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EPA Superfund Record of Decision:

Brook Industrial Park (O.U. 1), Bound Brook, NJ 9/30/1994

DECLARATION STATEMENT

RECORD OF DECISION

BROOK INDUSTRIAL PARK

Site Name and Location

Brook Industrial Park
Bound Brook, Somerset County, New Jersey

Statement of Basis and Purpose

This decision document presents the selected remedial action for contaminated soil, building interiors and ground water at the Brook Industrial Park site. The remedial action was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision is based on the administrative record for the site.

The State of New Jersey concurs with the selected remedy for the ground water, building interiors, and soil. However, if institutional controls are not established, the State cannot concur with the selected remedy for soil.

Assessment of the Site

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

Description of the Selected Remedy

The remedy described in this document represents the final remedy for the Brook Industrial Park site and addresses the current and future threats to human health and the environment associated with the contamination present in the soil, building interiors and ground water at the site. It provides for the remediation of soil and building interiors exceeding site-specific remediation goals and restoration of the ground water to the more stringent of the federal and New Jersey Safe Drinking Water Act Maximum Contaminant Levels (MCLs) and New Jersey Ground Water Quality Standards (NJGWQS).

The major components of the selected remedy include:

- Excavation and off-site treatment and disposal of contaminated soil exceeding remediation goals in Area One, Area Two, Subsurface Pits and the Stirling Center Basement and backfilling of the excavated areas with clean fill;
- Demolition and off-site disposal/incineration of the contaminated portions of the Blue Spruce Building;
- Extraction and treatment of contaminated ground water to levels attaining MCLs and NJGWQS;
- Reinjection of the treated ground water and restoration of the aquifer to the more stringent of the federal and New Jersey MCLs and NJGWQS; and
- Appropriate environmental monitoring to ensure the effectiveness of the remedy.

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. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because this remedy will result in hazardous substances remaining on the site above health-based levels, the five-year review will apply to this action.

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

Date 9/30/94

DECISION SUMMARY

RECORD OF DECISION

BROOK INDUSTRIAL PARK

SITE NAME, LOCATION AND DESCRIPTION

The Brook Industrial Park site is a located at 100 West Main Street in the Borough of Bound Brook, Somerset County, New Jersey. It is a 4.5-acre complex of warehouses and light industries situated on the northern bank of the Raritan River. The site is bordered by the New Jersey Transit railroad line to the north; the Lehigh Valley/Port Reading railroad lines to the south; an oil company to the west; and an undeveloped lot to the east. Figures 1 and 2 show the location and layout of the site.

The Borough of Bound Brook is considered an urban-suburban community of approximately 1.6 square miles, located near an urban center with large residential areas. According to 1990 census data, approximately 9,500 people live in the Borough of Bound Brook.

The Brook Industrial Park has been in existence since the late 1800s and currently includes several operating light manufacturing companies and offices. The Industrial Park consists of three buildings, referred to as Stirling Center, Blue Spruce and National Metal. Current occupants of Brook Industrial Park include a manufacturer of steel products, a manufacturer of extruded plastic products, a manufacturer of specialty chemicals, a metal plating company, an equipment contractor and several other small companies (Figure 2).

SITE HISTORY AND ENFORCEMENT ACTIVITIES

Several companies within Brook Industrial Park have been cited by the New Jersey Department of Environmental Protection (NJDEP) for inadequate housekeeping and waste disposal practices. These companies are Blue Spruce International, National Metal Finishings Corporation and Jame Fine Chemical Incorporated.

Industrial, chemical and pesticide production, usage and storage operations began at the site in 1971 when Blue Spruce International occupied a number of the buildings. Substances handled by the Blue Spruce facility included various pesticides, dioxin and arsenic compounds. Investigations by the Middlebrook Regional Health Commission (MBRHC) and NJDEP were initiated in 1980 when workers within these buildings reportedly became ill. Initial sampling conducted by NJDEP revealed the presence of dioxin, pesticides, organics and heavy metals.

There have been several reports of spills and drum leakage at the Blue Spruce facility which at one time stored as many as 300 55-

gallon drums on the site (MBRHC/NJDEP 1980). Investigations by NJDEP and MBRHC revealed standing puddles of wastewater on the floor of the basement (MBRHC 1980). Soil samples from the basement of the facility collected by the U.S. Environmental Protection Agency (EPA) contained dioxin and high concentrations of pesticides. During heavy rains, the basement flooded. Water from the basement was reported to be pumped to the rear of the facility and discharged to the ground surface.

Blue Spruce was cited by NJDEP for several violations in the 1970s. NJDEP fined Blue Spruce for shipment of mislabeled pesticides and for the illegal storage of lindane in 1975. The NJDEP Bureau of Air Pollution Control cited Blue Spruce in 1977 for installing mixing vats without obtaining an Air Pollution Control permit. In the 1970s, Blue Spruce accepted shipment of Agent Orange from the U.S. Air Force for shipment to a third world country. In 1980, an Order and Settlement was issued by NJDEP citing violations and outlining a sampling and cleanup schedule. Subsequent to this settlement, dioxin was discovered at the site. Since the funding under the settlement was insufficient to cover the cost on remediating the dioxin contamination, the cleanup was suspended. Blue Spruce International has been defunct since the early 1980s.

The National Metal Finishings Corporation has operated at Brook Industrial Park since the early 1970s. The metal plating process performed by National Metal Finishings included electroplating chromium onto large steel rollers followed by a final rinse over an open pit to remove the residual chromium. The chrome-plating units are located in two subsurface pits. These pits are believed to be in direct connection with ground water. NJDEP collected samples from one pit which revealed the presence of chromium, nickel, lead, toluene and xylene. In 1982, the New Jersey Department of Law and Public Safety required National Metal Finishings Corporation to cease further discharge from Pit #1 to ground water and to perform a hydrogeological study to determine the degree of soil and ground water contamination. This study was never performed. A closed-loop process was subsequently installed which eliminated any further discharge to the pits.

Jame Fine Chemicals, Inc. has manufactured specialty chemicals at Brook Industrial Park for over 20 years. NJDEP conducted an inspection of Jame Fine's manufacturing operations in 1980 and found a wastewater discharge which flowed into the Raritan River. This discharge was found to contain significant levels of several organic compounds. Subsequently, in that same year, NJDEP issued an Administrative Order and Notice of Civil Administrative Penalty assessment to Jame Fine Chemicals, Inc. directing it to cease the discharge of unpermitted chemicals and contaminated wastewater to the Raritan River. In 1986, the Company received a Notice of Violation from NJDEP for improper housekeeping and documentation procedures related to the storage of materials manufactured at the site.

In July 1983, EPA conducted an emergency response action to address immediate contaminant hazards present at the site. An asphalt cap was placed on an area of the site which was found to contain dioxin contamination. EPA conducted subsequent removal actions in 1990 and 1993 to secure the Blue Spruce Building against intruders.

In 1986, EPA initiated a focused feasibility study (FS) to address the contamination found in the Blue Spruce Building. This study was suspended when the entire industrial park was being considered for inclusion on the National Priorities List (NPL) of Superfund sites. However, the results of the field sampling conducted during the focused FS were incorporated into the 1994 FS report.

The Brook Industrial Park site was proposed for inclusion on the NPL in June 1988 and finalized in October 1989. In April 1989, EPA initiated a remedial investigation and feasibility study (RI/FS) to determine the nature and extent of contamination, assess the long-term risk and to develop and evaluate remedial alternatives.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

A Community Relations Plan (CRP) was developed to ensure the public opportunities for involvement in site-related decisions. In addition, the CRP was used by EPA to determine, based on community interviews, activities to ensure public involvement and to provide opportunities for the community to learn about the site.

EPA held a public meeting in November 1989 to explain the RI/FS process to the public and to report on the progress being made at the site.

The RI and FS reports were released to the public in July 1994. A Proposed Plan identifying EPA's preferred remedial alternatives was released on July 22, 1994. These documents were made available to the public at the information repository at the Bound Brook Memorial Library, located on East High Street in Bound Brook, New Jersey. A copy of the administrative record file is located at the Bound Brook Memorial Library and the EPA Docket Room in Region II, 26 Federal Plaza, New York, New York. The notice of availability of the above-referenced documents was published in The Courier News on July 22, 1994 and The Bound Brook Chronicle on July 28, 1994. The public comment period on these documents, which included the Proposed Plan, was held from July 22, 1994 to August 20, 1994.

On August 4, 1994, EPA held a public meeting at the Bound Brook Memorial Library, to present the findings of the RI/FS and the Proposed Plan, and to respond to questions and comments from area residents and other attendees. Responses to the comments received at the public meeting and during the public comment period are included in the Responsiveness Summary, which is part of this Record of Decision (ROD).

This decision document presents the selected remedial action for the Brook Industrial Park site, chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The selection of the remedy for this site is based on the administrative record.

SCOPE AND ROLE OF RESPONSE ACTION

The remediation of the site is complicated by the distribution of contaminants across media and within an area of complex hydrogeology. As a result, EPA has decided to address the site by evaluating three types of contaminated media (soils and sediments, ground water, and building interiors) individually with regard to the risk posed to human health and the environment, the potential for contaminant migration, and the development of remedial alternatives. This ROD addresses the entire site and identifies the selected remedy for contaminated soil and sediments, building interiors, and ground water. This is a final remedy which addresses the principal threats posed by the site.

SUMMARY OF SITE CHARACTERISTICS

Site Geology and Hydrology

The site lies in the floodplain adjacent to the Raritan River. The geology consists of a layer of fill ranging in thickness from approximately 1 foot to 17 feet. Bedrock is encountered approximately 20 feet below ground surface. The top portion of the bedrock is highly weathered and fractured.

Ground water resources within the area are an unconsolidated overburden aquifer and a deeper fractured bedrock aquifer which is part of the Brunswick group. The water table is at an average depth of 10 feet and appears to be sloping towards the Raritan River. The source of ground water recharge is precipitation. The precipitation infiltrates the ground, moving though subsurface material, and is stored in the aquifers. Generally, the overburden aquifer recharges the bedrock aquifer. The continuous pumping of an on-site production well, which draws water from the bedrock aquifer, is believed to have a direct impact on the ground water flow in the area of the site. All ground water beneath the site, in the portion of the bedrock aquifer which the production well penetrates, flows towards the pumping well. In addition, a mounding effect has been observed in the overburden aquifer which is believed to be the result of unused ground water flowing back down the production well casing. The aquifer, downgradient of the site, is currently not used as a drinking water supply.

Using the U.S. Fish and Wildlife Service Wetland Classification System, the wetlands present at the site are classified as Palustrine and Riverine. The Palustrine wetlands, which are present in the southern end of the site, are determined based on the dominant plant species occurring at the site. The Raritan River and the unnamed tributary are typical of a Riverine System. The total wetland area is approximately 71,000 square feet.

A Stage IA Cultural Resources Survey performed at the site as part of the RI concluded that no impacts on prehistoric resources are expected as a result of the remedial action. A review of historic site surveys identified no historic structures. Also, the presence of human-deposited fill on the upper 5 to 10 feet of the site surface and geological and historical record of river flooding across the site suggest that the preservation of prehistoric resources on the site is unlikely in the upper deposits.

Nature and Extent of Contamination

A series of field investigations, collectively referred to as the RI, was completed in June 1994. The purpose of the RI was to determine the nature and extent of contamination associated with the site. The RI included sampling of ground water, surface and subsurface soils, ponded water, sanitary sewers, floor drains, building interior surfaces, debris piles, subsurface pits, cooling water discharge, surface water and sediments.

The major conclusions of the RI for the site are summarized below:

- Approximately 5,000 square feet of building interior surfaces (walls and floors within the Blue Spruce Building) are contaminated with 2,3,7,8-TCDD (dioxin) at concentrations ranging from 0.03 parts per billion (ppb) to 6.1 ppb.

- Approximately 4,600 cubic yards of soil on the site are contaminated with chromium, arsenic, lead, beryllium, polychlorinated biphenyls (PCBs), aldrin, dieldrin, and 4,4 DDT (Table 1 and 2). This volume estimate includes soil in the basement of the Blue Spruce and Stirling Center buildings, subsurface pits, and sediment in the drainage ditch and tributary. The contaminated area within the drainage ditch and tributary (approximately 2,800 square feet) is considered wetland area. The highest levels of soil contamination are found in the eastern and southwestern portions of the site which are designated as Area One and Area Two respectively (Figure 3). Chromium is found in concentrations on-site ranging from 3.2 parts per million (ppm) to 2,200 ppm, arsenic from 1.0 ppm to 451 ppm, beryllium from 0.22 ppm to 23.5 ppm, lead from 3.4 ppm to 2,060 ppm, PCBs at 10 ppm, aldrin from 0.36 ppm to 7.4 ppm, dieldrin from 0.15 ppm to 6.3 ppm and 4,4 DDT from 3.0 ppm to 26 ppm (Table 3). Dioxin contamination above 1 ppb was not detected under the asphalt cap during confirmatory sampling. However, if contamination is detected above 1 ppb during subsequent activities, the contaminated soil would be remediated.

To characterize the ground water beneath the site, 16 ground water monitoring wells were installed. Samples were collected from these wells, the on-site production well and a nearby residential well. The residential is located upgradient of the site and no contaminants were found to exceed MCLs. The results of the analysis (Tables 4 and 5) demonstrated that the overburden aquifer is contaminated with benzene, chlorobenzene, 1,2-dichloroethane, trichloroethene (TCE), aluminum, antimony, arsenic, cadmium, lead, nickel, and chromium at concentrations which exceeded the Maximum Contaminant Levels (MCLs) or New Jersey Ground Water Quality Standards (NJGWQS). MCLs are federal or state standards devised to protect drinking water and NJGWQS are state standards devised to protect aquifers. Results of sampling the bedrock aquifer (Tables 6 and 7) have demonstrated that the aquifer is contaminated with volatile organic compounds (VOCs), aluminum, lead, nickel, and chromium at levels that exceed MCLs or NJGWQS. For example, chromium was detected at concentrations as high as 17,200 ppb in the overburden aquifer. By comparison, the MCL for chromium is 100 ppb. Similarly, concentrations of benzene were found as high as 133.8 ppb. The MCL for benzene is 1 ppb. Most of the contaminant plume is believed to be contained within the site boundary due to the continuous pumping of the on-site production well (Figures 4 and 5). However, it is possible that a portion of the plume is migrating off site. Additional information on aquifer characteristics will be collected during the remedial design.

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.

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 -- identified the contaminants of concern at the site based on several factors such as toxicity, frequency of occurrence, and concentration; Exposure Assessment -- estimated the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways (e.g., ingesting contaminated soil) by which humans are potentially exposed; Toxicity Assessment -- determined 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 -- summarized and combined outputs of the exposure and toxicity assessments to provide a quantitative (e.g., one-in-a-million excess cancer risk) assessment of site-related risks.

For risk assessment purposes, individual contaminants are separated into two categories of health hazard depending on whether they exhibit carcinogenic or non-carcinogenic effects. The contaminants of concern are presented in Tables 1, 2, 4 and 6. For known or suspected carcinogens, current federal guidelines for acceptable exposures are an individual lifetime excess carcinogenic risk in the range of 10^{-4} to 10^{-6}, representing a probability of approximately one in ten thousand to one in one million that an individual could develop cancer due to exposure. The non-carcinogenic effects (e.g., toxicity) posed by each contaminant are summarized as a "Hazard Index" (HI) for a particular exposure pathway. Only Hazard Indices greater than one are generally identified with potential adverse health effects.

EPA uses reference doses (RfDs) to calculate the non-carcinogenic risk attributable to a particular contaminant. An RfD is an estimate of a daily exposure level that is not likely to result in any appreciable risk of deleterious effects during a person's lifetime. The RfD is employed to calculate a Hazard Quotient which is defined as the chronic daily intake (CDI) of a chemical divided by its RfD (CDI/RfD). A list of RFDs is contained in Table 15. A Hazard Quotient greater than 1 indicates the potential for adverse effects to occur. When toxic endpoints and/or mechanisms-of-action of contaminants within the same medium are similar, Hazard Quotients are added to give a Hazard Index for the exposure pathway of concern. Similarly, a HI of greater than 1 indicates the potential for adverse effects to occur.

EPA uses a slope factor to calculate the carcinogenic risk attributable to a particular contaminant. A cancer slope factor establishes the relationship between the dose of a chemical and the response and is commonly expressed as a probability of a response per unit intake of a chemical over a lifetime. A list of slope factors is contained in Table 15.

Although EPA has established RfDs and slope factors for chemicals evaluated in the baseline risk assessment, lead currently does not have an RfD, slope factor or similarly accepted toxicological parameters. Therefore, lead, which was qualitatively evaluated independent of the other contaminants of concern, will be discussed separately from the quantitative baseline risk assessment.

To evaluate human health risk in the quantitative assessment, several exposure pathways were selected for detailed evaluation under both current and future land-use conditions. Under current land-use conditions, the general exposure pathways evaluated were incidental ingestion or dermal absorption of soil, inhalation of fugitive dust and dermal absorption of surface water. A detailed list of all exposure pathways can be found in Table 16. Under current land-use conditions, the dominant health risk is posed by the ingestion of on-site soil and inhalation of fugitive dust emissions in Area One and Area Two by an on-site worker. Ingestion of soil poses the greatest carcinogenic risk and is estimated to be $5x10^{-5}$ (five in one hundred thousand) in Area One and $1x10^{-4}$ (one in ten thousand) in Area Two. The risk is primarily due to heavy metals and the pesticides aldrin and dieldrin. The Hazard Index related to ingestion in Area One is 1 and in Area 2 is $4x10^{-1}$. The Hazard Index related to inhalation in Area One is $9x10^{-1}$ and Area Two is 1 (Table 8).

Elevated concentrations of lead have been detected in on-site soils in Area One and Area Two at concentrations above 500 ppm[1], EPA's cleanup policy number. As discussed earlier, lead does not have an RfD, slope factor, or similarly accepted toxicological parameters and could not be evaluated in the quantitative baseline risk assessment. Therefore, the risks posed by lead have been qualitatively evaluated for site soils. Exposure to lead has been associated with a wide range of non-carcinogenic effects in humans. High lead concentrations in the blood can cause severe irreversible brain damage and possible death. EPA

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[1] At the time of the field sampling, the current EPA policy on soil cleanup levels addressing lead was 500 - 1000 ppm. Subsequently, EPA recommended the use of the Uptake Biokinetic Model (UBK) as a risk assessment tool to predict blood lead levels and aid the risk management decision on soil lead cleanup levels at sites. In order to utilize this model, certain site-specific information must be collected. At the time this guidance was issued, the RI for the Brook Industrial Park site was past the field investigation stage and the necessary information to run the UBK was not available. However, when the model is utilized using default parameters, an acceptable soil level of approximately 400 ppm is predicted for lead.

has also classified lead as a "B2" carcinogen, which indicates that it is considered a probable human carcinogen. With regard to all exposure scenarios considered in the baseline risk assessment, it is plausible that the cumulative cancer risk and Hazard Indices discussed above would be even higher if the effects of lead were quantitatively included.

In addition, a Hazard Quotient for the non-carcinogenic risk due to the inhalation of chromium, which was detected in Area One above acceptable levels, is not taken into account in the quantitative risk assessment. However, the non-carcinogenic effects due to the inhalation of chromium were qualitatively assessed in the risk assessment. The main effect of inhalation of chromium is irritation of the respiratory track and ulceration of the nasal septum.

The risk in Area One ($5x10^{-5}$) and Area Two ($1x10^{-4}$) is at the upper bound of EPA's acceptable risk range, however, the risk due to lead and chromium is not considered in the calculation of these risk numbers. As stated above, it is plausible that the cumulative cancer risk and Hazard Indices would be even higher if the effects of lead and chromium were quantitatively included. In addition, contaminants from the soil would continue to migrate into the ground water which already contains the same contaminants at levels above MCLs. Therefore, EPA has determined that the potential risks due to Area One and Area Two are unacceptable.

The remaining exposure pathways evaluated under current land-use conditions, which include dermal contact with soils and surface water, are less than or within EPA's target cancer risk range of 10^{-4} to 10^{-6}. The Hazard Indices for these exposure pathways were below levels of concern.

Under future land-use conditions, the general exposure pathways evaluated were incidental ingestion and dermal absorption of soils and ingestion of ground water. A detailed list of exposure pathways can be found in Table 17. The dominant health risk is posed by incidental ingestion and dermal absorption of soil from the Stirling Center basement by a future worker and ingestion of ground water by future workers. The estimated cancer risk due to the ingestion of soil is $4x10^{-5}$ (four in one hundred thousand). The cancer risk due to dermal absorption is $5x10^{-5}$(five in one hundred thousand). These risks are primarily due to the PCB Aroclor-1248 and arsenic. The Hazard Index for ingestion of soils is 1 and is primarily due to arsenic. The estimated cancer risk due to ingestion of ground water is $4x10^{-4}$ (four in ten thousand) for the overburden aquifer and $7x10^{-4}$ (seven in ten thousand) for the bedrock aquifer. The risk in the overburden aquifer is primarily due to the presence of benzene, vinyl chloride, arsenic and beryllium. The risk in the bedrock aquifer is primarily due to dieldrin, tetrachloroethene and vinyl chloride. The Hazard Indices for the overburden and bedrock aquifers are 30 and 3, respectively, and are primarily due to manganese (Table 8).

A qualitative risk assessment was performed for debris piles, ponded water and building interiors because no established method exists to evaluate exposure risks. Since the debris piles have been removed from the site, they no longer pose a risk. Direct contact with the two shallow ponded water bodies by a child/trespasser or worker could result in dermal absorption of dieldrin and octachlorodibenzo dioxin (OCDD). However, the frequency of contact would be expected to be minimal given the small size of the water bodies and, therefore, the risks are likely to be negligible. The chemicals detected on the building surfaces were detected sporadically and at relatively low concentrations with the exception of dioxin in the Blue Spruce Building. Chronic exposure to dioxin could result in an elevated cancer risk and non-cancer effects.

Ecological Assessment

A four-step process is utilized for assessing site-related ecological risks for a reasonable maximum exposure scenario: Problem Formulation -- a qualitative evaluation of contaminant release, migration, and fate; identification of contaminants of concern, receptors, exposure pathways, and known ecological effects of the contaminants; and selection of endpoints for further study; Exposure Assessment -- a quantitative evaluation of contaminant release, migration, and fate; characterization of exposure pathways and receptors; and measurement or estimation of exposure point concentrations; Ecological Effects Assessment -- literature reviews, field studies, and toxicity tests, linking contaminant concentrations to effects on ecological receptors; and Risk Characterization -- measurement or estimation of both current and future adverse effects.

The ecological assessment is summarized as follows:

- The most important potential exposure pathway for ecological receptors at the site is associated with chemicals in the sediments and surface water of the unnamed tributary, the drainage ditch, and the Raritan River (wetland area). Aquatic animals could be exposed to the chemicals through direct contact or through ingestion while feeding.

- Chemical concentrations in on-site surface soils are at levels that may potentially impact plants and earthworms. However, on-site habitat for plants and earthworms is limited because of paved areas and compacted gravelly soils.

- The potential exposures to birds and mammals are estimated to be very limited. The site provides very limited habitat for birds and mammals that feed on soil organisms, such as worms, since the site consists primarily of buildings and paved areas.

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 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 contaminants in the media sampled. Consequently, there is significant uncertainty as to the actual levels present. Environmental sample-analysis error can stem from several sources including the errors inherent in the analytical methods and characteristics of the matrix being sampled.

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

Uncertainties in toxicological data occur in extrapolating both from animals and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of contaminants. 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 that may be exposed to the contaminants of concern and is highly unlikely to underestimate actual risks related to exposure.

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

Conclusion

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

REMEDIAL ACTION OBJECTIVES

The following remedial action objectives have been established for the Brook Industrial Park site:

- Reduce risks associated with incidental ingestion of and direct contact with contaminated soils in Area One, Area Two, basements and sediments (wetland area)
- Reduce risks associated with direct contact with contaminated building interiors
- Reduce potential risks associated with ingestion of the overburden and bedrock ground water

To achieve the remedial action objective relating to soils, EPA will utilize the risk-based remediation goals developed for the Brook Industrial Park site and EPA policy. Remediation goals for soils were established based on EPA's policy of calculating the concentration of a chemical which equals a risk of one in one million ($1x10^{-6}$). The goals for chromium (50 ppm), beryllium (1.3 ppm), DDT (17 ppm), aldrin (0.33 ppm) and dieldrin (0.35 ppm) were calculated using this methodology (Table 3). The remediation goal for chromium below five feet is based on a risk of one in one-hundred thousand (500 ppm). These remediation goals were based on the assumption that the site would continue to be used for industrial purposes only. If a residential land-use assumption were used, more stringent remediation goals would likely result. The remediation goal for arsenic (20 ppm) is based on the New Jersey State background concentration. The remediation goals for lead (500 ppm)[2] and PCBs (1 ppm) are based on EPA policy. Because significant contaminant concentrations are present near the ground water table in some areas of the site, soil in these areas will be remediated to the water table (approximately ten feet below ground surface).

The goal for the remediation of the ground water is to restore the aquifer to promulgated federal and New Jersey MCLs and NJGWQS (Tables 9 and 10).

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[2] At the time of the field sampling, the current EPA policy on soil cleanup levels addressing lead was 500 - 1000 ppm. Subsequently, EPA recommended the use of the Uptake Biokinetic Model (UBK) as a risk assessment tool to predict blood lead levels and aid the risk management decision on soil lead cleanup levels at sites. In order to utilize this model, certain site-specific information must be collected. At the time this guidance was issued, the RI for the Brook Industrial Park site was past the field investigation stage and the necessary information to run the UBK was not available. However, when the model is utilized using default parameters, an acceptable soil level of approximately 400 ppm is predicted for lead.

The remedial action objective for the Blue Spruce Building interiors is to remediate areas of the building where dioxin contamination is above 1 ppb.

DESCRIPTION OF REMEDIAL ALTERNATIVES

CERCLA, as amended by SARA, requires that each selected site remedy be protective of human health and the environment, be cost effective, comply with applicable or relevant and appropriate requirements (ARARs), utilize permanent solutions and alternative treatment technologies or resource recovery alternatives to the maximum extent practicable, and be cost effective. 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. Treatment options (e.g., soil washing, biological treatment) were considered during the development of remedial alternatives; however, they were not determined to be effective in remediating the contaminants of concern at the Brook Industrial Park site.

