (RI/FS) reports and to present the NJDEP's preferred alternative for remediation of the site.

The preferred remedial alternative addresses cleanup remedies for the site that includes landfill material, landfill gas and areas of buried drums and associated contaminated soil. Future monitoring and review requirements also are included for ground water and surface water. The Proposed Plan's preferred remedial alternative includes components of media-specific alternatives developed for remediation of the site in accordance with NJDEP Bureau of Landfill Engineering guidance, New Jersey Solid Waste Regulations regarding closure and post closure requirements for solid waste landfills, the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended, and Section 300.430(f) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Specifically, this includes: 1) construction of a modified solid waste cap over approximately 42 acres of the landfill area not addressed as part of a 1986 Interim Remedial Measure (IRM); 2) installation of a passive or active gas venting system; 3) replacement of the Sip Avenue Ditch with an alternative form of drainage; and, 4) quarterly ground water monitoring.

B. Background on Community Involvement

NJDEP prepared a community relations plan in June 1985 for the site detailing site history, community concerns and remedial action taken to date. Also, in June 1985, a public meeting was held in Jersey City to discuss NJDEP's plans to extinguish subsurface fires present at the site. A public meeting was held in December 1988 to discuss the initiation of the RI/FS. Briefings for Jersey City officials and their county, state and federal representatives and various surrounding municipalities were held in January 1989. Numerous press releases were distributed to the state-wide media announcing these public meetings and describing remedial work to be performed. An updated mailing list was developed in August 1994 for the site and used to inform interested residents and neighborhood groups as well as various officials about site activities.

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

The majority of comments received during the public comment period originated from the potentially responsible parties. Their comments focused on the definition of landfill parameters, the appropriateness of the preferred cap, future use of the site and the methodology and conclusions of the site risk assessment. One attorney submitted comments on behalf of a PJP potential responsible party group that included an alternate remedy that was presented as equally protective and more cost effective than the NJDEP preferred remedy. Concerns were also raised during the public meeting regarding how reasonable risk is determined and the impact this remediation may have on currently operating facilities in the vicinity of the site. All written comments as well as the transcript of the August 18, 1994 public meeting can be found in the appendices to this Responsiveness Summary.

<u>I. Landfill Definition and Characteristics and Liability Issues</u>

1. **Comment:** How much of the site is contaminated in cubic yards?

   Response: Various written and photographic records and results of remedial work performed at the PJP Landfill site indicates that the site was used for the disposal of thousands of drums and hundreds of thousands of gallons of chemical waste along with municipal, commercial and industrial refuse. It would be cost prohibitive to determine whether every cubic yard of the site believed to be used for municipal, commercial and industrial refuse disposal also was contaminated by chemical wastes. Therefore, the goal of the RI was to characterize the different media (i.e., ground water, soils, air, sediment) on a broader scale to determine an appropriate response to mitigate potential adverse impacts on human health and the environment.

A 45-acre capped portion of the site contained significant amounts of hazardous materials in the form of drums, cylinders and contaminated soils that were transported off site for permanent disposal. The remainder of the landfill also contains drums and contaminated soils that will be remediated as part of NJDEP's selected remedy noted in the Record of Decision (ROD).

2. Comment: How did the Department arrive at geographic boundaries of what is attributable to PJP? Can you give us an example of some of the kinds of documents or sources you used to determine that the landfill is 87 acres? Also, how do we know the chronology of dumping?

Response: Refer to the response to comment 3.

3. Comment: NJDEP's proposed cap inappropriately coincides with and is defined by the current property boundaries. Proper and adequate delineation of the landfill should have been performed to define what areas need to be capped.

Response: The site description paragraph located on page 2 of the Record of Decision defines those areas NJDEP intends to address as part of its selected remedy for the PJP Landfill site. The site boundaries are based upon studies conducted during the RI, NJDEP's review of reports of inspections conducted during the operation of the PJP Landfill, aerial photographs of the site and documents filed by the PJP operators in 1970. Collectively, these records and the RI/FS confirm that waste disposal activities extended well beyond the blocks and lots originally set forth in the documents filed by the PJP Landfill Company. The Hackensack River, the fenced trucking terminals and Truck Routes 1 and 9 provided geographic limits of the site on the northwest, west, south and east sides. The remedy will extend to the northeast to those parts of lots 3B and 4B in block 1627.1 that are determined during design to have been used for disposal of hazardous substances.

4. Comment: Are logs available of the RI borings?

Response: Yes. logs of the RI borings are contained in the Administrative Record and available for review. The soil borings are in Appendix H of the Phase I RI report, Volume II.

5. **Comment:** Did the Department perform any investigation to determine whether any of the neighboring sites were contributing to contamination on this site?

Response: The only neighboring site up-gradient from the PJP landfill site is a cemetery to the east, which is not considered to be a likely source of contamination.

