United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R02-90/113
September 1990

EPA

Superfund Record of Decision:

King of Prussia, NJ

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R02-90/113	2.	3. Recipient's Accession No.
4. Title and Subtitle SUPERFUND RECORD OF DECISION King of Prussia, NJ First Remedial Action			5. Report Date 09/28/90
			6.
7. Author(s)			8. Performing Organization Rept. No.
9. Performing Orgainization Name and Address			10. Project/Task/Work Unit No.
			11. Contract(C) or Grant(G) No. (C) (G)
12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460			13. Type of Report & Period Covered 800/000
			14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The 10-acre King of Prussia (KOP) site is an abandoned waste disposal and recycling facility in Winslow Township, Camden County, New Jersey. The nearest residence is one mile northeast of the site, and the nearest surface water body is the Great Egg Harbor River, which flows 1,000 feet southwest of the site. In addition, an onsite swale, which directs site runoff toward the river, has been dammed by two fire roads resulting in the formation of onsite wetlands. Site features include three man-made, former lagoons, two rusting and torn tankers on a concrete pad, and an area with an undetermined number of buried drums and containers. The waste recycling facility was operated from 1970 to 1974 by the KOP Corporation. Past waste handling and disposal practices at the facility, as well as suspected illegal dumping of trash and hazardous materials after the facility closed, have resulted in organic and inorganic contamination of site soil, sediment, and ground water. Soil and ground water contamination were detected by the State in 1976, and subsequently confirmed by EPA during site investigations conducted from 1978 to 1982. As a result of these investigations, buried plastic containers and visibly contaminated soil west of the lagoons were excavated and removed in late 1989 or 1990. However, several additional

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - King of Prussia, NJ
First Remedial Action
Contaminated Media: soil, sediment, sludge, debris, gw
Key Contaminants: VOCs (benzene, PCE, TCE), metals (chromium, lead)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 161
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) *See Instructions on Reverse* OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

Abstract (Continued)

discrete areas of contamination have been identified including: metal-contaminated soil adjacent to the lagoons, lagoon sludges, swale sediment, and soil near the tankers; VOC-contaminated soil in the drum disposal area; organic- and metal-contaminated ground water; and possible contamination of the surface water and sediment in the river. This Record of Decision (ROD) addresses the first operable unit for the site, including the contaminated ground water, soil, sediment, sludges, drums and tankers. A future ROD will address contaminated soil associated with the buried drum area. The primary contaminants of concern affecting the soil, sediment, sludge, debris, and ground water are VOCs including benzene, PCE, and TCE; and metals including chromium and lead.

The selected remedial action for this site includes excavating lagoon sludges, soil adjacent to the lagoons, and sediment in the swale, treating these materials using soil washing for metals removal, and redepositing the residual materials in their original location onsite; excavating and disposing of buried drums, their contents, and associated visibly contaminated soil onsite; removing tankers for offsite disposal; ground water pumping and treatment using air stripping, followed by reinjection of ground water and offsite disposal or treatment of residuals; conducting additional sampling and analysis of surface waters and sediment of the Great Egg Harbor River and soil in the buried drums area to determine the need for further site remediation; and implementing institutional controls including ground water restrictions. The estimated present worth cost for this remedial action is $14,889,000, which includes an estimated annual O&M cost of $285,000.

PERFORMANCE STANDARDS OR GOALS: Soil cleanup objectives are based on a 10-6 cancer risk to human health, an HI less than 1, or State Action Levels and include chromium 483 mg/kg (Health-Based level), copper 3,571 mg/kg (Health-Based level), lead 500 mg/kg (State) and nickel 1,935 mg/kg (Health-Based level). Ground water cleanup levels are based on State and Federal MCLs, whichever is more stringent, including PCE 1 ug/l (State), TCE 1 ug/l (State), chromium 50 ug/l (State), copper 1,000 ug/l (State), and nickel 210 ug/l (State).

ROD FACT SHEET

SITE

Name: King of Prussia Technical Corporation
Location/State: Winslow Township, Camden County, New Jersey
EPA Region: II
HRS score: 47.19 (7/22/82)
NPL rank: 244

ROD

Date Signed: September 28, 1990
Remedies: excavation and contaminant extraction of metal contaminated soils, sediments and sludges; drum removal and off-site disposal; tanker removal and off-site disposal; a pump and treat system for contaminated ground water; and additional monitoring of the Great Egg Harbor River.
Capital Cost: $10,501,000
O & M/Year: $285,000
Present Worth: $14,889,000

LEAD

Enforcement
EPA/PRP
Primary Contact: James Hahnenberg, (212) 264-5387
Secondary Contact: John LaPadula, (212) 264-5388
Main PRPs: Cabot Beryl Company, Carpenter Technology, Ford Motor Company, Johnson-Matthey, LNP Corporation, Reutgers-Nease
PRP Contact: Lynn Wright, (212)308-4411

WASTE

Type: metals and volatile organic compounds
Medium: soils, sediments, sludges, and ground water
Origin: abandoned lagoons, buried drums and carboys
Estimated quantity:
- 21,150 cubic yards metals contaminated materials
- 2,500 cubic yards organic contaminated materials
- 10 cubic yards tanker residue
- contaminant plume: 900 feet x 1500 feet x 30 feet (total volume 40,500,000 cubic feet)

DECLARATION STATEMENT

RECORD OF DECISION - OPERABLE UNIT ONE

KING OF PRUSSIA TECHNICAL CORPORATION SITE

Site Name and Location

King of Prussia Technical Corporation Site
Winslow Township, Camden County, New Jersey

Statement of Basis and Purpose

This decision document presents the selected remedial action for the King of Prussia Technical Corporation site, in Camden County, New Jersey, developed in accordance with the requirements of 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 document explains the factual and legal basis for selecting the remedy for this site. This decision is based on the administrative record for the site. The attached index identifies the items that comprise the administrative record.

Assessment of the Site

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

Description of the Selected Remedy

The remedial action described in this document is the first of two planned operable units for the site. The final remedy for the first operable unit action addresses groundwater and some soils, sediments and sludges, and the removal of drums and tankers. The second operable unit will address contaminated soils associated with the buried drum area.

The major components of the selected remedy include the following:

- Lagoon sludges, soils adjacent to the lagoons, and sediments in the swale will be excavated. Metal contaminants will be extracted from these materials utilizing a multi-phase, soil-washing process. Cleaned materials will then be redeposited in approximately their original location.

- Buried drums, their contents and visibly contaminated soils will be excavated and disposed at an off-site location. Additional characterization of residually contaminated soils in the buried drum area will be conducted. This will provide the basis for a remedial action decision regarding this soil.

- A ground-water pumping system will be installed to capture the contaminated ground water and prevent discharge of contaminants to the Great Egg Harbor River.

- An on-site ground-water treatment facility will be installed and maintained to remove contaminants from the collected groundwater.

- A ground-water reinjection system will be installed to reinject treated ground water into the aquifer.

- Tankers and their contents will be removed for off-site disposal.

- Additional sampling and analysis of surface waters and sediments of the Great Egg Harbor River will be performed. This will allow a determination on whether further remediation of the river system is required.

<u>Declaration of Statutory Determinations</u>

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 (or resource recovery) technologies to the maximum extent practicable, and it satisfies the statutory preference for remedies that employ treatment that reduce toxicity, mobility, or volume as their principal element.

Because this remedy will result in hazardous substances remaining on site above health-based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Constantine Sidamon-Eristoff
Regional Administrator

9/28/90
Date

DECISION SUMMARY

RECORD OF DECISION - OPERABLE UNIT ONE

KING OF PRUSSIA TECHNICAL CORPORATION SITE

SITE NAME, LOCATION, AND DESCRIPTION

The King of Prussia site (the "site") is located on Piney Hollow Road on tax block 8801, lot 1A in Winslow Township, Camden County, New Jersey (Figure 1). The ten-acre site is in a rural area approximately 30 miles southeast of Philadelphia, Pennsylvania.

The land to the northeast, northwest and southwest is within a dense pine forest of the state-owned, 6,000-acre Winslow Wildlife Management area (Figure 1) and is primarily utilized for recreational purposes. The site is also within the New Jersey Pinelands National Reserve, which encompasses portions of six counties in southern New Jersey.

The nearest residence is a single family home approximately one mile northeast (upgradient) of the site. Piney Hollow Road borders the site to the southeast and an unnamed fire road is located 200 to 500 feet southwest. The Atlantic City Expressway and U.S. Route 322 (Black Horse Pike) are located 2 miles northeast and southwest of the site, respectively.

The nearest body of surface water is the Great Egg Harbor River, approximately 1000 feet southwest of the site (Figure 2). The river is used for recreational purposes and has been proposed to be nationally designated as a Wild and Scenic river.

A swale, which directs site runoff toward the river, is dammed by two fire roads (Figure 2). The swale is a wetlands based on a preliminary assessment by the Environmental Protection Agency (EPA) personnel. During periods of heavy rainfall, water may cross the roads and deliver surface runoff to the river. Stressed vegetation and trees have been observed in the upper swale area and are believed to be caused by metals-contaminated runoff from the site.

Although no historic or landmark sites are directly affected by the site, the area has a high potential for archeological resources in areas not disturbed by modern activity.

There are no endangered species or critical habitats within close proximity of the site, but the Great Egg Harbor River and wetlands habitats along the river support migratory species which could be impacted.

The site itself is relatively level, rectangularly shaped, and generally barren and sandy. Vegetation is limited to sparse patches of tall seed grass. Three man-made lagoons are still evident, and a fourth may be identified by a slight depression. These lagoons are located in a slightly elevated area near the center of the property (Figure 2). Two rusting and torn tankers are lying on a concrete pad between Piney Hollow Road and the lagoons (Figure 2). Toward the back of the site is an area with an undetermined number of buried drums and containers (Figure 2).

SITE HISTORY

Origin of the Problem

On July 1, 1970, the King of Prussia Technical (KOP) Corporation presented a proposal to the Winslow Township Committee for the KOP Corporation to purchase a tract of land owned by the township for the purpose of constructing a waste recycling facility. The proposal was subsequently approved by the township and operations at the site began by January 1971.

Six lagoons were used to process liquid industrial waste. The stated intention by the KOP Corporation was to convert these wastes to materials that would be marketed as construction materials and other uses. However, the KOP Corporation was unable to market these materials and the site soon had more waste than it could process and sell. A minimum of 15 million gallons of acids and alkaline aqueous waste were processed at the facility when KOP Corporation was the operator, with excess materials transported to other disposal locations.

The KOP Corporation filed for bankruptcy on April 8, 1974. Prior to declaring bankruptcy, KOP Corporation sold its hauling operation to Evor Phillips Incorporated which subsequently purchased the site property. It is believed that operations ceased and the site was abandoned in late 1973 to early 1974. In 1976, Winslow Township foreclosed on the property for failure of the Evor Phillips Incorporated to pay taxes, and the township resumed ownership of the property. The township is the current owner of the property. Illegal dumping of trash and hazardous materials is suspected, as the site was easily accessible until a fence was installed by the Potentially Responsible Parties (PRPs) in 1988.

Enforcement Actions

In April 1985, EPA entered into an Administrative Order on Consent (AOC) with five PRPs to conduct a Remedial Investigation and Feasibility Study (RI/FS).

The RI was completed by the PRPs in July 1989. The FS, also completed by the PRPs, was released by EPA in July 1990. EPA also issued a Supplemental Feasibility Study (SFS) in August 1990 to clarify and explain alternatives not sufficiently addressed in the FS.

In 1988 and 1989, EPA identified additional PRPs bringing the total number of PRPs to fourteen. These PRPs are:

- Cabot Beryl Company
- Carpenter Technology
- Sidney Dennis
- Ford Motor Company
- Sidney Fried
- Robert Hauslohner (deceased)
- Anthony D. Introcaso
- Johnson-Matthey
- King of Prussia Technical Corporation (bankrupt)
- Harrison Kalbach
- LNP Corporation
- Evor Phillips
- Reutgers-Nease Chemical Company
- Ernest Roth

EPA's search for additional PRPs is continuing.

Remedial Actions and Initial Investigations by the EPA and the NJDEP

The New Jersey Department of Environmental Protection (NJDEP) was first notified of possible unauthorized activities at the site in January 1975. Subsequent site inspections by NJDEP and a ground-water study by Geraghty and Miller in 1976 indicated contamination of the soils and ground water at the site.

EPA confirmed contamination with additional sampling and investigations during 1979, 1980 and 1982. In December 1985, the site was formally listed on the National Priorities List.

Investigations conducted by the PRPs, with EPA oversight, were started in 1985, with the RI being approved in August 1989 and the FS issued to the public in July 1990. EPA also conducted a Supplemental Feasibility Study which was also released in August 1990. The site property was fenced in July 1988 at the request of EPA to restrict access and prevent health risks associated with direct contact and prevent illegal dumping.

Buried plastic containers (carboys) and surrounding soils with visible contamination, located inside the fence west of the lagoons, were excavated and staged for removal in October 1989. Final removal and off-site disposal is now complete.

Activities planned for the fall of 1990 include beginning the expedited removal of buried drums and visibly contaminated soils.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The RI/FS and SFS Reports and the Proposed Plan for the KOP site were released to the public for comment on July 16, 1990. These three documents were made available to the public as part of the administrative record which was maintained at the EPA Docket Room in Region II at 26 Federal Plaza in New York City and at an information repository at the Camden County Public Library. The notice of availability for these documents was published in the Courrier Post on July 22, 1990. A public comment period on the documents was held from July 16, 1990 to September 14, 1990. In addition, a public meeting was held on August 1, 1990. At this meeting, representatives from EPA answered questions about problems at the site and the remedial alternatives under consideration. A response to the comments received during this period is included in the Responsiveness Summary, which is part of this Record of Decision (ROD).

SCOPE AND ROLE OF RESPONSE ACTION

This ROD addresses planned remedial actions for the first operable unit.

Due to the wide variety of contaminants and multiple migration routes present at the KOP site, EPA has divided the remedial action for the first operable unit into the five components described below.

Component 1: Metals-contaminated soils adjacent to lagoons, sludges in lagoons, and sediments in the swale (Figure 2).

Component 2: Buried drums and soils contaminated with volatile organic compounds located toward the rear (northwest) of the site (Figure 2).

Component 3: Tankers and contents located near the front (southeast) of the site. Soils under and adjacent to the tankers will be addressed as part of Component 1 (Figure 2).

Component 4: Organic and metals-contaminated ground water (Figure 2).

Component 5: Surface waters and sediments and biota of the Great Egg Harbor River (Figure 2).

This remedial action addresses the principle threats presented at the site which are included in the first operable unit.. A second operable unit will address residually contaminated soils associated with the buried drum area. The Great Egg Harbor River could also become an additional operable unit, if contamination detected during the remedial design or subsequent monitoring indicates that remediation is required.

SUMMARY OF SITE CHARACTERISTICS

Site Geology

The site is underlain by unconsolidated Coastal Plain sediments of the Tertiary and Cretaceous Age. These sediments consist of unconsolidated sands, gravels and clays which form a southeastern thickening wedge approximately 2,000 feet thick. Unconformably underlying these sediments is relatively low permeability metamorphic bedrock.

The Cohansey Sand crops out at the site. This formation consists of unconsolidated sands, silts and clays.

The Cohansey Sand, the Kirkwood Formation, and any younger overlying sediments are collectively known in this area as the Kirkwood-Cohansey Aquifer System. Due to the absence of extensive regional confining beds, the Cohansey Sand and the underlying Kirkwood Formation are generally in hydraulic connection. Based upon regional data, the Kirkwood-Cohansey Aquifer occurs at approximately 150 feet below mean sea level at the site.