The FS report evaluated five alternatives for remediating the soil, four alternatives for remediating the building interiors and three alternatives for remediating the ground water. The estimated capital cost, operation and maintenance (O&M) cost, and net present worth cost for each alternative discussed below are provided for comparison. The estimated construction timeframes do not include the time needed to procure contracts, negotiate with potentially responsible parties or to perform the design work which would vary depending on the alternative. The implementation timeframe, as discussed under ground water alternatives, is the time required to achieve remediation goals.

SOIL/SEDIMENT REMEDIATION ALTERNATIVES

Alternative SO-1: No Action

Estimated Capital Cost:	none
Estimated Annual O&M Cost:	none
Estimated Present Worth Cost:	$ 64,500
Estimated Construction Timeframe:	none

A No Action alternative is evaluated for every Superfund site to establish a baseline for comparison of remedial alternatives. Under this alternative, no further action would be taken to address contamination at the site. The fence which currently surrounds the site would remain in place, however, it would not be maintained. Likewise, access restrictions to the contaminated Blue Spruce Building would not be maintained. Ground water contamination would continue to migrate from the site. No environmental monitoring activities would be performed other than five-year reviews to determine if contamination has spread. The cost estimate presented above includes the cost to perform this review.

Alternative SO-2: Limited Action

Estimated Capital Cost:	$ 62,200
Estimated Annual O&M Cost:	$ 33,000
Estimated Present Worth Cost:	$536,000
Estimated Construction Timeframe:	1 to 3 months

Under the Limited Action alternative, no measures would be taken to remediate the contamination on the site. However, minimal activities would be carried out to restrict access. This alternative contains provisions for fence maintenance, warning signs, and restriction of access to the Stirling Center basement, tributary, and drainage ditch. Site conditions would be periodically monitored to evaluate the migration of contaminants from the site and to monitor the ground water. As with the No Action alternative, a review would be implemented after five years.

Alternative SO-3: Asphalt Cap

Estimated Capital Cost:	$1,503,000
Estimated Annual O&M Cost:	$ 63,400
Estimated Present Worth Cost:	$2,354,000
Estimated Construction Timeframe:	3 to 6 months

Capping represents an alternative that utilizes containment with no treatment. Capping would eliminate exposure to contaminated soil and reduce the mobility of the soil contaminants by minimizing precipitation infiltration and subsequent leaching of soil contaminants into the ground water. For cost estimation purposes, an asphalt cap with an underlying High Density Polyethylene (HDPE) liner was selected as the representative process option for the capping alternative.

Prior to the construction of the cap, contaminated soils would be excavated from the Stirling Center basement and the subsurface pits and contaminated sediment would be excavated from the drainage ditch (wetland area) and relocated under the area to be capped. The excavated soil in the drainage ditch would be replaced with clean fill and the wetland area would be revegetated. A stormwater collection system would be constructed to collect the increased stormwater runoff.

During construction activities, an air monitoring program would be implemented to assure that no airborne particulate contamination migrates off site. Dust suppression and other appropriate measures would also be undertaken.

Following the installation of the cap, a long-term monitoring program, including five-year reviews, would be conducted to ensure the effectiveness of the remedy. Annual inspections of the cap and ground water monitoring would be performed.

Alternative SO-4: Stabilization

Estimated Capital Cost:	$2,940,000
Estimated Annual O&M Cost:	$ 36,300
Estimated Present Worth Cost:	$3,481,000
Estimated Construction Timeframe:	6 to 9 months

Under this alternative, contaminated soil would be mixed with setting agents, such as cement or lime, to form a hard, durable product on which contaminants would be chemically bound and/or entrapped in the stabilized mass. Approximately 4,600 cubic yards of contaminated soils and sediments would be excavated, stabilized and backfilled. Prior to stabilizing, the contaminated soils in the Stirling Center basement and subsurface pits would be excavated as well as the sediments in the drainage ditch (wetland area). The wetland area would be revegetated. An asphalt cap would be constructed over the stabilized area to reduce the infiltration of precipitation into the treated soils. However, because it is not practicable to cap just those areas, and to ensure the integrity of the cap, a much larger area would need to be capped. A stormwater collection system would be constructed to collect the increased stormwater runoff.

During construction activities, an air monitoring program would be implemented to assure that no airborne particulate contamination migrates off site. Dust suppression and other appropriate measures would also be undertaken.

Following the installation of the cap, a long-term monitoring program, including five-year reviews, would be conducted to ensure the effectiveness of the remedy. Annual inspections of the cap would be performed.

Alternative SO-5: Off-Site Resource Conservation and Recovery Act (RCRA) Landfill

Estimated Capital Cost:	$4,562,000
Estimated Annual O&M Cost:	none
Estimated Present Worth Cost:	$4,562,000
Estimated Construction Timeframe:	1 to 6 months

This alternative consists of the excavation and off-site treatment and disposal of approximately 4,600 cubic yards of contaminated soils and sediments in Area One and Area Two. This includes contaminated soils in the Stirling Center basement and subsurface pits as well as sediments in the drainage ditch (wetland area). The excavated areas would be backfilled with clean fill and the wetland area would be mitigated. Off-site shipment of excavated soil and sediments would be by rail cars, which would require construction of a rail spur. If necessary, excavated material could also be transported by truck.

During construction activities, an air monitoring program would be implemented to assure that no airborne particulate contamination migrates off site. Dust suppression and other appropriate measures would also be undertaken.

BUILDING INTERIORS REMEDIATION ALTERNATIVES

Alternative BI-1: No Action

The No Action alternative for the building interior surfaces is presented as Alternative SO-1 under the soils remedial alternatives. Under that alternative, no measures would be taken to reduce exposures to the contaminated interior building surfaces on the site. Although combined with the No Action alternative for soil, No Action for the interior building surfaces could be independently selected.

Alternative BI-2: Low Pressure Washing with Surface Sealing

Estimated Capital Cost:	$ 244,000
Estimated Annual O&M Cost:	$ 3,000
Estimated Present Worth Cost:	$ 346,000
Estimated Construction Timeframe:	3 to 6 months

Alternative BI-2 involves surface decontamination of the walls and floors with a two-part, non-flammable solvent/detergent-based wash where contamination is present only on the surface. The contaminated liquid generated would be disposed of off site. To reduce the possible exposure to subsurface contamination, it would be necessary to seal the surface with a two-part epoxy coating. The effectiveness of this technology is highly dependent on the depth of contamination. The epoxy coating would require periodic inspection and maintenance to ensure long-term effectiveness.

Alternative BI-3: Carbon Dioxide (CO_2) Blasting with Surface Sealing

Estimated Capital Cost:	$ 332,000
Estimated Annual O&M Cost:	$ 3,000
Estimated Present Worth Cost:	$ 434,000
Estimated Construction Timeframe:	3 to 6 months

Under this alternative, the building interior surfaces would be decontaminated using dry ice pellet blasting. Contaminated concrete and brick removed via this process would be transported to an off-site RCRA-permitted treatment facility. This alternative also includes the sealing of surfaces with a two-part epoxy coating as described in the previous alternative.

Alternative BI-4: Demolition with Off-Site Incineration/Disposal

Estimated Capital Cost:	$1,046,000
Estimated Annual O&M Cost:	none
Estimated Present Worth Cost:	$1,046,000
Estimated Construction Timeframe:	1 to 3 months

This alternative would include the demolition and removal of the entire Blue Spruce Building from the site. Walls common to other buildings would only be removed and replaced if the structural integrity of the adjacent building would not be compromised. Since the material could be contaminated with dioxin, it would be sent to a RCRA-permitted incinerator.

Alternative BI-4(A): Demolition with Off-Site Incineration/Disposal

Estimated Capital Cost:	$ 907,000
Estimated Annual O&M Cost:	$ 3,000
Estimated Present Worth Cost:	$1,009,000
Estimated Construction Timeframe:	1 to 3 months

This alternative would be implemented if the structural integrity of the adjacent building is compromised by removing the common walls as described under Alternative BI-4. This alternative would include demolition and removal of the entire Blue Spruce Building from the site with the exception of the common walls. Contaminated material would be sent to a RCRA-permitted incinerator. To reduce the possible exposure to contamination on the remaining walls, it would be necessary to seal the surface with a two-part epoxy coating.

GROUND WATER REMEDIATION ALTERNATIVES

Alternative GW-1: No Action

The No Action alternative for ground water is presented as Alternative SO-1 under the soils remedial alternatives. Under that alternative, no measures would be taken to reduce exposures to the contaminated ground water. Although combined with the No Action alternative for soil, No Action for the ground water could be independently selected.

Alternative GW-2: Limited Action

Estimated Capital Cost:	$ 62,000
Estimated Annual O&M Cost:	$ 33,000
Estimated Present Worth Cost:	$ 536,000
Estimated Construction Timeframe:	none
Implementation Timeframe:	30 years

This alternative includes a long-term ground water monitoring program and institutional controls to restrict the use of the ground water. The monitoring program would consist of annual ground water sampling over a 30-year period to determine the movement of the contaminated water. This alternative also includes five-year reviews.

Alternative GW-3: Ground Water Extraction and Treatment

This alternative includes ground water extraction wells to remove the contaminated ground water prior to on-site treatment. Contaminated ground water is present in both the overburden and bedrock aquifers. It is estimated that a pumping rate of 250 gallons per minute (gpm) would be required to prevent off-site migration of the contaminated ground water. For purposes of cost estimation, a ground water model was used to characterize ground water flow and develop an extraction system. It is estimated that two extraction wells screened over the entire saturated thickness of the aquifer would be required to provide the desired extraction rate. The existing on-site production well would be considered in the overall remedial design of the extraction system. Also, two discharge options, reinjection into the aquifer and discharge to the Raritan River, were evaluated. A five-year review would be performed as part of the long-term monitoring program.

Under this alternative, several treatment options were evaluated and are presented below:

Alternative GW-3(A): Chemical Precipitation and Air Stripping/Carbon Adsorption

River Discharge:

Estimated Capital Cost:	$ 1,521,000
Estimated Annual O&M Cost:	$ 342,000
Estimated Present Worth Cost:	$ 5,833,000
Estimated Construction Timeframe:	6 to 12 months
Implementation Timeframe:	30 years

Reinjection:

Estimated Capital Cost:	$ 1,664,000
Estimated Annual O&M Cost:	$ 342,000
Estimated Present Worth Cost:	$ 5,976,000
Estimated Construction Timeframe:	6 to 12 months
Implementation Timeframe:	30 years

Treatment of extracted ground water would consist of chemical precipitation to remove inorganic contaminants, followed by air stripping and carbon adsorption to remove the organic contamination. The chemical precipitation process produces an insoluble matrix which adsorbs and coprecipitates heavy metals. The VOCs are then removed through air stripping which is a mass transfer process in which VOCs are transferred to air blown in at the bottom of the tower. The remaining organic compounds would be treated through carbon adsorption. Environmental monitoring would be required during the life of the process.

Alternative GW-3(B): Chemical Precipitation and Ultraviolet (UV)/Oxidation

River Discharge:

Estimated Capital Cost:	$ 1,881,000
Estimated Annual O&M Costs:	$ 539,500
Estimated Present Worth Cost:	$ 8,641,000
Estimated Construction Timeframe:	6 to 12 months
Implementation Timeframe:	30 years

Reinjection:

Estimated Capital Cost:	$ 2,023,000
Estimated Annual O&M Cost:	$ 540,000
Estimated Present Worth Cost:	$ 8,783,000
Estimated Construction Timeframe:	6 to 12 months
Implementation Timeframe:	30 years

Treatment of extracted ground water would consist of chemical precipitation to remove inorganic contaminants, followed by UV/Oxidation to remove the organic contaminants. Chemical precipitation is described in Alternative GW-3(A). UV/Oxidation consists of mixing the extracted ground water with metered doses of an oxidant and exposing the mixture to UV light to form hydroxyl radicals which eventually break down to carbon dioxide, water and non-hazardous salts.

Alternative GW-3(C): Chemical Precipitation and Biological Treatment

River Discharge:

Estimated Capital Cost:	$ 2,290,000
Estimated Annual O&M Cost:	$ 533,000
Estimated Present Worth Cost:	$ 8,969,000
Estimated Construction Timeframe:	6 to 12 months
Implementation Timeframe:	30 years

Reinjection:

Estimated Capital Cost:	$ 2,432,000
Estimated Annual O&M Cost:	$ 533,000
Estimated Present Worth Cost:	$ 9,111,000
Estimated Construction Timeframe:	6 to 12 months
Implementation Timeframe:	30 years

Treatment of the extracted ground water consists of chemical precipitation to remove inorganic contaminants followed by powdered activated carbon treatment (PACT) to remove organics. Chemical precipitation is described in Alternative GW-3(A) above. PACT treatment is a combination of biological activated sludge and activated carbon treatment.

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

In accordance with the NCP, a detailed analysis of each remedial alternative was performed with respect to the nine evaluation criteria. This section discusses and compares the performance of the remedial alternatives under consideration against these criteria. These criteria were developed to address the requirements of Section 121 of CERCLA to ensure that all important considerations are factored into remedy selection decisions. All selected remedies must at least satisfy the Threshold Criteria. The selected remedy should provide the best trade-offs among the Primary Balancing Criteria. The Modifying Criteria are evaluated following the public comment period.

Threshold Criteria

1. Overall protection of human health and the environment addresses whether or not a remedy 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 or relevant and appropriate requirements (ARARs) considers whether or not a remedy would meet all of the applicable or relevant and appropriate requirements of other federal and state environmental

statutes and requirements or provides grounds for invoking a waiver.

Primary Balancing Criteria

3. Long-term effectiveness and permanence refers to the ability of a remedial alternative to maintain reliable protection of human health and the environment over time, once cleanup goals have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.

4. Reduction of toxicity, mobility, or volume through treatment addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity, mobility or volume of hazardous substances as a principal element.

5. Short-term effectiveness considers the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

6. Implementability refers to the technical and administrative feasibility of a remedial alternative, including the availability of materials and services needed to implement the alternative.

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

Modifying Criteria

8. State acceptance indicates whether, based on its review of the RI/FS reports and Proposed Plan, the state supports, opposes, and/or has identified any reservation with the preferred alternative.

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

Comparisons

The three categories of contaminated media (i.e., soil, ground water and building interiors) are evaluated separately utilizing the above criteria. A comparative analysis of the remedial alternatives, based upon the evaluation criteria noted above, follows.

SOIL/SEDIMENT REMEDIATION ALTERNATIVES

Overall Protection of Human Health and the Environment

Soil Alternative SO-1, No Action, would not provide protection of human health or the environment or any effective remediation in the long or short term. Alternative SO-2, Limited Action, provides minimal protection of human health and the environment through the maintenance of fencing and implementation of a monitoring program.

Alternatives SO-3, Asphalt Cap, and SO-4, Stabilization, provide a limited degree of protection of human health and the environment. Alternative SO-3, Asphalt Cap, reduces the possibility of direct contact with contaminated soils and, therefore, reduces human health risks associated with that particular exposure pathway. However, the existing contaminated soil would remain on the site. Alternative SO-4, Stabilization, also reduces the possibility of direct contact with the contaminated soils through immobilization and containment. Although contaminated soil would remain on site under Alternatives SO-3 and SO-4, further migration of contaminants into the ground water is reduced by minimizing infiltration and leaching of contaminants into the ground water. However, because contaminants are immobilized, Alternative SO-4 is more protective than Alternative SO-3.

Alternative SO-5, Off-site Treatment and Disposal, is protective of human health and the environment because contaminants are removed from the site for appropriate treatment and/or disposal. Under Alternative SO-5, further migration of contaminants into the ground water is eliminated. This alternative allows for full industrial use of the property in the future.

Wetlands would be assessed during design to determine the need for mitigation measures or restoration if they would be potentially impacted by remedial action under any of the alternatives.

Compliance with ARARs

Section 121(d) of CERCLA, as amended, requires that remedies for Superfund sites comply with federal and state laws and regulations that are applicable and legally enforceable. Remedies must also comply with the requirements of laws and regulations that are not applicable, but are relevant and appropriate. Applicable requirements are defined as cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, remedial action, location or other circumstance at a Superfund site. Relevant and appropriate requirements are defined as substantive environmental protection requirements, criteria or limitations promulgated under federal or state law that, while not "applicable" to a hazardous substance, pollutant, remedial action, location or circumstance at a Superfund site, address problems or situations sufficiently similar to those encountered at the Superfund site that their use is well suited to the particular site.

EPA has divided ARARs into three categories to facilitate their identification:

> Action-specific ARARs are usually technology or activity based requirements or limitations on actions or conditions involving specific substances.
>
> Chemical-specific ARARs are usually health or risk-based numerical values or methodologies used to determine acceptable concentrations of chemicals that may be found in or discharged to the environment.
>
> Location-specific ARARs restrict actions or contaminant concentrations in certain environmentally sensitive areas. Examples of areas regulated under various federal laws include floodplains, wetlands and locations where endangered species or historically significant cultural resources are present.

Alternatives SO-1, No Action, and SO-2, Limited Action, do not comply with ARARs or the established remediation goals as shown in Tables 14 and 3, respectively. Since Alternatives SO-1 and SO-2 do not meet the threshold requirements of overall protection of human health and the environment or compliance with ARARs, they will not be considered further in the evaluation of alternatives.

Alternatives SO-3, Capping, and SO-4, Stabilization, also do not comply with established remediation goals, however, these alternatives prevent direct contact with and migration of contaminants through containment and/or immobilization. Soil Alternative SO-5, Off-site Treatment and Disposal, satisfies the remediation goals established for the site. Alternatives SO-3, SO-4 and SO-5 would be designed to meet all applicable RCRA requirements. In addition, Alternative SO-5 would satisfy RCRA Land Disposal Restrictions. The contaminated soils would be transported according to Department of Transportation requirements to an appropriately regulated facility.

Because of the presence of wetlands in the area to be excavated, wetlands mitigation or restoration requirements would be complied with for all alternatives. This determination would be made during remedial design.

Long-Term Effectiveness And Permanence

Alternative SO-5, Off-Site Treatment and Disposal, has the highest degree of permanence of all the alternatives since contaminated soil would be excavated and appropriately treated and/or disposed of off site, and replaced by clean fill. The long-term effectiveness of Alternative SO-4, Stabilization, is less certain than Alternative SO-5 since contaminants remain on site. This alternative relies on the ability of soil-stabilizing techniques to permanently immobilize the contaminants and a cap to protect the integrity of the stabilized product. Continued maintenance of the cap would be required for an indefinite period of time. Alternative SO-3, Capping, is the least certain of the three remaining alternatives because its effectiveness relies solely on the integrity of the cap. Continued maintenance of the cap under Alternative SO-3 would be required for an indefinite period of time.

Reduction of Toxicity, Mobility, and Volume Through Treatment

Alternative SO-5 reduces the toxicity, mobility and volume of contaminants through excavation and off-site treatment and/or disposal of soils with contamination above the site remediation goals. Under this alternative, all soils classified as a RCRA hazardous waste would be treated prior to disposal, thereby reducing the toxicity of contaminated soil. This alternative also reduces the mobility of contaminants by containing the soils in a regulated landfill. Alternative SO-4, Stabilization, involves mixing contaminated soils with binding agents to immobilize the waste, thereby relying solely on the reduction of mobility. The long-term stability of the treated waste would need to be evaluated over time to assure the protectiveness of the treatment along with periodic maintenance of the cap. Toxicity is not reduced under Alternative SO-4. Also, this alternative increases the volume of contaminated material due to the addition of the binding material. Alternative SO-3, Capping, uses no form of treatment and relies solely on the ability of the cap to prevent direct contact and to reduce soil contamination from further adversely affecting surface water and ground water. Under Alternative SO-3, toxicity and volume are not reduced.

Short-Term Effectiveness

Alternative SO-3, Capping, involves the least intrusive activity and, as a result, poses the least threat to workers and the surrounding community. It is estimated that Alternative SO-3 would take one month to construct. Alternatives SO-4 and SO-5 involve excavation of soil and, therefore, would require measures to manage a short-term risk due to fugitive dust emissions. The construction contractor would be required to implement a health and safety plan to protect nearby residents and on-site workers. In addition, Alternative SO-5 involves off-site transportation which would temporarily increase the amount of truck traffic during construction, if that method of transportation were used. Alternative SO-4 requires an estimated three months to construct and Alternative SO-5 requires an estimated one month to construct. Under all alternatives, coordination with operating facilities would be conducted in order to minimize disruptions to the businesses.

Implementability

Alternative SO-3, Capping, is the easiest of the alternatives to implement and uses commonly available materials and equipment. The proposed asphalt cap is technically feasible to construct, however, it would increase the elevation of the site which would impact the operation of the on-site facilities (e.g., loading dock facilities). Alternative SO-5, Off-site Treatment and Disposal, is also easy to implement, provided that existing landfills continue to be able to receive the waste at the time the remediation occurs. Alternative SO-4, Stabilization, although successful in remediating inorganic contaminants, is more complicated to implement. Pilot-scale testing would need to be conducted in order to carefully determine the operating parameters of the system. In addition, the volume of soil to be placed back on site would be increased by approximately 25 percent of the pre-treatment volume.

Cost

Estimated capital costs, annual O&M costs, total present worth costs and the implementation timeframes are summarized in Table 11. Present worth costs are based on a 30-year period and a discount rate of 7 percent.

Alternative SO-3, Capping, is the least costly alternative, however, it is the only alternative that does not include any form of treatment. Alternative SO-4, Stabilization, is more costly than capping, and contaminated soil remains on site. However, the contaminants are immobilized in the bound material matrix. Alternative SO-5, Off-site Treatment and Disposal, is the most costly, however, it is the only alternative that provides for permanent reduction in toxicity, mobility and volume.

State Acceptance

The State of New Jersey concurs with the soil remedial actions which constitute the selected remedy. However, if institutional controls are not established, the State cannot concur with the selected remedy for soil.

Community Acceptance

Issues raised during the public comment period and at the public meeting held on August 4, 1994, are addressed in the Responsiveness Summary section of this ROD. Comments received during the public comment period indicated that the local residents were generally satisfied with the preferred alternative for the cleanup of contaminated soil. The PRP community did indicate a preference for capping the site.

BUILDING INTERIORS REMEDIATION ALTERNATIVES

Overall Protection of Human Health and the Environment

The No Action Alternative, BI-1, is not protective of human health and the environment. The risk of exposure to contaminated building interiors would not be reduced by any degree under this alternative. All other remedial alternatives reduce the current and future risks associated with direct contact with building interior surfaces and, as a result, are protective of human health and the environment to some degree. Alternative BI-2, Washing/Surface Sealing, and Alternative BI-3, CO_2 Blasting/Surface Sealing, use surface sealing as the primary isolation mechanism. Inspection and maintenance of the sealed surface would continue for an indefinite period of time to assure protection of human health and the environment. Alternative BI-4, Demolition and Off-site Disposal, removes the contaminated portion of the building, thereby removing the contaminants and protecting human health and the environment.

Compliance with ARARs

Alternative BI-1, No Action, would not comply with ARARs (Table 14) or the remedial action objective for building interiors. Alternatives BI-2, Washing/Surface Sealing, and BI-3, CO_2 Blasting/Surface Sealing, comply with the remedial action objective of reducing risk due to direct contact, however, contaminants would remain on site. Alternative BI-4, Demolition and Off-site Disposal, also complies with the remedial action objective as well as RCRA regulations for disposal of contaminated construction debris.

Because the No Action alternative does not meet the threshold requirements of protection of human health and the environment or compliance with ARARs, it will not be considered further in the evaluation of alternatives.

Long-Term Effectiveness and Permanence

Alternative BI-2, Washing/Surface Sealing, and Alternative BI-3, Co_2 Blasting/Surface Sealing, remove only the surface contamination. Both alternatives rely on sealing to prevent contact with subsurface contamination. As a result, these alternatives are effective only if the sealant is maintained and re-applied periodically. Inspections would need to be conducted over the lifetime of the building. Alternative BI-4, Demolition and Off-site Disposal, provides the only permanent remedy.

Reduction of Toxicity, Mobility, and Volume Through Treatment

None of the alternatives employ treatment except for that used for the disposal of residual, contaminated material or washing solution, or incineration of the dioxin contaminated building materials. Alternatives BI-2, Washing/Surface Sealing and BI-3, CO_2 Blasting/Surface Sealing, reduce the toxicity and volume of contaminants by removing surface contamination. Mobility is also reduced through containment. Alternative BI-4 reduces the toxicity, mobility and volume of contaminants through demolition and off-site treatment/disposal.

Short-Term Effectiveness

Alternative BI-2, Washing/Surface Sealing, and Alternative BI-3, CO_2 Blasting, are expected to take approximately three months to construct. Alternative BI-4, Demolition and Off-site Disposal, is expected to take one month to implement. Remediation workers could be potentially exposed to solvent mixtures during implementation of Alternative BI-2, and to airborne dust during implementation of Alternatives BI-3 and BI-4. Personal protective equipment and dust control practices can be used to manage the short-term risk.

While there would be some increase in traffic as a result of off-site disposal of the demolished building materials, coordination with local authorities would allow the development of safe transportation measures. Minimal disruption to the operating facilities is anticipated.

Implementability

All alternatives are relatively easy to implement, use widely available equipment and materials, and use well-established methods. However, where the contaminants have penetrated below the concrete or brick surface, it may be difficult to attain remediation objectives using the technologies discussed in Alternatives BI-2, Washing/Surface Sealing, and BI-3, CO_2 Blasting, since sub-surface contamination may not be removed.

Cost

Estimated capital costs, annual O&M costs, total present worth costs and the implementation timeframes are summarized in Table 12. Present worth costs are based on a 30-year period and a discount rate of 7 percent.

Alternative BI-2, Washing/Surface Sealing, is the least costly alternative. Alternative BI-3, CO_2 Blasting, is not much more expensive than Alternative BI-2. However, BI-2 and BI-3 provide for reduction of mobility of contaminants only by containment. These alternatives would require maintenance for the lifetime of the building. Alternative BI-4, Demolition and Off-site Disposal, is the most expensive, however, it provides for reduction of toxicity, mobility and volume through treatment.