6. **Comment:** How many PRPs are there?

Response: In 1992, NJDEP commenced cost recovery litigation seeking part costs and future costs and damages for the remediation of this Superfund site from entities and individuals alleged to be responsible for hazardous substances disposed at this site. As of September 1995 over 90 direct and third party defendants have been included in this law suit.

7. **Comment:** Do you have many photographs in the Administrative Record? Do any photographs identify responsible parties for this site?

Response: There are aerial photographs taken during the years the landfill operated in the Administrative Record File at NJDEP offices in Trenton. These photographs have been used to help determine what areas of the site needed to be capped. Also, there are numerous slides and photographs of the PJP Landfill site.

II. Drums Found at Landfill

8. **Comment:** Approximately how many drums are located at the site?

Response: During NJDEP's IRM project, there were 4,770 intact drums removed from the site for permanent disposal. Also, an indeterminate amount of broken and crushed drums were removed along with contaminated soil.

Two additional areas were found during the RI that contained drums. These areas are included in the ROD as requiring remediation through excavation and off-site disposal. During the IRM pockets of drums usually were found to extend out a significant distance in several directions. Therefore, the current number of drums located at the site is not known and will not be determined until the excavations are actually performed.

9. Comment: Did any of the drums have markings on them?

Response: During the IRM a separate log sheet was maintained for each of the 4,770 drums noting any markings in addition to a description of the contents of the drum.

10. Comment: Drum removal was not evaluated in the feasibility study and the areas of concern are unclear and inconsistent with the remedial investigation as only two areas have known buried drums, not 12, as DEP has proposed to investigate. Also, there is no criteria for proposed soil removal.

Response: In order for NJDEP's proposed cap to be effective and as suggested by NJDEP's 1993 sampling effort, it is necessary to remediate the two known buried drum areas. These two known buried drum areas actually encompass the approximately 12 test pit areas. Although the exact criteria for soil removal was not included in the Proposed Plan, it does state "associated visibly contaminated soils." The specific criteria for soil removal will be developed during the design phase. Such criteria may include, but not be limited to, the following examples: soils adjacent to or below containers (i.e., drums, barrels, etc.) that have ruptured, leaked or corroded; stained or discolored soils; material that visually appears to have originated (i.e., leaked or spilled) from a container.

III. Site Affects on Sip Avenue Ditch/Hackensack River/Newark Bay

11. Comment: Was any investigation done by the Department to determine whether the Hackensack River or the Sip Avenue Ditch was in any way affecting the site, either positively or negatively?

Response: It is not known whether the Hackensack River is affecting the site. No tidal studies were conducted in the RI. As is stated on page 420 of the RI, "The influence of the tides on [ground water] flow patterns is not known." In the future, if DEP and EPA decide that a ground water remediation is needed for the PJP Landfill site, it may be appropriate to conduct a tidal study. Such a study would be conducted through monitoring the tidal influence upon the wells at the site by continuously monitoring the shallow, deep and bedrock wells.

The Sip Avenue Ditch does not affect the site. The ditch is a discharge point for ground water from both the northern and southern parts of the site, so no contaminants are moving from the ditch to the landfill. Ground water flow direction was determined during the RI by measuring water levels in site monitor wells. As is stated on page 225 of the RI, "Generally, most of the ground water at the site flows into the SIP Avenue Ditch."

Leachate from the site is flowing into the ditch adding to contaminants already there. During the RI a leachate seep was sampled (Landfill Leachate Sample PJP-SW-011) on the landfill adjacent to the Pulaski Skyway and Sip Avenue Ditch. Results showed total volatile organic compounds of 1,017 parts per billion (ppb). The sample exceeded the Federal Surface Water Quality Criteria for the following compounds: benzene (160 ppb), n-nitrosodiphenylamine (13 ppb), arsenic (4.5 ppb), barium (1,560 ppb), iron (8,410 ppb), manganese (235 ppb), lead (25 ppb) and nickel (90 ppb).

12. Comment: DEP's proposed 15-foot diameter enclosed concrete culvert for the Sip Avenue Ditch is grossly oversized. The proposed culvert is unnecessary to prevent contact with contaminated sediments along the Ditch because the contamination does not exceed the acceptable risk range. Some or all of sediment contaminants within the ditch cannot be attributed to the site because it is a storm water channel for areas beyond the site.

Response: The exact design parameters for the Sip Avenue Ditch culvert will be determined in the design phase. The reference to a 15-foot culvert, which appears in the FS, was an option proposed by NJDEP's contractor to address the Sip Avenue Ditch as part of an overall capping alternative. In order to properly maintain the integrity of the landfill cap, adequately channel surface water runoff and adequately protect human health and the environment, some type of remedial action is necessary for the Ditch.

Also, please refer to the response to comment No. 26 and 40.

13. Comment: There may be a combined sewer overflow emptying into the Sip Avenue Ditch from a truck stop area that would have to be addressed in the remediation.