Two aquifers within the Kirkwood-Cohansey Aquifer System were identified at the KOP site. The upper (also referred to as the upper subzone) aquifer begins at 15 feet below the surface and extends to approximately 35 feet. A second aquifer extends downward from 50 feet below the surface to a depth of approximately 250 feet. This is herein referred to as the deep aquifer, but is referred to as the lower subzone aquifer in various site investigations. A 10-foot to 20-foot semi-confining layer separates the two porous and permeable aquifers and is composed predominantly of discontinuous silt and clay zones. These lithofacies grade to sands in some areas. This is herein referred to as the intermediate aquifer, but is referred as the middle subzone semi-confining (or confining) aquifer.

At the KOP site, the ground-water flow direction is southwest toward the Great Egg Harbor River. High porosity and permeability of on-site soils produces rapid infiltration of precipitation and rapid recharge of the underlying Kirkwood-Cohansey Aquifer. Lateral ground-water flow in the upper aquifer is approximately one foot per day and 0.4 foot per day in the lower aquifer. The upper aquifer discharges to the Great Egg Harbor River while the deeper aquifer may have a minor flow component that also discharges to the river.

The Great Egg Harbor River, located approximately 1000 feet southeast of the site (Figures 1 and 2), drains eastern Camden County and all of Atlantic County. The river discharges to the Atlantic Ocean north of Ocean City, New Jersey.

There are no residential wells in the vicinity of the site. Two wells, neither of which serve as potable water supplies, are located within a half mile radius of the site. These wells are located at the Johnson-Matthey Company located just across Piney Hollow Road from the site and the field office of the New Jersey Division of Fish, Game and Wildlife across the river from the site (Figure 1). The nearest residential water well is approximately one mile northeast and upgradient from the site.

Component 1 - Metals Contaminated Soils, Sediments and Sludges

During the RI, shallow soil on site and swale sediments less than 2 feet deep ("surface") were investigated by the collection and analysis of 117 samples from 100 locations. Soils from 2 to 10 feet in depth ("subsurface") were also investigated by collection and analysis of 104 samples from 66 locations. Surface and subsurface sludges were investigated by the collection and analysis of samples from 18 locations.

Beryllium, chromium, copper, nickel and zinc are the principal contaminants detected in the surface and subsurface soils adjacent to the lagoons, sediments in the swale and sludges in the lagoons and adjacent areas (Figure 2). Generally, the metals contaminants are known or probable carcinogens, and also exhibit harmful noncarcinogenic effects.

Distribution of site contamination demonstrated by analytical results of sampling efforts indicate that migration through environmental media is occurring. Contaminants residing in the soils, sediments and sludges are believed to be migrating vertically downward to the ground water.

Surface contamination from 0 to 2 feet depth is present in the lagoons, as well as in soils adjacent to the lagoons and tankers, and in the swale adjacent to the site. The highest concentrations of surface contamination is in sediments at the bottom of the swale. Maximum concentrations of contaminants that exceed soil cleanup levels are chromium 8,010 parts per million (ppm), copper 9,070 ppm, mercury 100 ppm (adjacent to the tankers), and silver 18 ppm (Table 1).

Subsurface contamination from 2 to 10 feet deep is present in the lagoons and adjacent on-site soils; deepest soils above the cleanup levels (Table 2) are at a depth of seven feet. Highest concentrations have been detected in a zone of sludge-like material at a depth of 3 to 4 feet northwest and adjacent to the lagoons. Maximum concentrations for the following contaminants are: 11,300 ppm for chromium, 16,300 ppm for copper, 389 ppm for lead, 1.7 ppm for mercury, and 11,100 ppm for nickel (Table 2). In general, the soils have infrequent and low concentrations of volatile and semi-volatile organic compounds.

The volume of metals-contaminated soils, sediments and sludges in the surface and subsurface above risk-based cleanup levels (Tables 1 and 2) for this component is estimated at 21,150 cubic yards. This includes 19,500 cubic yards of on-site soils and sludges and 650 cubic yards of sediments in the swale located between the site and the river (Figure 2). The total area covered by these materials is approximately three acres.

Component 2 - Buried Drums and Soils Contaminated with Volatile Organic Compounds

The contents of a partially buried drum and two samples of visibly contaminated soils were analyzed for determination of the types and concentrations of contaminants. Conductivity and magnetometer surveys were also conducted to determine the location and number of buried drums.

Analysis from a buried drum located in the rear (northwest) of the site (Figure 2) indicated high concentrations of volatile and semi-volatile organic compounds. The total concentration for volatile and semi-volatile organic compounds, including tentatively identified compounds, is greater than 80 percent (%) (Table 3) for the liquid contents sampled from the drum. Soil sampling in the area adjacent to the drums also indicated significant concentrations of volatile organic compounds (Table 4). Examples are: tetrachloroethane 270 ppm, 1,2-dichlorobenzene 44 ppm, and naphthalene 3 ppm. Metals-contaminant concentrations are above background levels but below soil cleanup goals.

The total volume of drums and soils contaminated with volatile and semi-volatile compounds is uncertain due to limited soils sampling in this area. Magnetic and conductivity surveys and sample data indicate an area of buried drums estimated to be 11,300 square feet. Assuming that the depth of contaminated soils and drums is approximately six feet, the estimated total volume is 2500 cubic yards of which 250 cubic yards (10% of total volume) are estimated to consist of drums and 2250 cubic yards of contaminated soils.

Many of the volatile and semi-volatile organic compounds identified in the contents sampled from the buried drum and adjacent soils have adverse carcinogenic and noncarcinogenic health effects on humans.

Contaminants in the buried drums and nearby soils have migrated vertically downward to the ground water and are continuing to discharge into the ground water. In order to prevent further discharge of contaminants into the ground water and to remove any physical hazard from the deteriorating drums, the drums and visibly contaminated soils are planned for removal and off-site treatment and disposal beginning in the fall of 1990.

<u>Component 3 - Tankers and Contents</u>

The contents of rusting, deteriorating tankers near the front (southeast) of the site (Figure 2) were sampled and analyzed.

Major contaminants of the residues in the tankers included: chromium 6,580 ppm, copper 10,080 ppm, and nickel 6,450 ppm (Table 5).

The tankers occupy an area approximately 15 by 30 feet for a total area of 450 square feet. Total tanker volume is estimated to be 83 cubic yards and the volume of the residue in the tankers is estimated to be 10 cubic yards.

These inorganic metals contaminants in the tanker residue are known to have adverse noncarcinogenic and carcinogenic health effects on humans.

<u>Component 4 - Ground Water</u>

Twenty-eight monitoring wells were installed to define the extent, concentrations and types of contaminants in the ground water (Figure 3). Wells located at the Johnson-Matthey facility and the New Jersey State Fish and Game office were also sampled and analyzed (Figure 1). Electric logs were run on 11 wells to assist in defining the lithology and stratigraphy of the aquifers.

The source for the ground-water contamination is believed to be from contamination in the soils, sludges and sediments, and the buried drums and tankers, discussed above. The highest contaminant concentrations have been identified in the upper aquifer in an area between the site and the Great Egg Harbor River (Figure 3) approximately 1000 feet wide and 1500 feet length.

Contaminants detected in the upper aquifer (also referred to as the upper subzone) in excess of acceptable federal and state levels under the Safe Drinking Water Act (SDWA) include metals and volatile organic compounds. Examples of maximum concentrations are: chromium 1,040 parts per billion (ppb), copper 1[illegible],500 ppb, nickel 4,670 ppb, tetrachloroethene 2,500 ppb, trichloroethene 940 ppb, and ethylbenzene 80 ppb (Table 6). The upper aquifer discharges to the Great Egg Harbor River and is believed to be the source of contaminants detected in river sediments and surface waters.

These compounds are known to have adverse carcinogenic and noncarcinogenic health effects on humans.

Site-related contamination in concentrations above drinking water standards was also detected in the intermediate and deep aquifers (Tables 7 and 8). The intermediate and deep aquifers are also referred to as the middle subzone semi-confining aquifer and lower subzone aquifer, respectively.

<u>Component 5 - the Great Egg Harbor River</u>

Eight surface-water and nine sediment locations were sampled and analyzed to determine the extent, concentration and types of contaminants in the river (Tables 9 and 10).

Ground-water contamination has migrated toward the Great Egg Harbor River, with contaminants in the upper aquifer discharging to the river (Figure 3). The highest contaminant concentrations in the aquifer have not yet reached the river and are estimated to be approximately 500 feet east of the river (Figure 3).

The Great Egg Harbor River has low levels above background concentrations of metals contamination in both the surface waters and sediments (Tables 9 and 10). Maximum concentrations detected in the surface water were 11 ppb of chromium and 110 ppb of copper. Copper was the only compound that exceeded its Ambient Water Quality Standards (12 ppb). Metals contaminants may present a threat to stream biota, but are below those values determined to present a risk to human health. No organic compounds were detected above background levels in surface water or river sediment samples.

<u>Purple Stained Sands</u>

A minor but visible feature at the site are purple stained sands found intermittently in the surface and near-surface soils, primarily northwest of the lagoons toward the rear of the site. Analysis suggests these materials are rounded sand grains which are thinly coated with methyl violet dye believed to have been produced from a grinding process in dye manufacture. This material was analyzed for priority pollutants and indicator compounds with no significant concentrations found. Since purple stained soils are not believed to present a human health or environmental risk at the site, no remedial alternatives were considered for these materials.

SUMMARY OF SITE RISKS

Hazard Identification

EPA conducted an Endangerment Assessment (EA) of the "no action" alternative to evaluate the potential risks to human health and the environment associated with the King of Prussia site in its current state. The EA focused on the site contaminants which are likely to pose the most significant risks to human health and the environment (indicator chemicals). These "indicator chemicals" included volatile and semi-volatile organic compounds and metals. The indicator compounds and their concentrations in site media are shown in Tables 11 and 12.

Contaminants and Exposure Assessment

Contaminated media at the site include: metal-contaminated soils, swale sediments, and lagoon sludges; buried drums containing volatile and semi-volatile organic contaminants; tankers containing metals residue; ground water contaminated with volatile and semi-volatile organics and metals; and metal-contaminated surface waters and sediments of the Great Egg Harbor River.

EPA's EA identified several potential exposure pathways by which the public may be exposed to contaminant releases from the site. These include:

- ingestion of site soils, sludges and swale sediments;
- inhalation of contaminated dust from site soils and swale sediments;
- dermal contact with contaminated soils, sludges and swale sediments;
- ingestion and dermal contact with contaminated ground water;
- inhalation of compounds volatilizing from contaminated ground water; and
- ingestion of fish caught from the Great Egg Harbor River.

The potentially exposed populations include adults or children residing at the site or using the area for recreational activities.

Dose-Response Evaluation

The dose-response evaluation presented available human health and environmental criteria for the contaminants of concern, and related the chemical exposure (dose) to expected adverse health effects (response). Included in this assessment are the pertinent standards, criteria, advisories and guidelines developed for the protection of human health and the environment. An explanation of how these were applied is presented below.

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

Potential carcinogenic risks were evaluated using the cancer potency factors developed by the EPA for the indicator compounds. Cancer potency factors (CPFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to generate an upper-bound estimate of the excess lifetime cancer risk associated with exposure to the compound at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes the underestimation of the risk highly unlikely. The CPFs for the indicator chemicals are presented in Table 13.

Noncarcinogenic risks were assessed using a hazard index (HI) approach, based on a comparison of expected contaminant intakes and safe levels of intake (Reference Doses). Reference doses (RfDs) have been developed by EPA for indicating potential adverse health effects. RfDs, which are expressed in units of mg/kg-day, are estimates of daily exposure levels for humans which are thought to be safe over a lifetime (including sensitive individuals). Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) are compared with the RfD to derive the hazard quotient for the contaminant in the particular media. The hazard index is obtained by adding the hazard quotients for all compounds across all media. A hazard index greater than one indicates that potential exists for noncarcinogenic health effects to occur as a result of site-related exposures. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. The reference doses for the indicator chemicals at the King of Prussia site are presented in Table 13.

Risk Characterization

The risk characterization quantifies present and/or potential future threats to human health that result from exposure to the contaminants of concern at the site. The site-specific risk values are estimated by incorporating information from the hazard identification, dose-response evaluation, and exposure assessment.

The cancer risks for the King of Prussia site are shown in Table 14. For known or suspected carcinogens, the EPA considers excess upper bound individual lifetime cancer risks of between 10^{-4} to 10^{-6} to be acceptable. This level indicates that an individual has an additional chance in ten thousand to one additional chance in a million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year period under specific exposure conditions at the site. Cancer risks at the site primarily result from potential use of contaminated ground water, although presently there are no users of the ground water in the proximity of the site. The cancer risk associated with the ingestion of site ground water is 2.4×10^{-2} (Table 14), well above EPA's acceptable risk range of 10^{-4} to 10^{-6}. The proposed remedial activities will reduce contaminant concentrations to Maximum Contaminant Levels (MCLs) which are drinking water standards (Table 16).

The Hazard Indices for the indicator compounds at the King of Prussia site are shown in Table 15. The greatest noncancer risks result from residential use of ground water in the upper aquifer. For a child, a hazard index of 89.5, and 31 for an adult has been calculated due to ingestion of copper, nickel and chromium (Table 15) at contaminant concentrations residing in the ground water. The calculations presented in the EA indicate that the major risks presented from surface and near surface contamination are from soil ingestion. The greatest noncancer risk represented is due to ingestion by a small child residing at the site and is represented by a hazard index of 3.7 (Table 15). Based upon these data, cleanup standards for surface soils were developed during the FS (Table 17). These standards will reduce the hazard index to less than one and will ensure that contaminants do not continue to migrate to the ground water.

In summary, risks to public health include actual or potential risks to recreational users and future residents at the site who may be impacted from the ingestion or inhalation of contaminated ground water and ingestion of contaminated soils. EPA has determined that actual or potential site-related risks warrant a remedial action for the site.

<u>Environmental Impacts</u>

Evaluation of adverse environmental impacts have not been developed to the extent that public health standards have been developed. Consequently, the evaluation of potential adverse environmental impacts is qualitative.

In many respects, environmental concerns at the KOP site are as significant as the public health concerns presented above. The site is surrounded on three sides by the Winslow Wildlife Management Area and is part of the Pinelands National Reserve. Also, the Great Egg Harbor River has been proposed to be nationally designated as a Wild and Scenic River.

The terrestrial flora or fauna on or in the vicinity of the site could potentially be exposed directly or through bioaccumulation from site-associated contamination.

Although concentrations of metals detected in sediments and surface waters of the Great Egg Harbor River and the swale suggest minimal potential for adverse effects to aquatic receptors (primarily fish), contaminants may be in a bioavailable form. Several of the metals found are bioaccumulative and also exhibit other effects such as phytotoxicity (copper) and carcinogenicity (chromium and nickel). In addition, migratory birds may be receiving bioaccumulated contaminants through invertebrates and fish in their food chain. Adverse effects to terrestrial fauna cannot be discounted.

Environmental damage to the forested area surrounded by the King of Prussia site is the most obvious impact of contamination existing at and migrating from the site. Aerial photographs and discussions with State Fish and Wildlife personnel indicate that vegetation in the area was not stressed prior to establishment of the KOP waste treatment facility in 1970 or 1971. A photograph taken in 1975, just after site abandonment, shows stressed vegetation throughout much of the area on and off site. Information in the literature indicates that concentrations of heavy metals well below those known to be present at the site exert toxic effects on terrestrial ecosystems.