State Acceptance

The State of New Jersey supports the building interiors remedial action called for by the selected remedy.

Community Acceptance

Issues raised during the public comment period and at the public meeting held on August 4, 1994, are addressed in the Responsiveness Summary section of this ROD. Comments received during the public comment period indicated that the local residents were generally satisfied with the preferred alternative for the cleanup of contaminated building interiors. The PRP community did indicate a preference for sealing the contaminated building interiors.

GROUND WATER REMEDIATION ALTERNATIVES

Overall Protection of Human Health and the Environment

Alternative GW-1, No Action, does not provide protection of human health and the environment or any effective remediation of the contaminated ground water. Contaminated ground water would be governed by natural attenuation, and may likely spread over a wider area. Alternative GW-2, Limited Action, relies on institutional controls for the protection of human health. The risk due to exposure to contaminated ground water is only reduced by restricting its use as a potable water supply. The Ground Water Extraction and Treatment Alternative, GW-3, Options A, B and C, are protective of human health and the environment. This alternative would reduce contaminant levels in the ground water to below MCLs or NJGWQS, reduce the non-carcinogenic risks to acceptable levels, and reduce the carcinogenic risk to below $1X10^{-6}$, thus protecting human health and the environment.

Compliance with ARARs

Alternative GW-2, Limited Action, does not remediate contaminated ground water or comply with ARARs (MCLs or NJGWQS). Concentrations of chemicals in the aquifer would continue to exceed MCLs or NJGWQS. The treated discharge under Alternative GW-3, Ground Water Extraction and Treatment, would achieve MCLs or NJGWQS in the aquifer if reinjection is implemented, or surface water quality standards if surface water discharge is used, thus complying with chemical-specific and action-specific ARARs. Under Alternative GW-3(A), all applicable air quality standards would be met. In addition, any treatment residuals generated under GW-3 Options A, B and C would be managed in accordance with ARARs. Also, location-specific ARARs regarding construction activities in a floodplain would be satisfied.

Because of the presence of wetlands, wetlands mitigation or restoration requirements would be complied with for Alternative GW-3.

Since Alternatives GW-1 and GW-2 do not meet the threshold requirements of overall protection of human health and the environment or compliance with ARARs, they will not be considered further in the evaluation.

Long-Term Effectiveness and Permanence

Alternative GW-3, Options A, B and C, provides long-term effectiveness by preventing further migration of the contaminated ground water and treating contaminated ground water so that the aquifer would meet ARARs. This results in significant reduction of risk to human health and the environment. Alternative GW-3 would be consistent with the long-term effectiveness goals for the site by treating the ground water until MCLs or NJGWQS in the aquifer are achieved. The estimated timeframe to achieve remediation goals is 30 years. A long-term performance monitoring program would confirm the effectiveness of the remedy.

An assessment would be made during the design of the remedy to ensure that any adverse impacts to the wetland areas would also be mitigated. If appropriate, some of the treated ground water could be discharged to the wetland areas to help offset any dewatering effects created by ground water extraction.

Reduction of Toxicity, Mobility and Volume Through Treatment

Alternative GW-3, Options A, B and C, reduces the toxicity, mobility and volume of the contaminants of concern through extraction and treatment of the ground water. The toxicity and volume would be reduced by treating the ground water until MCLs or NJGWQS are achieved. The extraction system would be designed to prevent migration of the contaminant plume during remediation, thus reducing the mobility of the contaminant plume. The residual sludge, generated from the chemical precipitation of inorganic contaminants under GW-3, Options A, B and C, will be disposed of properly. Under Option A, Air Stripping, there will be controls in place to prevent an unacceptable release of contaminants to the environment. Under Option C, the biological sludge will be disposed of properly.

Short-Term Effectiveness

All treatment options under Alternative GW-3 do not create any significant short-term, health-related concerns beyond those associated with normal construction activities. The construction contractor would be required to implement a health and safety plan to protect nearby residents and on-site workers. Increased traffic during construction, and transportation of treatment residuals, is expected. Under all alternatives, coordination with operating facilities would be conducted in order to minimize disruptions to the businesses.

An assessment would be made during the design of the remedy to ensure that any adverse impacts to the wetland areas are mitigated.

The construction period for all options under Alternative GW-3 is estimated to be six months, however, Option GW-3C, Biological Treatment, requires a treatability study, which increases the timeframe required for design of the system. It is estimated that it would take 30 years to achieve MCLs or NJGWQS under Alternative GW-3.

Implementability

All options under Alternative GW-3 are technically feasible, however, each alternative differs in the complexity of implementation. Options GW-3A, GW-3B and GW-3C include chemical precipitation for the removal of inorganic contaminants. This technology is readily available and widely used in wastewater treatment. Option GW-3A, Air Stripping, is the easiest to implement. Air Stripping is a proven and widely used method for removing VOCs and is readily available. Option GW-3B, UV/Oxidation, is an innovative technology that has been used at industrial sites for the removal of organic contaminants and is available. Option GW-3C, Biological Treatment, would require treatability studies to provide design information, verify removal efficiencies, and determine the size of the unit. Option GW-3C also generates additional sludge from the biological treatment unit, which would require disposal. The availability of the treatment unit is limited.

Discharge to surface water is technically easier to implement than reinjection ground water due to the relative ease of maintenance. Reinjection to ground water is also implementable, however, because of potential operational problems due to difficulty in recharging the volume of water treated or clogging of the reinjection wells, additional maintenance may be required. In addition, placement of the reinjection system upgradient of the plume may be difficult to implement because of space limitations.

Cost

Estimated capital costs, annual O&M costs, total present worth costs and the implementation timeframes are summarized in Table 13. Present worth costs are based on a 30-year period and a discount rate of 7 percent.

The costs of the three treatment options under Alternative GW-3 are relatively similar, with Option GW-3A being the least expensive, followed by Option GW-3B. Option GW-3C is the most expensive. With respect to the discharge options, surface water discharge may be less expensive and require less maintenance than reinjection.

State Acceptance

The State of New Jersey supports the ground water remedial action called for by the selected remedy.

Community Acceptance

Issues raised during the public comment period and at the public meeting held on August 4, 1994, are addressed in the Responsiveness Summary section of this ROD. Comments received during the public comment period indicated that the local residents were generally satisfied with the preferred alternative for the cleanup of contaminated ground water. The community did express some reservations regarding the potential release of VOCs into the atmosphere. As noted in the Responsiveness Summary, there will be controls in place to prevent an unacceptable release of contaminants to the environment.

THE SELECTED REMEDY

After careful review and evaluation of the alternatives presented in the feasibility study, and consideration of all evaluation criteria, EPA presented Alternative SO-5, Excavation and Off-site Treatment and Disposal for soils; Alternative BI-4, Demolition and Off-site Incineration/Disposal for the contaminated Blue Spruce Building, which includes Option A if necessary; and Alternative GW-3(A), Ground Water Extraction, Chemical Precipitation, Air Stripping and Reinjection for ground water, to the public as the preferred remedy.

The input received during the public comment period is presented in the Responsiveness Summary section of this ROD. Public comments did not necessitate any changes to the preferred alternatives. Accordingly, the preferred alternatives have been selected by EPA and supported by NJDEP, as the remedial solution for the site. This is the final remedy for the site.

The remedy includes the following components:

Soils

- Excavation of soil in Area One and Area Two, the soil in the Stirling Center basement and the sediment in the National Metal pits;
- Off-site treatment and disposal of the contaminated soil;
- Backfilling of the excavated areas with clean fill; and
- Mitigation of the Wetland Area as appropriate.

The remedy and associated cleanup goals for soils were based on continued use of the property for commercial or industrial purposes.

Building Interior

- Demolition and off-site disposal of the dioxin-contaminated material from the Blue Spruce Building;
- Sealing of the common walls if demolition compromise the structural integrity of the adjacent facilities; and
- Maintenance of the sealed walls over the lifetime of the building.

Ground Water

- Installation of ground water extraction wells;
- Treatment of the contaminated ground water by chemical precipitation and air stripping;
- Reinjection of the treated ground water into the aquifer (if it is determined during design that reinjection is not feasible, the treated ground water would be discharged to the Raritan River); and
- Long-term monitoring which will include five-year reviews.

While EPA plans to treat the extracted ground water to levels attaining federal and New Jersey MCLs and NJGWQS, if the reinjection of treated ground water will be within the zone of capture of the extraction system, EPA may treat to less stringent levels. However, the aquifer restoration goal will be to attain the more stringent of the federal and New Jersey MCLs and NJGWQS.

Some additional activities will be performed during the remedial design and remedial action phases for the site. These activities are described below.

- An analysis will be made during the remedial design to ensure that any adverse impacts to any wetland areas will be mitigated. If appropriate, some of the treated ground water could be discharged to the wetland areas to help offset any dewatering effect created by ground water extraction.

- Additional ground water information will be collected during remedial design in order to conduct ground water modeling to evaluate the hydrologic effects of the remedy and to design the extraction and reinjection systems.

- Since the remedial action will occur within the 100-year and 500-year floodplains, additional floodplain assessment work will be conducted as necessary.

Contingency Measures

As previously discussed, the goal of the ground water remedial action is to restore the ground water to the more stringent of the New Jersey MCLs, Federal MCLs and the NJGWQS. Based on information obtained during the RI, EPA believes that the selected remedy will achieve this goal.

It may become apparent, during the implementation or operation of the ground water extraction system, that contaminant levels have ceased to decline and are remaining constant at levels higher than the drinking water standards over some portion of the contaminant plume. In that case, the performance standards and/or the remedy may be re-evaluated.

The selected remedy will include ground water extraction for a period which is presently estimated to be 30 years (but which, depending upon the degree of contaminant reduction, may ultimately be a longer or shorter period), during which the system's performance will be carefully monitored on a regular basis and adjusted as warranted by the performance data collected during operation. Modifications may include, but may not be limited to, any or all of the following:

- Discontinuing pumping at individual wells where cleanup goals have been attained.

- Alternating pumping at wells to eliminate stagnation.

- Pulse pumping to allow aquifer equilibration and to allow adsorbed contaminants to partition into ground water.

- Installing additional extraction wells to facilitate or accelerate cleanup of the contaminant plume.

During the performance of the long-term monitoring program, EPA may determine that the remedial action objective has been met. Periodic monitoring will be used to reassess the time frame and the technical practicability of achieving cleanup goals.

With respect to soil remediation, if dioxin contamination is detected above 1 ppb during design or excavation activities, the contaminated soil would be remediated.

Upon meeting all remedial objectives, or determining that the site has been sufficiently purged of contaminants so that human health is no longer threatened, EPA will initiate proceedings to delete the site from the NPL.

STATUTORY DETERMINATIONS

Superfund remedy selection is based on CERCLA as amended and the regulations contained in the NCP. Under its legal authorities, EPA's primary responsibility in selecting remedies at Superfund sites is to undertake 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 remedy must comply with ARARs unless a statutory waiver is justified. The selected remedy must also 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 the hazardous wastes, as their principal element. The following sections discuss how the selected remedy meets these statutory requirements for the Brook Industrial Park site.

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy protects human health and the environment by removing contaminated soils and the contaminated Blue Spruce Building and by reducing the levels of contaminants in the ground water through extraction and treatment of the contaminant plume.

There are few short-term risks associated with the implementation of this remedy. Where excavation occurs, dust suppression measures can reduce risk of inhalation of contaminated soils. While no cross-media impacts are expected from the remedy, any environmental impacts associated with site-related contaminants or remedial activities will be addressed in the remedial design.

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The selected remedy will be designed to meet all chemical-specific, action-specific and location-specific ARARs and site-specific remediation goals. These ARARs and remediation goals are listed in Tables 14 and 3, respectively.

Chemical-Specific ARARs

The contaminants of concern for the soils will be remediated to meet EPA risk-based remediation goals or policy remediation goals. The remediation goals are listed in Table 2. All soils that exceed these levels will be excavated to the average ground water table (approximately 10 feet below ground surface). During excavation, confirmatory sampling will be conducted around the perimeter of the excavation zone to ensure complete removal of soils exceeding remediation goals. The soil will be transported off site for treatment and disposal in accordance with all applicable RCRA regulations.

The contaminants of concern for the ground water will be remediated to meet the more stringent of the federal or state MCLs or the NJGWQS.

Location-Specific ARARs

The soil and ground water remediation will be designed and constructed to minimize the disturbance of areas identified as wetlands and to comply with the requirements of Executive Order No. 11990 for the Protection of Wetlands and the New Jersey Wetlands Act of 1970. Before initiating remedial activities, an assessment of the wetlands will be performed to determine the potential impact of the remedial action. If necessary, a detailed plan for wetland mitigation or restoration will be developed. Also, since the site lies in a floodplain, all ARARs governing construction activities in a floodplain will be met. The project area is not sensitive to the discovery of cultural resources. Therefore, no additional investigation is considered necessary.

Action-Specific ARARs

All contaminated material exceeding remediation goals will be transported off site in accordance with RCRA regulations to a properly permitted facility. The construction debris from the Blue Spruce Building will be segregated, if possible, according to the level of contamination, for appropriate management.

Dust suppressants and other appropriate control measures will be used if necessary during soil excavation and building demolition to minimize dust emissions. Air monitoring will be conducted to ensure compliance with ARARs.

In order to mitigate risks, a site health and safety plan will be developed and implemented. This plan will address personal protective equipment for remediation workers, dust suppressant mechanisms and operation safety.

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

EPA has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner for the Brook Industrial Park site. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA and the State of New Jersey have determined that the selected remedy provides the best balance of trade-offs in terms of long-term effectiveness and permanence, short-term effectiveness, implementability and cost, and considering the statutory preference for treatment as a principal element and State and community acceptance.

Preference for Treatment as a Principal Element

By treating the contaminated soils and ground water, the selected remedy addresses the principal threats posed by the site through the use of treatment technologies. Therefore, the statutory preference for remedies that employ treatment as a principal element is satisfied.

Cost Effectiveness

The selected remedy is cost-effective because it provides the highest overall effectiveness relative to its cost. The remedy provides for protection of the human health and the environment.

DOCUMENTATION OF SIGNIFICANT CHANGES

There are no significant changes from the preferred alternative presented in the Proposed Plan.