Response: The design phase of this project will include the replacement of the Sip Avenue Ditch with an alternate form of drainage that takes sewer overflow into account.

14. Comment: Is the leaching of contaminants from the landfill into the Hackensack River directly or indirectly affecting the dredging that is going on in the Newark Bay?

Response: NJDEP does not believe contaminant levels measured during the RI in surface water and sediment at the site will adversely impact adjacent surface waters including the Hackensack River. Consequently, dredging operations in Newark Bay, about two miles downstream from the site, also would not be adversely affected.

IV. Reuse of Site and Affect of Remediation on Adjacent Properties

15. Comment: What steps are being taken to create the best opportunity for potential development in the future of this prime development site? It appears that every time a site gets cleaned up it gets cleaned up to the minimum level that is required. A program needs to exist to try to preserve as much property as possible for future development. Also, why did NJDEP not explore on-site remediation for the site to clean up the land and restore it to the tax base?

Response: In selecting a remedial alternative NJDEP must balance a number of factors including cost effectiveness and the requirement that the chosen remedy adequately protects human health and the environment. While a cleanup plan that calls for excavation and off-site removal of all contaminated waste would leave the site available for unrestricted development, the economics of such an alternative are not feasible because the costs would be prohibitive. Removal and off-site disposal of all landfill materials was examined in the Phase II FS, but was screened out due to excessive cost--approximately $1 billion--in the Phase III FS.

NJDEP's selected remedy will provide adequate protection of human health and the environment. Any proposed development of the PJP Landfill site subsequent to implementation of NJDEP's selected remedy will have to take such work into consideration. This means that the site owners or potential developers may propose to NJDEP and implement, if approved, some type of redevelopment of this site as long as it does not compromise the remedial measures performed.

Also, please refer to the response to comment No. 60.

It should be noted that the M & T Delisa Landfill Superfund site in Ocean Township, New Jersey, currently occupied by the Seaview Square Mall, is the only Superfund site in the state that has been reused. The site was deleted in 1991 from the National Priorities List.

16. Comment: It appears that some currently active properties have been included in the area to be capped. How do you propose to

initiate further actions here while these facilities are still operating?

Response: NJDEP does not intend to disrupt any current large facilities with permanent structures. One aspect of the modified solid waste cap is to prevent additional infiltration into the ground water. Therefore, NJDEP considers areas that have buildings in place and concrete floors already to be capped.

However, the area now occupied by A.T. Autowreckers, which operates a junk yard, will need to be either temporarily or permanently relocated off the site since this area will be capped and investigated for buried drums during the remedial design/action phase.

17. Comment: NJDEP's preferred remedy constitutes a compensable taking under the Fifth Amendment of the U.S. Constitution as private property is being taken for public use. Also, future access requirements for monitoring and maintenance constitutes imposing an easement and requires compensation.

Response: NJDEP believes that the remedial actions it intends to implement at the PJP Landfill site do not constitute a compensable taking under the applicable laws and regulations.

18. Comment: The best use of the site is for light industry or possibly an office or research and development facility. Also, recreational facilities could be constructed to benefit the local community on certain areas of the landfill if an appropriate cap is installed.

Response: Please refer to response to comment No. 15.

V. Recent Illegal Dumping at Site

19. Comment: Comments were made that during the past year and a half about 40,000 to 60,000 yards of fill material very high in polycyclic aromatic hydrocarbons (PAHs), demolition refuse and possibly chemical wastes have been brought to or dumped at properties adjacent to the PJP Landfill site.

Response: NJDEP's solid waste enforcement element has investigated the fill material complaint and ordered the specific property owner to comply with appropriate state laws and regulations that cover the handling of such material. In terms of illegal dumping of chemical wastes, NJDEP has forwarded the comments regarding continued dumping at this site to the New Jersey

Division of Criminal Justice. Those allegations were investigated by that agency.

Much of the site is enclosed with a 10-foot high cyclone fence. While this fence restricts access to much of the site, access can be obtained through a number of business establishments that border the site. The chosen remedy will include security measures that will restrict, to the extent possible, all access to the unoccupied portion of the site.

VI. Costs

20. Comment: How did you arrive at an estimated cost for the NJDEP preferred alternative?

Response: The estimated cost includes calculations for capital costs, annual operation and maintenance costs and a present worth cost. The present worth cost is calculated using both the capital costs and annual operation and maintenance costs. Specifically, the present worth cost is derived from an analysis of expenditures that would occur at different times by discounting all future costs to a common year, usually the current year. The present worth cost is based on a 30-year period and a discount rate of seven percent. This allows the costs of each remedial action alternative to be compared on the basis of a single figure representing the amount of money that, if invested in the base year and dispersed as needed, would be sufficient to cover all costs associated with the remedial action.