While there are few site-specific data to evaluate the effects of the observed concentrations of indicator compounds on flora or fauna which may come into contact with site-related contamination, adverse affects cannot be discounted.

Data generated during the EA was utilized to develop soil cleanup standards to assure that contaminants do not continue to migrate into the ground water and risks to recreational users or inhabitants at the site are reduced to an acceptable level.

<u>Uncertainties</u>

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

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

Environmental sampling uncertainty arises in part from the potentially uneven distribution of chemicals in the media sampled. Consequently, there is significant uncertainty as to the actual levels present over an extended area. Chemical 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 estimates of how often an individual would actually come in contact with the chemicals of concern, the period of time over which such exposure would occur, and in the models used to estimate the concentrations of the chemicals of concern at the point of exposure. Toxicological uncertainties occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the EA provides upper bound estimates of the risks to nearby populations, and is highly unlikely to underestimate actual risks related to the site.

In conclusion, based on the results of the risk assessment, actual or threatened releases of hazardous substances at the site, if not addressed by implementing the response action selected in this Record of Decision, may present an endangerment to public health, welfare or the environment.

DESCRIPTION OF ALTERNATIVES

The remedial alternatives which were selected for detailed evaluation as described below, are presented for each area of contamination, described herein as components. Estimated implementation times for the alternative components represent construction times and do not include remedial design.

Component 1 - Metals Contaminated Soils, Sediments and Sludges

The objective of Remedial Component 1 is to achieve removal of contaminants from site soils, lagoon sludges and swale sediments that exceed cleanup levels (Table 17 for cleanup levels and Figure 2 for areal distribution) developed during the FS; the total volume of these materials is estimated to be 21,150 cubic yards. These standards were developed based on risk to public health. Although these standards are not considered applicable or relevant and appropriate requirements (ARARs), cleanup to these levels would ensure that the contaminants do not continue to migrate into the ground water and that risks to recreational users or inhabitants at the site would be reduced to an acceptable level (a hazard index of less than 1). Human health risks presented by current contaminant concentrations of ingestion of metal contaminated soils are calculated to have a hazard index of 3.7.

ALTERNATIVE S-1: NO ACTION

Capital Cost:	$ 0
Annual Operation and Maintenance Cost:	$ 7,000
Total Present Worth:	$79,000
Estimated Implementation Time:	2 Months

The No Action Alternative for metals-contaminated soils, sludges and sediments provides a baseline against which other alternatives may be compared. The fence that presently encloses the site would remain to restrict public access. No remedial activities would be performed but long-term ground-water monitoring would be conducted. Potential health risks would not be reduced as there would be no reduction in toxicity, mobility or volume of metals contaminants in the soils, sediments and sludges.

ALTERNATIVE S-2: LIMITED ACTION

Capital Cost:	$ 43,000
Annual Operation and Maintenance Cost:	$ 9,000
Total Present Worth:	$144,000
Estimated Implementation Time:	6 Months

The Limited Action Alternative for metals-contaminated soils consists of site and deed restrictions, additional fencing around the swale and long-term, ground-water monitoring. Potential public health risks would be somewhat reduced by limiting access to contaminated soils, sediments and sludges. However, there would be no reduction in toxicity, mobility or volume of metals contaminants in the soils, sediments and sludges. Contaminants from these media would also continue to migrate into the ground water and eventually discharge to the Great Egg Harbor River. This would pose minor risks to current recreational users and higher risks to future users when higher concentrations of contaminants subsequently reach the river.

ALTERNATIVE S-3: LIMITED EXCAVATION OF SEDIMENTS AND SOILS; CONSOLIDATION; CAPPING

Capital Cost:	$1,550,000
Annual Operation and Maintenance Cost:	$ 17,000
Total Present Worth:	$1,741,000

Estimated Implementation Time:	12 Months

This alternative consists of excavation and consolidation of 650 cubic yards of swale sediments and 350 cubic yards of site soils outside of the area to be capped. These materials would be consolidated in the lagoons and adjacent area followed by installation of a multi-layer cap covering 2.6 acres. Long-term, ground-water monitoring would also be conducted to determine contaminant degradation and/or migration. Potential health risks would be reduced by eliminating direct contact with these materials, but there would be no reduction in toxicity or volume of metals contaminants in the soils, sediments and sludges. Migration of contaminants from these materials into the ground water would be reduced but not eliminated.

ALTERNATIVE S-4: COMPLETE EXCAVATION OF SOILS, SEDIMENTS AND SLUDGES; CONTAMINANT EXTRACTION; REDEPOSITION ON SITE

Capital Cost:	$8,050,000
Annual Operation and Maintenance Cost:	$ 0
Total Present Worth:	$8,050,000
Estimated Implementation Time:	18 Months

This alternative consists of excavating and treating 20,150 cubic yards of contaminated soils, sediments and sludges in a multi-stage soil washing/extraction process which would reduce the concentration of contaminants so that they would no longer be hazardous or would be "noncharacteristic". These materials would be redeposited to their approximate former locations to restore site topography followed by revegetation with native Pinelands species. The site would be restored for unrestricted use. Treatability studies would be required to optimize design of a soil washing system.

ALTERNATIVE S-5: IN SITU STABILIZATION/SOLIDIFICATION; CAPPING

Capital Cost:	$3,182,000
Annual Operation and Maintenance Cost:	$ 10,000
Total Present Worth:	$3,336,000
Estimated Implementation Time:	18 Months

This alternative consists of excavation and consolidation of 650 cubic yards of swale sediments and 350 cubic yards of site soils outside of the area to be treated and capped. The area of consolidation, stabilization and capping includes a 2.6-acre area of the lagoons and adjacent area toward the rear of the site. After consolidation, in situ stabilization would be performed using a system of injection and mixing augers and a multi-layer cap constructed. Mobility of contaminants would be reduced; treated materials would then be rendered "noncharacteristic". Long-term, ground-water monitoring would be required and site access restricted. Treatability studies would be required to determine the design parameters for this alternative.

ALTERNATIVE S-5a: COMPLETE EXCAVATION OF SOILS, SEDIMENTS AND SLUDGES; STABILIZATION/SOLIDIFICATION; CAPPING

Capital Cost:	$5,402,000
Annual Operation and Maintenance Cost:	$ 10,000
Total Present Worth:	$5,555,000
Estimated Implementation Time:	18 Months

This alternative is similar to S-5, except all contaminated soils, sediments and sludges (20,150 cubic yards) would be excavated and stabilized above ground. After excavation and consolidation, these materials would be mixed with cementing and stabilizing agents to create a structurally strong and inert matrix. A multi-layer cap would then be constructed over a 2.6-acre area over the lagoons and adjacent area. Long-term monitoring would be required and site access restricted. Treatability studies would be required to determine the design parameters for this alternative.

ALTERNATIVE S-6: COMPLETE REMOVAL; OFF-SITE DISPOSAL

Capital Cost:	$11,500,000
Annual Operation and Maintenance Cost:	$ 0
Total Present Worth:	$11,500,000
Estimated Implementation Time:	12 Months

For this alternative, approximately 20,150 cubic yards of untreated contaminated soils, sludges and sediments would be excavated and transported to an off-site Resource Conservation and Recovery Act (RCRA) facility permitted for disposal of hazardous materials. All soils, sludges and sediments above action levels would be removed from the site, replaced with clean fill and revegetated with native Pinelands species.

Because of the current limitations on the off-site treatment or disposal of hazardous wastes caused by the unavailability of permitted disposal locations, the potential exists that these materials would have to be stored onsite in accordance with appropriate RCRA mixed waste requirements until a treatment or disposal facility becomes available.

Component 2 - Buried Drums and Soils Contaminated with Volatile Organic Compounds

The objective of Remedial Component 2 is to achieve removal of buried drums and visibly contaminated soils and to characterize remaining organically contaminated soils (Figure 2). Volumes are estimated at 250 cubic yards of buried drums and 2250 cubic yards of adjacent soils that may contain volatile and semi-volatile organic contaminants.

ALTERNATIVE DR-1: NO ACTION

Capital Cost:	$ 0
Annual Operation and Maintenance Cost:	$ 7,000
Total Present Worth:	$79,000
Estimated Implementation Time:	2 Months

The No Action Alternative for organically contaminated soils in the buried drum area provides a baseline against which other alternatives may be compared. The fence that presently encloses the site would remain to restrict public access. Contaminants in the soil and deteriorating drums would continue to migrate into the ground water. Ground water would be monitored using existing wells. The number and condition of buried drums would remain undetermined.

ALTERNATIVE DR-2: DRUM REMOVAL AND OFF-SITE DISPOSAL; SAMPLING AND ANALYSIS OF SOILS

Capital Cost:	$386,000
Annual Operation and Maintenance Cost:	$ 0
Total Present Worth:	$386,000
Estimated Implementation Time:	12 Months

This alternative consists of removal and off-site treatment and disposal of buried drums and visibly contaminated soils followed by sampling and analysis of residually contaminated soils. The volume of materials that would require off-site treatment and disposal is estimated to be approximately 250 cubic yards. Post-removal soil sampling and analysis would define contaminant types, concentrations and soil volumes that may also require remediation. A focused feasibility study including treatability testing would be conducted to evaluate remedial alternatives for residual soil contamination.

Component 3 - Tankers and Contents

The objective of Remedial Component 3 is to achieve removal of the tankers and contents (Figure 2). The tankers are estimated to have 83 cubic yards capacity, with approximately 10 cubic yards of waste metals-contaminated residue. Contaminated soils under and adjacent to the tankers would be addressed as part of Component 1.

ALTERNATIVE TK-1: NO ACTION

Capital Cost:	$0
Annual Operation and Maintenance Cost:	$0
Total Present Worth:	$0

Estimated Implementation Time:	0 Months

This alternative would not include any remedial activity. The fence that presently encloses the site would remain to restrict public access to the tankers and their contents. There would be no reduction in toxicity, mobility or volume of contaminants in the tankers and deterioration of the tankers would continue. Runoff from the tanker contents would continue to contaminate nearby soils and migrate into the ground water.

ALTERNATIVE TK-2: TANKER REMOVAL AND OFF-SITE DISPOSAL

Capital Cost:	$22,000
Annual Operation and Maintenance Cost:	$ 0
Total Present Worth:	$22,000
Estimated Implementation Time:	2 Months

This consists of removing the tankers and contents and their treatment and disposal at an off-site facility. This would permanently reduce mobility, toxicity and volume of the tanker wastes at the site and eliminate the risks posed by this source area.

<u>Component 4 - Ground Water</u>

Ground-water extraction scenarios were designed for aquifer restoration and to prevent migration of contaminated ground water (Figure 3) to the Great Egg Harbor River. The ground water at this site is classified as GW-2 (drinking water quality) under NJAC 7:9-6.7 and NJAC 7:9-6.4.

The cancer risk from drinking contaminated ground water is 2.4×10^{-2} although there are no users of the ground water in proximity of the site. The nearest residential user of ground water is one mile northeast (upgradient) of the site.

New Jersey Ground Water Quality Criteria and Maximum Contaminant Levels established pursuant to the federal and state Safe Drinking Water Acts would be applicable or relevant and appropriate federal and state ground-water requirements for this remedial action. Table 16 identifies the ground-water remedial ARARs for the site.

ALTERNATIVE GW-1: NO ACTION

Capital Cost:	$ 0
Annual Operation and Maintenance Cost:	$ 11,000
Total Present Worth:	$122,000
Estimated Implementation Time:	2 Months

The No Action Alternative provides a baseline against which to compare other alternatives. This alternative would not contain or recover the contaminated ground-water plume. Long-term monitoring of ground-water contaminants would be conducted by analysis of samples from existing monitoring wells. The Great Egg Harbor River would also be sampled to determine current and future levels of contamination in the river. Natural flushing would not significantly reduce potential health risks. Health risks would persist due to the continuing migration of the contaminated ground water in the aquifer and discharge of contaminants to the Great Egg Harbor River system. Additionally, adverse impacts to the ecosystems of the Great Egg Harbor River would continue.

ALTERNATIVE GW-2: LIMITED ACTION

Capital Cost:	$ 0
Annual Operation and Maintenance Cost:	$ 11,000
Total Present Worth:	$122,000
Estimated Implementation Time:	6 Months

This alternative is the same as GW-1 with the addition of institutional controls such as deed and/or zoning restrictions to prevent use of contaminated ground water at the site.

ALTERNATIVE GW-3: GROUND WATER PUMPING, TREATMENT AND REINJECTION

Capital Cost:	$2,043,000
Annual Operation and Maintenance Cost:	$ 285,000
Total Present Worth:	$6,431,000
Estimated Implementation Time:	30 Years

This alternative involves pumping ground water at an estimated 240 gallons per minute from extraction wells southwest and downgradient from the site to capture the contaminant plume (Figure 3) currently discharging to the Great Egg Harbor River. The ground water would be extracted and treated to drinking water standards and subsequently reinjected into the aquifer at an estimated rate of 240 gallons per minute, until contaminants in the aquifer meet drinking water standards (Table 16). Extraction and reinjection rates would be modified during the remedial design to optimize the system. Institutional controls would be imposed until ground-water contaminants fall below ARARs.

As part of the remedial design effort, additional monitoring wells would be required to obtain data to define the vertical extent of contamination more precisely. Based on this information, the ground-water pumping, treatment and reinjection design would be modified since the present design only considers contamination of the upper aquifer.

Initial sampling after installation of the extraction, treatment and reinjection system would be quarterly for ground-water monitoring wells, and monthly for the treatment plant effluent. This may later be modified pending analysis of data and determination of aquifer response to the remedial action.

ALTERNATIVE GW-4: GROUND WATER PUMPING, TREATMENT AND DISCHARGE TO THE GREAT EGG HARBOR RIVER

Capital Cost:	$2,766,000
Annual Operation and Maintenance Cost:	$ 406,000
Total Present Worth:	$9,016,000
Estimated Implementation Time:	30 Years

This alternative involves pumping ground water at an estimated 460 gallons per minute from extraction wells southwest and downgradient from the site to capture the contaminant plume (Figure 3) currently discharging to the Great Egg Harbor River. The ground water would be extracted and treated to drinking water standards and subsequently discharged to the Great Egg Harbor River until contaminants in the aquifer fall below ARARs (Table 16). This would require a waiver of Pinelands regulations that restrict surface water discharge. The cost estimate for this alternative was based on treating the contaminated ground water to drinking water standards. This cost estimate may increase if the discharge limitations for the river were determined to be more stringent than drinking water standards.

As part of the remedial design effort, additional monitoring wells would be required to obtain data to define the vertical extent of contamination more precisely. Based on this information, the ground-water pumping, treatment and discharge system would be modified, since the present design only considers contamination of the upper aquifer.

Initial sampling after installation of the extraction, treatment and surface discharge system would be quarterly for ground-water monitoring wells, and monthly for the treatment plant effluent. This may be subsequently modified pending analysis of data and determination of aquifer response to the remedial action.

<u>Component 5 - Great Egg Harbor River</u>

The river would be monitored before and during implementation of the extraction/treatment system for ground-water remediation. The objective of Component 5 is to assure that contamination from this site is not causing the river to exceed federal and state ARARs. Remedial alternatives for the Great Egg Harbor River surface waters and sediments were not developed, because the contamination in the river has not been completely characterized and contaminant loading to the river would be reduced once the flow of contaminated ground water is controlled by implementation of a ground-water extraction/treatment system.