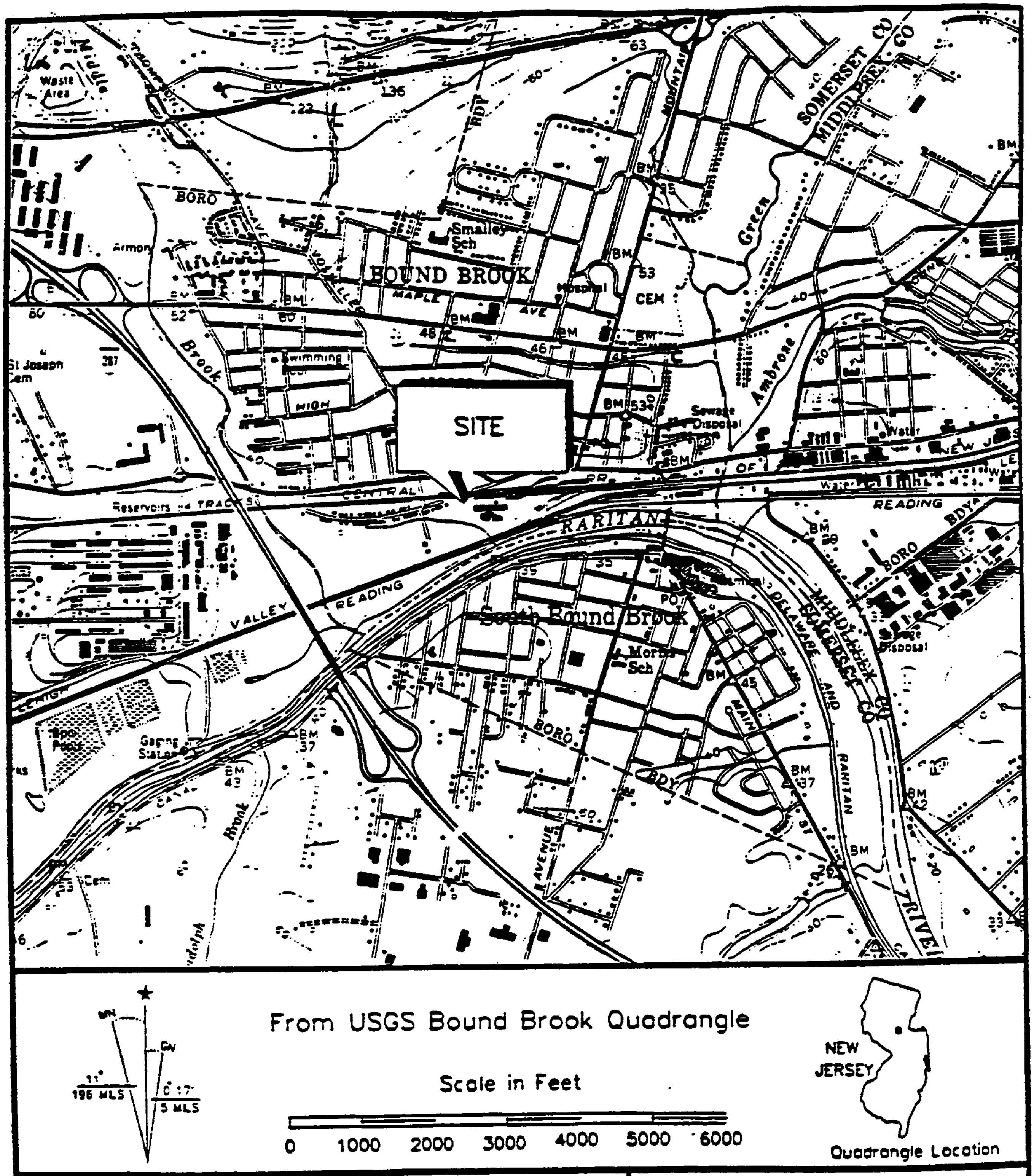


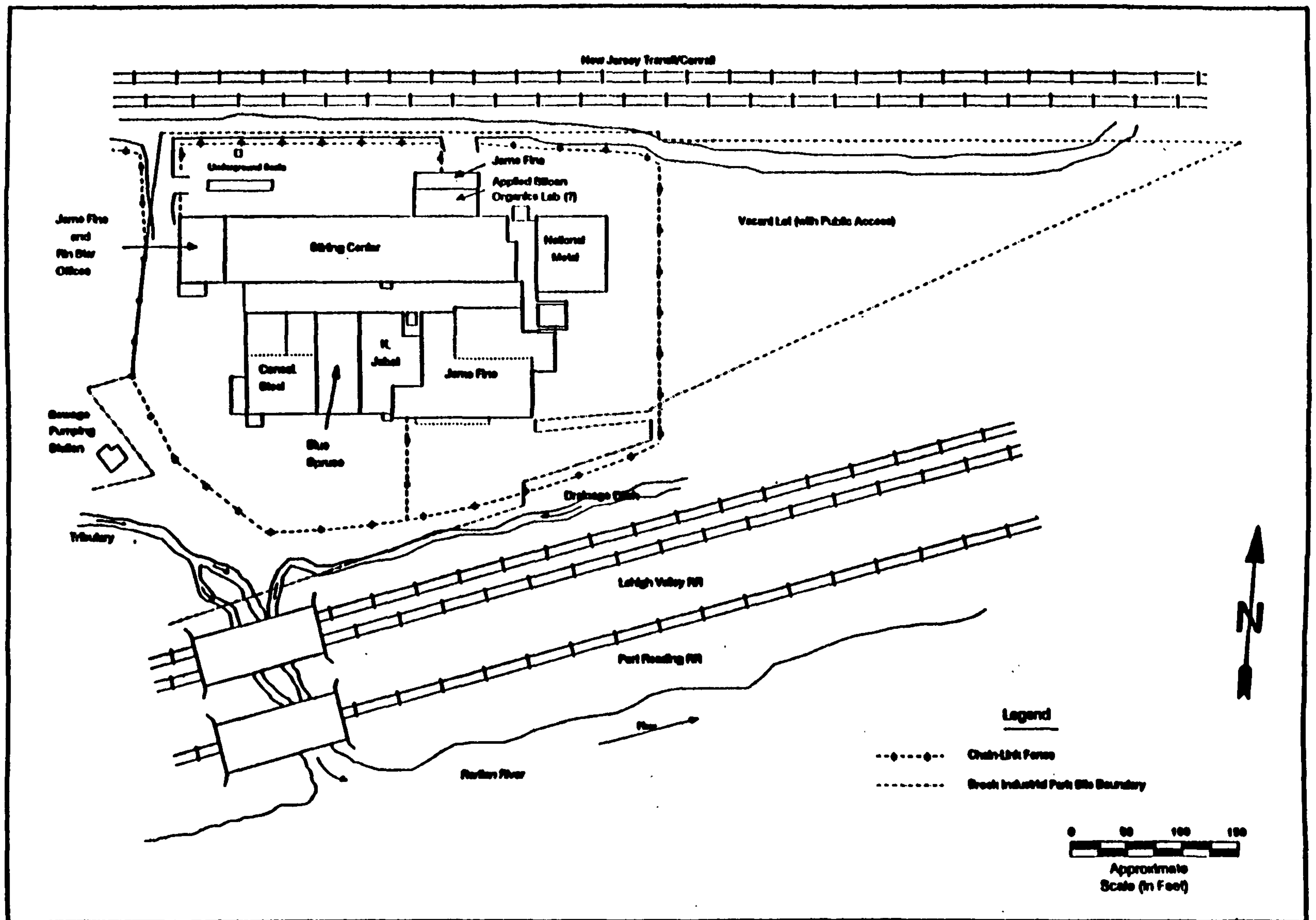
Figure 1–1

Site Location Map

Brook Industrial Park

Bround Brook, NJ

FIGURE 2



BROOK INDUSTRIAL PARK SITE
BOUND BROOK, SOMERSET COUNTY, NJ

FIGURE 3

SITE MAP
DEPICTING EXTENT OF SOIL CONTAMINATION

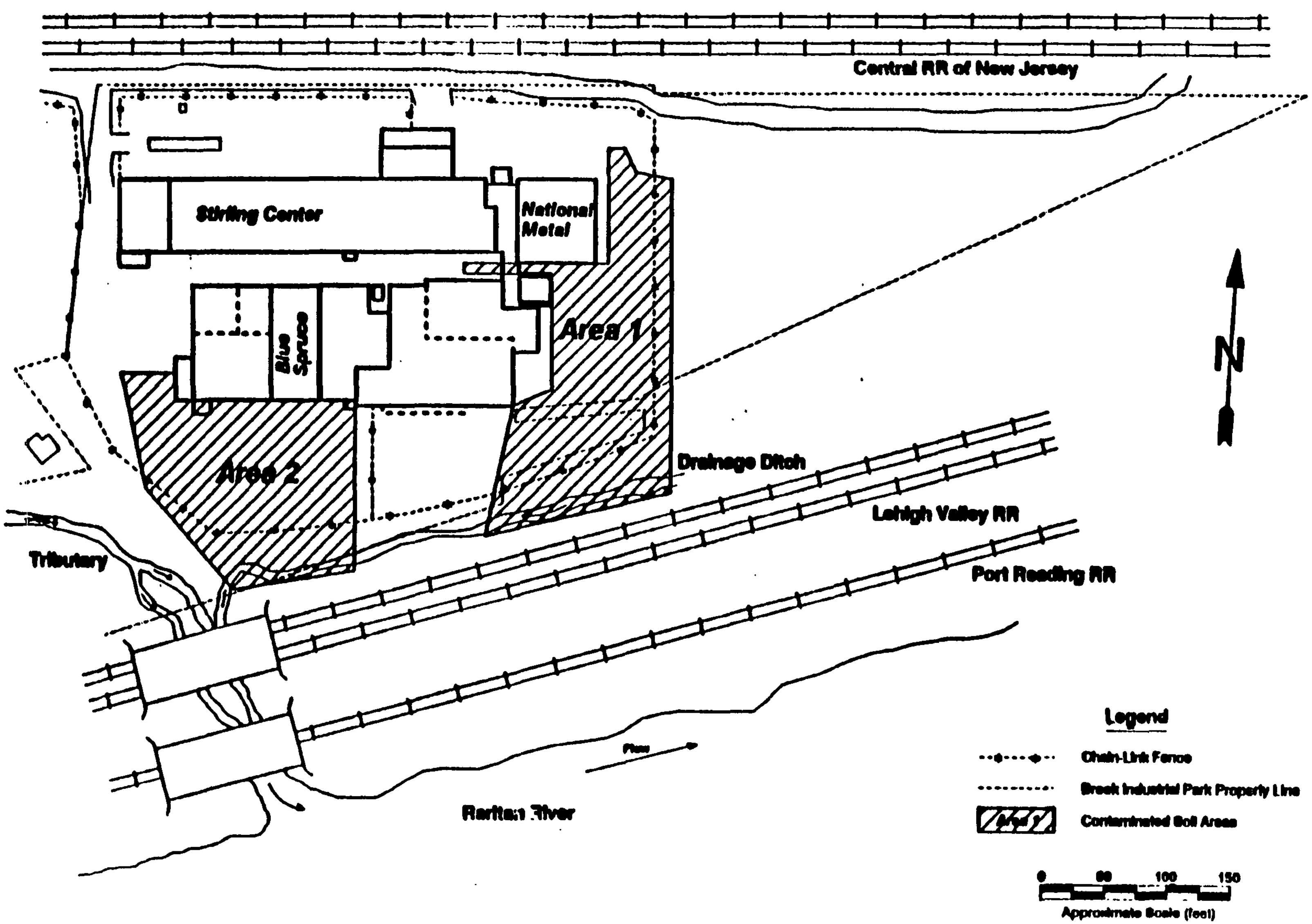


FIGURE 4

SITE MAP
OVERBURDEN GROUNDWATER CONTAMINATION CONTOURS

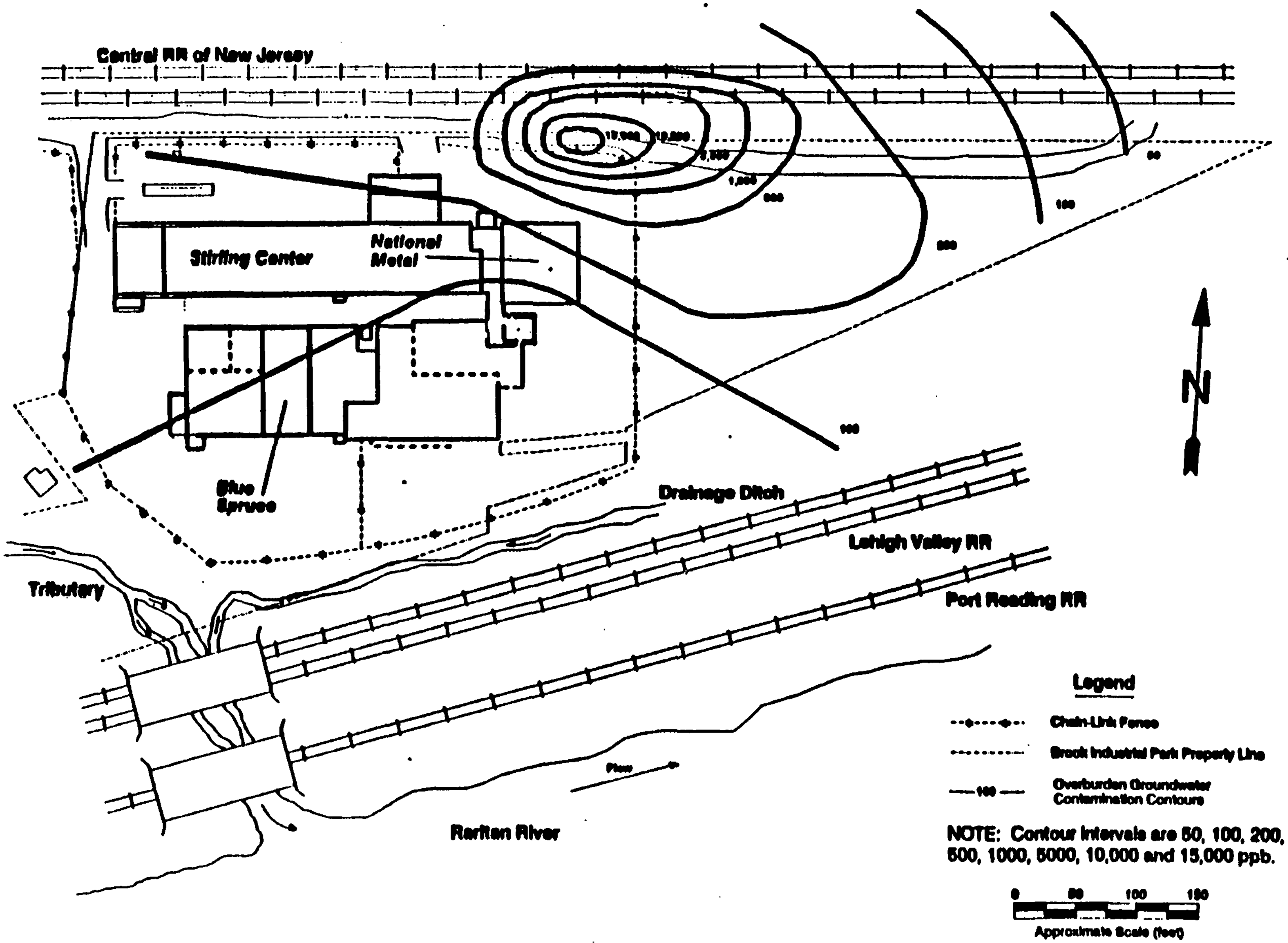


FIGURE 5

SITE MAP
BEDROCK GROUNDWATER CONTAMINATION CONTOURS

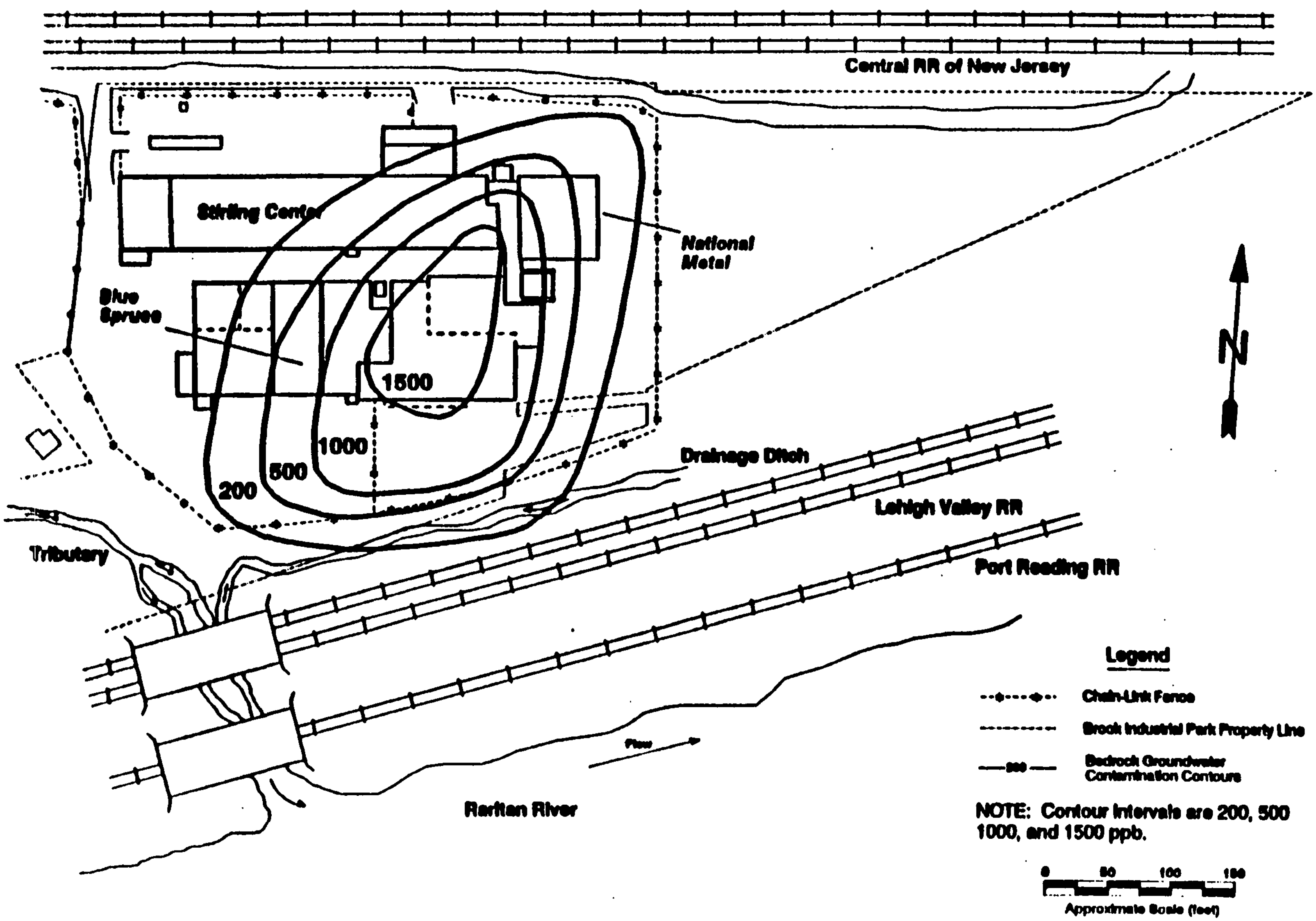


TABLE 1

CHEMICALS DETECTED IN AREA 1 AND AREA 2 SURFACE SOIL/SEDIMENT SAMPLES (a)
(Units: Organics: ug/kg, Inorganics: mg/kg)

Chemical (b)	AREA 1 Frequency of Detection (c)	AREA 1 Range of Detected Concentrations	AREA 2 Frequency of Detection (c)	AREA 2 Range of Detected Concentrations
Organics:				
Acetone	---	---	2 / 11	11 - 13
* Aldrin	---	---	6 / 11	4.9 - 4,100
Aroclor-1254	1 / 12	406	---	---
Aroclor-1260	1 / 12	101	---	---
beta-BHC	---	---	1 / 10	13
gamma-BHC (Lindane)	1 / 12	0.9	1 / 10	300
Benzene	1 / 12	1.0	---	---
Benzoic acid	3 / 9	170 - 520	1 / 10	340
Bis(2-ethylhexyl)phthalate	9 / 12	120 - 150,000	7 / 11	215 - 130,000
Bromoform	---	---	1 / 11	2
2-Butanone	---	---	1 / 10	20
Butylbenzylphthalate	2 / 12	34 - 4,795	2 / 11	60 - 92
alpha-Chlordane	2 / 12	100 - 220	5 / 11	11 - 200
gamma-Chlordane	1 / 12	190	5 / 11	17 - 60
Chlorobenzene	---	---	---	---
Chloroform	1 / 12	2.0	---	---
4,4'-DDD	2 / 12	67 - 140	9 / 11	37 - 3,100
4,4'-DDE	2 / 12	30 - 130	5 / 10	43 - 400
* 4,4'-DDT	6 / 12	28 - 340	9 / 11	23 - 11,000
Di-n-butylphthalate	3 / 12	37 - 2,460	3 / 11	50 - 1,000
Di-n-octylphthalate	1 / 12	28	3 / 11	86 - 1,400
1,2-Dichlorobenzene	3 / 12	230 - 2,400	4 / 11	35 - 775
1,4-Dichlorobenzene	1 / 12	120	4 / 11	17 - 150
1,2-Dichloroethane	2 / 12	9 - 24	2 / 11	1 - 590
1,2-Dichloroethene (total)	1 / 10	310	2 / 8	29.0 - 51
2,4-Dichlorophenol	---	---	1 / 11	910
* Dieldrin	3 / 12	36 - 900	7 / 11	17 - 3,600
Diethylphthalate	---	---	1 / 11	1,500
2,4-Dimethylphenol	---	---	1 / 11	37
Dimethylphthalate	---	---	2 / 11	26 - 150
Endosulfan II	---	---	1 / 10	4
Endosulfan sulfate	---	---	---	---
Endrin	1 / 12	800	1 / 10	68
Endrin ketone	1 / 12	3.6	---	---
Heptachlor	---	---	---	---
Heptachlor epoxide	1 / 12	200	2 / 11	3.5 - 540
Hexachlorocyclopentadiene	1 / 12	120,000	---	---
2-Hexanone	---	---	1 / 11	20
Isophorone	---	---	2 / 11	16 - 390
Methoxychlor	---	---	4 / 10	15 - 970
Methylene chloride	1 / 12	3.0	4 / 11	1 - 780
4-Methylphenol	---	---	1 / 11	96
N-Nitrosodiphenylamine	---	---	1 / 11	90
Nitrobenzene	1 / 12	92	---	---
Pentachlorophenol	---	---	1 / 11	700
Phenol	---	---	3 / 11	81 - 730
1,1,2,2-Tetrachloroethane	---	---	1 / 10	3
Tetrachloroethene	4 / 12	2 - 110	2 / 11	7 - 38
Toluene	2 / 12	1.0 - 2.0	---	---
1,2,4-Trichlorobenzene	1 / 12	42	1 / 11	111
1,1,1-Trichloroethane	3 / 12	1.0 - 2.0	---	---
1,1,2-Trichloroethane	---	---	1 / 11	2
Trichloroethene	1 / 12	37	3 / 11	4 - 19
2,4,5-Trichlorophenol	---	---	2 / 10	53 - 1,000
Vinyl chloride	1 / 12	16	---	---
Xylenes (total)	---	---	1 / 11	1

See footnotes on the following page.

TABLE 1 (Continued)

CHEMICALS DETECTED IN AREA 1 AND AREA 2 SURFACE SOIL/SEDIMENT SAMPLES (a)
(Units: Organics: ug/kg, Inorganics: mg/kg)

Chemical (b)	AREA 1 Frequency of Detection (c)	AREA 1 Range of Detected Concentrations	AREA 2 Frequency of Detection (c)	AREA 2 Range of Detected Concentrations
PAHs				
Acenaphthene	6 / 12	130 - 1,100	6 / 11	53 - 930
Acenaphthylene	8 / 12	24 - 570	8 / 11	38 - 240
Anthracene	9 / 12	96 - 2,300	8 / 11	89 - 2,300
* Benzo(a)anthracene	10 / 12	320 - 16,000	11 / 11	360 - 4,200
* Benzo(a)pyrene	10 / 12	290 - 11,000	11 / 11	380 - 4,500
* Benzo(b)fluoranthene	10 / 12	240 - 17,000	11 / 11	430 - 5,700
* Benzo(k)fluoranthene	9 / 12	305 - 11,000	11 / 11	440 - 3,200
Benzo(g,h,i)perylene	9 / 12	198 - 7,100	8 / 11	210 - 2,100
Carbazole	3 / 3	78.5 - 540	1 / 1	71
* Chrysene	10 / 12	350 - 14,000	11 / 11	400 - 4,000
* Dibenzo(a,h)anthracene	8 / 12	86 - 3,300	5 / 11	38 - 1,000
Dibenzofuran	8 / 12	15 - 1,000	5 / 11	69 - 560
Fluoranthene	10 / 12	570 - 6,800	11 / 11	640 - 9,000
Fluorene	8 / 12	33 - 1,000	7 / 11	46 - 950
* Indeno(1,2,3-cd)pyrene	10 / 12	188 - 9,500	10 / 11	220 - 2,200
2-Methylnaphthalene	8 / 12	12 - 1,300	4 / 11	94 - 190
Naphthalene	7 / 12	132 - 1,200	7 / 11	40 - 1,200
* Phenanthrene	10 / 12	310 - 7,900	11 / 11	380 - 7,200
Pyrene	11 / 12	555 - 25,000	11 / 11	590 - 6,300
PCDDs & PCDFs				
1,2,3,4,6,7,8-HpCDD	---	---	1 / 2	0.4
Total HpCDD	---	---	1 / 2	0.4
* OCDD	---	---	2 / 2	6.2 - 7.6
Inorganics:				
Aluminum	12 / 12	1,970 - 18,500	11 / 11	4,110 - 17,000
* Antimony	7 / 12	12.5 - 591	3 / 11	3.4 - 30.2
* Arsenic	12 / 12	3 - 149	11 / 11	6.4 - 284
Barium	12 / 12	17.7 - 1,800	10 / 11	37.5 - 436
* Beryllium	10 / 12	0.4 - 2.6	10 / 11	0.3 - 79.7
* Cadmium	7 / 12	1.7 - 15.4	6 / 10	0.9 - 16.6
Calcium	12 / 12	1,470 - 26,500	10 / 10	1,620 - 13,800
* Chromium	12 / 12	4.2 - 300	11 / 11	28.4 - 1,170
Cobalt	12 / 12	4.2 - 282	11 / 11	7.3 - 140
* Copper	12 / 12	18.9 - 2,370	11 / 11	67.7 - 1,730
Cyanide	2 / 9	0.3 - 0.6	---	---
Iron	12 / 12	8,160 - 191,000	11 / 11	2,880 - 116,000
* Lead	12 / 12	15.1 - 10,700	10 / 10	10.2 - 1,590
Magnesium	12 / 12	276 - 9,920	10 / 10	1,290 - 10,900
* Manganese	12 / 12	151 - 1,980	11 / 11	247 - 5,680
Mercury	8 / 10	0.2 - 3.4	9 / 11	0.2 - 0.6
* Nickel	12 / 12	6.5 - 82.1	11 / 11	12.1 - 910
Potassium	12 / 12	167 - 2,860	11 / 11	265 - 1,150
Selenium	6 / 8	0.4 - 2.4	1 / 7	1.2
* Silver	6 / 9	1.2 - 292	8 / 10	5.6 - 17.5
Sodium	5 / 12	61.2 - 837	7 / 11	123 - 1,300
Thallium	2 / 12	0.3 - 0.5	---	---
Vanadium	12 / 12	5.3 - 90.3	11 / 11	19.4 - 49.5
* Zinc	9 / 9	14.3 - 9,950	7 / 7	80.5 - 5,360

* = Selected as a chemical of potential concern.
--- = Chemical was not detected in any of the samples in this sample grouping.

(a) Area 1 consists of samples SB-4 through SB-11, SB-19, SB-34, and sediment samples SD-5 and SD-6; and Area 2 consists of samples SB-13, SB-17, SB-21 through SB-26, SB-28 and sediment samples SD-3 and SD-4. Concentrations reported to three significant figures.
(b) Chemicals of potential concern from on-site surface soil and tributary sediment sample groupings were considered chemicals of potential concern for Group 1 and Group 2 surface soil/sediment sample groupings.
(c) The number of samples in which the chemical was detected divided by the total number of samples, excluding those rejected by QA/QC.

TABLE 2

CHEMICALS DETECTED IN SOIL AND SEDIMENT SAMPLES
FROM THE STIRLING CENTER BASEMENT (a)
(Units: Organics: ug/kg, Inorganics: mg/kg)

Chemical	Frequency of Detection (b)	Range of Detected Concentrations	Site Specific Background (c)
Organics:			
Acetone	1 / 7	270	ND (<11)
* Aroclor-1248	1 / 1	10,000	ND (<35)
Benzoic acid	3 / 7	100 - 400	ND (<690)
Benzyl alcohol	2 / 7	380 - 1,200	ND (<690)
Bis(2-ethylhexyl)phthalate	3 / 7	274 - 2,100	1,100
Carbon Disulfide	1 / 7	5	ND (<11)
Chlorobenzene	1 / 7	5	ND (<11)
Chloromethane	1 / 7	13	ND (<11)
Di-n-butylphthalate	5 / 7	220 - 650	ND (<690)
Ethylbenzene	1 / 7	1	ND (<11)
PAHs			
Acenaphthene	2 / 7	57 - 240	410
Anthracene	5 / 7	57 - 370	1,000
* Benzo(a)anthracene	5 / 7	210 - 3,800	3,300
* Benzo(a)pyrene	4 / 7	180 - 3,300	2,300
Benzo(b)fluoranthene	5 / 7	240 - 2,700	4,900
Benzo(k)fluoranthene	5 / 7	61 - 2,900	4,900
Benzo(g,h,i)perylene	5 / 7	260 - 2,800	1,100
* Chrysene	5 / 7	280 - 4,900	3,200
* Dibenzo(a,h)anthracene	1 / 7	580	310
Dibenzofuran	1 / 7	130	380
Fluoranthene	6 / 7	54 - 3,700	4,800
Fluorene	2 / 7	56 - 290	470
* Indeno(1,2,3-cd)pyrene	5 / 7	280 - 2,900	1,100
2-Methylnaphthalene	1 / 7	110	380
Naphthalene	4 / 7	52 - 180	350
Phenanthrene	5 / 7	270 - 4,100	4,600
Pyrene	5 / 7	230 - 5,500	5,600
Inorganics:			
Aluminum (d)	7 / 7	1,010 - 16,200	8,780
Antimony	2 / 7	7.8 - 12.8	8.5
* Arsenic	7 / 7	2.3 - 58.8	R
Barium	7 / 7	65.6 - 756	103
* Beryllium	4 / 7	0.4 - 1	0.43
Cadmium	4 / 7	2.8 - 7.7	5.6
Calcium (d)	7 / 7	1,880 - 18,800	5,500
* Chromium	7 / 7	5.1 - 8,380	44.8
Cobalt	7 / 7	1.5 - 16	15.1
* Copper	7 / 7	169 - 2,180	209
Cyanide	2 / 7	2.5 - 4.9	R
Iron (d)	7 / 7	14,700 - 127,000	47,200
* Lead	7 / 7	6.8 - 3,900	429
Magnesium (d)	7 / 7	672 - 12,700	3,600
Manganese	7 / 7	78.1 - 538	515
Mercury	5 / 7	0.2 - 6.1	R
Nickel	7 / 7	3.8 - 62.9	43.7
Potassium (d)	7 / 7	179 - 1,020	648
Selenium	2 / 7	1.1 - 1.6	R
* Silver	7 / 7	5.3 - 218	ND (<0.9)
Sodium (d)	7 / 7	108 - 546	1,840
Vanadium	7 / 7	3.7 - 58.4	37.9
Zinc	7 / 7	67.5 - 3,110	305

* = Selected as a chemical of potential concern. See text.
ND = Not detected in sample. Detection limits shown in parentheses.

(a) Samples SCSD-1, SCSD-2, SCSS-1 to SCSS-5. Concentrations reported to three significant figures.
(b) The number of samples in which the chemical was detected divided by the total number of samples, excluding those samples rejected by QA/QC.
(c) Sample SB-1.
(d) Essential nutrient.

TABLE 3
SOIL CONTAMINANTS OF CONCERN
and
REMEDIATION GOALS

CONTAMINANT	CONCENTRATION RANGE[1]	REMEDIATION GOALS[2]
CHROMIUM	3.2 to 2,200	50/500[3]
ARSENIC	1 to 451	20[4]
BERYLLIUM	0.22 to 23.5	1.3
LEAD	3.4 to 2,060	500[5]
PCBs	10	1
ALDRIN	0.36 to 7.4	0.33
DDT	3 to 26	17
DIELDRIN	0.15 to 6.3	0.35

1. all concentrations are in parts per million (ppm)

2. all concentrations are in ppm; all Remediation goals was developed based on a risk of 10^{-6} using an industrial exposure scenario

3. The Remediation Goal for Chromium is based on a risk of 10^{-6} (0-5 feet) and 10^{-5}
(5 feet to the water table)

4. The NJDEP has determined that 20 ppm represents the typical background levels for arsenic in New Jersey

5. Remediation Goal for lead is based on EPA guidance

TABLE 4

CHEMICALS DETECTED IN GROUNDWATER SAMPLES FROM THE SATURATED OVERBURDEN (a)
(Units: ug/L)

Chemical	Frequency of Detection (b)	Range of Detected On-Site Concentrations	Site-Specific Background (c)
Organics:			
Acetone	6 / 8	4.1 - 400	1.9
* Benzene	6 / 8	3.7 - 134	ND (<1)
alpha-BHC	2 / 8	0.01 - 0.02	ND (<0.5))
beta-BHC	1 / 8	0.04	ND (<0.5))
Bis(2-ethylhexyl)phthalate	4 / 8	1 - 25	ND (<10)
Carbon Disulfide	4 / 8	0.7 - 3.7	ND (<1)
Chlorobenzene	6 / 8	13.1 - 158	ND (<1)
2-Chlorophenol	1 / 8	3	ND (<10)
4,4'-DDD	2 / 8	0.02 - 0.03	ND (<0.10)
1,2-Dichlorobenzene	6 / 8	2.9 - 9.6	ND (<1)
1,3-Dichlorobenzene	2 / 8	0.1 - .4	ND (<1)
1,4-Dichlorobenzene	3 / 8	2.8 - 5.1	ND (<1)
1,1-Dichloroethane	2 / 8	0.3 - 0.6	ND (<1)
* 1,2-Dichloroethane	3 / 8	0.4 - 55.3	ND (<1)
cis-1,2-Dichloroethene	2 / 8	0.1 - 0.6	ND (<1)
trans-1,2-Dichloroethene	6 / 8	0.4 - 35.5	ND (<1)
* Dieldrin	1 / 8	0.4	ND (<1)
2,4-Dinitrophenol	1 / 8	22	ND (<25)
Endosulfan II	1 / 8	0.03	ND (<0.10)
Endrin	1 / 8	0.1	ND (<0.10)
Ethylbenzene	6 / 8	0.1 - 280	ND (<1)
Heptachlor	1 / 8	0.1	ND (<0.05)
Tetrachloroethene	5 / 8	0.3 - 10.1	ND (<1)
Toluene	4 / 8	0.3 - 820	ND (<1)
1,1,1-Trichloroethane	5 / 8	0.9 - 21.1	ND (<1)
Trichloroethene	1 / 8	4.7	ND (<1)
2,4,6-Trichlorophenol	7 / 8	5 - 8	5
* Vinyl Chloride	1 / 8	2.5	ND (<1)
Xylenes (total)	6 / 8	0.3 - 113	ND (<1)
PAHs			
Acenaphthene	1 / 8	1	ND (<10)
Fluorene	1 / 8	1	ND (<10)
2-Methylnaphthalene	2 / 8	2 - 20	ND (<10)
Naphthalene	3 / 8	1 - 26	ND (<10)
Phenanthrene	2 / 8	2	ND (<10)
Inorganics:			
Aluminum (d)	8 / 8	3,880 - 63,700	17,300
* Antimony	2 / 8	38 - 163	ND (<38)
* Arsenic	8 / 8	2.6 - 43.2	4.9
Barium	8 / 8	121 - 575	185
* Beryllium	1 / 8	4.3	1.1
Cadmium	6 / 8	6 - 9.3	ND (<5)
Calcium (d)	8 / 8	20,100 - 85,800	48,500
* Chromium	8 / 8	15.4 - 17,200	31.8
Cobalt	7 / 8	14.1 - 62.7	24.4
Copper	8 / 8	11.4 - 262	20.1
Iron (d)	8 / 8	17,100 - 146,000	31,200
Lead (e)	7 / 7	2.6 - 8.6	4.4
Magnesium (d)	8 / 8	7,340 - 27,900	19,900
* Manganese	8 / 8	1,240 - 19,600	4,900
Mercury	1 / 8	0.7	ND (<0.2)
Nickel	7 / 8	18.4 - 149	41
Nitrite/nitrate	2 / 8	1,000 - 2,400	2,100
Potassium (d)	8 / 8	4,300 - 16,100	8,190
Silver	2 / 8	10.7 - 11.1	ND (<5)
Sodium (d)	8 / 8	13,900 - 90,400	22,700
Vanadium	6 / 8	21.4 - 171	43.7
Zinc	8 / 8	38.1 - 435	78.9

* = Selected as a chemical of potential concern. See text.
ND = Not detected in sample. Detection limits shown in parentheses.

(a) Samples MW-1 to MW-8. Concentrations reported to three significant figures.
(b) The number of samples in which the chemical was detected divided by the total number of samples, excluding those samples rejected by QA/QC.
(c) Upgradient sample MW-9.
(d) Essential nutrient.
(e) Lead data are from a second round of sampling conducted in Spring 1993.