21. Comment: What is the margin of error in the cost estimates?

Response: The remedial cost estimates provided in the Proposed Plan can range from 30 percent less than to 50 percent more than the actual remedial costs.

22. Comment: How did you determine the preferred remedy is the most cost-effective?

Response: In accordance with USEPA guidance, a detailed analysis of each remedial alternative in the Proposed Plan was conducted with respect to nine criteria, one of which involves costs. A complete analysis using the nine criteria also is included in the ROD on pages 16 to 20. The criteria in the ROD are divided into three separate references: threshold criteria, primary balancing criteria and modifying criteria.

Under the provisions of P.L. 1993, c.139, Section 35g relating to remedial costs, DEP cannot require a responsible party to implement a permanent remedy at a contaminated site if a non-permanent remedy can be implemented for less than half the cost. All of the alternatives presented in the NJDEP Proposed Plan were nonpermanent remedies. Consequently, NJDEP's selected remedy noted in the ROD complies with the specific cost provisions of this statute.

23. **Comment:** Who is paying for the remediation currently and who will pay for the future remediation?

Response: NJDEP paid all costs associated with the RI/FS. Also, the IRM performed by NJDEP was funded almost entirely with state monies. The Roman Catholic Archdiocese of Newark, an owner of a portion of the PJP Landfill site, paid $46,575 toward a study conducted in 1985. Also, $336,824 was paid by a group of potentially responsible parties in 1989 in response to a directive issued to those parties for the funding of the RI/FS. NJDEP is involved in cost recovery litigation seeking past and future costs associated with remediating the site. If the potential responsible parties will not perform future actions, public monies will be used for an engineering design and construction project to implement the ROD and long-term operation and maintenance costs.

VII. Site Risk Issues

24. **Comment:** What was the worst case scenario used for calculating risks to children from swimming in the Sip Avenue Ditch and what kind of exposure are you talking about?

Response: The maximum plausible scenario is the worst case scenario for calculating risks to children swimming in the Sip Avenue Ditch and is noted in Section 5.0 of the Phase I RI. The maximum plausible scenario is intended to place an upper bound on the potential risks by combining maximum plausible exposure estimates with upper bound health effects criteria. Data used to calculate the plausible maximum case are provided in Table 5-25 of the Phase I RI. They include: sediment concentration, quantity of chemical ingested and absorbed, quantity of chemical absorbed dermally, combined chronic daily intake, potency factor and reference dose.

The exposure pathways evaluated for the Sip Avenue Ditch also are discussed in detail in Section 5.0 of the Phase I RI. Specifically, the potentially exposed population is trespassing children wading in the Sip Avenue Ditch. The exposure pathways evaluated for this population are dermal absorption of chemicals in the Ditch sediment and surface water and incidental ingestion of chemicals in the Ditch sediment.

25. Comment: How did you determine what is a reasonable risk with regard to human health?

Response: In order to determine what is a reasonable risk for human health, NJDEP followed USEPA guidelines. These guidelines included an acceptable exposure as having an excess carcinogenic risk in the range of one in ten thousand to one in one million ($1x10^{-4}$ to $1x10^{-6}$). After the RI/FS and Risk Assessment were performed for the PJP site, NJDEP adopted a new allowable cancer risk: one in one million ($1x10^{-6}$) based on P.L. 1993, c.139, Section 35d.

To assess non-carcinogenic effects, NJDEP follows USEPA's hazard index guidelines. A hazard index with a value greater than one is generally identified with potential adverse health effects. Details on the public health evaluation are provided in Section 5.0 of the Phase I RI.

26. Comment: NJDEP did not consider background conditions when evaluating potential risks presented by the site. Arsenic is used as an example of a naturally occurring inorganic that should not have been included in the assessment. Also, the proposed remedial action for the Sip Avenue Ditch is based on potential risks from non-site related contaminants.

Response: NJDEP believes that it is inappropriate to compare sediment concentrations from the Sip Avenue Ditch with the NJDEP Soil Cleanup Criteria to determine site-related contaminants of concern. The example of 20 parts per million for arsenic in soils considered to be "natural background" is not relevant to sediments in the Sip Avenue Ditch.

In the absence of native soils on site, it was unlikely that true background samples could be obtained at this urban, industrialized site. NJDEP decided to rely on a reference location at the upgradient-most portion of the Sip Avenue Ditch. It is not unreasonable to include contaminants of concern at background levels if they pose a risk. Also, it may be conservative to retain a chemical detected at low concentrations if it is a class A carcinogen, such as arsenic.

NJDEP acknowledges that the Sip Avenue Ditch does not originate on site and does provide a pathway for non-site related contaminants to enter the on-site portion of the Ditch. Nevertheless, NJDEP's ultimate decision to remediate the Sip Avenue Ditch was largely based on engineering principles associated with the modified solid waste cap included in the selected remedy rather than solely human health and ecological risk concerns.