Data collected during the remedial design should provide a basis for determination whether remediation of the Great Egg Harbor River surface waters and/or sediments would be necessary or if additional treatment of the ground water is required. Surface-water and sediment monitoring would also be conducted during the operation of the ground-water extraction/treatment system. If remediation of the river sediments or surface waters were required, a focused feasibility study would be conducted to evaluate remedial alternatives.

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

In accordance with the National Contingency Plan, a detailed analysis of each remedial alternative is conducted with respect to each of the nine detailed evaluation criteria. All selected remedies must at least attain the Threshold criteria. The selected remedy should provide the best trade-offs among the Primary Balancing Criteria. The Modifying Criteria were evaluated following the public comment period.

Threshold Criteria

- Overall Protectiveness of Human Health and the Environment - This criterion evaluates the adequacy of protection that the remedy provides while describing how risks are eliminated, reduced or controlled through treatment, engineering controls, and/or institutional controls.

- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) - This criterion addresses whether a remedy would meet all of the ARARs of other federal and state environmental statutes and/or provide grounds for invoking a waiver.

  There are several types of ARARs: action-specific, chemical-specific and location-specific. Action-specific ARARs are technology or activity-specific requirements or limitations related to various activities. Chemical-specific ARARs are usually numerical values which establish the amount or concentrations of a chemical that may be in, or discharged to, the ambient environment. Location-specific requirements are restrictions placed on the concentrations of hazardous substances or the conduct of activities solely because they occur in a special location.

Primary Balancing Criteria

- Reduction of Toxicity, Mobility or Volume Through Treatment - This criterion addresses the anticipated treatment performance of the remedy.

- Short-Term Effectiveness - This criterion refers to the speed with which the remedy achieves protection, as well as the remedy's potential to create adverse impacts on human health and the environment during the remedial action.

- Long-Term Effectiveness and Permanence - This criterion evaluates the magnitude of residual risk and the ability of the remedy to maintain reliable protection of human health and the environment over time once the remedial action has been completed.

- Implementability - This criterion examines the technical and administrative feasibility of executing a remedy, including the availability of materials and services needed to implement the chosen solution.

- Cost - This criterion includes the capital and operation and maintenance costs of the remedy.

Modifying Criteria

- State Acceptance - This criterion indicates whether, based on its review of the Feasibility Study and Proposed Plan, the State of New Jersey concurs with, opposes, or has no comment on the preferred alternative.

- Community Acceptance - This criterion evaluates the reaction of the public to the remedial alternatives and EPA's Proposed Plan. Comments received during the public comment period and EPA's responses to those comments are summarized in the Responsiveness Summary attached to this document.

Overall Protection of Human Health and the Environment

COMPONENT ONE - METALS CONTAMINATED SOILS, SEDIMENTS AND SLUDGES

Complete Removal with Off-Site Disposal (Alternative S-6) and Soil Extraction (Alternative S-4) would provide the greatest protection to human health and the environment by removing contaminants present in concentrations determined to present an unacceptable health risk (Table 17). Stabilization and Solidification (Alternatives S-5 and S-5a) would render contaminants in the soil insoluble and immobile, thus greatly reducing leachate generation; capping, included with these alternatives, would further reduce leaching and migration to the ground water in addition to minimizing direct contact with contaminated soil. Consolidation and Capping (Alternative S-3) would reduce public health risks by minimizing direct contact with the contaminated soil and prevent adverse impacts to the environment by reducing leaching and subsequent migration of the contaminants. However, if the capping system fails, the threat to human health and the environment would be present. The

Limited Action (S-2) and No Action (S-1) Alternatives would provide minimal protection to human health and the environment.

COMPONENT TWO - BURIED DRUMS AND SOILS CONTAMINATED WITH VOLATILE ORGANIC COMPOUNDS

Drum Removal and Off-Site Disposal (Alternative DR-2) would remove contaminants from the site that currently present an unacceptable risk to human health and the environment. Additional sampling and analysis (included in Alternative DR-2) would determine if further remediation would be required. The No Action (DR-1) Alternative would provide minimal protection to human health and the environment. Contaminants would continue to migrate to the ground water and the potential for human exposure to hazardous materials would remain.

COMPONENT THREE - TANKERS AND CONTENTS

Removal and Off-Site Disposal (Alternative TK-2) would remove contaminants from the site that currently present an unacceptable risk to human health and the environment. The No Action (TK-1) Alternative would provide inadequate protection to human health and the environment. Contaminants would continue to migrate to the ground water and potential for human exposure to hazardous materials would remain.

COMPONENT FOUR - GROUND WATER and
COMPONENT FIVE - THE GREAT EGG HARBOR RIVER

Ground-water extraction/treatment alternatives (GW-3 and GW-4) would protect public health and the environment because they would provide for the removal of contaminants from the ground water to meet the required cleanup levels (drinking water standards) in the aquifer (Table 16). Contaminant discharge to the Great Egg Harbor River would be controlled and contaminants presently in surface waters and sediments would be reduced by natural river processes. A characterization of the river waters and sediment quality, including a biologic assessment of organisms inhabiting the river, would more completely determine current levels of contamination, and determine if additional remediation would be required.

The Limited Action (GW-2) Alternative would prevent the use of contaminated ground water at the site, provide limited protection for human health but would not restore the aquifer. No protection would be provided to the environment as the upper aquifer would continue to discharge to the Great Egg Harbor River.

The No Action (GW-1) Alternative would provide no protection to the environment as contaminated ground water in the upper aquifer would continue to discharge to the Great Egg Harbor River. Human health would also not be protected since future residents would potentially utilize contaminated ground water.

Compliance with ARARs

COMPONENT ONE - METALS CONTAMINATED SOILS, SEDIMENTS AND SLUDGES

Extraction (Alternative S-4), Stabilization and Solidification (Alternatives S-5 and S-5a), and Removal and Off-Site Disposal (Alternative S-6) could be designed to meet all federal and state ARARs. Consolidation and Capping (Alternative S-3), Limited Action (Alternative S-2), and No Action (Alternative S-1) would not meet all Federal and State ARARs because untreated hazardous materials would remain at the site.

COMPONENT TWO - BURIED DRUMS AND SOILS CONTAMINATED WITH VOLATILE ORGANIC COMPOUNDS and
COMPONENT THREE - TANKERS AND CONTENTS

Removal and Off-Site Disposal of buried drums and tankers (Alternatives DR-2 and TK-2) would be designed to meet all federal and state ARARs. The No Action Alternatives (DR-1 and TK-1) would not meet all federal and state ARARs.

COMPONENT FOUR - GROUND WATER and
COMPONENT FIVE - THE GREAT EGG HARBOR RIVER

Extraction, Treatment and Reinjection (Alternative GW-3) would meet all federal and state ARARs.

The Pinelands surface water discharge restrictions (N.J.A.C. 7:50-7.83 and 7:50-6.84) would not allow surface water discharge (Alternative GW-4) of treated ground water.

If long-term monitoring were executed and ground-water use were restricted, the Limited Action (GW-2) and No Action (GW-1) Alternatives would meet action-specific ARARs, but would not meet contaminant-specific or location-specific ARARs.

Reduction of Toxicity, Mobility, or Volume through Treatment

COMPONENT ONE - METALS CONTAMINATED SOILS, SEDIMENTS AND SLUDGES

Excavation and Extraction (Alternative S-4) and Disposal and Off-Site Removal (Alternative S-6) would reduce the toxicity, mobility and volume of contaminants.

Stabilization and Solidification (S-5 and S-5a) Alternatives would significantly reduce toxicity and mobility but would not reduce the volume of contaminants at the site.

The Consolidation and Capping (S-3) Alternative would provide no reduction in toxicity or volume, but would achieve reductions in mobility by minimizing infiltration of water through contaminated media. The Limited Action (S-2) and No Action (S-1) Alternatives would provide no reduction of the mobility, toxicity or volume of the contaminants in the soil.

COMPONENT TWO - BURIED DRUMS AND SOILS CONTAMINATED WITH VOLATILE ORGANIC COMPOUNDS

Removal and Off-Site Disposal (Alternative DR-2) would reduce toxicity, mobility and volume. Further evaluation of the soils would determine what additional remediation would be required.

The No Action (DR-1) Alternative would offer no reduction in toxicity, mobility or volume of contaminants in the drums or the soils. Deteriorating drums would result in increased levels of contamination being released into soils and the ground water.

COMPONENT THREE - TANKERS AND CONTENTS

Removal and Off-Site Disposal (Alternative TK-2) would reduce toxicity, mobility and volume.

The No Action Alternative (TK-1) would offer no reduction in toxicity, mobility or volume of contaminants in the tankers. Deterioration of the tankers would result in increased levels of contamination being released into soils and the ground water.

COMPONENT FOUR - GROUND WATER and
COMPONENT FIVE - THE GREAT EGG HARBOR RIVER

Ground-water extraction/treatment alternatives (GW-3 and GW-4) would reduce toxicity, mobility and volume. Furthermore, the discharge of contaminants to the Great Egg Harbor River would be eliminated.

The Limited Action (GW-2) and No Action (GW-1) Alternatives would not utilize treatment to reduce toxicity, mobility or the volume of contamination.

Short-Term Effectiveness

COMPONENT ONE - METALS CONTAMINATED SOILS, SEDIMENTS AND SLUDGES

The No Action (S-1) and Limited Action (S-2) Alternatives would take two months and six months, respectively, to implement and would present no short-term risks to workers or the community; these alternatives, however, would provide minimal protection.

Consolidation and Capping (Alternative S-2) would achieve limited protection against contaminants of concern within 6 months and present minimal short-term risks to workers during remedial action through direct contact pathways and the normal hazards associated with construction activities. These hazards would be addressed in a health and safety plan which would be developed for the construction activities. The plan would specify measures to minimize such hazards.

Stabilization and Solidification that would mix/stabilize/cement contaminated materials in situ (Alternative S-5) would require excavation and consolidation of a limited volume of materials and would also require 18 months to complete. Short-term risk to human health would be minimized through implementation of the health and safety plan.

Stabilization and Solidification involving above ground mixing/stabilizing processes (Alternative S-5a) and Excavation and Extraction by soil washing (Alternative S-4) would require 18 months to achieve full protection. These alternatives would involve excavation and treatment of contaminated materials and would increase the short-term risk to human health due to increased direct contact pathways and construction hazards during excavation activities. These hazards would be minimized through implementation of the health and safety plan.

Removal and Off-Site Disposal (Alternative S-6) would pose short-term risk of exposure to the community and workers during the transport of the soil to an off-site facility for treatment and disposal. These hazards would be minimized through implementation of a health and safety plan.

COMPONENT TWO - BURIED DRUMS AND SOILS CONTAMINATED WITH VOLATILE ORGANIC COMPOUNDS

The No Action (DR-1) Alternative would take approximately two months to implement and would present a short-term hazard to workers at the site (implementing remedies for other components) or trespassers exposed to drum contents if a buried drum were to surface.

Removal and Off-Site Disposal (Alternative DR-2) would pose a short-term risk of exposure to the community and workers during transport of the drums to an off-site facility for treatment and disposal. These hazards would be minimized through implementation of a health and safety plan.

COMPONENT THREE - TANKERS AND CONTENTS

The No Action (TK-1) Alternative would present no short-term risks to on-site workers or the community. However, it would provide little or no protection to human health and the environment.

Removal and Off-Site Disposal (Alternative TK-2) would pose a short-term risk of exposure to the community and workers during transport of the tankers to an off-site facility for treatment and disposal. These hazards would be minimized through implementation of a health and safety plan.

COMPONENT FOUR - GROUND WATER and
COMPONENT FIVE - THE GREAT EGG HARBOR RIVER

Limited Action (GW-2) and No Action (GW-1) Alternatives would take about six months and two months, respectively, to implement and present no short-term risks to on-site workers or the community. However, these alternatives would provide little or no protection to human health and the environment.

Ground-water extraction/treatment Alternatives (GW-3 and GW-4) would present minimal short-term risks to workers through direct contact pathways and contaminated water resulting from piping leaks, and normal construction hazards during remedial action. These alternatives would also present a small additional risk due to emissions from the air stripper which would be minimized by installation of a system to capture air emissions. Each of these ground-water extraction/treatment alternatives would take 15 to 30 years or longer to achieve aquifer restoration. This time estimate is based on remediating contaminated soils and removing buried drums and tankers at the site.

__Long-Term Effectiveness and Permanence__

COMPONENT ONE - METALS CONTAMINATED SOILS, SEDIMENTS AND SLUDGES

Excavation and Off-Site Disposal (Alternative S-6) and Excavation and Extraction (Alternative S-4) would be effective in permanently reducing risks to recreational users and any future inhabitants of the site to acceptable levels. These alternatives would permanently remove contamination, completely restore the site and allow for future unrestricted use. Stabilization and Solidification (S-5 and S-5a) would not be as effective or as permanent as Alternative S-4, and would require institutional controls, maintenance of the capping system and continued monitoring of the ground water. Consolidation and Capping (Alternative S-3) would reduce migration of contaminants into the ground water, but if the cap were to fail or during periods of high seasonal ground water (estimated to occur every two to three years), contamination would come into contact with ground water and migration could occur. It would also require long-term monitoring, is not as permanent, and does not satisfy preference for treatment. Consolidation and Capping would require a long-term management program to detect migration of contaminants into the ground water and determine whether the ground water had contacted contamination materials. The Limited Action (S-2) and No Action (S-1) Alternatives would not remediate contaminated media and a significant risk associated with contaminant migration into the ground water would remain.

COMPONENT TWO - BURIED DRUMS AND SOILS CONTAMINATED WITH VOLATILE ORGANIC COMPOUNDS

Removal and Off-Site Disposal of Drums (Alternative DR-2) would be effective and permanent in removing risks to recreational users and future inhabitants of the site. Alternative DR-2 would provide for characterization of soils and would provide the basis to determine if additional action would be required. The No Action (DR-1) Alternative would not remediate contaminated media and risks to human health and the environment would persist.

COMPONENT THREE - TANKERS AND CONTENTS

Removal and Off-Site Disposal (Alternative TK-2) would be effective in permanently removing risks to any recreational users and future inhabitants of the site. The No Action (TK-1) Alternative would not remediate contaminated media and risks to human health and the environment would persist.

COMPONENT FOUR - GROUND WATER and
COMPONENT FIVE - THE GREAT EGG HARBOR RIVER

Ground-water extraction/treatment (GW-3 and GW-4) Alternatives would present no long-term threat to public health because these alternatives clean up the aquifer to contaminant levels which would be health protective. These alternatives would utilize proven technologies (e.g., extraction wells, air stripping, chemical precipitation, injection wells) which have been used frequently for treatment of industrial and hazardous waste. These alternatives (GW-3 and GW-4) are reliable and would present no major operational problems assuming proper maintenance.

The Limited Action (GW-2) and No Action (GW-1) Alternatives would present a long-term risk to public health and the environment because contaminated ground water would not be cleaned to health based levels and would continue to discharge to the Great Egg Harbor River. Since the discharge of ground-water contaminants from the aquifer into the river would increase with time, contaminant concentrations in the sediments and surface waters in the river would also be expected to increase.