TABLE 5

BROOK INDUSTRIAL PARK RI REPORT
SUMMARY OF INORGANICS IN OVERBURDEN GROUNDWATER

	FEDERAL MCL	STATE GROUNDWATER STANDARDS	NUMBER OF DETECTIONS/ NUMBER OF WELLS	NUMBER OF DETECTIONS ABOVE ARAR	AVERAGE DETECTION	RANGE OF DETECTION
Aluminum	50 - 200	200	9/9	9	18,711	3,880 - 63,700
Antimony	6	2	2/9	2	100.5	38 - 163
Arsenic	50	8	9/9	5	17.8	2.6 - 43.2
Beryllium	4	20	2/9	1	2.7	1.1 - 4.3
Cadmium	5	4	6/9	6	7.9	6 - 9.3
Chromium	100	100	9/9	3	1,974.3	15.4 - 17,200
Copper	1,300	1,000	9/9	0	83.5	11.4 - 262
Lead	15	5	8/8	2	4.4	2.6 - 8.6
Nickel	100	100	7/9	2	70.1	18.4 - 149
Zinc	NA	5,000	9/9	0	156.4	38.1 - 279

All values in ug/l.
NA = Not Available.

TABLE 5

BROOK INDUSTRIAL PARK RI REPORT
SUMMARY OF VOCs IN OVERBURDEN GROUNDWATER

COMPOUNDS	FEDERAL MCL	STATE MCL	STATE GROUNDWATER CLEANUP STANDARDS	NUMBER OF DETECTIONS/ NUMBER OF WELLS	NUMBER OF DETECTIONS ABOVE ARAR	AVERAGE DETECTION	RANGE OF DETECTION
Benzene	5	1	1	6/9	6	58.6	3.7 - 133.8
Chlorobenzene	100	4	4	6/9	6	60.5	17.7 - 157.7
1,2-DCA	5	2	2	3/9	1	18.9	0.4 - 55.3
Trans-1,2-DCE	100	100	100	6/9	0	6.9	0.4 - 35.5
Ethylbenzene	700	NA	700	6/9	0	48.4	0.1 - 279.8
PCE	5	1	1	5/9	2	2.6	0.1 - 10.1
TCE	5	1	1	1/9	1	8.8	8.8
Toluene	1,000	NA	1,000	4/9	0	207.5	0.1 - 820.3
Vinyl Chloride	2	2	2	1/9	1	2.55	2.55
Xylenes	10,000	44	40	6/9	1	27.1	0.3 - 113.3

All concentrations in ug/l.
NA = Not available.

TABLE 6

CHEMICALS DETECTED IN GROUNDWATER SAMPLES
FROM THE BEDROCK AQUIFER (a)
(Units: ug/L)

Chemical	Frequency of Detection (b)	Range of Detected On-Site Concentrations	Site-Specific Background (c)
Organics:			
* Benzene	1/6	20	ND (<1)
* beta-BHC	1/6	0.02	ND (<0.05)
* Bis(2-ethylhexyl)phthalate	6/6	3 - 8	1
* Carbon disulfide	1/6	0.6	ND (<1)
* Chlorobenzene	1/6	11.2	ND (<1)
* 1,2-Dichlorobenzene	1/6	82.2	ND (<1)
* 1,3-Dichlorobenzene	1/6	0.1	ND (<1)
* 1,4-Dichlorobenzene	1/6	1.4	ND (<1)
* 1,2-Dichloroethane	1/6	21.8	ND (<1)
* cis-1,2-Dichloroethene	1/6	3.8	ND (<1)
* trans-1,2-Dichloroethene	4/6	0.1 - 968	ND (<1)
* Dieldrin	1/6	0.3	ND (<0.1)
* Tetrachloroethene	5/6	0.4 - 544	0.4
* 1,1,1-Trichloroethane	1/6	0.1	ND (<1)
* Trichloroethene	1/6	65.1	ND (<1)
* 2,4,6-Trichlorophenol	6/6	4 - 6	4
* Vinyl chloride	1/6	85.4	ND (<1)
* Xylenes (total)	1/6	0.2	ND (<1)
Inorganics:			
Aluminum (d)	6/6	218 - 2,340	1,470
Barium	6/6	69.1 - 149	368
Calcium (d)	6/6	11,000 - 88,300	45,800
* Chromium	3/6	15.1 - 230	249
Iron (d)	6/6	387 - 3,980	2,880
* Lead (e)	6/6	2.1 - 12.4	2.7
Magnesium (d)	6/6	660 - 23,400	22,900
* Manganese	6/6	12.8 - 1,060	77
Nickel	3/6	20.6 - 101	189
Nitrite/nitrate	5/6	300 - 2,800	4,600
Potassium (d)	6/6	1,210 - 92,100	1,670
Sodium (d)	6/6	15,000 - 55,600	12,300
Zinc	6/6	8.3 - 22.7	18.1

* = Selected as a chemical of potential concern. See text.
ND = Not detected in sample. Detection limits shown in parentheses.

(a) Samples MW-2RS to MW-5RS, MW-7RS and MW-8RS. Concentrations reported to three significant figures.
(b) The number of samples in which the chemical was detected divided by the total number of samples, excluding those samples rejected by QA/QC.
(c) Upgradient sample MW-9RS.
(d) Essential nutrient.
(e) Lead data are from a second round of sampling conducted in Spring 1993.

TABLE 7

BROOK INDUSTRIAL PARK RI REPORT
SUMMARY OF VOCs IN BEDROCK GROUNDWATER

COMPOUNDS	FEDERAL MCL	STATE MCL	STATE GROUNDWATER CLEANUP STANDARDS	NUMBER OF DETECTIONS/ NUMBER OF WELLS	NUMBER OF DETECTIONS ABOVE ARAR	AVERAGE DETECTION	RANGE OF DETECTION
Benzene	5	1	1	2/8	1	10.5	1 - 20
Chlorobenzene	100	4	4	2/8	2	7.8	4.3 - 11.2
1,2-DCA	5	2	2	2/8	2	9.7	16.9 - 21.8
Trans-1,2-DCE	100	100	100	5/8	2	242.4	0.1 - 968.3
Ethylbenzene	700	NA	700	0/8	0	ND	ND
PCE	5	1	1	7/8	5	88.8	0.4 - 544.2
TCE	5	1	1	2/8	2	42.4	19.6 - 65.1
Toluene	1,000	NA	1,000	0/8	0	ND	ND
Vinyl Chloride	2	2	2	2/8	2	46.2	7 - 85.4
Xylenes	10,000	44	40	1/8	0	0.2	0.2

All concentrations in ug/l.

TABLE 7

BROOK INDUSTRIAL PARK RI REPORT
SUMMARY OF INORGANICS IN BEDROCK GROUNDWATER

	FEDERAL MCL	STATE GROUNDWATER STANDARDS	NUMBER OF DETECTIONS/ NUMBER OF WELLS	NUMBER OF DETECTIONS ABOVE ARAR	AVERAGE DETECTION	RANGE OF DETECTION
Aluminum	50 - 200	200	7/8	7	773.4	2.8 - 2,340
Antimony	6	2	0/8	0	ND	ND
Arsenic	50	8	2/8	0	1.45	1.4 - 1.5
Beryllium	4	20	0/8	0	ND	ND
Cadmium	5	4	0/8	0	ND	ND
Chromium	100	100	5/8	4	458.8	15.1 - 1,650
Copper	1,300	1,000	1/8	0	10.5	10.5
Lead	15	5	8/8	4	5.4	2.1 - 12.4
Nickel	100	100	4/8	2	89.3	20.6 - 189
Zinc	NA	5,000	8/8	0	14.8	8.3 - 22.7

All values in ug/l.
ND = Not detected.
NA = Not available.

TABLE 8

SUMMARY OF POTENTIAL HEALTH RISKS ASSOCIATED WITH THE BROOK INDUSTRIAL PARK SITE

Exposure Pathway	Upper Bound Excess Lifetime Cancer Risk[a]	Hazard Index for Noncarcinogenic Effects[b]
CURRENT LAND USE:		
Ingestion of Soil:		
Child/teenage trespasser (6-16 years) on-site	4E-06	< 1
On-site Worker	3E-05	< 1
Child/teenager (6-16 years) at railroad tracks	6E-08	< 1
Child/teenager (6-16 year) at the subdivided lot	3E-06	< 1
Dermal Absorption from Soil Matrix[c]:		
Child/teenager (6-16 years) at railroad tracks	2E-07	< 1
Child/teenager (6-16 year) at the subdivided lot	5E-07	< 1
Ingestion of Sediment from Drainage Ditch/Tributary:		
Child/teenager (6-16 years)	2E-05	< 1
Dermal Absorption from Sediment Matrix in Drainage Ditch/Tributary:		
Child/teenager (6-16 years)	6E-07	< 1
Ingestion of Soil-Sediment in Area 1 and Area 2:		
Worker in Area 1	5E-05	≈ 1
Worker in Area 2	1E-04	< 1
Dermal Absorption from Surface Water:		
Child/teenager (6-16 years)	2E-07	< 1
Inhalation of Fugitive Dust Emissions:		
On-site Worker	6E-06	< 1
Nearby Child Resident	4E-07	< 1
Nearby Adult Resident	2E-06	< 1
Worker in Area 1	1E-05	< 1
Worker in Area 2	3E-05	≈ 1

See footnotes on next page

TABLE 8 (CONTINUED)

SUMMARY OF POTENTIAL HEALTH RISKS ASSOCIATED WITH THE BROOK INDUSTRIAL PARK SITE

Exposure Pathway	Upper Bound Excess Lifetime Cancer Risk[a]	Hazard Index for Noncarcinogenic Effects[b]
<u>FUTURE LAND USE:</u>		
Soil Ingestion:		
Workers at Stirling Center basement	4E-05	= 1
Workers at the Subdivided lot	9E-06	< 1
Dermal Absorption from Soil Matrix[c]:		
Workers at the Stirling Center basement	5E-05	< 1
Workers at the Subdivided lot	1E-06	< 1
Ingestion of On-Site Saturated Overburden Groundwater:		
Workers	4E-04	> 1 (30)
Ingestion of On-Site Bedrock Aquifer Groundwater:		
Workers	7E-04	> 1 (3)
Ingestion of Jame Fine Groundwater:		
Workers	7E-05	< 1

[a] The upperbound individual excess lifetime cancer risk represents the additional probability that an individual may develop cancer over a 70-year lifetime as a result of exposure conditions evaluated.

[b] The hazard index indicates whether or not exposure to mixtures of noncarcinogenic chemicals may result in adverse health effects. A hazard index less than one indicates that adverse human health effects are unlikely to occur.

[c] Assessment of dermal exposures to soil or sediment is limited to three chemicals/chemical classes (i.e., PCDDs/PCDFs, PCBs and cadmium) and to the locations where these chemicals are present.

(Title 40 CFR • Part 141, 1992)
ORGANIC CHEMICALS
All units are milligrams per liter (mg/l)

Table 9

VOLATILE ORGANIC CHEMICALS

CHEMICAL	CAS No.	MCL	MCLG
Benzene*	71-43-2	0.005	zero
Carbon tetrachloride*	56-23-5	0.005	zero
ortho-Dichlorobenzene (1,2)•	95-50-1	0.6	0.6
para-Dichlorobenzene (1,4)*	106-46-7	0.075	0.075
1,2-Dichloroethane*	107-06-2	0.005	zero
1,1-Dichloroethylene*	75-35-4	0.007	0.007
cis-1,2-Dichloroethylene•	156-59-2	0.07	0.07
trans-1,2-Dichloroethylene•	156-60-5	0.1	0.1
Dichloromethane• (Methylene chloride)	75-09-2	0.005	zero
1,2-Dichloropropane•	78-87-5	0.005	zero
Ethylbenzene•	100-41-4	0.7	0.7
Monochlorobenzene•	108-90-7	0.100	0.1
Styrene•	100-42-5	0.1	0.1
Tetrachloroethylene• (PCE)	127-18-4	0.005	zero
Toluene•	108-88-3	. 1.0	1.0
1,2,4-Trichlorobenzene•	120-82-1	0.07	0.07
1,1,1-Trichloroethane*	71-55-6	0.2	0.2
1,1,2-Trichloroethane•	79-00-5	0.005	0.003
Trichloroethylene (TCE)*	79-01-6	0.005	zero
Vinyl chloride*	75-01-4	0.002	zero
Xylenes (total)•	1330-20-7	10.0	10.0

PESTICIDES

CHEMICAL	CAS No.	MCL	MCLG
Alachlor•	15972-60-8	0.002	zero
Aldicarb'	116-06-3	0.003	0.001
Aldicarb sulfone'	1646-88-4	0.002	0.001
Aldicarb sulfoxide'	1646-87-3	0.004	0.001
Atrazine•	1912-24-9	0.003	0.003
Carbofuran•	1563-66-2	0.04	0.04
Chlordane•	57-74-9	0.002	zero
Dalapon*	75-99-0	0.2	0.2
Dibromochloropropane(DBCP)•	96-12-8	0.0002	zero
Dinoseb*	88-85-7	0.007	0.007
Diquat*	85-00-7	0.020	0.02
Endothall*	145-73-3	0.1	0.1
Endrin*	72-20-8	0.002	0.002
Ethylene dibromide(EDB)•	106-93-4	0.00005	zero
Glyphosate*	1071-83-6	0.7	0.7
Heptachlor•	76-44-8	0.0004	zero
Heptachlor epoxide•	1024-57-3	0.0002	zero
Lindane•	58-89-9	0.0002	0.0002
Methoxychlor•	72-43-5	0.04	0.04
Oxamyl(Vydate)*	23135-22-0	0.2	0.2
Pentachlorophenol'	87-86-5	0.001	zero
Picloram*	1918-02-1	0.5	0.5
Simazine*	122-34-9	0.004	0.004
Toxaphene•	8001-35-2	0.003	zero
2,4-Dichlorophenoxypropionic acid•	94-75-7	0.07	0.07
2,4,5-TP(Silvex)•	93-72-1	0.05	0.05

SYNTHETIC ORGANIC CHEMICALS Table 9

CHEMICAL	CAS No.	MCL	MCLG
Benzo(a)pyrene*	50-32-8	0.0002	zero
Di(2-ethylhexyl)adipate*	103-23-1	0.4	0.4
Di(2-ethylhexyl)phthalate*	117-81-7	0.006	zero
Hexachlorobenzene*	118-74-1	0.001	zero
Hexachlorocyclopentadiene (HEX)*	77-47-4	0.05	0.05
PCBs (as decachlorobiphenyl)#	1336-36-3	0.0005	zero
2,3,7,8-TCDD (Dioxin)*	1746-01-6	3E-08	zero

TREATMENT TECHNIQUES

CHEMICAL	CAS No.	MCL	MCLG
Acrylamide#	79-06-1	TT	zero
Epichlorohydrin#	106-89-8	TT	zero

DISINFECTION BY-PRODUCTS

CHEMICAL	MCL	MCLG
Total Trihalomethanes (TTHMs)‡	0.10	

TT - Treatment Technique
Total Trihalomethanes (TTHMs) - the sum of the concentrations of bromodichloromethane, tribromomethane (bromoform), dibromochloromethane, and trichloromethane (chloroform).
‡Final value. Published in *Federal Register*, Nov. 29, 1979.
+Final value. Published in *Federal Register*, July 8, 1987.
#Final value. Published in *Federal Register*, Jan. 30, 1991.
†Final value. Published in *Federal Register*, July 1, 1991.
*Final value. Published in *Federal Register*, July 17, 1992.

(Title 40 CFR - Part 141, 1992)

INORGANIC CHEMICALS

All units are milligrams per liter (mg/l)

Table 9

CHEMICAL	CAS #	MCL	MCLG
Antimony[*]	7440-36-0	0.006	0.006
Arsenic[*]	7440-38-2	0.05	--
Asbestos[#] (fibers/l > 10um)	1332-21-4	7 MFL	7 MFL
Barium[†]	7440-39-3	2.0	2.0
Beryllium[*]	7440-41-7	0.004	0.004
Cadmium[#]	7440-43-9	0.005	0.005
Chromium (total)[#]	7440-47-3	0.100	0.100
Copper[°]	7440-50-8	TT	1.300
Cyanide[*]	57-12-5	0.200	0.200
Fluoride[‡]	-	4.0	4.0
Lead (at tap)[°]	7439-92-1	TT	zero
Mercury[#]	7439-97-6	0.002	0.002
Nickel[*]	7440-02-0	0.1	0.1
Nitrate (as N)[#]	-	10.0	10.0
Nitrite (as N)[#]	-	1.0	1.0
Total Nitrate+Nitrite (as N)[#]	14797-55-8	10.0	10.0
Selenium[#]	7782-49-2	0.05	0.05
Sulfate[*]	-	deferred	deferred
Thallium[*]	7440-28-0	0.002	0.0005

MFL - Million Fibers per Liter

TT - Treatment Technique - Copper - action level 1.3 mg/l
Lead - action level 0.015 mg/l

+Final value. Published in *Federal Register*, Nov. 13, 1985.

‡Final value. Published in *Federal Register*, April 2, 1986.

#Final value. Published in *Federal Register*, Jan. 30, 1991.

°Final value. Published in *Federal Register*, June 7, 1991.

†Final value. Published in *Federal Register*, July 1, 1991.

*Final value. Published in *Federal Register*, July 17, 1992.

NEW JERSEY DRINKING WATER STANDARDS
(N.J.A.C. 7:10-1 through 16.12, 1989)
ORGANIC CHEMICALS
All units are milligrams per liter (mg/l)

VOLATILE ORGANIC CHEMICALS

CHEMICAL	CAS No.	MCL
Benzene	71-43-2	0.001
Carbon tetrachloride	56-23-5	0.002
meta-Dichlorobenzene (1,3)	541-73-1	0.600
ortho-Dichlorobenzene (1,2)	95-50-1	0.600
para-Dichlorobenzene (1,4)	106-46-7	0.075
1,2-Dichloroethane	107-06-2	0.002
1,1-Dichloroethylene	75-35-4	0.002
1,2-Dichloroethylene (cis)	156-59-2	0.010
1,2-Dichloroethylene (trans)	156-60-5	0.010
Dichloromethane (Methylene chloride)	75-09-2	0.002
1,2-Dichloropropane	78-87-5	0.005
Ethylbenzene	100-41-4	0.700
Monochlorobenzene	108-90-7	0.004
Styrene	100-42-5	0.100
Tetrachloroethylene (TCA)	127-18-4	0.001
Toluene	108-88-3	1.00
Trichlorobenzene(s)	120-82-1	0.008
1,1,1-Trichloroethane	71-55-6	0.026
1,1,2-Trichloroethane	79-00-5	0.005
Trichloroethylene (TCE)	79-01-6	0.001
Vinyl Chloride	75-01-4	0.002
Xylene(s)	1330-20-7	0.044

TABLE 10

CONSTITUENT	CAS No.	GROUND WATER QUALITY CRITERIA	PRACTICAL QUANTITATION LEVELS (PQLs)
3,4-Benzofluoranthene (Benzo(b)fluoranthene)	205-99-2	NA	0.010
Benzo(ghi)perylene	191-24-2	NA	0.020
Benzo(k)fluoranthene	207-08-9	NA	0.002
Beryllium	7440-41-7	0.000008	0.020
alpha-BHC (alpha-HCH)	319-84-6	0.000006	0.00002
beta-BHC (beta-HCH)	319-85-7	0.0002	0.00004
gamma-BHC (gamma-HCH/Lindane)	58-89-9	0.0002	0.0002
Bis(2-chloroethyl) ether	111-44-4	0.00003	0.010
Bis(2-chloroisopropyl) ether	39638-32-9	0.3	0.010
Bis(2-ethylhexyl) phthalate	117-81-7	0.003	0.030
Bromodichloromethane (Dichlorobromomethane)	75-27-4	0.0003	0.001
Bromoform	75-25-2	0.004	0.0008
Butylbenzyl phthalate	85-68-7	0.1	0.020
Cadmium	7440-43-9	0.004	0.002
Carbofuran	1563-66-2	0.04	0.007
Carbon tetrachloride	56-23-5	0.0004	0.002
Chlorobenzene	108-90-7	0.004	0.002
Chlordane	57-74-9	0.00001	0.0005
Chloride	16887-00-6	250.0	2.0
Chloroform	67-66-3	0.006	0.001
4-Chloro-3-methyl (o-chloro-m-cresol)	59-50-7	NA	0.020
2-Chlorophenol	95-57-8	0.04	0.020
Chlorpyrifos	2912-88-2	0.02	0.0002
Chromium (Total)	7440-47-3	0.1	0.010

PESTICIDES

CHEMICAL	CAS No.	MCL
Alachlor	15972-60-8	0.002
Aldicarb	116-06-3	0.010
Aldicarb sulfone	1646-88-4	0.002
Aldicarb sulfoxide	1646-87-3	0.004
Atrazine	1912-24-9	0.003
Carbofuran	1563-66-2	0.040
Chlordane	57-74-9	0.0005
Dalapon	75-99-0	0.200
Dibromochloropropane (DBCP)	96-12-8	0.0002
Dinoseb	88-85-7	0.007
Diquat	85-00-7	0.02
Endothall	145-73-3	0.1
Endrin	72-20-8	0.0002
Ethylene dibromide (EDB)	106-93-4	0.00005
Glyphosate	1071-83-6	0.7
Heptachlor	76-44-8	0.0004
Heptachlor epoxide	1024-57-3	0.0002
Lindane	58-89-9	0.0002
Methoxychlor	72-43-5	0.04
Oxamyl	23135-22-0	0.2
Pentachlorophenol	87-86-5	0.001
Picloram	1918-02-1	0.5
Simazine	122-34-9	0.001
Toxaphene	8001-35-2	0.003
2,4-D (2,4-Dichlorophenoxyacetic acid)	94-75-7	0.070
2,4,5-TP (Silvex)	93-72-1	0.050

TABLE 10
NEW JERSEY DRINKING WATER STANDARDS
(N.J.A.C. 7:10-1 through 16.12, 1989)
INORGANIC CHEMICALS
All units are milligrams per liter (mg/l)

CHEMICAL	CAS No.	MCL
Antimony	7440-36-0	0.006
Arsenic	7440-36-0	0.05
Asbestos .	1332-21-4	7 MFL
Barium	7440-39-3	2.0
Beryllium	7440-41-7	0.004
Cadmium	7440-43-9	0.005
Chromium (total)	7440-47-3	0.1
Copper	7440-50-8	1.3 AL
Cyanide	57-12-5	0.2
Fluoride	-	4.0
Lead[1]	7439-92-1	0.015 AL
Mercury	7439-97-6	0.002
Nickel	7440-02-0	0.1
Nitrate (as N)	-	10.0
Nitrite (as N)	-	1.0
Total Nitrate/Nitrite (as N)	14797-55-8	10.0
Selenium	7782-49-2	0.05
Sulfate	-	deferred
Thallium	7440-28-0	0.002

Note: MFL Million Fibers per Liter with fiber length > 10 microns
AL Action Level requiring corrective measures

[1] Effective 12/7/92.

TABLE 10

CONSTITUENT	CAS No.	GROUND WATER QUALITY CRITERIA	PRACTICAL QUANTITATION LEVELS (PQLs)
Fluorene	86-73-7	0.3	0.010
Fluoride	16984-48-8	2.0	0.500
Foaming agents (ABS/LAS)	-	0.5	0.0005
Glyphosate	1071-83-6	0.7	NA
Hardness (as CaCO³)	-	250mg/l	10mg/l
Heptachlor	76-44-8	0.000008	0.0004
Heptachlor epoxide	1024-57-3	0.000004	0.0002
Hexachlorobenzene	118-74-1	0.00002	0.010
Hexachlorobutadiene	87-68-3	0.001	0.001
Hexachlorocyclopentadiene	77-47-4	0.05	0.010
Hexachloroethane	67-72-1	0.0007	0.010
Hydrogen sulfide	7783-06-4	0.02	NA
Indeno(1,2,3-cd)pyrene	193-39-5	NA	0.02
Iron	7439-89-6	0.3	0.10
Isophorone	78-59-1	0.1	0.010
Lead (Total)	7439-92-1	0.005	0.010
Malathion	121-75-5	0.2	0.005
Manganese	7439-96-5	0.050	0.006
Mercury (Total)	7439-97-6	0.002	0.005
Methoxychlor	72-43-5	0.04	0.010
Methyl bromide (bromomethane)	74-83-9	0.01	0.002
Methyl chloride (chloromethane)	74-87-3	0.03	0.002
Methyl ethyl ketone	78-93-3	0.3	NA
3-Methyl-4-chlorophenol	59-50-7	NA	0.020
Methylene chloride	75-09-2	0.002	0.002
4-Methyl-2-pentanone (MIBK)	108-10-1	0.4	NA

TABLE 10

CONSTITUENT	CAS No.	GROUND WATER QUALITY CRITERIA	PRACTICAL QUANTITATION LEVELS (PQLs)
Sulfate	14808-79-8	250,000	5.0
Taste	-	None Objectionable	NA
TCDD (2,3,7,8-Tetrachlorodibenzo-p-dioxin)	1746-01-6	2X10[illegible]	0.00001
1,1,1,2-Tetrachloroethane	630-20-6	0.01	NA
1,1,2,2-Tetrachloroethane	79-34-5	0.002	0.001
Tetrachloroethylene	127-18-4	0.0004	0.001
2,3,4,6-Tetrachlorophenol	58-90-2	NA	0.010
Thallium	7440-28-0	0.0005	0.010
Toluene	108-88-3	1.0	0.005
Total dissolved solids (TDS)	-	500,000	10,000
Toxaphene	8001-35-2	0.00003	0.003
2,4,5-TP (Silvex)	93-72-1	0.05	0.005
1,2,4-Trichlorobenzene	120-82-1	0.009	0.001
1,1,1-Trichloroethane	71-55-6	0.03	0.001
1,1,2-Trichloroethane	79-00-5	0.003	0.002
Trichloroethylene	79-01-6	0.001	0.001
2,4,5-Trichlorophenol	95-95-4	0.7	0.010
2,4,6-Trichlorophenol	88-06-2	0.003	0.020
Vinyl chloride	75-01-4	0.00008	0.005
Xylenes (Total)	1330-20-7	0.04	0.002
m&p-Xylenes	NA	NA	0.002
o-Xylene	NA	NA	0.001
Zinc	7440-66-6	5.0	0.030
Microbiological criteria[m], Radionuclides & Turbidity	prevailing Safe Drinking Water Act Regulations (N.J.A.C. 7:10-1 et seq.)		