Also, please refer to response to comment No. 12.

27. Comment: The risk assessment concludes that excess risks warranting remedial action are present based on soil concentrations that are actually below NJDEP cleanup guidance.

Response: As shown in the Phase III FS, Table 1-3, numerous compounds were detected at concentrations exceeding NJDEP subsurface soil cleanup criteria.

28. Comment: The use of National Oceanographic Atmospheric Administration (NOAA) sediment screening guidelines to evaluate impacts to Sip Avenue Ditch is not appropriate, since no data were collected to assess benthic community presence/absence, structure or function, or to assess upgradient chemical conditions.

Response: The environmental assessment performed for the site (Phase I RI, Section 5.7) is considered to meet the standard practice for that time period. It was not then, nor is it now, standard practice to conduct benthic macroinvertebrate surveys as part of a baseline ecological risk assessment. Risk to ecological receptors from contaminated sediments is initially screened based upon comparison with NOAA sediment quality guidelines. Exceedances of these guidelines may suggest the potential for adverse ecological effects and thus may suggest the need for rigorous ecological investigations, such as benthic surveys.

29. Comment: The chemical sensitivity of resident benthic species is highly variable and may differ significantly from the organisms used in laboratory settings; selection of a remedy based upon laboratory bioassay results is not appropriate.

Response: NJDEP interpreted this comment to imply that the NOAA guidelines are based on laboratory bioassays and therefore are not appropriate for determining effects on in situ benthic species. In fact, the NOAA guidelines are based upon data from three basic approaches: the equilibrium-partitioning approach; the spiked-sediment bioassay approach; and, various methods of evaluating synoptically collected biological and chemical data in field surveys. NJDEP has always considered NOAA sediment quality guidelines, as well as other sediment quality guidelines generally available, as screening level values and are not intended to determine the need for a remedial action.

Also, please refer to response to Comment No. 12.

30. Comment: Since the upgradient sources of contaminants severely impact the Sip Avenue Ditch and Hackensack River, the area is not pristine and the evaluation of impacts to such a system requires information regarding baseline conditions for comparison.

Response: Please refer to the response to comment No. 26.

31. Comment: The application of NOAA sediment screening guidelines to Sip Avenue Ditch sediments is inappropriate because the criteria originate partly from data based on equilibrium partitioning coefficients, which do not address bioavailability of the compound or the organic carbon/acid volatile sulfide concentrations in sediment.

Response: The equilibrium partitioning approach to sediment quality evaluations does in fact address organic carbon content, since partitioning of a contaminant between sediments and interstitial water is dependent upon organic carbon content. The total organic carbon (TOC) is an integral part of the calculation for the sediment-specific criterion value and TOC content is directly related to bioavailability.

NJDEP and USEPA Region II do not endorse the routine use of acid volatile sulfide (AVS) to normalize sediment metals concentrations. NJDEP believes that much research is needed before this approach is widely applied. For example, additional data is needed to evaluate the use of AVS for oxidized sediments, where AVS concentrations can be low, invalidating the normalization of metals concentrations.

32. Comment: NOAA Effects Range-Low (ER-L) and Effects Range Median (ER-M) values are not to be construed as NOAA standards or criteria; exceedance of these values do not infer effects at a particular site.

Response: NJDEP's use of NOAA guidelines has always been for screening purposes. They have never been used or construed as remediation "standards."

Also, please refer to the response to comment 28.

33. Comment: Of the data presented, the mean sediment concentrations exceeded the NOAA ER-M for only four inorganics. It is inappropriate to use the NOAA "effects-based" values for

comparison to site data, since "effects" do not necessarily equate with mortality.

Response: Examination of Tables 4-8 and 4-10 in the Phase I RI indicate exceedances of the ER-L values for six inorganics and eight PAHs; the ER-M is exceeded for four inorganics. NJDEP and EPA Region II routinely consider both the ER-L and ER-M values, as well as any other appropriate State, Federal or literature values, in a "weight of evidence" approach when determining sediment quality. While it is true that "effects" do not equate with "mortality," we are certainly concerned with any sub-lethal effect (such as effects on reproduction, decreased growth, etc.) that could negatively impact the ecosystem.

34. Comment: Biological effects-based approaches--such as sediment bioassays, tissue residues-based methods, apparent effects thresholds approach, etc.--should have been used to derive threshold concentration limits for contaminants in sediments.

Response: Based on exceedance of NOAA guidelines, it is agreed that more rigorous evaluation of sediment toxicity could have been appropriate for studies subsequent to the Phase I RI. However, the need for remediation of the Sip Avenue Ditch was largely based on engineering principles associated with the modified solid waste cap included in the NJDEP selected remedy rather than solely human health and ecological risk concerns.