<u>Implementability</u>

COMPONENT ONE - METALS CONTAMINATED SOILS, SEDIMENTS AND SLUDGES

The No Action (S-1) and Limited Action (S-2) Alternatives would be the easiest soil alternatives to implement. The required services and materials would be readily obtained and no special equipment would be needed. Consolidation and Capping contaminated materials (Alternative S-3) would be readily implementable and would use standard road construction equipment with a limited amount of specialized equipment for installation of the cap. Stabilization and Solidification Alternatives (S-5 and S-5a) would require specialized equipment, materials and labor which would be readily available. Treatability studies would be required to select the optimum reagent mixture and processing techniques. Specialized equipment, materials and labor required for Contaminant Extraction (Alternative S-4) would also be readily available. Treatability studies would be required to determine the optimum extraction agents. Materials, equipment and labor to implement on-site activities for Removal and Off-Site Disposal (Alternative S-6) of contaminated materials would be readily available. However, the availability of off-site disposal facilities is uncertain and Land Disposal Restrictions would prevent implementation of this alternative without first treating the material.

COMPONENT TWO - BURIED DRUMS AND SOILS CONTAMINATED WITH VOLATILE ORGANIC COMPOUNDS

The No Action Alternative (DR-1) would be the easiest to implement. Material, labor, equipment and services needed for Drum Removal and Off-Site Disposal (Alternative DR-2) would be readily available.

COMPONENT THREE - TANKERS AND CONTENTS

The No Action Alternative (TK-1) would be easiest to implement. Materials, labor, services and for Removal and Off-Site Treatment and Disposal (Alternative TK-2) would be readily available.

COMPONENT FOUR - GROUND WATER and
COMPONENT FIVE - THE GREAT EGG HARBOR RIVER

The No Action (GW-1) and Limited Action (GW-2) Alternatives would be easiest to implement but would not provide adequate protection of human health and the environment. Ground-water extraction/treatment alternatives (GW-3 and GW-4) would begin in relatively short periods of time. The proposed treatment technologies and equipment required for Alternatives GW-3 and GW-4 would be available as prefabricated packages from a number of vendors. These packages would be installed as part of an on-site treatment plant.

<u>Cost</u>

COMPONENT ONE - METALS CONTAMINATED SOILS, SEDIMENTS AND SLUDGES

The No Action (S-1) and Limited Action (S-2) Alternatives would not provide adequate protection for a present worth of $79,000 and $144,000, respectively. Consolidation and Capping (Alternative S-3) has a present worth of $1,740,000 and would achieve only limited protection against contaminants of concern.

Stabilization and Solidification utilizing in-situ and above-ground treatment processes (Alternatives S-5 and S-5a) have present worths of $3,336,000 and $5,555,000, respectively; these alternatives would minimize human health risk but would not fully restore the site for unrestricted use. Moreover, these alternatives would not reduce toxicity or volume of the contaminants. Excavation and Contaminant Extraction (Alternative S-4) with a present worth of $8,050,000 would achieve long-term protection of human health, comply with ARARs and restore the site for unrestricted use in a cost-effective manner. Removal and Off-Site Disposal (Alternative S-6) would also achieve long-term protection of human health and fully restore the site and would be the most costly alternative with a present worth of $11,500,000.

Costs for all alternatives are presented in Table 18A. This table includes Capital, Annual Operation and Maintenance Costs and Total Costs which is expressed as present worth.

COMPONENT TWO - BURIED DRUMS AND SOILS CONTAMINATED WITH VOLATILE ORGANIC COMPOUNDS

The No Action (DR-1) Alternative would be the least costly to implement with a cost of $79,000 but would not provide adequate protection. Removal and Disposal (Alternative DR-2) would be protective, permanent and complete, and has a cost of $386,000.

Costs for alternatives considered for this component are included in Table 18B.

COMPONENT THREE - TANKERS AND CONTENTS

The No Action (TK-1) Alternative has no cost and would not provide adequate protection. Removal and Disposal (Alternative TK-2) has a relatively low cost of $22,000 and would be protective, permanent and complete.

Costs for the alternatives considered for this component are included in Table 18C.

COMPONENT FOUR - GROUND WATER and
COMPONENT FIVE - THE GREAT EGG HARBOR RIVER

Cost for remediation of ground water and the Great Egg Harbor River's sediments and surface waters are included in the ground water (GW) alternatives. Although the No Action (GW-1) and Limited Action (GW-2) Alternatives would be the least costly to implement with both having a present worth of $122,000, both actions would be inadequate to protect human health and the environment. Ground-water extraction/treatment alternatives (GW-

3 and GW-4) have present worths of $6,431,00 and $9,016,000 and would be protective of human health and the environment, and would achieve ARARs in a cost-effective manner.

Costs for the alternatives considered for this component are included in Table 18D.

State Acceptance

COMPONENT ONE - METALS CONTAMINATED SOILS, SEDIMENTS AND SLUDGES

The New Jersey Department of Environmental Protection (NJDEP) concurs with Contaminant Extraction of metals-contaminated media (Alternative S-4).

COMPONENT TWO - BURIED DRUMS AND SOILS CONTAMINATED WITH VOLATILE ORGANIC COMPOUNDS

The NJDEP concurs with drum removal and the conduct of additional soil sampling and analysis of the nearby soils (Alternative DR-2).

COMPONENT THREE - TANKERS AND CONTENTS

The NJDEP concurs with removal and disposal of tankers (Alternative TK-2).

COMPONENT FOUR - GROUND WATER and
COMPONENT FIVE - THE GREAT EGG HARBOR RIVER

The NJDEP, while concurring with Alternative GW-3 for ground-water remediation, has raised concerns regarding the impact of the GW2 discharge ARARs upon the FW1 stream standards for the Great Egg Harbor River.

EPA acknowledges this concern, and will evaluate the need for further action as part of monitoring efforts which will be conducted during design and implementation of the remedy.

The Pinelands Commission has provided comments that have been addressed in the attached Responsiveness Summary.

Community Acceptance

COMPONENT ONE - METALS CONTAMINATED SOILS, SEDIMENTS AND SLUDGES

The community supports Contaminant Extraction (Alternative S-4) and Removal and Off-Site Disposal (Alternative S-6) since these actions would remove contaminants and restore the site for unrestricted use. The other alternatives (S-1, S-2, S-3, S-5, S-5a) are not supported by the community since they do not remove contaminants nor restore the site for unrestricted use.

COMPONENT TWO - BURIED DRUMS AND SOILS CONTAMINATED WITH VOLATILE ORGANIC COMPOUNDS

The community supports Removal and Off-Site Disposal (Alternative DR-2) of the drums. The No Action (DR-1) Alternative would not be supported by the community, since it would not remove the drums from the site.

COMPONENT THREE - TANKERS AND CONTENTS

The community supports Removal and Off-Site Disposal (Alternative TK-2), since this would remove the tankers from the site. The No Action Alternative (TK-1) would not be supported by the community.

COMPONENT FOUR - GROUND WATER and
COMPONENT FIVE - THE GREAT EGG HARBOR RIVER

The community supports ground-water extraction/treatment (Alternatives GW-3 and GW-4) which would restore the ground water to drinking water standards and control contaminant discharge to the Great Egg Harbor River.

The No Action (GW-1) and Limited Action (GW-2) Alternatives would not receive community support since the ground water would not be restored to drinking water standards and contaminants from the aquifer would continue to discharge to the river.

SELECTED REMEDY

EPA has evaluated the remedial alternatives in accordance with Section 121 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 ("CERCLA"), as amended, 42 U.S.C. Section 9621 and Section 300.432 of the National Contingency Plan ("NCP"), and has selected a remedial action for the site based on the findings of the RI/FS and SFS and input by the public. The components of the remedial action are as follows:

- **S-4, Complete Excavation, Contaminant Extraction, and Replacement On-Site;**
- **DR-2, Drum Removal and Off-Site Disposal and Sampling and Analysis of Soils;**
- **TK-2, Tanker Removal and Off-Site Disposal; and**
- **GW-3, Ground Water Pumping, Treatment and Reinjection.** (GW-3 includes sampling and analysis of sediments, surface waters and an assessment of biota of the Great Egg Harbor River.)

The costs associated with these remedial alternatives are presented in Table 19. A summary of the selected alternatives follows.

ALTERNATIVE S-4: COMPLETE EXCAVATION; CONTAMINANT EXTRACTION; REPLACEMENT ON SITE

This consists of excavation of metals-contaminated soils that exceed the cleanup objectives (Table 17) in the area adjacent to the lagoons, sediments in the swale and sludges in the lagoons. Extraction of metals contaminants from the 20,150 cubic yards of excavated materials will be performed in a multi-stage batch process until the soil cleanup objectives (Table 17) are met. Treatability studies will be required to determine optimum extraction agents and system design parameters. Treated materials will then be redeposited in their original locations to restore site topography, followed by revegetation with native Pinelands species.

During the initial phases of the remedial design, additional sampling of on-site soils, sludges, and sediments in the swale, including the lower swale between the fire road and the river, will be conducted to ensure that all soils requiring remediation are identified. Sampling and analysis will also include sediments and surface waters in a depression approximately 50 feet across and 10 feet deep adjacent to the fire road, approximately 200 feet northwest of the swale.

Soil cleanup objectives (Table 17) developed during the FS were based on risk to human health. Although these standards are not considered ARARs, cleanup to these standards will ensure that contaminants do not continue to migrate into the ground water and human health risks are reduced to a protective Hazard Index of less than one. This remedial action component, in combination with the other remedial action components, will allow full restoration of the site conditions, including re-establishment of an indigenous ecosystem.

The alternative requires specialized equipment, materials and labor but these are readily available and are easily implemented. Contingency plans will be developed during implementation of the remedial action component, to address any short-term problems, i.e., protective equipment for workers, plastic covers for temporary material storage, and water/surfactant sprays.

The selected remedy has an estimated implementation cost of $8,050,000. This includes construction and operation of the contaminant extraction system.

ALTERNATIVE DF-2: DRUM REMOVAL AND OFF-SITE DISPOSAL; SAMPLING AND ANALYSIS OF SOILS

This consists of removal and off-site treatment and disposal of the buried drums and visibly contaminated soils[1] followed by sampling and post-removal analysis of residually contaminated soils to define types and concentrations of residual contaminants. This will provide an additional characterization of soils contamination and volumes. These soils will be addressed as a separate operable unit and a focused feasibility study will be conducted to evaluate remedial alternatives. Implementation of this remedial alternative component would utilize standard construction industry equipment and practices, and would not rely on new, untested technologies or procedures. The cost associated with this component is estimated at $386,000.

ALTERNATIVE TK-2: TANKER REMOVAL AND OFF-SITE DISPOSAL

This involves removing the two tankers and their contents for off-site treatment and disposal. Implementation of this remedial alternative would utilize standard construction industry equipment and practices and would not rely on new untested technologies or procedures. The cost associated with this component is estimated to be $22,000.

ALTERNATIVE GW-3: GROUND WATER PUMPING, TREATMENT AND REINJECTION

This involves pumping the contaminated ground water from the upper aquifer, treating it to drinking water standards (Table 16) and reinjecting it into the aquifer. The process will continue until drinking water standards are achieved in the aquifer.

Implementation of this alternative will require the construction of a treatment plant and installation of pumping wells and piping. The locations of the pumping wells, pumping rates for extraction and reinjection wells, and the configuration of the treatment plant will be developed during the design phase. Waste streams produced by the ground-water treatment system will be treated and/or disposed off site. Treatment and/or disposal would comply with all ARARs.

Prior to design of this alternative, additional monitoring wells will be installed, sampled and analyzed to provide data to define the concentrations, types and extent of contamination in the intermediate and deep aquifers. Based on this information, the extraction/treatment/reinjection ground-water alternative (GW-3) will be modified to include contaminated ground water in the deeper aquifer. The design presently assumes that only the upper aquifer will be remediated.

Monitoring wells will be sampled and analyzed after installation of the treatment and pumping system to determine hydrologic

[1] Visibly contaminated soils constitute those soils that are grossly contaminated and are adjacent to the drums.

effects, ground-water movement and contaminant concentrations. Initial sampling and analysis will be on a quarterly basis for ground-water monitoring wells, and monthly for treatment plant effluent. This may be modified after analysis of monitoring well data and a determination of the aquifer response to the remedial action. Sampling and analysis of monitoring wells will continue after cleanup objectives are achieved to assure that aquifer remediation is permanent and complete.

The goal of this remedial action is to restore ground water to beneficial use as a drinking water aquifer, and to meet all state and federal ARARs in the Great Egg Harbor River due to discharge of contaminants in the ground water. Based on information obtained during the remedial investigation and on a careful analysis of all remedial alternatives, EPA believes that the selected remedy will achieve this goal. However, studies suggest that ground water extraction and treatment are not always completely successful in reducing contaminants to health-based drinking water standards in the aquifer (Table 16). EPA recognizes that operation of the selected extraction and treatment system may indicate the technical impracticability of reaching health-based ground water quality standards using this approach. If it becomes apparent during implementation or operation of the system, that contaminant levels have ceased to decline and are remaining constant at levels higher than the remediation goal, the goal and the remedy may be reevaluated.

The selected remedy assumes operation of the ground-water extraction for a period of 30 years, 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:

a) discontinuing operation of extraction wells in areas where cleanup goals have been attained;

b) alternating pumping at wells to eliminate stagnation points; and

c) pulse pumping to allow aquifer equilibration and encourage adsorbed contaminants to partition into ground water.

The treatment system will control contaminant discharge to the Great Egg Harbor River. Any modifications to the ground-water extraction/treatment system will consider impacts to the Great Egg Harbor River.

As part of Alternative GW-3, additional sampling and analysis of the Great Egg Harbor River will be conducted to provide a basis for determining whether remediation of the river is required. During the remedial design, sampling and analysis will further determine bioavailability and concentration and distribution of contaminants in the river sediments.

Surface-water and sediment sampling and analysis will continue during the operation of the ground-water pumping and treatment system to ensure that the Great Egg Harbor River meets all state and federal ARARs. If monitoring data indicate that remediation of the river sediments or surface waters is required, the river will be designated as a separate operable unit and a focused feasibility study will be conducted to evaluate remedial alternatives. The feasibility study will consider appropriate alternatives to remediate and/or prevent impacts to the river, including additional treatment of the ground water.

This selected remedial component for ground-water remediation and river monitoring has an estimated total present worth of $6,431,000. The remedy will cost approximately $2,043,000 to construct. The estimated annual operation and maintenance cost is $285,000.

ADDITIONAL ACTIVITIES

Additional activities which will be performed as part of the remedial action include, but are not limited to the following:

- During the remedial design, a wetlands characterization (delineation/assessment) will be conducted for the upper reaches of the swale (between the fire road and the site) to identify impacts of remedial activities to wetlands and procedures to reduce any impacts. If additional sampling indicates the lower portion of the swale requires remediation, the wetland characterization will also include the lower portion of the swale. This delineation and assessment will include, but not necessarily be limited to, a description of soils and vegetation, and a map delineating the areas of concern.

- A habitat restoration plan will be prepared.

- During the remedial design, a cultural resource survey (Stage IB archeological investigation) will be completed which will include any previously undisturbed portion of the project area that will be affected by remedial activities.

- Following completion of the remedial actions, the areas affected will be recontoured, restored and revegetated to their original conditions.

STATUTORY DETERMINATIONS

The EPA has been explicitly directed by Congress in Section 121 (b) of CERCLA to select remedial actions which utilize permanent solutions and alternative treatment technologies or resource recovery options to the maximum extent practicable. In addition, the Agency is to prefer remedial actions that permanently and significantly reduce the mobility, toxicity or volume of site wastes.