Explanation of Terms:
PQL = Practical Quantitation Level as defined in N.J.A.C. 7:9-6.4
NA = not available for this constituent
a = Asbestos criterion is measured in terms of fibers/L longer than 10 micrometers (f/L > 10 um)
ug = micrograms, L = Liter, f = fibers, CU = Standard Cobalt Units
b = Odor Threshold Number, mg = milligrams, H = Hardness
m = Pursuant to prevailing Safe Drinking Water Act Regulations any positive result for total coliform is in violation of the MCL and is therefore an exceedance of the ground water quality standards.

TABLE 10
NJ SPECIFIC GROUND WATER QUALITY CRITERIA
CLASS II-A & PRACTICAL QUANTITATION LEVELS
(N.J.A.C. 7:9-6, 1993)
All units are milligrams per liter (mg/l)

CONSTITUENT	CAS No.	GROUND WATER QUALITY CRITERIA	PRACTICAL QUANTITATION LEVELS (PQLs)
Acenaphthene	83-32-9	0.40	0.010
Acenapthylene	208-96-8	NA	0.010
Acetone	67-64-1	0.70	NA
Acrolein	107-02-8	NA	0.050
Acrylamide	79-06-1	0.000008	NA
Acrylonitrile	107-13-1	0.000060	0.050
Adipates (Di(ethylhexyl)adipate)	103-23-1	NA	0.006
Alachlor	15972-60-8	0.00043	0.002
Aldicarb sulfone	1646-88-4	0.0020	0.003
Aldrin	309-00-2	0.000002	0.00004
Aluminum	7429-90-5	0.200	0.200
Ammonia	7664-41-7	0.500	0.200
Anthracene	120-12-7	2.0	0.010
Antimony	7440-36-0	0.002	0.020
Arsenic (Total)	7440-38-2	0.00002	0.008
Asbestos	1332-21-4	7X10⁶f/L>10um	10⁶f/L>10um
Atrazine	1912-24-9	0.003	0.001
Barium	7440-39-3	2.0	0.200
Benzo(a)anthracene	56-55-3	NA	0.010
Benzene	71-43-2	0.0002	0.001
Benzidine	92-87-5	0.0000002	0.050
Benzyl Alcohol	100-51-6	2.0	NA
Benzo(a)pyrene (BaP)	50-32-8	NA	0.020

TABLE 11
BROOK INDUSTRIAL PARK
SUMMARY OF COST ANALYSIS
SOIL REMEDIATION ALTERNATIVES

ALTERNATIVES	CAPITAL COST	ANNUAL O&M	PRESENT WORTH (7%)	CONSTRUCTION/IMPLEMENTATION TIMEFRAMES
SO-1 (No Action)	NONE	NONE	$64,500	NONE
SO-2 (Limited Action)	$62,200	$33,000	$536,000	1 to 3 months
SO-3 (Asphalt Cap)	$1,503,000	$63,400	$2,354,000	3 to 6 months
SO-4 (Stabilization)	$2,940,000	$36,300	$3,481,000	6 to 9 months
SO-5 (Off-Site Treatment/Disposal)	$4,562,000	NONE	$4,564,000	1 to 6 months

TABLE 12
BROOK INDUSTRIAL PARK
SUMMARY OF COST ANALYSIS
BUILDING REMEDIATION ALTERNATIVES

ALTERNATIVE	CAPITAL COST	ANNUAL O&M	PRESENT WORTH (7%)	CONSTRUCTION/IMPLEMENTATION TIMEFRAME
BI-2 (Washing/Surface Sealing)	$244,000	$3,000	$346,000	3 to 6 months
BI-3 (CO_2 Blasting)	$332,000	$3,000	$434,000	3 to 6 months
BI-4 (Demolition w/ Disposal)	$1,046,000	NONE	$1,046,000	1 to 3 months
BI-4A (Demolition with Disposal)	$907,000	$3,000	$1,009,000	1 to 3 months

TABLE 13
BROOK INDUSTRIAL PARK
SUMMARY OF COST ANALYSIS
GROUNDWATER REMEDIATION ALTERNATIVES

ALTERNATIVE	CAPITAL COST	ANNUAL O&M	PRESENT WORTH (7%)	CONSTRUCTION/IMPLEMENTATION TIMEFRAMES
GW-1 (No Action)	NONE	NONE	$64,500	NONE
GW-2 (Limited Action)	$62,000	$33,000	$536,000	NONE/30 yrs.
GW-3A (Pump & Treat) Reinjection	$1,664,000	$342,000	$5,976,000	6 to 12 months/30 yrs.
GW-3B (Pump & Treat) Reinjection	$2,023,000	$540,000	$8,783,000	6 to 12 months/30 yrs.
GW-3C (Pump & Treat) Reinjection	$2,432,000	$533,000	$9,111,000	6 to 12 months/30 yrs.

TABLE 14
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENT	CITATION	DESCRIPTION
FEDERAL ARARS		
Resource Conservation and Recovery Act (RCRA), General Requirements	40 CFR 260-268, 270	Establishes regulations for Hazardous Waste management.
RCRA, Identification and Listing of Hazardous Waste	40 CFR 261	Establishes procedures for identification and listing of hazardous waste.
RCRA, Standards for Generators	40 CFR 262	Establishes procedures for generators of hazardous waste.
RCRA, Standards for Transporters	40 CFR 263	Establishes procedures for transporters of hazardous waste.
RCRA, Standards for Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	40 CFR 264, 265	Establishes procedures for hazardous waste treatment, storage, and disposal.
RCRA, Land Disposal Restrictions	40 CFR 268	Identifies hazardous wastes that are restricted from land disposal.
Safe Drinking Water Act (SDWA), National Primary Drinking Water Standards	40 CFR 141	Establishes health-based standards (Maximum Contaminant Levels) for public drinking water systems
SDWA, National Secondary Drinking Water Standards	40 CFR 143	Establishes welfare-based standards (Secondary MCLs) for public drinking water systems
Clean Water Act (CWA), Water Quality Criteria	40 CFR 131	Establishes criteria for surface water quality based on toxicity to organisms and human health.
Toxic Pollutant Effluent Standards	40 CFR 129	Establishes effluent standards or prohibitions for certain toxic pollutants: aldrin, dieldrin, DDT, endrin, toxaphene, benzidine, PCBs.

TABLE 14
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENT	CITATION	DESCRIPTION
Clean Air Act, National Ambient Air Quality Standards	40 CFR 50	Defines levels of air quality adequate to protect the public health and welfare. Establishes non-attainment zones with respect to health-based criteria.
Federal Criteria, Advisories, and Guidance	EPA Carcinogen Assessment Group, Potency Factors	Potency Factors are developed from health effects assessments on evaluation of the EPA.
Federal Criteria, Advisories, and Guidance	EPA Risk Reference Doses (RfDs)	RfDs are dose levels developed by the EPA for non-carcinogenic effects.
Federal Criteria, Advisories, and Guidance	EPA Office of Drinking Water Health Advisories	Health advisories are estimates of risk due to consumption of drinking water considering non-carcinogenic effects only.
Executive Order on Floodplain Management	Exec. Order No. 11988	Requires federal agencies to evaluate the potential effects of actions, and to avoid, to the maximum extent possible, adverse impacts to a floodplain.
CWA, Regulations on Discharge of Dredged or Fill Material	40 CFR 230, 231	Prohibits discharge of fill material onto wetlands without a permit. Preserves and enhances wetlands.
U.S. Army Corps of Engineers, Nationwide Permit Program	33 CFR 330	Prohibits activity that adversely impacts wetlands if a practicable alternative that has less impact is available.
Rivers and Harbors Act of 1899	33 CFR 320-330	Establishes a COE permit program for construction in navigable waters.

TABLE 14
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENT	CITATION	DESCRIPTION
Executive Order protecting wetlands	Exec. Order No. 11990	Requires federal agencies to minimize the destruction, loss,or degradation of wetlands on federal property.
U.S. Fish and Wildlife Service Coordination Act	16 USC 661 40 CFR s 6:302(g)	Requires consultation with the USFWS when a federal agency proposes modifications to a water body.
National Pollutant Discharge Elimination System	40 CFR 122, 125	Requirements for permits for discharges into navigable waters.
Occupational Safety and Health Act	29 CFR 1910, 1926, 1904	Regulates worker health and safety, specifies training requirements, safety equipment, and procedures to be followed for workers at hazardous waste operations.
Hazardous Materials Transportation Act	49 CFR 100-177	Regulates transportation of hazardous materials.
STATE ARARS		
NJ SDWA, MCLs	NJAC 7:10 A-280 Amendments	Establishes State criteria for drinking water.
NJ Water Pollution Control Act (WPCA), Wastewater Discharge Requirements	NJAC 7:9-5	Establishes effluent standards for wastewater discharge.
NJ WPCA, Groundwater Standards	NJAC 7:9-6	Establishes State groundwater quality criteria.
NJ WPCA, Sealing of Abandoned Wells	NJAC 7:9-9	Establishes standards for sealing of abandoned wells.

TABLE 14
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENT	CITATION	DESCRIPTION
NJ Water Pollution Control Act, Sludge Quality Criteria	NJAC 7:14-4 Appendix B-1	Establishes procedures for management of sludge generated through water treatment.
NJ Pollutant Discharge Elimination System (NJPDES)	NJAC 7:14A	Requires permit for surface water discharges. May provide criteria for discharge concentrations.
NJ Water Pollution Control Act, Surface Water Criteria	NJAC 7:9B	Defines surface water classes and establishes surface water quality-based effluent limitations.
NJ Air Pollution Control Act, Prohibition of Air Pollution	NJAC 7:27-5	Prohibits emissions that result in air pollution.
NJ Air Pollution Control Act, Ambient Air Quality Standards	NJAC 7:27-13	Establishes State ambient air quality criteria.
NJ Air Pollution Control Act, Permitting Requirements	NJAC 7:27-8	Establishes permit and operating certificate requirements.
NJ Air Pollution Control Act	NJAC 7:27-16	Provides requirements for emissions of toxic substances
NJ Air Pollution Control Act, Control and Prohibition of Air Pollution by Toxic Substances	NJAC 7:27-17	Provides requirements for emissions of toxic substances.
NJ Air Pollution Control Act	Memorandum from William O'Sullivan (3/23/87)	Information required for air permits must be submitted for State review, approved equipment must be used.
NJ Air Pollution Control Act, Air Stripping Guidelines	Memorandum from Assistant Commissioner, Tyler	Provides criteria for air stripping emissions air pollution control equipment.

TABLE 14
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENT	CITATION	DESCRIPTION
NJ Air Permits	NJ Letter to R. Palasits, Elizabethtown Water Company 6/17/85	Provide permit conditions with respect to total flow rate, emissions rate, and testing.
NJ Flood Hazard Area Control Act	NJAC 7:13	Establishes permit requirements for construction and development in floodplains.
NJ Wetland Act of 1970	NJSA 13:9A-1	Establishes listing and permitting requirements for regulated activities.
NJ Policy/Procedures for Discharge to Surface Waters (DSW) from Superfund Sites	Memorandum from E. Post, 11/1/83	Provides information required for a Superfund site DSW permit.
NJ Requirements for Groundwater Monitoring	NJAC 7:26-9	Establishes groundwater monitoring requirements.
NJ Well Drillers and Pump Installers Act	NJSA 58:4A-5	Establishes requirements for well and pump installation.
NJ Noise Control Act	NJAC 7:29	Establishes criteria for protection of public from noise from industrial, commercial, public service, or community service operations.

Table 15

ORAL TOXICITY CRITERIA FOR CHEMICALS OF POTENTIAL CONCERN

Chemical	Chronic RfD (mg/kg-day)	Uncertainty Factor (a)	Target Organ/ Critical Effect	Source	Slope Factor/ (mg/kg-day)-1	Weight of Evidence Class (b)	
ORGANICS:							
Acenaphthene	6E-02	3,000	Liver	IRIS	---	---	
Acetone	1E-01	1,000	Kidney/Liver	IRIS	---	D	
Aldrin	3E-05	1,000	Liver	IRIS	1.7E+01	B2	IRIS
Benzene	---	---	---	IRIS	2.9E-02	A	IRIS
Benzo(a)anthracene	---	---	---	IRIS	7.3E-01 (c)	B2	IRIS
Benzo(a)pyrene	---	---	---	IRIS	7.3E+00	B2	IRIS
Benzo(b)fluoranthene	---	---	---	IRIS	7.3E-01 (c)	B2	IRIS
Benzo(k)fluoranthene	---	---	---	IRIS	7.3E-01 (c)	B2	IRIS
Benzoic acid	4E+00	1	Malaise	IRIS	---	D	IRIS
Benzyl alcohol	3E-01	1,000	Forestomach	HEAST	---	---	---
beta-BHC	---	---	---	IRIS	1.8E+00	C	IRIS
Bis(2-ethylhexyl)phthalate	2E-02	1,000	Liver	IRIS	1.4E-02	B2	IRIS
Carbon disulfide	1E-01	100	Fetotoxicity	IRIS	---	---	---
Chlorobenzene	2E-02	1,000	Liver	IRIS	---	D	IRIS
Chloromethane	--- (m)	---	---	IRIS	1.3E-02	C	HEAST
Chrysene	---	---	---	HEAST	7.3E-02 (c)	B2	IRIS
4,4'-DDT	5E-04	100	Liver lesions	IRIS	3.4E-01	B2	IRIS
Dibenzo(a,h)anthracene	---	---	---		7.3E+00 (c)	B2	IRIS
1,2-Dichlorobenzene	9E-02	1,000	Liver	IRIS	---	D	IRIS
1,3-Dichlorobenzene	8.9E-02	1,000	Liver	HA 1987	---	---	
1,4-Dichlorobenzene	1E-01	1,000	Kidney	HA 1987	2.4E-02 (o)	C	HEAST
1,1-Dichloroethane	1E-01 (m)	1,000	Kidney	HEAST	---	C	IRIS
1,2-Dichloroethane	---	---	---	IRIS	9.1E-02	B2	IRIS
1,1-Dichloroethene	9E-03	1,000	Liver	IRIS	6E-01	C	IRIS
cis-1,2-Dichloroethene	1E-02	3,000	Hematological	HEAST	---	D	IRIS
trans-1,2-Dichloroethene	2E-02	1,000	Liver	IRIS	---	---	---
Dieldrin	5E-05	100	Liver	IRIS	1.6E+01	B2	IRIS
Di-n-butylphthalate	1E-01	1,000	Mortality	IRIS	---	---	---
Ethylbenzene	1E-01	1,000	Liver/Kidney	IRIS	---	D	IRIS
Fluoranthene	4E-02	3,000	Liver/Kidney	IRIS	---	D	IRIS
Fluorene	4E-02	3,000	Blood	IRIS	---	D	IRIS
Indeno(1,2,3-c,d)pyrene	---	---	---		7.3E-01 (c)	B2	IRIS
Methylene chloride	6E-02	100	Liver	IRIS	7.5E-03	B2	IRIS
PCBs (total)	7E-05 (d)	100	< Birth Weight	IRIS	7.7E+00 (p)	B2	IRIS
Phenanthrene	3E-02 (j)	3,000	Kidney	IRIS	---	D	IRIS
2,3,7,8-TCDD	1E-09	1,000	Reproductive	HA 1987	1.5E+05 (o)	B2	HEAST
Tetrachloroethene	1E-02	1,000	Liver	IRIS	5.2E-02	C/B2	ECAO
1,1,1-Trichloroethane	9E-02 (n)	1,000	Liver	HEAST	---	D	IRIS
Trichloroethene	7.35E-03	1,000	Liver	HA 1987	1.1E-02	B2-C	ECAO
Trichlorophenol, 2,4,6-	---	---	---	IRIS	1.1E-02	B2	IRIS
Vinyl chloride	---	---	---	HEAST	1.9E+00	A	HEAST
Xylenes (total)	2E+00	100	CNS	IRIS	---	D	IRIS
INORGANICS:							
Antimony	4E-04	1,000	Blood Chemistry	IRIS	---	D	IRIS
Arsenic	3E-04	3	Skin	IRIS	1.75E+00 (e)	A	IRIS
Barium	7E-02	3	Increased BP	IRIS	---	D	IRIS
Beryllium	5E-03	100	None Observed	IRIS	4.3E+00	B2	IRIS
Cadmium	5E-04 (f)	10	Kidney	IRIS	---	---	IRIS
Cadmium	1E-03 (g)	10	Kidney	IRIS	---	---	IRIS
Chromium III	1E+00	1,000	Liver	IRIS	---	---	IRIS
Chromium VI	5E-03	500	CNS (h)	IRIS	---	---	IRIS
Copper	3.7E-02 (i)	1	GI irritation	HEAST	---	D	IRIS
Cyanide	2E-02	500	Myelin deg.	IRIS	---	D	IRIS
Lead	---	---	CNS	IRIS	---	B2	IRIS
Manganese	1.4E-01 (k)	1	CNS	IRIS	---	D	IRIS
Manganese	5E-03 (l)	1	CNS	IRIS	---	D	IRIS
Mercury	3E-04 (m)	1,000	Kidney	HEAST	---	D	IRIS
Nickel	2E-02	300	< Body weight	IRIS	---	---	IRIS
Selenium	5E-03	3	Selenosis	IRIS	---	D	IRIS
Silver	5E-03	3	Argyria	IRIS	---	D	IRIS
Vanadium	7E-03 (m)	100	None Observed	HEAST	---	D	IRIS
Zinc	3E-01	3	Blood Chemistry	HEAST	---	D	IRIS

See footnotes on following page.

Table 15

INHALATION TOXICITY CRITERIA FOR CHEMICALS OF POTENTIAL CONCERN

Chemical	Chronic RfC (mg/m3)	Uncertainty Factor (a)	Target Organ/ Critical Effect	Source	Inhalation Unit Risk (ug/m3)-1	Weight of Evidence Class (b)	Source
ORGANICS:							
Aldrin	---	---	---	IRIS	4.9E-03	B2	IRIS
Benzo(a)anthracene	---	---	---	IRIS	1.7E-04 (c)	B2	HEAST
Benzo(a)pyrene	---	---	---	IRIS	1.7E-03	B2	HEAST
Benzo(b)fluoranthene	---	---	---	IRIS	1.7E-04 (c)	B2	HEAST
Benzo(k)fluoranthene	---	---	---	IRIS	1.7E-04 (c)	B2	HEAST
Chrysene	---	---	---	IRIS	1.7E-05 (c)	B2	HEAST
4,4'-DDT	---	---	---	IRIS	9.7E-05 (d)	B2	IRIS
Dibenzo(a,h)anthracene	---	---	---	IRIS	1.7E-03 (c)	B2	HEAST
Dieldrin	---	---	---	IRIS	4.6E-03	B2	IRIS
Indeno(1,2,3-c,d)pyrene	---	---	---	IRIS	1.7E-04 (c)	B2	HEAST
PCBs (total)	---	---	---	IRIS	---	B2	IRIS
INORGANICS:							
Antimony	---	---	Cancer	IRIS	---	---	---
Arsenic	---	---	Cancer	IRIS	4.3E-03	A	IRIS
Barium	5E-04 (e)	1,000	Fetotoxicity	HEAST	---	---	---
Beryllium	---	---	---	IRIS	2.4E-03	B2	IRIS
Chromium III	---	---	---	HEAST	---	---	IRIS
Chromium VI	---	---	---	---	1.2E-02	A	IRIS
Copper	---	---	---	IRIS	---	---	---
Lead	---	---	CNS	IRIS	---	B2	IRIS
Mercury	3E-04	30	Neurotoxicity	HEAST	---	D	IRIS
Nickel	---	---	---	IRIS	---	---	IRIS
Silver	---	---	---	IRIS	---	---	---
Zinc	---	---	---	IRIS	---	D	IRIS

(a) Uncertainty factors used to develop reference doses generally consist of multiples of 10, with each factor representing a specific area of uncertainty in the data available. The standard uncertainty factors include the following:
- A 10-fold factor to account for the variation in sensitivity among the members of the human population;
- A 10-fold factor to account for the uncertainty in extrapolation animal data to the case of humans;
- A 10-fold factor to account for uncertainty in extrapolating from less than chronic NOAELs to chronic NOAELs; and
- A 10-fold factor to account for the uncertainty in extrapolating from LOAELs to NOAELs.

(b) EPA Weight of Evidence for Carcinogenic Effects:
[A] = Human carcinogen based on adequate evidence from human studies;
[B2] = Probable human carcinogen based on inadequate evidence from human studies and adequate evidence from animal studies;
[C] = Possible human carcinogen based on limited evidence from animal studies in the absence of human studies; and
[D] = Not classified as to human carcinogenicity;

(c) The unit risk for benzo(a)pyrene was conservatively used as a surrogate to evaluate carcinogenic PAHs along with the TEF approach recommended by EPA Region II. See text.

(d) Value based on route-to-route extrapolation.

(e) Value was derived using methodologies not currently practiced by the RfD/RfC workgroup.

NOTE: IRIS = Integrated Risk Information System, May 1, 1993
HEAST = Health Effects Assessment Summary Tables, Annual 1992
--- = No information available
CNS = Central Nervous System

Table 16

POTENTIAL EXPOSURE PATHWAYS: CURRENT LAND-USE CONDITIONS

Exposure Medium	Source and Mechanism of Release	Exposure Point	Potential Receptor	Exposure Route	Pathway Potentially Complete? Basis.	Me at
Surface Soil	Past spills and direct discharge of wastes to surface soil	On-site	Workers, child/teenager (6-16 years) trespasser	Incidental ingestion, dermal absorption	Yes. Chemicals are present in on-site surface soil. Six companies are currently operating at the site, and evidence of on-site trespassing exists.	Qu
	Past spills and direct discharge of wastes to surface soil	On-site, Stirling basement	Workers	Incidental ingestion, dermal absorption	No. Basement is not currently used by workers or other individuals.	None.
	Past spills and direct discharge of wastes to surface soil	Off-site, sub-divided lot	Child/teenager (6-16 years)	Incidental ingestion, dermal absorption	Yes. Chemicals are present in off-site surface soil at the subdivided lot. This lot is accessible to the public, and is known to be frequented by local populations principally as a shortcut.	Quantitative.
	Aerial transport of chemicals released directly to air during past operations or as a result of wind or vehicle erosion.	Off-site, railroad tracks	Child/teenager (6-16 years)	Incidental ingestion, dermal absorption	Yes. Chemicals are present in surface soils near railroad tracks.	Quantitative.
Sediment	Surface water runoff, transport of contaminated soil, groundwater seepage	Off-site drainage ditch/tributary	Child/teenager (6-16 years)	Incidental ingestion, dermal absorption	Yes. Chemicals detected in ditch adjacent to site, and this is an attractive play area for children.	Quantitative.
	Surface water runoff, transport of contaminated soil, groundwater seepage	Raritan River	Child/teenager (6-16 years)	Incidental ingestion, dermal absorption	Yes. Some chemicals detected in river sediment were elevated compared to the upgradient sample.	None. Significant uncertainty associated with presence of chemicals and exposures likely to be low.
Surface Soil-Sediment in Areas 1 and 2	see Surface Soil and Sediment	Areas 1 and 2 (On-site surface soil and Off-site drainage ditch sediment)	Workers, child/teenager (6-16 years) trespasser	Incidental ingestion, dermal absorption	Yes, as described for on-site surface soil and drainage ditch sediment.	Quantitative, for incidental ingestion by workers only (focussed assessment)

Table 16 - Continued

POTENTIAL EXPOSURE PATHWAYS: CURRENT LAND-USE CONDITIONS

Exposure Medium	Source and Mechanism of Release	Exposure Point	Potential Receptor	Exposure Route	Pathway Potentially Complete? Basis.	Method of Evaluation
Surface Water	Spills and other releases during plant operations	On-site ponded water bodies	Workers, child/teenager (6-16 years) trespasser	Dermal absorption	Yes. Chemicals are present in ponded water.	Qualitative. Ponded water bodies are small (<3 sq.ft.) and contact frequency is likely to be minimal.
	Surface water runoff, transport of contaminated soil, and groundwater seepage	Off-site drainage ditch/tributary	Child/teenager (6-16 years)	Dermal absorption	Yes. Chemicals detected in ditch adjacent to site may be dermally absorbed during wading. The ditch is an attractive play area for children.	Quantitative.
	Surface water runoff, transport of contaminated soil, and groundwater seepage	Off-site drainage ditch/tributary	Child/teenager (6-16 years)	Incidental ingestion	No. The surface water is shallow.	None.
	Surface water runoff, transport of contaminated soil, and groundwater seepage	Raritan River	Child/teenager (6-16 years)	Incidental ingestion, dermal absorption	Yes. Tetrachloroethene detected in river.	None. Significant uncertainty associated with presence of chemicals and exposures likely to be low.
Groundwater	Leaching of contaminats from soil with percolation through vadose zone into aquifer	On-site and downgradient wells	None	None	No. No on-site or downgradient water supply wells exist. Local drinking water obtained from the Raritan River, at an upgradient location.	None.
Air	Volatilization of chemicals from surface soil, subsurface soil, building surfaces and wastes	On-site, off-site	Workers, child/teenager tres-passer, nearby residents	Inhalation	Yes. Volatile compounds were detected in soil borings and in soil gas samples.	None. No volatile chemicals were selected as chemicals of concern based on a toxicity-concentration screen. Semi-volatile chemicals were present at low concentrations and therefore will not result in signficant inhalation impacts.