35. Comment: There are insufficient data to characterize Sip Avenue Ditch as an aquatic habitat, or that site-related constituents contribute to potential ecological risk. Past studies did not characterize presence/absence of a viable aquatic community nor did they use a biological effects-based approach for deriving threshold concentration limits; ammonia, hydrogen sulfide and dissolved oxygen should have been measured.

Response: Please refer to the response to comments 26 and 28-34. Also, ammonia, hydrogen sulfide and dissolved oxygen would normally be run as part of sediment bioassay testing, which was not done during this portion of the RI.

36. Comment: Based on the information in the Chronic BioMonitoring Report, a determination cannot be made about impacts to surface water and biota attributable to the site contrary to what is stated in the Proposed Plan. Specifically, the data set from November 1993 is inadequate to assess the ecological integrity of the current system nor are the data adequate to differentiate site-related contributors to degradation, if any.

Response: Please refer to the detailed response to comments 26 and 28-34.

37. **Comment:** Physical/chemical data, such as grain size, hydrogen sulfide in sediment, total organic carbon, dissolved oxygen, ammonia and temperature, should have been collected and used to conduct appropriate evaluation of the sediment and surface water data and bioassay results.

Response: NJDEP agrees that it would have been appropriate to measure the referenced conventional parameters and recommends their inclusion should any further testing be conducted. However, their omission has no impact on the remedial decision because the need for remediation of the Sip Avenue Ditch was largely based on engineering principles associated with the modified solid waste cap included in the NJDEP selected remedy rather than solely human health and ecological risk concerns. It should be noted that temperature, dissolved oxygen, pH, salinity and conductivity were measured by the laboratory conducting the bioassay on those samples, prior to test initiation. Those results are contained in the appendix to the Chronic BioMonitoring Report.

38. **Comment:** Inconsistencies between the analytical and bioassay results require that more information regarding test conditions be made available and presented with the data. It cannot be concluded that the cause of mortality was the test solution.

Response: NJDEP recognizes that the results of the bioassay tests are inconclusive. Based upon the contaminant levels measured in the river water, high mortality would not ordinarily be expected. Furthermore, the lowest mortality observed is associated with the highest chemical contamination, while the highest mortality observed is associated with the lowest contaminant levels. It is the experience of NJDEP's Site Remediation Program that these ostensible inconsistencies between bioassay and chemical data are not uncommon and, therefore, we have come to use a "weight of evidence" approach employing various environmental assessment methods when assessing ecological impacts from contaminated sites.

39. **Comment:** Relevant background references should have been identified in order to allow a comparison of the bioassay results associated with the site.

Response: Please refer to the response to comment 26.

40. **Comment:** The significant on-site risk identified as unacceptable in the Proposed Plan in not greater than the EPA acceptable risk range of 1 x 10^{-4} to 1 x 10^{-6}. Based on the Human Health Risk Assessment, there is no need to conduct a remedial response action addressing the Sip Avenue Ditch because the identified site risks are within the EPA's acceptable risk range.

Response: Normally, a baseline risk assessment evaluates the risk posed by the site in the absence of any remedial action. In the case of the PJP Landfill site, an IRM cap had already been put in place prior to evaluating site-wide risk. NJDEP decided that a residential exposure scenario (a house placed on top of the landfill with occupants eating the leachate and drinking contaminated water) was not realistic. Therefore, exposure was limited to children trespassing that included time spent playing in the Sip Avenue Ditch.

NJDEP acknowledges that the carcinogenic risk falls within EPA's acceptable risk range. However, a Hazard Index of 4 was calculated for current land use for the plausible maximum case of potential exposures and risk associated with incidental ingestion and dermal absorption by children of chemicals in sediment from Sip Avenue Ditch.

Also of relevance is EPA's Directive 9355 3-11FS dated July 1990 entitled "Streamlining the RI/FS for CERCLA Municipal Landfill Sites." Page three of this EPA Directive states, "Where established standards, for one or more contaminants in a given medium are clearly exceeded, the basis for taking remedial action can be established. Detailed, quantitative assessments that consider all chemicals, their potential additive effects, or additivity of multiple exposure pathways are not necessary to initiate remedial action." On page 389, section 5.9.3 of the Phase I RI, the comparison of site data to ARARs is discussed. Measured concentrations in soil, ground water and surface water exceeded these values.

Also, please refer to the response to comment No. 12.

41. **Comment:** There is no need to conduct a remedial response action addressing vented landfill gas because the identified site risks are all within or less than EPA's acceptable risk range of 10^{-4} to 10^{-6}.

Response: NJDEP acknowledges that the risk estimate for inhalation of vented landfill gas is within the EPA's acceptable risk range. However, NJDEP's ultimate decision to install a gas venting system is not a risk-based decision.

Also, please refer to the response to comment 59.

42. **Comment:** Risk estimates for carcinogenic PAHs are misrepresented based upon the summation for the class of chemicals versus evaluation of individual components.