Protection of Human Health and the Environment

The selected site remedy protects human health and the environment by dealing effectively with the principle threats posed by the King of Prussia Technical Corporation site. These principle threats involve ingestion of contaminants found in the soils and ground water. The selected alternative addresses these contaminant pathways by capturing and treating the contaminated plume, removing and treating contaminated soils, and removing buried drums and tankers at the site. The primary contaminants of concern in the ground water and soils identified in the RI report are the indicator compounds discussed in the summary of site risks in this document. Exposure levels for these and other contaminants will be reduced so human health risk will be less than 10^{-6} for carcinogens and to a hazard index of less than one for noncarcinogens. This remedial action is permanent and provides for complete restoration of the site which will allow for future unrestricted use.

Compliance with Applicable or Relevant and Appropriate Requirements

Action-Specific

Metals-contaminated soils, sediments and sludges on site and in the swale are RCRA characteristic wastes which will be rendered noncharacteristic by treatment. Residual materials (e.g., sludges) from the ground-water treatment system and soil-extraction processes will be treated and/or disposed in a manner consistent with applicable RCRA Land Ban Restrictions.

The reinjection process for the treated ground water will meet underground injection well regulations by its status as a Superfund remedial action. Ground-water extraction/treatment/reinjection will continue until drinking water standards are achieved in the aquifer.

Buried drums and tankers at the site, will be also be disposed off site consistent with applicable RCRA Land Ban Restrictions.

RCRA federal air regulations which are considered applicable requirements, include 40 CFR Parts 264.301(i) and 264.273(f); applicable state requirements include NJAC 7:26 Parts 10.8(d) and 10.6(e).

Under the Clean Air Act, the National Ambient Air Quality

Standards (as contained in 40 CFR Parts 50.6 and 50.9) are considered applicable federal requirements for limiting the concentration of ozone and particulate matter which may be emitted from the air stripping unit, the water precipitation process, soil extraction processes and other removal or construction activities in the selected remedial actions. The Ambient Air Quality Standards (NJAC 7:27 Parts 5 and 13) are considered applicable state requirements. Relevant and appropriate state requirements include the emission standards provided in NJAC 7:27-6 (Control and Prohibition of Particulate from Manufacturing), the substantive requirements for the operation of air pollution equipment under NJAC 7:27-8.5(b) (Permits and Certificates), NJAC 7:27 Parts 16.6 and 17.4 and the proposed federal regulation 52 FR 3748.

Contaminant-Specific

To date, there are no promulgated federal or state standards for cleanup of contaminated soils. Therefore, in lieu of ARARs, "To-Be-Considers" (TBCs) for contaminated soils were developed during the FS. These values are based on protection of human health and protection of ground water and are presented in Table 17. These are the cleanup goals for contaminated soils, sediments and sludges at the site, and will provide for unrestricted future use of the site.

The ARARs determined for the ground-water remediation were developed for this site consistent with the New Jersey Water Pollution Control Act (NJPDES 58:10A and 7:14A) and the MCLs under the Federal Safe Drinking Water Act (Table 16). The selected alternative, GW-3, is anticipated to achieve these concentrations by the end of the remedial action. After completing the implementation of Alternatives S-4, DR-2, and TK-2, contaminants will not migrate into the ground water.

Location-Specific

In compliance with the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), a consultation with the U.S. Fish and Wildlife Service has been carried out to evaluate the potential for encountering federal endangered or threatened species in the vicinity of the site. Except for occasional transient species, no federally listed or proposed or endangered species are known to exist at the site. It is expected that the selected remedy will not have any detrimental impact on these species because of their transient nature in this area. If additional information indicates a likelihood for the presence of endangered species, the U.S. Fish and Wildlife Service will be consulted.

The site is located about 1000 feet from the Great Egg Harbor River which is proposed as a nationally designated Wild and

Scenic River. The selected remedial action will not have an adverse impact on the river. Sampling and analysis of sediments and surface waters before and during implementation of the selected remedial action components will determine impacts to the river.

The remedial action will comply with the Flood Hazard Area Control Act of New Jersey. All remedial activities with the exception of river sampling will be conducted above the 500 year flood plain.

The swale that directs runoff from the site toward the Great Egg Harbor River may be a wetland. Therefore, before the remedial action is implemented, a wetlands assessment will be conducted to assure compliance with Executive Orders 11988 and 11990 and the Clean Water Act (Section 404).

The site is located within the Protection Area of the New Jersey Pinelands National Reserve. Therefore, pursuant to N.J.A.C. 7:50-6.77, storage of toxic waste is prohibited at the site. All contaminated materials will either be treated or removed.

The site will be in compliance with the Farmland Preservation Act and National Historic Preservation Act which are ARARs for the site.

Cost-Effectiveness

After evaluating all of the alternatives which most effectively address the principal threats posed by the contamination at the site and the statutory preference for treatment, EPA has concluded that the selected remedial action components afford the highest level of overall effectiveness proportional to their cost. The selected remedial action components are cost-effective because they provide the highest degree of protectiveness for human health and the environment among the alternatives evaluated, while representing a reasonable value for the cost and will allow for unrestricted use of the site.

Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable

The selected remedial action components utilize permanent and effective solutions and alternative treatment technologies to the maximum extent practicable and provide the best balance among the nine evaluation criteria of all of the alternatives examined.

The ground-water treatment alternative will reduce the contaminants of concern to health protective levels.

The soil treatment will assure that any contaminants that remain at the site are in concentrations below levels determined to be a human health risk either from direct exposure or due to migration to the ground water.

Removal of other sources of contamination (buried drums and tankers) will also be permanent and effective in removing risks at the site.

In summary, the selected remedial actions will achieve a complete restoration of the site for unrestricted use and reduce public health and environmental risks.

Preference for Treatment as a Principal Element

The statutory preference for treatment is satisfied by the selected remedy which employs on-site treatment of the ground water through precipitation processes and air stripping. It also includes on-site contaminant extraction for contaminated soils and sediments and removal and off-site treatment and disposal of buried drums and tankers. These treatment methods effectively reduce the toxicity, mobility and volume of contaminants.

Documentation of Significant Changes

There are no significant changes from the Proposed Plan.

ROD FIGURES

FIGURE 1

Site Location and Regional Topographic Map
King of Prussia Technical Corporation Site
Winslow Township, New Jersey

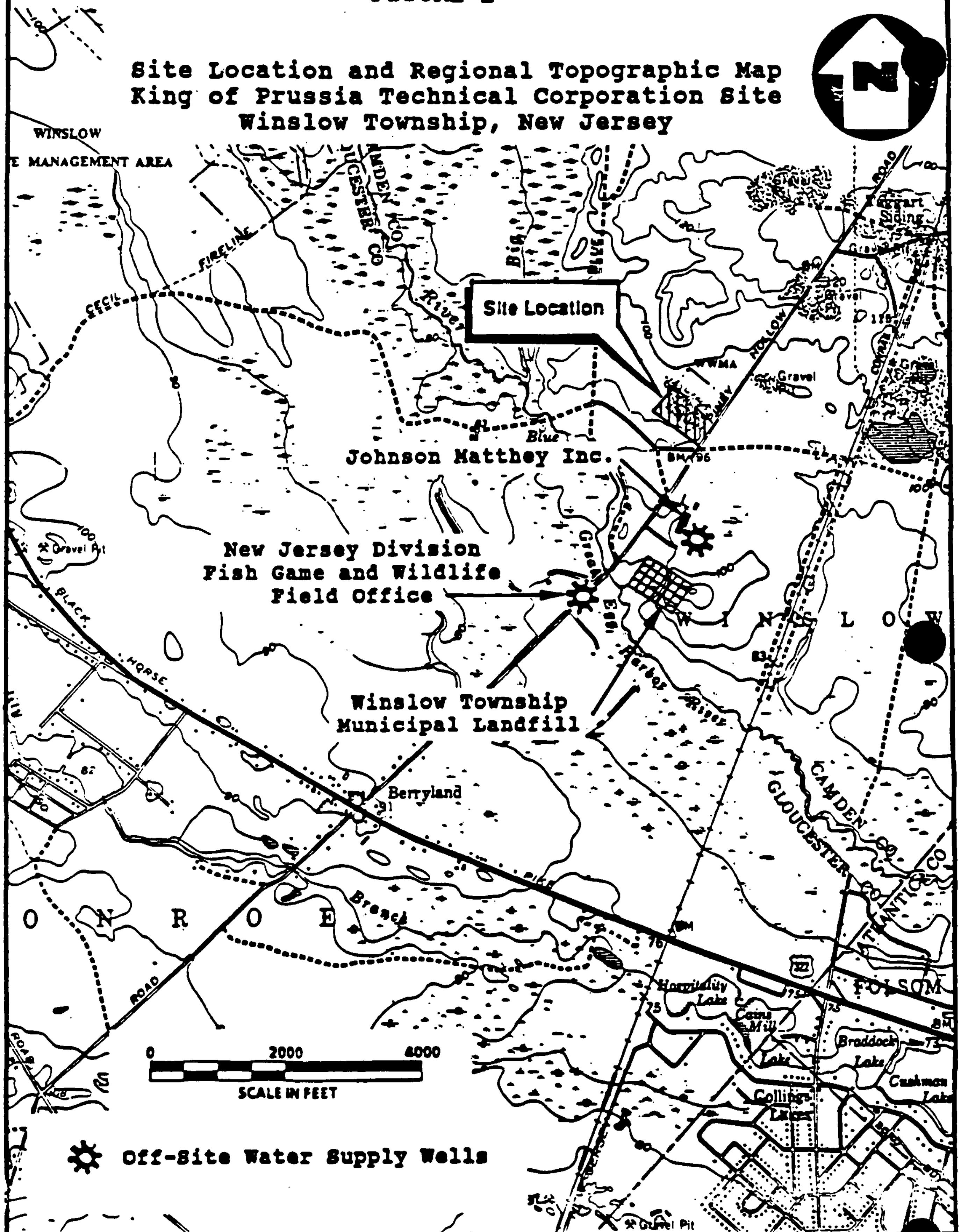
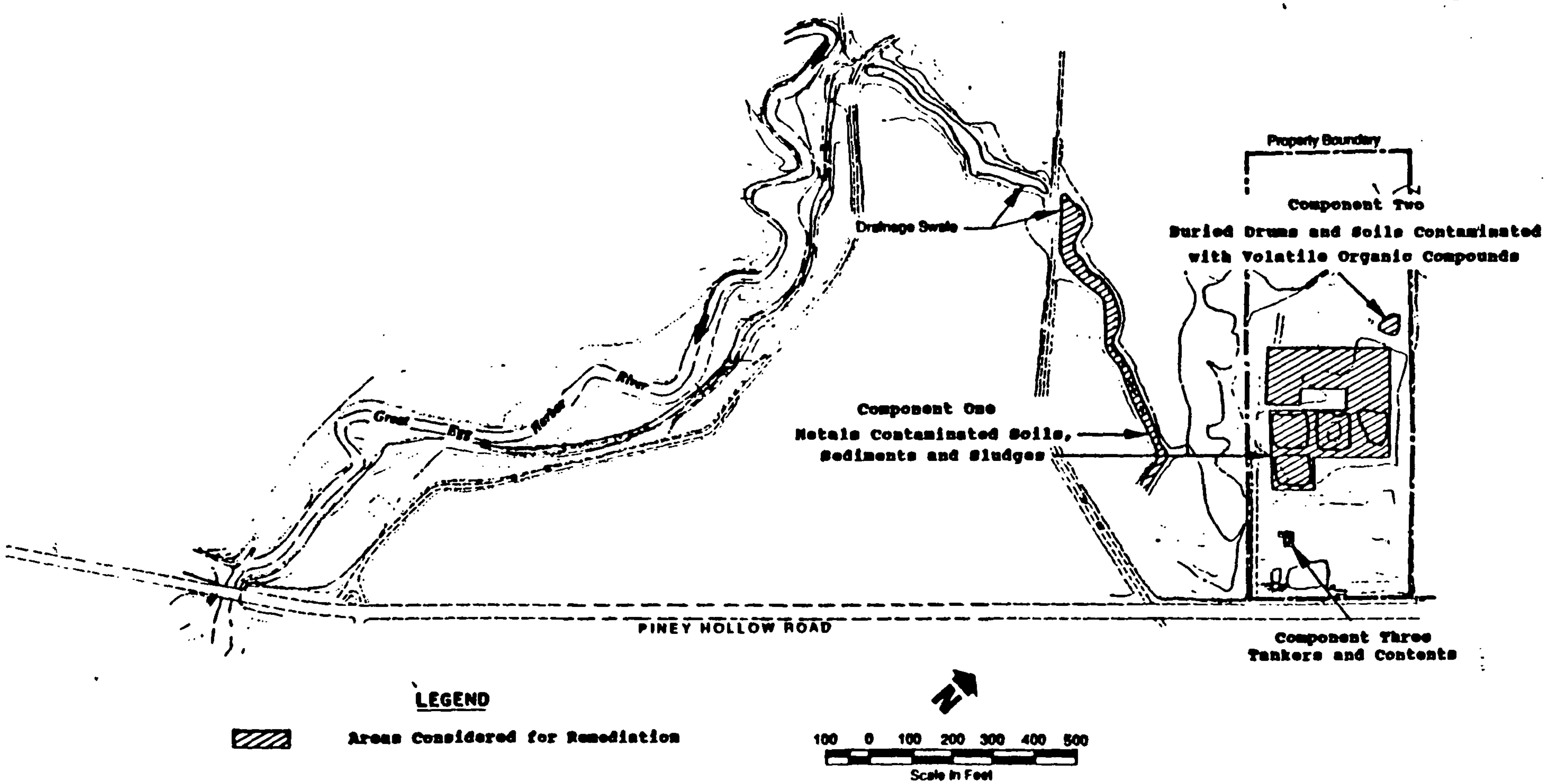


FIGURE 2

Areas Considered for Remediation

King of Prussia Technical Corporation Site
Winslow Township, New Jersey



DECLARATION STATEMENT

RECORD OF DECISION - OPERABLE UNIT ONE

KING OF PRUSSIA TECHNICAL CORPORATION SITE

Site Name and Location

King of Prussia Technical Corporation Site
Winslow Township, Camden County, New Jersey

Statement of Basis and Purpose

This decision document presents the selected remedial action for the King of Prussia Technical Corporation site, in Camden County, New Jersey, developed in accordance with the requirements of 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 document explains the factual and legal basis for selecting the remedy for this site. This decision is based on the administrative record for the site. The attached index identifies the items that comprise the administrative record.

Assessment of the Site

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

Description of the Selected Remedy

The remedial action described in this document is the first of two planned operable units for the site. The final remedy for the first operable unit action addresses groundwater and some soils, sediments and sludges, and the removal of drums and tankers. The second operable unit will address contaminated soils associated with the buried drum area.

The major components of the selected remedy include the following:

- Lagoon sludges, soils adjacent to the lagoons, and sediments in the swale will be excavated. Metal contaminants will be extracted from these materials utilizing a multi-phase, soil-washing process. Cleaned materials will then be redeposited in approximately their original location.

- Buried drums, their contents and visibly contaminated soils will be excavated and disposed at an off-site location. Additional characterization of residually contaminated soils in the buried drum area will be conducted. This will provide the basis for a remedial action decision regarding this soil.

- A ground-water pumping system will be installed to capture the contaminated ground water and prevent discharge of contaminants to the Great Egg Harbor River.

- An on-site ground-water treatment facility will be installed and maintained to remove contaminants from the collected groundwater.

- A ground-water reinjection system will be installed to reinject treated ground water into the aquifer.

- Tankers and their contents will be removed for off-site disposal.

- Additional sampling and analysis of surface waters and sediments of the Great Egg Harbor River will be performed. This will allow a determination on whether further remediation of the river system is required.