Table 17

ADDITIONAL POTENTIAL EXPOSURE PATHWAYS: FUTURE LAND-USE CONDITIONS

Exposure Medium	Source and Mechanism of Release	Exposure Point	Potential Receptor	Exposure Route	Pathway Potentially Complete? Basis.	Method of Evaluation
Surface Soil	Past spills and direct discharge of wastes to surface soil	On-site, Stirling basement	Workers	Incidental ingestion, dermal absorption	Yes. Chemicals detected in Stirling basement soil.	Quantitative.
	Past spills and direct discharge of wastes to surface soil	Off-site, subdivided lot	Workers	Incidental ingestion, dermal absorption	Yes. Chemicals detected in soils of the subdivided lot and an office/construction equipment storage building has been proposed for this land. This property is unattractive for residential development because it is bordered by two railroad tracks and contains power lines.	Quantitative.
Surface Water	Groundwater seepage	On-site, Stirling basement	Workers	Incidental ingestion, dermal absorption	Yes. Low concentration of chemicals detected in surface water, and infrequent contact will result in negligible risks.	None.
Groundwater	Leaching of contaminants from soil with percolation through vadose zone into aquifer	On-site wells, Jame Fine well	Workers	Ingestion	Yes. Chemicals present in on-site monitoring wells.	Quantitative.
Air	Dust during construction and industrial operations/traffic	On-site/off-site	Workers, nearby residents	Inhalation	Yes. Chemicals detected in soil. An office/construction equipment storage building has been proposed on the subdivided lot, and portions of this area have been cleared in the preparation of construction.	None. Becaus no subsurface soil samples were collecte at subdivided lot, insufficient data is available to assess this exposure. It is unlikely that construction will occur on site.

RESPONSIVENESS SUMMARY
FOR THE
BROOK INDUSTRIAL PARK SITE
BOUND BROOK, SOMERSET COUNTY, NEW JERSEY

I. INTRODUCTION

This Responsiveness Summary provides a summary of public comments and concerns regarding the remedial investigation and feasibility study (RI/FS) report and the Proposed Plan for the Brook Industrial Park Superfund site. It also provides the U.S. Environmental Protection Agency's (EPA's) responses to those comments. EPA has selected a final remedy for the Brook Industrial Park site after reviewing and considering all public comments received during the public comment period.

EPA held a public comment period from July 22, 1994 through August 20, 1994 to provide interested parties with the opportunity to comment on the RI/FS reports and the Proposed Plan for the Brook Industrial Park site. In addition, EPA held a public information meeting to discuss the remedial alternatives described in the RI/FS report and to present EPA's preferred remedial alternatives for cleaning up the site. The meeting was held at the Bound Brook Memorial Library on August 4, 1994 at 7:00 p.m.

In general, the community responded positively to EPA's Proposed Plan. A majority of the residents recognized the importance of remediating the contamination at the Brook Industrial Park site and supported EPA's preferred remedy. However, the potentially responsible parties did not fully support EPA's preferred remedy.

The next section of this Responsiveness Summary provides a comprehensive summary of major questions, comments, concerns and responses, by summarizing oral comments raised at the public meeting, written comments submitted during the public comment period and EPA's responses.

The last section of this Responsiveness Summary includes appendices which document public participation in the remedy selection process for the site. There are five appendices attached to this Responsiveness Summary. They are as follows:

Appendix A: The Proposed Plan that was distributed to the public for review and comment;

Appendix B: The public notices which appeared in The Courier News and the Bound Brook Chronicle;

Appendix C: The public meeting transcript;

Appendix D: The written comments received by EPA during the public comment period; and

Appendix E: The index to the administrative record developed for the site.

II. <u>COMPREHENSIVE SUMMARY OF MAJOR QUESTIONS, COMMENTS, CONCERNS AND EPA'S RESPONSES</u>

ORAL COMMENTS RECEIVED AT THE PUBLIC MEETING

This section summarizes oral comments raised at the public meeting and EPA's responses. The comments and corresponding responses are presented in the following categories:

1.0 Remedial Investigation/Feasibility Study
2.0 Risk Assessment
3.0 EPA's Proposed Plan
4.0 Cleanup Schedule/Cost
5.0 Other

1.0 Remedial Investigation and Feasibility Study

1.1 Comment: A representative of a PRP asked if EPA knew how the New Jersey Transit Railroad tracks were kept free of weeds.

Response: EPA has no knowledge of New Jersey Transit's weed control practices. However, EPA collected five surface soil samples along the railroad tracks located to the north of the site. These samples were analyzed for herbicides. The only compound detected was octachlorodibenzo dioxin (OCDD). Based on EPA's risk assessment for the site, OCDD did not pose an unacceptable risk at the railroad tracks.

1.2 Comment: A representative of a PRP commented that OCDD was detected near the railroad tracks and that high energy can cause OCDD to dehalogenate to 2,3,7,8 TCDD.

Response: OCDD was detected near the railroad tracks but at levels that did not present an unacceptable risk. Furthermore, the likelihood of high energy in the soil is minimal.

1.3 Comment: A representative of a PRP asked about the presence of heavy metals along the railroad tracks.

Response: EPA did not sample for heavy metals along the railroad tracks. However, samples taken on the northern border of the site did not reveal the presence of lead or chromium at levels above EPA's remediation goals.

1.4 Comment: A representative of a PRP asked if EPA studied the "canal" that runs along the southern boundary of the site.

Response: EPA sampled the "canal" (referred to as the drainage ditch in the RI/FS report and Proposed Plan) that runs along the southern boundary of the site. A surface water sample was collected at the point where a storm sewer discharges into the drainage ditch. No volatile organic compounds (VOCs) and only low concentrations of inorganic contaminants were detected.

1.5 Comment: A representative of a PRP asked if pesticides were generated on site and if the drainage ditch or area along the river were sampled for pesticides.

Response: The Blue Spruce Company, which operated on site in the 1970s, was a pesticide manufacturing facility. EPA sampled the drainage ditch and tributary which run along the southern border of the site. One sediment sample was found to contain a pesticide of concern above remediation goals.

1.6 Comment: A representative of a PRP asked what the source of contamination is and if contamination has migrated.

Response: EPA believes that contamination is a result of on-site operations by several companies that have been identified as PRPs. Results of sampling have shown that contamination has not migrated off site.

1.7 Comment: A resident asked if the concentration of contaminants in the ground water could increase during the "dry season" and would this increase the risk.

Response: EPA did not estimate the effects of seasonal fluctuations of precipitation on the concentration of contaminants in the ground water. The effect on the degree of risk was not estimated. However, EPA does not believe that normal variation of precipitation would significantly affect the concentration of contaminants in the ground water.

1.8 Comment: A resident questioned whether the site is contaminated.

Response: Analysis of samples collected from many different media revealed the presence on contaminants in the soil, ground water and Blue Spruce Building at levels that pose an unacceptable long-term threat to public health and the environment.

1.9 Comment: A representative of a PRP asked how monitoring well 9RS could be contaminated with chromium.

Response: Although chromium was detected in monitoring well 9RS at levels above the Safe Drinking Water Act Maximum Contaminant Levels (MCLs), the concentration was significantly less than the chromium level found in the on-site production well. The mechanism by which well 9RS was contaminated has not been established. Chromium was not found to be above MCLs in upgradient residential wells.

1.10 Comment: Several residents asked if the contamination has spread to the off-site monitoring wells and if any private wells could be affected by the contamination spreading off site.

Response: Three contaminants were detected in an off-site monitoring well at levels above MCLs. However, all private wells that EPA has knowledge of are upgradient of the site and, therefore, are unlikely to be affected by the site. In addition, the analysis of samples taken from a residential well approximately one-quarter mile upgradient from the site did not show any contaminant above MCLs.

1.11 Comment: A resident asked why it took five years to conduct the RI/FS.

Response: Initially, EPA was denied access to the site. Access was granted only after EPA issued a unilateral administrative order which demanded access to the site. This denial of access was responsible for a substantial delay. In addition, the RI/FS conducted at the Brook Industrial Park site was quite extensive. EPA sampled many different media and collected many samples. Once the samples were collected and analyzed, the analysis was subjected to an extensive quality assurance process.

1.12 Comment: A resident asked if any buildings on site other than the Blue Spruce Building are contaminated.

Response: The soil in the Stirling Center basement is contaminated as well as the sediment in the National Metal pits. These areas would pose a risk if a worker were exposed to the soils or sediments daily on a long-term basis. Therefore, those areas will be remediated.

1.13 Comment: A representative of a PRP stated that Blue Spruce did not occupy a number of buildings on site.

Response: EPA records indicate that Blue Spruce occupied more than one building on site.

2.0 Risk Assessment

2.1 Comment: A representative of a PRP asked for an explanation of chronic daily intake.

Response: The chronic daily intake (CDI) represents the reasonable maximum amount of exposure to a site-related contaminated medium (e.g., soil). It is a function of the magnitude (e.g., amount of soil ingested per day), frequency (e.g., number of days per year), and duration (e.g., number of years) of exposure.

2.2 Comment: A representative of a PRP asked how a person can ingest soil.

Response: The main route for ingestion of soil by adults is through hand-to-mouth activity.

2.3 Comment: A resident asked for an explanation of risk, what the degree of risk posed by the site is, and if there is a danger to the surrounding community.

Response: The term "risk" refers to an individual's probability of an adverse effect (e.g., cancer) occurring. The purpose of the risk assessment is to estimate the long-term threat due to exposure to the site. The risks presented in the Proposed Plan and the Record of Decision (ROD) are based on a 25-year worker or 30-year residential exposure scenario and deal with chronic toxicity. EPA looks at the cumulative effect of chronic exposure to a chemical rather than a single acute dose. If an immediate risk is present at a site, such as an exposure to a single acute dose, that site would be addressed through an emergency response action. This site poses a long-term risk resulting from daily exposure to site contaminants. Also, the risk assessment has indicated that the site currently does not pose an unacceptable risk to the surrounding community.

2.4 Comment: A resident asked how accurate the risk calculations are, if EPA is confident that the risk actually exists, and if there is a scientific basis for the calculations.

Response: The actual risk calculations are based on EPA's risk assessment guidance which utilizes the best available science. For example, slope factors, which establish the relationship between the dose of a chemical and the response, are generally based on extrapolation of animal data and on human epidemiology. These factors are subject to very rigid criteria and a peer-review process before EPA adopts them for use in its risk assessment process. Of course, the procedures and inputs in the risk assessment, as in all risk assessments, are subject to a variety of uncertainties. However, these uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters and, as a result, it is highly unlikely that actual risks related to exposure have been underestimated. The risk calculations for Brook Industrial Park are based on results of site-specific sampling data; therefore, EPA is confident in stating that the site poses a risk to human health and the environment.

2.5 Comment: A representative of a PRP asked how a person can drink the water that is contaminated and how much a person would have to consume to increase their cancer risk by seven in ten thousand.

Response: The current access to the ground water is the on-site production well and EPA based its assessment on consumption of the ground water by an on-site worker. A standard assumption of one liter a day for 25 years was used in the risk assessment to arrive at a risk of seven in ten thousand. Additionally, there is currently no prohibition to the installation of potable wells on the site.

2.6 Comment: A representative of a PRP asked what areas of the Stirling Center pose the risk and whether the risk calculation was based on someone working in the basement for 25 years.

Response: Exposure to contaminated soils in the Stirling Center basement was determined to pose a risk to a future worker. Standard industrial exposure assumptions were used to calculate the risk posed by the soils to someone working in the basement over a 25-year period.

2.7 Comment: A representative of a PRP asked if the risk due to soil contamination in the Stirling Center basement is based on ingestion of the soil and if inhalation increases the risk.

Response: The risk to workers in the Stirling Center basement is based on ingestion of soil. Inhalation of hazardous substances would increase the risk to workers.

2.8 Comment: A representative of a PRP questioned the conclusion of EPA's ecological assessment.

Response: The results of the ecological assessment were threefold. First, the most important potential exposure pathway for ecological receptors at the site is associated with chemicals in the sediments and surface water of the unnamed tributary, the drainage ditch, and the Raritan River (wetland area). Aquatic animals could be exposed to the chemicals through direct contact or through ingestion while feeding. These areas would be remediated as part of Area One and Area Two. Second, chemical concentrations in on-site surface soils are at levels that may potentially impact plants and earthworms. However, on-site habitat for plants and earthworms is limited because of paved areas and compacted gravelly soils. Lastly, the potential exposures to birds and mammals are estimated to be very limited. The site provides very limited habitat for birds and mammals that feed on soil organisms, such as worms, since the site consists primarily of buildings and paved areas.

2.9 Comment: A resident asked if this site is as bad as Times Beach or Love Canal where EPA evacuated the sites. The resident also asked if the companies on site can continue to operate.

Response: This site is not similar to Times Beach or Love Canal. It does not need to be evacuated.

2.10 Comment: A resident expressed some concern about risks to companies operating on a Superfund site.

Response: The risk posed by the site is a long-term risk, not an immediate threat.

2.11 Comment: A representative of a PRP asked if there is an immediate danger posed by the site. The representative also asked if capping the dioxin was what EPA refers to as the removal action.

Response: The immediate threat due to the dioxin contamination was addressed by EPA through removal actions. Currently, EPA believes that no other immediate threat remains. The removal actions already taken at the site consisted of limiting access to the dioxin contamination by capping the contaminated area and securing the Blue Spruce Building.

2.12 Comment: A representative of a PRP asked if EPA's "lack of action" means that the site poses no danger to the community or workers.

Response: The site currently does not pose a threat to off-site areas or residents. With respect to workers, the risk posed by the site is a long-term risk, not an immediate threat. EPA addressed the immediate threat of the dioxin through capping the contaminated area in 1983 and securing the Blue Spruce Building in 1991.

2.13 Comment: A representative of a PRP commented that he believes the risk posed by the site is based on miscalculations.

Response: The risk estimates are based on the results of actual data analysis and are calculated based on EPA guidance using standard industrial use assumptions.

3.0 Proposed Plan

3.1 Comment: A representative of a PRP asked how the chromium in the ground water was going to be removed.

Response: The chromium and other inorganic contaminants will be removed using chemical precipitation as part of the ground water extraction and treatment program.

3.2 Comment: A resident questioned whether air stripping the ground water to remove organic contaminants would result in releasing VOCs into the atmosphere.

Response: If it is determined during design that the level of VOCs in the air emissions will exceed allowable levels, they will be captured by carbon and disposed of properly.

3.3 Comment: A resident questioned the concentration of organics in the vapor discharged during air stripping.

Response: The concentrations of VOCs in air emissions from the air stripper will be estimated during the design of the remedy and will be verified during initial unit testing. If it is determined during design that the level of VOCs in the air emissions will exceed allowable levels, they will be captured by carbon and disposed of properly. VOC concentrations will be monitored during the operation of the treatment system as part of a long-term monitoring program.

3.4 Comment: A resident commented that he was not happy with the air stripping alternative to address organic contamination in the ground water due to the potential discharge of organics to the atmosphere and would prefer Alternative GW-3(B), Chemical Precipitation and Ultraviolet (UV)/Oxidation.

Response: EPA appreciates the resident's concern, however, EPA believes that air stripping can be safely implemented and is a proven technology for treating organic contamination in the ground water. If it is determined during design that the level of VOCs in the air emissions will exceed allowable discharge levels, the organics will be captured by carbon and disposed of properly. While Alternative GW-3(B), Chemical Precipitation and UV/Oxidation, would also be effective in treating the organic contamination, it was estimated to cost almost $3 million more than the air stripping alternative. Therefore, EPA believes air stripping is the best alternative for addressing the organic contamination in the ground water.

3.5 Comment: A representative of a PRP asked what would happen to the demolished building material.

Response: The material will be taken off site for appropriate disposal and treatment as necessary.

3.6 Comment: A resident asked what portion of the building would be removed.

Response: Only the contaminated portion of the building which was occupied by the Blue Spruce Company will be demolished. This portion of the building is currently vacant.

3.7 Comment: A resident asked if the Blue Spruce Building is the only one to be demolished.

Response: The vacant Blue Spruce Building is the only building to be demolished.

3.8 Comment: A resident asked what will happen to the contaminated soil after it is transported off site.

Response: The contaminated soil would be transported to a facility that is licensed to accept the waste. The soil would then be treated, if required, at the facility prior to disposal.

4.0 Cleanup Schedule/Cost

4.1 Comment: A resident and a representative of a PRP voiced concern about maintenance costs not being included in the $12 million cost estimate.

Response: The $12 million cost estimate is a present worth cost estimate which includes all maintenance costs associated with the remedy for a 30-year period.

4.2 Comment: Residents asked who will pay for the cleanup and who will benefit, i.e., would EPA pay contractors to conduct the action, and what role PRPs have in the cleanup process.

Response: It is EPA's policy to first offer the PRPs the opportunity to conduct the cleanup. If the PRPs refuse, EPA may order them to perform the cleanup or fund the cleanup and seek reimbursement of costs from the PRPs at a later date.

4.3 Comment: A resident asked if funds were available to conduct the cleanup at the site.

Response: Annual funding of the Superfund program is subject to Congressional Appropriation and EPA cannot predict the availability of funds. However, historically, funds have been available for all sites ready to begin construction activities.

4.4 Comment: A resident asked if there is anything that would stop or delay EPA in moving forward with cleanup of the site.

Response: Although EPA hopes to move forward as quickly as possible, there are several things that could delay cleanup of the site. First, Superfund is currently up for reauthorization. Second, although unlikely, funding may not be available when the action is ready to begin. Lastly, any litigation regarding the site may delay cleanup. All three of these occurrences could delay cleanup.

4.5 Comment: A resident asked when the construction would begin.

Response: Construction will not begin until the remedial design is completed which would likely be several years away. There are several steps that EPA takes before starting construction. First, EPA offers the PRPs the opportunity to conduct the work. If the PRPs do not accept this offer, EPA would may proceed using federal funds. If the PRPs offer to conduct the work, EPA and the PRPs would proceed to negotiate a consent decree. This consent decree would then go through a public comment period before it becomes effective. The next step would be to design the remedy. Since the design for the building remediation would probably be the easiest, the building remediation might begin first. The ground water would take the longest to design; therefore, this phase of construction would probably occur last.

4.6 Comment: A resident asked how long it will take before the site is clean.

Response: The site would be considered clean after all remediation is completed. EPA estimates that the soil and building remediation can be completed six months from the start of the remedial action. Construction of the ground water extraction and treatment system is estimated to take one year from the start of remedial action. The operation of the ground water treatment system will be ongoing for approximately 30 years.

4.7 Comment: A representative of a PRP voiced a concern about the accuracy of EPA's cost estimates.

Response: EPA's cost estimates are based on the best available data and are used primarily for comparison between the alternatives. All cost estimates will be refined during design.

5.0 Other

5.1 Comment: Representatives of a PRP asked several questions regarding re-evaluating the site's eligibility for inclusion on the National Priorities List (NPL).

Response: All requests regarding a re-evaluation of the site's eligibility for inclusion on the NPL have been referred to the office in EPA Headquarters responsible for the NPL-listing process.

5.2 Comment: A representative of a PRP asked how much money EPA has spent on the RI/FS.

Response: As of July 1994, EPA expended $1,946,590 on the RI/FS under the ICF work assignment.

5.3 Comment: A representative of a PRP commented that EPA's reports did not indicate that anyone was asked if the heavy metals of concern were ever produced on site.

Response: Through EPA's search for PRPs, several companies were identified that used the contaminants of concern found on the site. Such PRP-search information is not included in RI/FS reports.

5.4 Comment: A representative of a PRP asked how much EPA spent on securing the Blue Spruce Building.

Response: EPA spent approximately $75,000 on the two emergency response actions to secure the Blue Spruce Building.

5.5 Comment: A representative of a PRP asked what the land could be used for in the future.

Response: Although EPA cannot predict future land use, EPA's risk assessment was based on an assumption that the land would continue to be used for industrial purposes only.

5.6 Comment: A representative of a PRP asked if the site was correctly evaluated.

Response: This RI/FS was conducted in accordance with EPA guidance and the National Oil and Hazardous Substances Pollution Contingency Plan, and provided EPA with sufficient information to evaluate alternatives and select a remedy.

5.7 Comment: A representative of the PRP asked why it took EPA 10 to 14 years, with three studies to get to this point in the process.

Response: EPA's involvement in the site began in 1983 when dioxin was discovered in the Blue Spruce Building. EPA addressed the immediate threat posed by the dioxin contamination through a removal action in 1983. Subsequently, the site went through the NPL ranking process which ended with it being included on the NPL in 1989. In 1989, EPA initiated the RI/FS to determine the long-term threat posed by the site. This process was delayed when a PRP denied EPA access to the site.

5.8 Comment: A resident asked if written comments would be accepted after the public meeting.

Response: EPA indicated that written comments or questions would be accepted following the public meeting through August 20, 1994. Responses to those comments or questions are included in this Responsiveness Summary.

5.9 Comment: A resident asked if EPA would take no action if the contamination on site was below EPA cleanup criteria and there was no risk. Would it be turned over to some other group?

Response: If contamination on the site did not exceed cleanup criteria and the risk was in the acceptable range, EPA would not take an action under the Superfund program. However, the Brook Industrial Park and the companies operating there would still be subject to other environmental laws. EPA and the state would be responsible for enforcing provisions of those laws.

5.10 Comment: A resident asked if NJDEP would perform another study if the site were turned over to NJDEP.

Response: There are no current plans to transfer the lead for the site to NJDEP. However, if that were to occur, NJDEP would utilize EPA's data and make a determination at that time if any additional information would be required to be obtained under an additional study.

5.11 Comment: A resident asked when the Superfund law is due to be reauthorized.

Response: Funding under the current legislation expires September 30, 1994. New legislation is now before the Congress.

5.12 Comment: A resident asked when the final report would be finished.

Response: The final RI and FS reports were issued in July 1994.

5.13 Comment: A representative of a PRP asked what companies other than Blue Spruce were cited for poor housekeeping practices.

Response: National Metal Finishings Corporation and Jame Fine Chemicals Incorporated were also cited for various violations by NJDEP.

5.14 Comment: A representative of a PRP asked if any remediation had been done other than capping the dioxin-contaminated area.

Response: Two additional removal actions have been conducted to secure the Blue Spruce Building.

5.15 Comment: A representative of a PRP asked if any contamination has been removed.

Response: No contamination has been removed, however, the objective of this ROD is to select a remedy to remediate the site.

5.16 Comment: A representative of a PRP asked if the U.S. Air Force is considered a PRP.

Response: EPA considers the U.S. Air Force to be a PRP.

5.17 Comment: A representative of a PRP asked if Blue Spruce was operating when EPA became involved in the site in 1983.

Response: According to EPA records, Blue Spruce was not operating on site when EPA became involved in the Brook Industrial Park.

5.18 Comment: A representative of a PRP asked if EPA knew when Jame Fine Chemicals Incorporated was cited for poor housekeeping and if it was prior to 1983.

Response: According to EPA's records, Jame Fine was cited by NJDEP for environmental violations between 1980 and 1986.

5.19 Comment: A representative of a PRP asked if EPA knew when National Metal was cited for poor housekeeping practices and if it was prior to 1984.

Response: According to EPA's records, National Metals was cited by NJDEP in 1982 for improper discharging of plating waste to the subsurface pits. National Metal was ordered by NJDEP to cease discharging to the pits and to perform a hydrogeological study.

5.20 Comment: A representative of a PRP asked if EPA was aware of any environmental violations subsequent to 1984.

Response: According to EPA's records, Jame Fine was issued a Notice of Violation by NJDEP in 1986 for improper housekeeping and documentation procedures.

5.21 Comment: A representative of a PRP commented that a fund of $100,000 was established to perform the cleanup of Blue Spruce which was known at that time to be contaminated with pesticides. The person also commented that EPA did not allow cleanup of the contamination to proceed.

Response: According to EPA records, the settlement which addressed pesticide contamination was reached before dioxin was discovered. At that point, the cleanup was suspended and the site turned over to EPA to address the dioxin contamination. The immediate threat due to the dioxin contamination was addressed by EPA through a removal action. Subsequently, the Brook Industrial Park site was listed on the NPL and EPA conducted the RI/FS to determine the nature and extent of contamination. This ROD sets forth the remedial action selected to address the long-term threat posed by the site.

5.22 Comment: A representative of a PRP asked if EPA was aware of the system of wells installed by the owner of the site under the direction of NJDEP.

Response: EPA was aware of the existence of wells, which were properly sealed by EPA during the RI/FS.

5.23 Comment: A representative of a PRP asked if EPA was aware of the owner's plan and that EPA instructed the owner and NJDEP to put the plan on hold.

Response: EPA is not familiar with "the plan" and is not aware of any direction to suspend work.

5.24 Comment: A representative of a PRP asked if EPA has higher authority than NJDEP. The representative also asked if NJDEP were to use the $100,000 in escrow to clean up the site, if EPA would no longer be involved.

Response: EPA and NJDEP work as partners in the Superfund program. Brook Industrial Park is a federal-lead site, meaning that EPA has ultimate responsibility for addressing the contamination. Therefore, NJDEP would not conduct an action at the site without EPA agreement. Finally, the $100,000 in escrow would be insufficient to remediate the site.

5.25 Comment: A resident asked if the owners would be compensated for the loss of the Blue Spruce Building.

Response: Since the owners are considered to be PRPs, they would not be compensated for the loss of the Building. However, they would essentially be left with an area that could be rebuilt.

5.26 Comment: A representative of a PRP commented that ICF Technologies won a bid in 1986 to perform the RI/FS at Brook Industrial Park. The representative also commented that he did not receive a response to a Freedom of Information Act (FOIA) request which asked for copies of losing bids.

Response: ICF was utilized under an Alternate Remedial Contracting Strategy (ARCS) contract. A work assignment for the RI/FS was issued to ICF under the ARCS contract in 1989. With respect to the FOIA request, an interim response was submitted, pending a final response.

5.27 Comment: A representative of a PRP commented that EPA began testing at Brook Industrial Park in 1979 or 1980.

Response: EPA has no indication of any involvement with Brook Industrial Park before dioxin was discovered in 1983.

5.28 Comment: A representative of a PRP commented that EPA left drums of "toxic waste" on site for an extended period of time.

Response: The drums referred to contained RI waste which was generated as a result of extensive soil and ground water sampling. The drums were stored on site until arrangements were made for proper disposal. The drums were removed from the site in 1992.

5.29 Comment: A representative of a PRP commented that National Metal never used lead or arsenic.

Response: In its search for PRPs, EPA determined that National Metal used lead and Blue Spruce used arsenic trioxide.