Response: At the time the risk assessment was performed, it was the policy of both NJDEP and EPA Region II to treat all carcinogenic PAHs quantitatively with the same potency as Benzo(a)pyrene, while recognizing in the uncertainty section of the risk characterization that this approach may overestimate the true risk posed by the site.

43. **Comment:** The potential off-site risk is actually greater than risk estimates for the potential exposure to current on-site conditions.

Response: Comparing risk from anthropogenic background conditions off site to site-related risks are not relevant for determining remedial actions at NPL sites.

44. **Comment:** The risk assessment used the detection limit as the concentration present when a non-detect was indicated for inorganic chemicals in determining site-wide averages of the compounds.

Response: This was NJDEP policy at the time the risk assessment was done. Total risk from the Sip Avenue Ditch is $4x10^{-5}$, of which $3x10^{-5}$ is a result of carcinogenic PAHs.

45. **Comment:** The scope of the remedy as it pertains to the Sip Avenue Ditch is inconsistent with the potential risk determined by NJDEP and supported by site engineering data.

Response: Please refer to the response to comment 12.

46. **Comment:** The Human Health Risk Assessment used extrapolated emission concentrations at estimated maximum discharge rates when evaluating risks that are overly conservative. The non-methane organic compound should have been quantified on a weight/time basis with results reported in pounds per eight hours. NJDEP should have used EPA Method 25C to analyze landfill vent gases rather than EPA Method TO-14.

Response: Table 5-18 of the Phase I RI lists a summary of estimated ambient air concentrations for the site for both the geometric mean and maximum air concentrations. It would be inappropriate to use results reported on an eight-hour basis for nearby residents. Not using a time-weighted approach for the trespasser and worker would probably overestimate site-related risks. However, site risks are already less than $1x10^{-6}$ for all scenarios except the Plausible Maximum Case for the child trespasser, which is $2x10^{-6}$, a level EPA deems discretionary for taking remedial action. Finally, EPA Method 25C was not developed until 1991, so it was not feasible to use this methodology for the site RI completed prior to 1991.

47. Comment: A reference was made to a statement in the Phase III FS prepared by NJDEP's contractor ICF Technology Company that "there were no contaminants found in the surface soil sampling data in exceedance of the current NJDEP non-residential surface soil cleanup criteria; and there were no contaminants found in the subsurface soil sampling data in exceedance of the current subsurface soil cleanup criteria."

Response: Further scrutiny of the FS report indicates that the ICF statements are erroneous. In order to correctly evaluate the data, it is necessary to review the RI and Proposed Plan. The RI data tables depict that contaminants were detected in surface, subsurface and test pit soil samples at concentrations greater than NJDEP's surface and subsurface soil cleanup criteria in use at the time the RI/FS was performed. Please note that the current soil cleanup criteria categories are different from those used during the RI/FS. Presently, DEP's soil cleanup criteria is listed under the categories of residential direct contact, non-residential direct contact and impact to ground water.

48. Comment: The cost of the NJDEP proposed solid waste cap is not justified based on risk assessments:

Response: Please refer to the response to comments No. 26 and 40.

VIII. Wetlands

49. Comment: It is a presumption in the Proposed Plan that wetland mitigation/land banking will be required as part of the remediation of the site. A functional wetland evaluation should have been conducted at the site prior to determining if, and what types of, compensatory measures are required.

Response: While NJDEP implies in Section XIII of the Proposed Plan that a mitigation plan to address areas impacted will be prepared, it is also stated that the design phase will include a wetland assessment. In Section XIII of the Proposed Plan NJDEP states that "a qualitative assessment of the habitat values, acreage, tidal influences and other defining factors will characterize the wetlands and better provide requirements for the restoration of any wetlands found to be impacted." Thus, wetlands are appropriately considered in the remedial design/action phases. During further wetland characterization and compensatory decisions, NJDEP will use "Considering Wetlands at CERCLA Sites" (EPA540/R-94/019, May 1994) as a guide.

50. **Comment:** NJDEP did not evaluate the existing wetlands or perform a species inventory.

Response: This statement appears erroneous because it does not take into account work performed during the RI. Specifically, work performed during the RI, as noted in Section 5.0 of the Phase I RI, includes identifying wetlands, conducting a vegetation inventory, and listing expected terrestrial wildlife and aquatic species and observed wildlife.

IX. IRM/Fires

51. **Comment:** In the late 1980's underground fires occurred in an area defined as Lincoln Park West. Additionally, there have been other underground fires in that area as late as a couple of years ago. What studies have been done to see what effects the PJP Landfill has had on this area? Can DEP require that additional testing be done in that area?

Response: Historical information indicates that underground fires did occur in 1986 in the Lincoln Park West area, which is near the PJP Landfill site. These fires were extinguished in 1986 by Boots and Coots, the same NJDEP contractor responsible for extinguishing the fires at the PJP Landfill site. The PJP Landfill site and the Lincoln Park West area are separated by roads and other paved surfaces. There is no connection between the fires at the two sites. Local officials can request that NJDEP conduct a preliminary assessment and site investigation of the Lincoln Park West area as a separate action.