<u>Declaration of Statutory Determinations</u>

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 (or resource recovery) technologies to the maximum extent practicable, and it satisfies the statutory preference for remedies that employ treatment that reduce toxicity, mobility, or volume as their principal element.

Because this remedy will result in hazardous substances remaining on site above health-based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

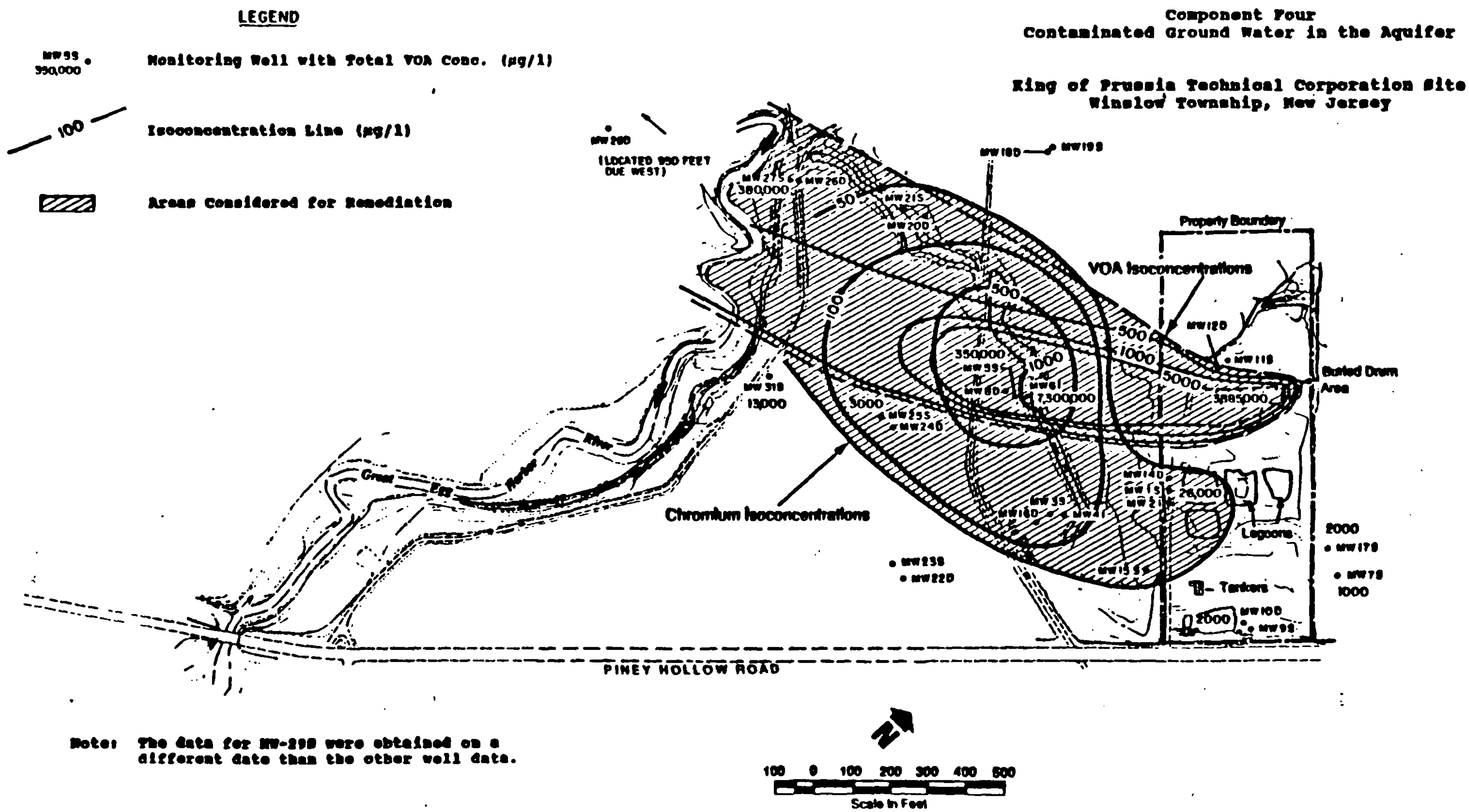
Constantine Sidamon-Eristoff
Regional Administrator

9/28/90
Date

FIGURE 3

Component Four
Contaminated Ground Water in the Aquifer

King of Prussia Technical Corporation Site
Winslow Township, New Jersey



Note: The data for MW-29S were obtained on a different date than the other well data.

ROD TABLES

TABLE 1

MAJOR CONTAMINANTS OF
SURFACE SOILS, SLUDGES AND SEDIMENTS (0 TO 2 FEET DEPTH)
KING OF PRUSSIA TECHNICAL CORPORATION SITE

CONTAMINANTS	# of detects/ # of samples taken	Maximum concentration detected (ppm)	Soil Cleanup Levels (ppm)
Arsenic	17/44	5.7	190
Beryllium	41/88	8.3	485
Cadmium	9/54	2.6	107
Total Chromium	92/102	**8010**	483
Copper	86/102	**9070**	3,571
Lead	59/88	87	250-1000
Mercury	15/61	**100**	1
Nickel	69/102	387	1,935
Selenium	25/31	3.5	4
Silver	1/10	**18**	5
Zinc	53/78	300	3,800

NOTE: Concentrations exceeding cleanup levels are in **BOLD**.

TABLE 2

MAJOR CONTAMINANTS OF
SUBSURFACE SOILS, SEDIMENTS AND SLUDGES (2 TO 10 FEET DEPTH)
KING OF PRUSSIA TECHNICAL CORPORATION SITE

CONTAMINANTS	# of detects/ # of samples taken	Maximum concentration detected (ppm)	Soil Cleanup Levels (ppm)
Arsenic	39/75	22	190
Beryllium	26/101	361	485
Cadmium	6/43	27	107
Total Chromium	98/102	**11,300**	483
Copper	84/115	**16,300**	3,571
Lead	80/107	**389**	250-1000
Mercury	5/76	**1.7**	1
Nickel	27/109	**11,100**	1,935
Selenium	3/24	2.9	4
Silver	0/7	ND	5
Zinc	49/89	1,270	3,800

NOTES: 1) Concentrations exceeding cleanup levels are in BOLD.
2) ND=Not Detected.

TABLE 3

MAJOR CONTAMINANTS OF BURIED DRUM CONTENTS
KING OF PRUSSIA TECHNICAL CORPORATION SITE

CONTAMINANTS	Contaminant Concentration (ppm)
Inorganics	
Antimony	ND
Arsenic	ND
Beryllium	ND
Cadmium	ND
Chromium	2.9
Copper	24.7
Lead	1
Mercury	ND
Nickel	ND
Zinc	14
Volatile Organics	
Ethylbenzene	43,000
Tetrachloroethene	4,400
Trichloroethene	7,800
Toluene	1,100

NOTE: ND=Not Detected.

TABLE 3 (continued)

MAJOR CONTAMINANTS OF BURIED DRUM CONTENTS
KING OF PRUSSIA TECHNICAL CORPORATION SITE

CONTAMINANTS	Contaminant Concentration (ppm)
Semi-Volatile Organics	
1,4-Dichlorobenzene	99
1,2-Dichlorobenzene	18,000
2,4-Dimethylphenol	21
Phenol	1,300
1,2,4-Trichlorobenzene	72
Total Phenols	4,650
TENTATIVELY IDENTIFIED CONTAMINANTS (TICs)	
Volatile Organics	
2-Butanone	2,250
1,4-Dimethylbenzene	350,000
1,2-Dimethylbenzene	250,000
Semi-Volatile Organics	
Benzenes	2,056
Ethylhexane	620
4-Ethyl-2-Methylhexane	280
2-Methylphenol	2,400
4-Methylbenzaldehyde	150
Unknowns (total)	180,000

TABLE 4

MAJOR CONTAMINANTS OF
SOILS IN THE BURIED DRUM AREA
KING OF PRUSSIA TECHNICAL CORPORATION SITE

CONTAMINANTS	Concentration (ppm) Location A	Location B
<u>Inorganics</u>		
Arsenic	9.6	44
Chromium	25	354
Copper	18	697
Lead	11J	12J
Zinc	16	81
<u>Volatile Organics</u>		
Tetrachloroethene	0.55	270J
Trichloroethene	0.011	0.019
1,1,2-Trichloroethane	0.002J	ND
Toluene	ND	0.017
<u>Semi-Volatile Organics</u>		
Bis(2-ethylhexyl)phthalate	0.052J	0.1J
1,2-Dichlorobenzene	ND	44
1,4-Dichlorobenzene	ND	0.3J
Naphthalene	ND	3.2
Phenathrene	ND	0.41J
Phenol	ND	0.14J
Pentachlorophenol	ND	0.44J
1,2,4-Trichlorobenzene	ND	0.48

NOTE: J=Estimated Value, ND=Not Detected.

TABLE 4 (continued)

MAJOR CONTAMINANTS OF
SOILS IN THE BURIED DRUM AREA
KING OF PRUSSIA TECHNICAL CORPORATION SITE

CONTAMINANTS	Concentration (ppm) Location A	Location B
Pesticides/PCBs		
Chlordane	0.192	0.470J
Dieldrin	0.160	0.230J
4,4'-DDE	ND	0.019J
4-4'-DDT	0.4	0.13J
Toxaphene	1.4	5.6J
Tentatively Identified Compounds		
Dimethyl Benzene Isomer	ND	40J
Unknown Hydrocarbons	29.7	644J
Alkyl Substituted Benzenes	ND	992J
Total Unknown	ND	573J
Unknown Fatty Acid	ND	99J

NOTE: J=Estimated Value, ND=Not Detected.

TABLE 5

MAJOR CONTAMINANTS OF TANKERS CONTENTS
KING OF PRUSSIA TECHNICAL CORPORATION SITE

CONTAMINANTS	Concentration (ppm) Tanker #1	Concentration (ppm) Tanker #2
<u>Inorganics</u>		
Antimony	ND	24
Arsenic	22	ND
Beryllium	38	38
Cadmium	ND	1.8
Chromium	6,450	1,430
Copper	8,940	10,080
Cyanide	3	1.4
Lead	35	30
Nickel	6,580	1,790
Zinc	317	ND

NOTE: ND=Not Detected.

TABLE 6

MAJOR GROUND-WATER CONTAMINANTS
IN UPPER AQUIFER
KING OF PRUSSIA TECHNICAL CORPORATION SITE

UPPER AQUIFER CONTAMINANTS	# detects/ # samples taken	Maximum concent. detected (ppb)	ARARs (MCLS) (ppb)
Inorganics			
Beryllium	8/12	233	none
Cadmium	2/12	6.2	10
Chromium	10/12	**1,040**	50
Copper	11/12	**12,500**	1000
Mercury	0/12	ND	2
Nickel	9/12	**4,670**	210
Zinc	12/12	2,030	5000
Volatile Organics			
Benzene	1/12	**8**	1
1-1-Dichloroethane	1/12	**64**	2
Trans-1,2-Dichloroethene	1/12	**12**	10
Ethylbenzene	1/12	**80**	50
Tetrachloroethene	3/12	**2,500**	1
1,1,2,2-Tetrachloroethane	3/12	**2,900**	1.4
Trichloroethene	5/12	**940**	1
1,1,1-Trichloroethane	3/12	**570**	26
Toluene	1/12	**190**	none

NOTES: 1) Ground-water data included in this Table are from Phase II of the RI. Sampling during Phase I of the RI and during the FS show similar concentrations to those presented here.
2) Concentrations exceeding cleanup levels are in BOLD.
3) ND=Not detected.

TABLE 7

MAJOR GROUND-WATER CONTAMINANTS
IN INTERMEDIATE AQUIFER
KING OF PRUSSIA TECHNICAL CORPORATION SITE

INTERMEDIATE AQUIFER CONTAMINANTS	# detects/ # samples taken	Maximum concent. detected (ppb)	ARARs (MCLs) (ppb)
Inorganics			
Beryllium	2/3	31	none
Cadmium	0/3	ND	10
Chromium	2/3	26	50
Copper	2/3	**3,070**	1000
Mercury	1/3	0.46	2
Nickel	2/3	**899**	210
Zinc	1/3	627	5000
Volatile Organics			
Benzene	1/3	1	1
1-1-Dichloroethane	0/3	ND	2
Trans-1,2-Dichloroethene	0/3	ND	10
Ethylbenzene	1/3	3	50
Tetrachloroethene	0/3	ND	1
1,1,2,2-Tetrachloroethane	0/3	ND	1.4
Trichloroethene	0/3	ND	1
1,1,1-Trichloroethane	0/3	ND	26
Toluene	0/3	ND	none

NOTES 1) Ground-water data included in this Table are from Phase II of the RI. Sampling during Phase I of the RI and during the FS show similar concentrations to those presented here.
2) Concentrations exceeding cleanup levels are in BOLD.
3) ND=Not detected.

TABLE 8

MAJOR GROUND-WATER CONTAMINANTS
IN DEEP AQUIFER
KING OF PRUSSIA TECHNICAL CORPORATION SITE

DEEP AQUIFER CONTAMINANTS	# detects/ # samples taken	Maximum concent. detected (ppb)	ARARs (MCLs) (ppb)
Inorganics			
Beryllium	3/10	1.3	none
Cadmium	0/10	ND	10
Chromium	2/10	77	50
Copper	1/10	8.9	1000
Mercury	0/10	ND	2
Nickel	1/10	34	210
Zinc	7/10	89	5000
Volatile Organics			
Benzene	0/10	ND	1
1-1-Dichloroethane	0/10	ND	2
Trans-1,2-Dichloroethene	0/10	ND	10
Ethylbenzene	0/10	ND	50
Tetrachloroethene	0/5	ND	1
1,1,2,2-Tetrachloroethane	0/10	ND	1.4
Trichloroethene	1/10	3	1
1,1,1-Trichloroethane	0/10	ND	26
Toluene	0/10	ND	none

NOTES 1) Ground-water data included in this Table are from Phase II of the RI. Sampling during Phase I of the RI and during the FS show similar concentrations to those presented here.
2) Concentrations exceeding cleanup levels are in BOLD.
3) ND=Not detected.

TABLE 9

COMPOUNDS DETECTED IN SURFACE WATERS
KING OF PRUSSIA TECHNICAL CORPORATION SITE

	Great Egg Harbor River Surface Water Samples								Ambient Water Quality Standards
	SW-3 upstream	SW-4	SW-5	SW-6	SW-208 upstream	SW-209	SW-210	SW-211	
CONTAMINANTS									
Chromium	ND	ND	ND	ND	ND	ND	11	ND	11
Copper	ND	ND	110	50	ND	ND	ND	ND	12
Mercury	na	na	na	na	na	0.32	ND	ND	0.12
Lead	na	na	na	na	2.8	3.8	5.1	3.2	3.2
Nickel	ND	ND	ND	ND	ND	ND	83	ND	96
Zinc	260	140	130	110	ND	ND	49	54	47

NOTES : 1) ND=not detected
2) na=not analyzed.
3) Concentrations ppb.