WRITTEN COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD

This section summarizes the written comments received during the public comment period. The comments and corresponding responses are presented in the following categories:

1.0 Proposed Plan
2.0 Other

1.0 Proposed Plan

1.1 Comment: Representatives of several PRPs stated that EPA proposed unnecessary remediation on a site that posed no risk to the surrounding areas and an almost undetectable risk to 70 on-site workers. The representative also stated that no action or limited action is appropriate for this site.

Response: The site does not, at this time, pose an unacceptable risk to the surrounding areas, however, it does pose an unacceptable risk to on-site workers. EPA has proposed remediation of those areas of the site which exceed EPA's acceptable risk levels as well as certain areas which are within the Agency's acceptable risk range. EPA determined that remediation of areas within the acceptable risk range is necessary since these areas are also contaminated with lead and chromium, two contaminants which EPA cannot quantitatively evaluate in its risk assessment. Inclusion of these contaminants would increase the quantitative value of the risk posed by the site.

1.2 Comment: A representative of a PRP questioned why the Proposed Plan did not discuss the 1983 settlement with NJDEP nor the 1982/1983 remediation plan. The representative also questioned why the Proposed Plan did not provide a comparison of the 1983 remediation plan with the current remediation plan.

Response: The purpose of the Proposed Plan was to present a summary of the results of EPA's RI/FS and proposed remediation alternatives to the public. The Proposed Plan was not meant to contain an extensive history of the site. That information is contained in the RI report which is part of the Administrative Record for the site. The 1983 remediation plan cannot be compared to the current alternatives since the 1983 plan was developed before the full extent of contamination of the site was known.

1.3 Comment: A representative questioned why the map contained in the Proposed Plan identified only Blue Spruce, National Metal and Stirling Center.

Response: The map was provided as a reference to the areas of the site to be remediated. It was not meant to depict all companies operating on site or those parties which are considered by EPA as PRPs.

1.4 Comment: A representative of a PRP commented that the Proposed Plan failed to discuss the results of the Focused easibility Study (FFS).

Response: The purpose of the Proposed Plan was to present a summary of the results of the RI/FS and EPA's proposed remediation alternatives to the public. The results of the FFS report were used by EPA in developing alternatives for remediating the Blue Spruce Building. This is reflected in the 1994 FS report which is part of the Administrative Record for the site.

1.5 Comment: A representative of PRP asked why EPA did not consider letters from the U.S. Air Force in 1984 and the Federal Centers for Disease Control in 1983 which stated that no further sampling of the site was needed.

Response: These letters addressed only the dioxin contamination and not the threat posed by other contaminants. EPA cannot develop and evaluate alternatives for a particular medium until the nature and extent of contamination is known.

1.6 Comment: A representative of a PRP questioned why there was no mention of the 1986 written agreement in the Proposed Plan.

Response: The purpose of the Proposed Plan was to present a summary of the results of the RI/FS and EPA's proposed remediation alternatives to the public. The Proposed Plan was not meant to contain an extensive history of the site. That information can be found in the Administrative Record for the site.

1.7 Comment: A representative of a PRP asked why there was no consideration in the Proposed Plan of NJDEP's 1986 position that dioxin was the principal concern at Brook Industrial Park.

Response: EPA considers dioxin to be a contaminant of concern at the site and is remediating the dioxin contamination. The RI, which contains the results of the baseline Risk Assessment, has shown that the site poses a significant risk even without consideration of the risk posed by the dioxin contamination.

1.8 Comment: A representative of a PRP questioned whether the dioxin had been cleaned up to the satisfaction of EPA or whether the Proposed Plan encompasses dioxin cleanup.

Response: Dioxin contamination has not been remediated to the satisfaction of EPA; however, the immediate threat posed by the dioxin contamination has been addressed through a removal action.

The Proposed Plan addressed remediation of the dioxin contamination in the Blue Spruce Building. The Proposed Plan also stated that dioxin contamination above 1 part per billion (ppb) was not detected under the asphalt cap during confirmatory sampling. However, if dioxin contamination is detected above 1 ppb during subsequent activities, the contaminated soil would be remediated.

1.9 Comment: A representative of a PRP stated that EPA's proposed expenditure for remediating the site is $17 million.

Response: The present worth cost estimate of the remedy is $12 million. This cost estimate will be further refined during design.

1.10 Comment: A representative of a PRP questioned to what extent the selected remedy will introduce its own contaminants to Brook Industrial Park site.

Response: The selected remedy will not introduce any new contamination to the Brook Industrial Park. Any migration of contaminants, such as through fugitive dust emission, will be limited through dust suppression measures.

1.11 Comment: A representative of a PRP commented that EPA ignored economic responsibility and the latest technical developments throughout the RI, FS and Proposed Plan.

Response: EPA must balance economics with overall protection of human health and the environment and compliance with ARARs when screening alternatives. If an alternative does not protect human health and the environment or comply with ARARs, then the alternative cannot be evaluated further in the screening process even if it is more economical. EPA believes that the latest technical information was considered in the development of remedial alternatives for the site.

1.12 Comment: A representative of a PRP stated that the RI contains a high level of uncertainty and that the risk assessment used oral toxicity data in the absence of dermal toxicity information.

Response: In the absence of specific "portal of entry" effects resulting from dermal exposure, the use of appropriately adjusted (to account for differences in absorption) oral toxicities data in the absence of corresponding dermal toxicities data is scientifically justifiable.

1.13 Comment: A representative of a PRP stated that EPA ignored the unique geological setting which tends to contain the site soil and ground water in a nearly impervious bowl and that the clean fill deposited on site will be subject to contamination by the rising and falling of the ground water table.

Response: EPA does not believe that the geological setting would serve to confine contamination to the site. The results of EPA's hydrogeological study have shown that the overburden aquifer likely flows into the Raritan River and is in direct connection with the bedrock aquifer. The bedrock aquifer is not part of any "impervious bowl" referred to in the comment. With respect to the clean fill, EPA does not believe that the ground water will contaminate the clean fill. However, EPA believes that reducing the contamination in the soil will lessen the time required for ground water remediation.

1.14 Comment: A representative of a PRP commented that the delay in remediating the site from the time of the NJDEP settlement to the present has significantly escalated the cost of remediation.

Response: The remediation plan resulting from the NJDEP settlement is not comparable to the current Proposed Plan since the full extent of contamination of the site was not known at the time of the NJDEP settlement.

1.15 Comment: A representative of a PRP stated that Jame Fine Chemicals and National Metal Finishings has made good-faith efforts to remediate the soil and ground water but have been unable to accomplish this due to inclusion of the site on the NPL.

Response: EPA has no knowledge of efforts or requests by Jame Fine Chemicals or National Metal Finishings to remediate the site since it was listed on the NPL. In fact, it is EPA's understanding that National Metal never conducted the hydrogeological study which was to be conducted under a 1982 settlement with NJDEP.

1.16 Comment: A representative of a PRP stated that the findings of the RI included contamination of the bedrock aquifer with VOCs and metal.

Response: The bedrock aquifer as well as the overburden aquifer are contaminated with VOCs and heavy metals.

1.17 Comment: A representative of a PRP stated that the findings of the RI/FS included an on-going program of continuous pumping of the Jame Fine well to provide process cooling water for Jame Fine's manufacturing operations.

Response: The RI/FS did not state that there would be an on-going program of continuous pumping of the production well to provide Jame Fine with cooling water. EPA did make an assumption that the well would continue to operate and could be used as part of the extraction system. This was done for the purpose of providing a cost estimate of the extraction system only. EPA stated in the Proposed Plan that the on-site production well would be considered in the overall remedial design of the extraction system.

1.18 Comment: A representative of a PRP commented that there is no evidence that the ground water plume is migrating off site and that, based on geological history of the site, the plume is confined within the boundary of the site.

Response: EPA has no evidence to support the statement that the plume is confined within the site boundary. Any limitation of the migration of the plume is likely the result of the pumping of the on-site production well, and not any geological conditions. A determination of the exact boundaries of the plume is not necessary for the selection of a remedy. Additional ground water data will be collected for use in the design of the extraction and reinjection systems.

1.19 Comment: A representative of a PRP commented that it is difficult to accept the proposed risks associated with ingestion of soil where property is not used for agricultural purposes or where even earthworms could not eat the soils.

Response: There is no correlation between property being used for agricultural purposes and risk posed by ingestion of soil. Soil can be ingested by adults through hand-to-mouth activities. The risk due to on-site workers at the Brook Industrial Park site was calculated using a standard industrial exposure scenario. In addition, the exposure scenario for earthworms cannot be compared to the exposure scenario for humans.

1.20 Comment: A representative of a PRP stated that the long-term continual ingestion of 50 milligrams (mg) of soil per day by a worker is unlikely.

Response: 50 mg, which is the default assumption for adults in EPA's Risk Assessment guidance,is an extremely small amount of soil to be ingested particularly when one considers the ways that it can be ingested, such as through daily hand-to-mouth activity.

1.21 Comment: A representative of a PRP commented that the assumption that workers would drink one liter of ground water a day for 25 years is not supportable since the facility uses a public water supply and the conclusion that there is a risk of 7 in 10,000 is insupportable.

Response: EPA recognizes that the facility uses a public water supply and that is why risk due to ground water ingestion is presented in the RI and Proposed Plan as a potential future risk. The risk calculations for the ground water use standard industrial assumptions which include the assumption of one liter per day for 25 years.

1.22 Comment: A representative of a PRP stated that the soil is at the "cusp" of EPA's acceptable risk range.

Response: The risk due to exposure to the soils is at the lower end of EPA's acceptable risk range; however, the quantitative assessment did not consider the risk due to exposure to lead or chromium since the risks posed by those contaminants were not quantifiable. It is plausible that the cumulative cancer risk and Hazard Indices would be higher if the effects of lead and chromium were quantitatively included. In addition, the contaminants in the soil are contributing to the ground water contamination. Therefore, EPA determined that remediation of soil is necessary.

1.23 Comment: A representative of a PRP stated that "since birds and small mammals living on the property would be exposed to on-site contamination 24 hours per day, it does not follow that contaminant concentrations on these fauna causing very limited exposure to small animals would significantly impact workers on-site for forty hours per week" [sic].

Response: The Proposed Plan states that the potential exposures to birds and mammals are estimated to be very limited. This is because there are limited areas available for habitat. This exposure scenario cannot be compared to a human exposure scenario since different exposure assumptions were used in the latter such as workers being exposed to the site for approximately 40 hours per week.

1.24 Comment: A representative of a PRP commented that consideration of the likelihood that a worker would ingest soil would clearly discount the conclusion that the risk would fall within EPA's acceptable risk range.

Response: EPA used a standard ingestion assumption in the estimation of risk resulting from the ingestion exposure pathway. The likelihood of ingestion of soil was factored into the development of that standard assumption.

1.25 Comment: A representative of a PRP questioned basing the total Hazard Index for soils on the effects of manganese. The representative also stated that after remediation, naturally occurring manganese may still exist.

Response: The Hazard Index was calculated using standard assumptions and based on the actual concentrations of contaminants detected in samples from the site. The Hazard Index was not calculated based solely on manganese, but included a number of other inorganic compounds and pesticides. In addition, EPA did not propose remedial action because of the presence of manganese.

1.26 Comment: A representative of a PRP questioned the validity of assessing the risk due to exposure to the soils in the Stirling Center basement and the subdivided lot.

Response: EPA could not eliminate the potential for future use of the basement or exposures on the adjacent subdivided lot. Therefore, EPA assessed the risk posed by the soil in the Stirling Center basement based on the potential for exposure of an on-site worker in the future. EPA also evaluated the risk to trespassers on the subdivided lot.

1.27 Comment: A representative of a PRP stated that conservatism in the RI, such as using oral toxicity data in absence of dermal toxicity data, led to improper conclusions in the FS.

Response: In the absence of specific "portal of entry" effects resulting from dermal exposure, the use of oral toxicity data, appropriately adjusted to account for differences in absorption, in the absence of corresponding dermal toxicities data is scientifically justifiable. Further, EPA believes that the conclusions of the RI provided sufficient information to develop and evaluate alternatives in the FS.

1.28 Comment: A representative of a PRP commented that EPA erroneously calculated hazard quotients that resulted in a Hazard Index of one or higher.

Response: The hazard quotient calculations were arithmetically correct and were generated according to EPA's Risk Assessment Guidance for Superfund.

1.29 Comment: A representative of a PRP commented that since the RI could not quantify the bioavailability of chemicals to terrestrial organisms and due to the speculative nature of the findings, any FS conclusion regarding the effect on such organisms is considered suspect.

Response: EPA evaluated the impact on terrestrial organisms using all available information, following standard practice and guidelines. Where site-specific information was not available, information from similar studies was utilized. The Agency believes that the selected remedy will result in the protection of the environment.

1.30 Comment: A representative of a PRP stated that the assumption that chemicals found in the overburden aquifer could be of concern to aquatic organisms if the chemicals discharge to the river fails to consider the slow rate at which this discharge would occur.

Response: The results of the ecological assessment indicate that aquatic organisms in the Raritan River are not expected to be affected by the site.

1.31 Comment: A representative of a PRP stated that the RI contains an inordinate amount of uncertainty, greatly exaggerates the requirement for remediation and that the FS is overly conservative.

Response: EPA believes that the RI provided an accurate characterization of the site. Risks were estimated using appropriate guidance and EPA believes that they were not overly conservative. In fact, EPA's risk assessment did not include two inorganic contaminants which would have likely increased the estimated risk if they had been considered in the assessment. EPA also believes that the RI provided sufficient information to develop and evaluate alternatives for remediating the site, and that the FS evaluated reasonable remediation alternatives.

1.32 Comment: A representative of a PRP stated that wholesale removal of soils to an undetermined depth is unwarranted and uneconomical and that it is clear that the vertical delineation of contamination was not done.

Response: EPA did not state that soil would be removed to an undetermined depth. EPA conducted extensive soil sampling efforts to determine the extent of contamination. EPA plans to excavate contaminated soil to the ground water table. EPA also believes that the RI provided sufficient information to develop and evaluate alternatives for remediating the site. Any additional information necessary for the implementation of the remedy will be developed during design activities.

1.33 Comment: A representative of a PRP commented that the objective and recommendation of the RI seems to be to remediate soils until all contaminants are non-detectable.

Response: The RI/FS reports do not make recommendations regarding the remediation of the soil at the site. It is not EPA's intention to remediate all soil contamination to a non-detectable level. As summarized in the Proposed Plan, the remedial action objective for soil is to remediate soil in Areas One and Two where the contaminants of concern exceed EPA risk-based remediation goals. There are areas of the site where contamination is present at detectable levels, but below the remediation goals, which will not be excavated.

1.34 Comment: A representative of a PRP commented that EPA disregarded emergent technology, particularly bioremediation of areas contaminated with organic compounds, including dioxin, pesticides and herbicides.

Response: Bioremediation technologies were evaluated in the initial screening of alternatives. Bioremediation was screened out because it is not effective in remediating all contaminants of concern in the soil, particularly the inorganic compounds. Although bioremediation can be considered an emergent technology for remediating pesticides, with the exception of the Blue Spruce Building, pesticides were never detected without inorganic contamination.

1.35 Comment: A representative of a PRP commented that demolition of the Blue Spruce Building is not a cost-effective solution.

Response: EPA evaluated several alternatives to address contamination of the Blue Spruce Building and determined that demolition of the building provided the only solution which is permanent and protective of human health.

1.36 Comment: A representative of a PRP stated that the soil in the Blue Spruce Building could be bioremediated.

Response: Bioremediation was considered in the FS, but was screened out in the initial assessment of alternatives since it is considered to be generally ineffective in remediating the older, more chlorinated pesticides, such as those found in the Blue Spruce Building.

1.37 Comment: A representative of a PRP stated that the contaminated walls of the Blue Spruce Building can be foam cleaned and sealed to preclude contact with the contaminated surfaces by future workers.

Response: EPA considered and evaluated a similar option in the FS and the Proposed Plan. Such an approach would not provide a permanent solution, and would be subject to continuous maintenance over the lifetime of the building. EPA believes that it is preferable to demolish the contaminated portions of the building since that would provide a permanent remedy and would be more protective of human health.

1.38 Comment: A representative of a PRP commented that the disposal of the contaminated construction debris can be separated from noncontaminated debris in order to decrease disposal costs.

Response: EPA agrees that this may be possible. In fact, the Proposed Plan states that the "the demolition could occur in phases in order to segregate the dioxin-contaminated material which could reduce disposal costs."

1.39 Comment: A representative of PRP commented that the study indicated a "doming" effect in the overburden aquifer and that ground water and soils are contained by the railroad tracks.

Response: EPA believes that the ground water "mounding effect" indicated by the RI is the result of leakage from the on-site production well. While the presence of the railroad tracks may have prevented some migration of soil, it is highly unlikely that the ground water contamination is impeded by the railroad tracks.

1.40 Comment: A representative of a PRP commented that concerns for possible migration of the ground water plume due to cessation of operation of the on-site production well can be dispelled by long-term monitoring and long-term access to EPA.

Response: EPA is not concerned that the operation of the on-site production well might cease. EPA does not believe that operation of the well is sufficient to contain the ground water contamination. Although EPA would welcome long-term access to the well, operation of only that well may not provide for remediation of the aquifer even with a modified pumping scenario.

1.41 Comment: A representative of a PRP stated that the VOCs in the ground water can be treated within Jame Fine's operations rather than constructing a separate system.

Response: While VOCs are being extracted by the on-site production well, no treatment is being provided. Further, current ground water pumping rates are insufficient to capture and remediate the ground water contamination. EPA plans to consider the production well in the overall design of the extraction system. The selected remedy also includes treatment to remove both organic and inorganic contaminants.

1.42 Comment: A representative of a PRP commented that the area has been an industrial site and it is highly unlikely that the site will be converted to residential or recreational purposes which would call for mitigation to a standard beyond that required for a comparable-use facility.

Response: As stated in the Proposed Plan, EPA used industrial exposure assumptions to develop the soil remediation goals.

1.43 Comment: A representative of a PRP stated that the soils in the drainage ditch can be bioremediated.

Response: EPA screened out bioremediation in the initial assessment of alternatives since it is not known to be effective in remediating inorganic compounds.

1.44 Comment: A representative of a PRP commented that since there is no evidence that vegetation on site or in the area of the drainage ditch and tributary has been adversely affected by the defoliant characteristic of the chemicals, this contamination is not a hazard.

Response: The major contaminants in the area of the drainage ditch and tributary are inorganic compounds which do not exhibit defoliant characteristics. Regardless, EPA also considered the risk posed to human health as unacceptable in determining the need to remediate the area.

1.45 Comment: A representative of a PRP stated that the use of railroad cars is an unnecessary expense.

Response: EPA would consider transporting the contaminated soil by truck if it were determined during design that it was more efficient and economical than rail transportation. This is referenced in the Proposed Plan.

1.46 Comment: A representative of a PRP commented that the Proposed Plan "concedes" that washing and surface sealing in the Blue Spruce Building would achieve compliance with ARARs.

Response: The Proposed Plan states that washing and surface sealing would "comply with the remedial action objective of reducing risk due to direct contact." However, it would not provide a permanent remedy since contamination would remain in the building materials and would need long-term monitoring and maintenance.

1.47 Comment: A representative of a PRP stated that the contaminated walls in the Blue Spruce Building could be easily cleaned and sealed and be inspected by EPA for maintenance of the sealant and that EPA offers no compelling argument to justify demolition.

Response: Such an approach would not provide a permanent solution, and would be subject to continuous maintenance over the lifetime of the building. EPA believes that it is preferable to demolish the contaminated portions of the building since that would provide a permanent remedy and would be more protective of human health.

1.48 Comment: A representative of a PRP commented that the Proposed Plan does not address the costs that demolition would impose upon the owners of the property in terms of deprivation of use of the property.

Response: The owners of the Blue Spruce Building are considered to be PRPs. In addition, they currently do not have use of the Blue Spruce property. Remediating the Blue Spruce Building would leave the owners with an essentially clean property which could be used.

1.49 Comment: A representative of a PRP stated that after a decade of monitoring, there is no evidence to suggest that the ground water contamination has spread beyond the boundaries of the site and that the existing process of removing the ground water for cooling water use can continue to control the plume.

Response: EPA does not have knowledge of a decade of ground water monitoring and does not have any evidence to suggest that the ground water contamination will not migrate. Further, if the plume were controlled and not remediated, monitoring and containment would need to continue indefinitely.

1.50 Comment: A representative of a PRP commented that a pumping rate of 250 gallons per minute and two extraction wells to contain the contaminant plume is an unsubstantiated conclusion.

Response: The pumping rate and number of extraction wells were presented in the Proposed Plan for cost estimation purposes only. Specific extraction system details will be developed during design.

1.51 Comment: A representative of a PRP proposed remediating the ground water by continuous pumping of the Jame Fine well, use of the extracted ground water by Jame Fine as cooling water, and treatment of the used cooling water to remove VOCs and metals.

Response: EPA has selected ground water extraction and treatment to remediate the contaminant plume. EPA will consider integrating the on-site production well into the design of the extraction system; however, EPA does not believe that current well operating parameters would be sufficient to capture and remediate the ground water contamination. Specific details of the system will be determined during design.

1.52 Comment: A representative of a PRP proposed bioremediation, and sealing and capping of exterior areas with a six-inch asphalt cap to reduce and contain contaminants in the upper soil levels.

Response: Bioremediation is not effective in remediating inorganic compounds. Further, capping is not a permanent solution; it would require maintenance of the cap and monitoring over an indefinite period. Finally, capping certain portions of the site might not be feasible due to the layout and nature of use of the site.

2.0 Other

2.1 Comment: Several representatives of PRPs requested that EPA recalculate the ranking of the site on the NPL.

Response: All requests regarding a re-evaluation of the site's eligibility for inclusion on the NPL have been referred to the office in EPA Headquarters responsible for the NPL-listing process.

2.2 Comment: A representative of a PRP stated that EPA is responsible for any contamination found on site after the 1979/1982 NJDEP study due to a delay in remediating the site. The representative also stated that EPA is responsible for any increase in cost over the remediation that could have been conducted in 1983.

Response: The NJDEP study did not fully delineate the nature and extent of contamination at the Brook Industrial Park site. Dioxin, for example, was not discovered on site until after the study was completed. EPA cannot evaluate alternatives for a selected medium until the nature and extent of contamination of that medium is known. In addition, several companies within the Industrial Park were cited for environmental violations after the NJDEP study was completed.

With respect to the claim that EPA delayed remediation, EPA did not become involved in the site until dioxin was discovered in 1983. At that time, EPA addressed the immediate threat posed by the dioxin contamination through a removal action. Subsequently, the site proceeded through the NPL-listing process which ended with the site being included on the NPL in 1989. EPA initiated the RI/FS in 1989 to determine the long-term threat posed by the site. However, the RI/FS was delayed when the owner of Brook Industrial Park denied EPA access to the site. The purpose of this ROD is to select the alternatives which will address the long-term threats posed by the site. EPA believes that the cost to remediate the site is the responsibility of those parties which contributed to the pollution of the site.

2.3 Comment: A representative of a PRP questioned why the Proposed Plan did not discuss the effect, if any, caused by a delay in site cleanup.

Response: EPA addressed the immediate health threat posed by the dioxin contamination through the 1983 removal action as well as subsequent removal actions in 1990 and 1992 which secured the

Blue Spruce Building. The remaining threats are addressed in this ROD.

2.4 Comment: A representative of a PRP stated that EPA performed duplicative sampling and has given insufficient weight or ignored the sampling conducted by NJDEP and the draft reports prepared by NUS.

Response: The sampling conducted by NJDEP did not delineate the nature and extent of contamination associated with the site nor did it follow the rigorous quality assurance process EPA requires. With respect to the NUS reports, additional sampling was not conducted in the Blue Spruce Building. However, EPA relied on the data collected during the NUS study and by NJDEP in developing alternatives for remediating the site.

2.5 Comment: A representative of a PRP asked if EPA could assure the public that the Proposed Plan would remediate environmental concerns at the site including concerns about contaminants that originated on site as well as those introduced from off-site sources.

Response: EPA will perform confirmatory sampling to assure that contaminants of concern are remediated to levels established in this ROD, thus remediating the environmental concerns posed by the site. With respect to off-site sources, EPA's sampling has not indicated any off-site sources of contamination.

2.6 Comment: A representative of a PRP asked that EPA consider the railroad operators PRPs.

Response: EPA does not consider the railroad operators (New Jersey Transit) to be a PRP at this time.

2.7 Comment: A representative of a PRP commented that although other occupants of Brook Industrial Park have been cited for improper housekeeping and waste disposal, the facts point to Blue Spruce as a significant contributor to on-site contamination.

Response: EPA recognizes several occupants of Brook Industrial Park as contributors to the on-site contamination. These occupants include Blue Spruce, National Metal Finishings Corporation and Jame Fine Chemicals Incorporated. EPA has no indication that the Blue Spruce contamination contribution was more significant than the other contributors to site contamination.

ROD FACT SHEET

SITE

Name	Brook Industrial Park
Location/State	Bound Brook, Somerset County, New Jersey
EPA Region	II
HRS Score (date)	58.12 (6/88)
Site ID #	NJD 078 251 675

ROD

Date Signed	9/30/94
Remedies	Contaminated soil will be excavated and transported off site for treatment and disposal. The excavated soil will be replaced with clean fill. The dioxin-contaminated portion of a building on the site will be demolished and incinerated or disposed of in an appropriate off-site landfill. The contaminated ground water will be extracted, treated by air-stripping and chemical precipitation, and reinjected.
Operating Units:	OU-1, OU-2, OU-3, and OU-4
Capital Cost	$7,272,000
O & M/year	$342,000
Present worth	$11,584,000

LEAD

Lead agency	U.S. EPA
Primary contact (phone)	Donna Vizian (212) 264-6478
Secondary contact (phone)	Robert McKnight (212) 264-1870

WASTE

Type (metals, PCB, &c)	heavy metals, dioxin, organics
Medium (soil, g.w., &c)	soil, buildings, ground water
Origin	specialty chemical manufacturer, metal plating company, pesticide production and storage company
Est. quantity	approx. 4,600 cu. yd. of soil approx. 5,000 sq. ft. of building interior surfaces