52. **Comment:** What kind of cap was used during the IRM?

Response: A two-foot cap was installed by NJDEP during the IRM. A cross section of the IRM cap consists of the following sections: six inches of clean fill material (bottom layer); 12 inches of clay (middle layer); and, six inches of topsoil that was hydroseeded (top layer).

53. **Comment:** How can you guarantee the fire will not flare up again?

Response: NJDEP took all possible steps during the IRM to prevent a fire from reoccurring. These included: removing hazardous materials that fueled the fire; excavating and dousing the fill to the water table; and, compacting and capping the fill to prevent it from reigniting.

X. NJDEP Preferred Remedy

54. **Comment:** The NJDEP proposed Solid Waste Cap design for the PJP Landfill is not in compliance with the most current NJDEP Bureau of Landfill Engineering guidance. The NJDEP has not followed its own guidance.

Response: NJDEP's proposed cap for the site is a modified solid waste cap. It should be noted that at the present time NJDEP's "Technical Guidance for Final Covers at Sanitary Landfills" is guidance, not a promulgated regulation.

55. **Comment:** The NJDEP proposed solid waste cap may prove to be an ineffective "barrier" to prevent precipitation infiltration.

Response: NJDEP's proposed cap for the site incorporates USEPA guidance that called for a cap with a 10^{-7} impermeability to ensure adequate impermeability for the site.

56. **Comment:** The NJDEP proposed impervious modified Solid Waste Cap will inhibit expedient natural attenuation since it does not account for the hydrological setting of the landfill medium. A more "pervious" cover would be more beneficial.

Response: Due to the nature of the waste in the uncapped portions of the site, it is necessary to install an impervious cap.

57. **Comment:** The NJDEP proposed 3.5 foot thick Solid Waste Cap may adversely impact the existing structures in the area.

Response: Please refer to the response to comment No. 16.

58. **Comment:** The NJDEP proposed modified solid waste cap with a high density polyethylene (plastic) and/or clay layer will inhibit development in the area.

Response: NJDEP will work with interested parties to allow for reuse of the site.

Also, please refer to the response to comment No. 15.

59. **Comment:** The NJDEP Proposed Plan is inconsistent with respect to landfill gas management. An active gas collection system was eliminated from consideration while a gas treatment system was retained in the Phase I and II feasibility study, which is contradictory because you need a collection system if you have a gas treatment unit. The Proposed Plan should reflect gas management by monitoring or appropriate actions should be determined during the design phase. Also, gas management would be better served by the use of a "pervious" cover.

Response: As with all major landfill closures, a gas venting or treatment system needs to be included in the permanent remedial actions selected for the PJP site. A gas venting system is operating on the portion of the site capped during the IRM. Furthermore, a collection trench and venting system will be included for the remainder of the site to be capped with the possibility that this system will be upgraded to an active system during the design phase. If an active system is determined to be necessary, the IRM cap venting system will be incorporated into the new active treatment system.

Overall, the reasons for installing a gas venting system are regulatory and engineering based, in accordance with NJDEP solid waste guidance. A system is needed to control the pressure and migration of landfill gases under the proposed cap. The specific type of venting system--passive or active--will be determined during the design phase.

60. **Comment:** The PJP PRP Group submitted an alternate cap design that it states is equally protective--meeting or exceeding the expected performance of NJDEP's proposed remedy--and much more cost efficient.

Response: The ROD permits a degree of flexibility in the design of the cap, so long as the alternate design meets the ROD's requirements, e.g. an impermeability of 10^{-7} and other stated engineering controls.

61. **Comment:** Why did NJDEP not evaluate in the feasibility study a cap similar to the one the agency used as an IRM cap in 1985 for a 45-acre portion of the site since NJDEP has since determined

that the IRM cap to be a sufficient permanent remedy for this portion of the site.

Response: The IRM cap was part of an interim action. Prior to the IRM cap installation, NJDEP removed 4,770 intact drums, 4,600 cubic yards of contaminated soil (including 650 cubic yards of soil contaminated with polychlorinated biphenyls), 136 pressurized gas cylinders and other contaminated debris. Also, during the interim action approximately 1,033,000 cubic yards of refuse were excavated and compacted.

62. Comment: Is this project the direct responsibility of NJDEP?

Response: NJDEP is the lead agency for this Superfund site. USEPA provides oversight with respect to review of the RI/FS and ROD. NJDEP will sign the Declaration Statement for the ROD with concurrence from USEPA.

63. Comment: Where would you take the known contaminated areas that are removed?

Response: Areas of contamination removed during the remediation will be analyzed and disposed of at an appropriately licensed disposal facility.

Index of Attachments

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