TABLE 10

COMPOUNDS DETECTED IN RIVER SEDIMENTS
KING OF PRUSSIA TECHNICAL CORPORATION SITE

	Great Egg Harbor River Sediment Samples								
	SD-3 upstream	SD-4	SD-5	SD-6	SD-208 upstream	SD-209	SD-210	SD-211	SD-212
CONTAMINANTS									
Chromium	ND	38	35	40	ND	43	131	9.3	ND
Copper	ND	220	300	35	ND	199	13	6.8	55
Lead	na	na	na	na	11	49	3.9	3.2	36
Mercury	ND	0.4	0.4	0.3	ND	ND	0.5	ND	ND
Nickel	ND	ND	ND	ND	ND	28	ND	ND	16
Zinc	2.4	4.3	1.9	5.5	25	37	18	ND	ND

NOTES: 1) ND=not detected
2) na=not analyzed
3) Concentrations are ppm

TABLE 11
CONCENTRATIONS OF CARCINOGENIC INDICATOR COMPOUNDS
FOR ALL COMPONENTS
KING OF PRUSSIA TECHNICAL CORPORATION SITE

CARCINOGENIC INDICATOR CONTAMINANTS	Maximum Contaminant Concentration				
	Component One	Component Two	Component Three	Component Four	Component Five-River
	Soils, etc. (ppm)	Drums/Soil (ppm)	Tankers (ppm)	Ground Water (ppb)	Seds./Water (ppm/ppb)
Inorganics					
Beryllium (B1)	361	ND/ND	38	233	ND/ND
Cadmium (B1)	27	ND/ND	1.8	6.2	ND/ND
Chromium-VI (A)	11,300	2.9/25	1,430	1,040	131/11
Lead (B2)	389	1/11J	35	ND	ND/5.1
Nickel (A)	11,100	ND/ND	6,580	4,670	ND/83
Volatile Organics					
Benzene (A)	ND	ND/ND	ND	8	ND/ND
1-1-Dichloroethane (C)	ND	ND/ND	ND	64	ND/ND
Tetrachloroethene (B2)	ND	4,400/270J	0.55	2,500	ND/ND
1,1,2,2-Tetrachloroethane (C)	ND	ND/ND	ND	2,900	ND/ND
Trichloroethene (B2)	ND	7,800/0.11	0.02	940	ND/ND

NOTES: 1) ND=Not Detected.
2) A-Human Carcinogen, B1 and B2-Probable Human Carcinogen, C-Possible Human Carcinogen.

TABLE [illegible]
CONCENTRATIONS OF NONCARCINOGENIC I[illegible]
FOR ALL COMPONENTS
KING OF PRUSSIA TECHNICAL CORPORATION SITE

NONCARCINOGENIC INDICATOR CONTAMINANTS	Maximum Contaminant Concentration				
	Component One	Component Two	Component Three	Component Four	Component Five-River
	Soils, etc. (ppm)	Drums/Soils (ppm)	Tankers (ppm)	Ground Water (ppb)	Seds./Water (ppm/ppb)
<u>Inorganics</u>					
Copper	16,300	24.7/18	8,940	12,500	300/110
Mercury	1.7	ND/ND	ND	ND	0.4/0.32
Zinc	1,270	14/16	ND	2,030	37/260
<u>Volatile Organics</u>					
Trans-1,2-Dichloroethene	ND	ND/ND	ND	12	ND/ND
Ethylbenzene	ND	43,000/ND	ND	80	ND/ND
1,1,1-Trichloroethane	ND	ND/ND	ND	570	ND/ND
Toluene	ND	1,100/ND	0.02	190	ND/ND

NOTE: ND=Not Detected

TABLE 13

CANCER POTENCY FACTORS AND REFERENCE DOSES
FOR INDICATOR COMPOUNDS
KING OF PRUSSIA TECHNICAL CORPORATION SITE

INDICATOR COMPOUNDS	Carcinogenic Potency Factor (CPF) $(mg/kg\text{-}day)^{-1}$		Reference Doses (RfDs) mg/kg/day	
	Ingestion	Oral	Ingestion	Oral
Inorganics				
Beryllium	8.4	---	---	5×10^{-3}
Cadmium	6.1	---	---	5×10^{-4}
Chromium	4.1×10^{-1}	---	---	5×10^{-3}
Copper	---	---	1×10^{-2}	3.7×10^{-2}
Lead	---	---	---	1.4×10^{-3}
Mercury	---	---	---	3×10^{-4}
Nickel	1.7	---	---	2×10^{-2}
Zinc	---	---	---	2x10[illegible]
Volatile Organics				
Benzene	2.9×10^{-2}	2.9×10^{-2}	---	---
1-1-Dichloroethene	1.16	6×10^{-1}	---	9×10^{-3}
Trans-1,2-Dichloroethene	---	---		
Ethylbenzene	---	---	---	1×10^{-1}
Tetrachloroethene	3.3×10^{-3}	5.1×10^{-2}	---	1×10^{-2}
1,1,2,2-Tetrachloroethane	2×10^{-1}	2×10^{-1}	---	---
Trichloroethene	3×10^{-2}	1.1×10^{-2}	---	---
1,1,1-Trichloroethane	---	---	3×10^{-1}	9×10^{-2}
Toluene	---	---	1.0	3×10^{-1}

TABLE 14

CANCER RISKS FOR INDICATOR COMPOUNDS FROM RESIDENTIAL USE OF GROUND WATER IN THE UPPER AQUIFER KING OF PRUSSIA TECHNICAL CORPORATION SITE

	Maximum	Average	Primary Risk Source
Off-Site Wells	2.4×10^{-2}	2.8×10^{-3}	1,1,2,2-Tetrachloroethane Tetrachloroethene 1-1-Dichloroethane
On-Site Wells	4.7×10^{-6}	1.5×10^{-6}	Trichloroethene

TABLE 15

NONCANCER RISK
RESIDENTIAL SETTING
KING OF PRUSSIA TECHNICAL CORPORATION SITE

	HAZARD INDICES				
	ADULT		CHILD		Primary
	Maximum	Average	Maximum	Average	Risk Source
Ground Water					
Off-site Wells	31	5.23	89.5	15.7	Cr, Cu, Ni
On-site Wells	1.7	0.48	4.3	1.7	Cr, Cu
On-site Soils	Not Evaluated		3.7	0.2-1.0	Cr, Cu, Ni, Pb
Swale Sediments	Not Evaluated		2.2	1.2	Cr, Cu, Pb

NOTE: Cr=Chromium, Cu=Copper, Ni=Nickel, Pb=Lead

TABLE 16

MAJOR GROUND-WATER CONTAMINANTS
KING OF PRUSSIA TECHNICAL CORPORATION SITE

CONTAMINANTS	ARARs (ppb)	Source
Inorganics		
Beryllium	1	2
Cadmium	10	1
Chromium	50	1
Copper	1000	1
Mercury	2	1
Nickel	210	1
Zinc	5000	2
Volatile Organics		
Benzene	1	1
1-1-Dichloroethane	2	1
Trans-1,2-Dichloroethane	10	1
Ethylbenzene	50	1
Tetrachloroethene	1	1
1,1,2,2-Tetrachloroethane	1.4	1
Trichloroethene	1	1
1,1,1-Trichloroethane	26	1
Toluene	2000	2

NOTE: Sources-
1=Drinking Water Standards (Maximum Contaminant Levels [MCLs]) under NJSA 7:9-6, 7:10-16.7, 58:10A and 7:14A
2=Federal Safe Drinking Water Act (40 CFR, Parts 141 and 142)

TABLE 17

SOIL CLEANUP GOALS FOR MAJOR INORGANIC CONTAMINANTS KING OF PRUSSIA TECHNICAL CORPORATION SITE

CONTAMINANTS	Soil Cleanup Levels	Source
<u>Inorganics</u>		
Arsenic	190	1
Beryllium	485	1
Cadmium	107	1
Total Chromium	483	1
Copper	3,571	1
Lead	500	2
Mercury	1	2
Nickel	1,935	1
Selenium	4	2
Silver	5	2
Zinc	3,800	1

NOTE: Sources-
1=Based on human health risk which will result in a cancer risk less than $1x10^{-6}$ and a Hazard Index of less than one
2=New Jersey Soil Action Levels

TABLE 18A

COST SUMMARY FOR REMEDIAL ALTERNATIVES
KING OF PRUSSIA TECHNICAL CORPORATION SITE

Remedial Alternative Component One	Capital Costs	Annual Operation and Maintenance	Total
Alternative S-1 - No Action	$ 0	$ 7,000	$ 79,000
Alternative S-2 - Limited Action	$ 43,000	$ 9,000	$ 144,000
Alternative S-3 - Consolidation & Capping	$ 1,550,000	$ 17,000	$ 1,741,000
Alternative S-4 - Excavation & Extraction	$ 8,050,000	$ 0	$ 8,050,000
Alternative S-5 - In-Situ Stabilization & Solidification	$ 3,182,000	$ 10,000	$ 3,336,000
Alternative S-5a - Above-Ground Stabilization & Solidification	$ 5,402,000	$ 10,000	$ 5,555,000
Alternative S-6 - Removal & Disposal	$11,500,000	$ 0	$11,500,000

TABLE 18B

COST SUMMARY FOR REMEDIAL ALTERNATIVES
KING OF PRUSSIA TECHNICAL CORPORATION SITE

Remedial Alternative Component Two	Capital Costs	Annual Operation and Maintenance	Total
Alternative DR-1 No Action	$ 0	$ 7,000	$ 79,000
Alternative DR-2 Removal & Disposal	$ 386,000	$ 0	$ 386,000

TABLE 18C

COST SUMMARY FOR REMEDIAL ALTERNATIVES
KING OF PRUSSIA TECHNICAL CORPORATION SITE

Remedial Alternative Component Three	Capital Costs	Annual Operation and Maintenance	Total
Alternative TK-1 No Action	$ 0	$ 0	$ 0
Alternative TK-2 Removal & Disposal	$ 22,000	$ 0	$ 22,000

TABLE 18D

COST SUMMARY FOR REMEDIAL ALTERNATIVES
KING OF PRUSSIA TECHNICAL CORPORATION SITE

Remedial Alternative Component Four & Five	Capital Costs	Annual Operation and Maintenance	Total
Alternative GW-1 No Action	$ 0	$ 11,000	$ 122,000
Alternative GW-2 Limited Action	$ 0	$ 11,000	$ 122,000
Alternative GW-3 Extraction, Treatment & Reinjection	$ 2,043,000	$ 285,000	$6,431,000
Alternative GW-4 Extraction, Treatment & Surface Discharge	$ 2,766,322	$ 406,000	$9,016,000

NOTE: Remedial Component Five (the Great Egg Harbor River) is included in the GW alternatives for costing purposes.

TABLE 19

COST SUMMARY FOR
SELECTED REMEDIAL ALTERNATIVES
KING OF PRUSSIA TECHNICAL CORPORATION SITE

Selected Alternative	Capital Costs	Annual Operation & Maintenance	Present Worth
S-4	$8,050,000	$ 0	$ 8,050,000
DR-2	386,000	0	386,000
TK-2	22,000	0	22,000
GW-3	2,043,000	285,000	6,431,000
TOTAL	$10,501,000	$ 285,000	$14,889,000

RESPONSIVENESS SUMMARY

RECORD OF DECISION

KING OF PRUSSIA TECHNICAL CORPORATION SITE

I. Introduction

The King of Prussia Technical Corporation site, located in Winslow Township, New Jersey, consists of an abandoned waste disposal facility. Past waste handling and disposal practices at the facility have resulted in organic and inorganic contamination of site soil, ground water and sediments in an adjacent swale. The site was placed on the National Priorities List of uncontrolled hazardous waste sites in 1985. A Remedial Investigation and Feasibility Study were completed for the site in July 1990.

In accordance with the U.S. Environmental Protection Agency's (EPA's) community relations policy and guidance and the public participation requirements of the Comprehensive Environmental Response, Compensation, and Liability Act, the EPA Region II office originally established a public comment period from July 16, 1990 through August 15, 1990 to obtain comments on the Proposed Plan for this site. At the request of the potentially responsible parties (PRPs) for the site, who have formed the King of Prussia Technical Corporation Site Committee, the public comment period was extended an additional 30 days to September 14, 1990.

On August 1, 1990, EPA held a public meeting to receive public comments on the Proposed Plan. Copies of the Proposed Plan were distributed at the meeting and placed in the information repositories for the site.

The Responsiveness Summary, required by the Superfund Law, provides a summary of citizens' comments and concerns. Section II of this document provides a brief background of the community involvement and concerns regarding the site. Section III presents a summary of the significant questions and comments expressed by the public at the public meeting concerning the proposed remedy selection. Section IV presents a summary of the PRP's and their contractor's comments on the Proposed Plan and Supplemental Feasibility Study. A summary of the comments received from The Pinelands Commission is also contained in Section IV. Each question or comment is followed by EPA's response. Written comments received during the public comment period and EPA's response are attached in Appendices as described below. It is noted that no written comments were received from the community. Written comments were provided by the Pinelands Commission and the King of Prussia Technical Corporation Committee. All comments expressed to EPA were considered in EPA's final decision for selecting the remedial alternatives for addressing contamination at the site.

Attached to the Responsiveness Summary are the following Appendices:

- Appendix A - Proposed Plan and Public Comment
    - Attachment A.1 - Proposed Remedial Action Plan, King of Prussia Technical Corporation site, Winslow Township, New Jersey, July 1990.
    - Attachment A.2 - Public Notice
    - Attachment A.3 - August 1, 1990 Public Meeting Attendance Sheet
    - Attachment A.4 - Notice of Public Comment Period Extension
- Appendix B - King of Prussia Technical Corporation Site Committee's Comments on the Proposed Plan and Supplemental Feasibility Study
    - Attachment B.1 - King of Prussia Technical Corporation Site Committee Comments
- Appendix C - The Pinelands Commission Comments on the Proposed Plan and EPA's Response
    - Attachment C.1 - The Pinelands Commission Comments
    - Attachment C.2 - EPA's Response

II. Background on Community Involvement and Concerns

The King of Prussia Technical Corporation site initially became an issue of public concern when local residents noticed illegal dumping occurring at the site. Subsequent sampling by EPA and the New Jersey Department of Environmental Protection (NJDEP) revealed the presence of organic and inorganic contaminants in the soils, ground water and surface water.

Major issues and concerns expressed by the community regarding the King of Prussia Technical Corporation site are listed below:

- Potential contamination of potable wells and if the contaminated ground water is spreading to residential areas.

- Potential health risks associated with exposure to contaminants in sediments, surface waters, and the contents of buried drums and tankers.

- Potential health effects to the community during the implementation phase of the remediation.

- Responsibility for remediation of the site, i.e., Winslow Township's financial liability.

III. Summary of Public Comments and EPA Responses

This section contains verbal questions and comments received from the community during the August 1, 1990 public meeting. Comments contained in this section are grouped according to subject discussed.

A. Aquifer Contamination

1. **A member of the Winslow Township Committee asked whether metal contaminants were detected in the lower aquifer at the site, and if so, would the lower aquifer require remediation. It was also asked, if additional areas of contamination were discovered, how would this affect cleanup costs.**

   EPA Response: Yes, site-related contamination above drinking-water standards was detected in the deep aquifer. EPA proposes to install additional monitoring wells during the remedial design to delineate contamination in the deep aquifer more completely. EPA will expand the ground-water treatment system as needed, to address contamination in the deeper aquifer. This would increase the cost associated with ground-water remediation. The increase in cost would be dependant on the extent of the ground-water contamination in the deep aquifer.

2. **A resident asked if an intermediate layer or aquifer existed between the deep and shallow aquifers underneath the KOP site.**

   EPA Response: There is an intermediate layer which is called the middle subzone semi-confining aquifer. This intermediate layer has an average thickness of approximately six feet, and partially separates ground water in the lower and upper aquifers. The intermediate subzone is primarily composed of silts and clays, and is semi-permeable.

3. **Two residents asked where the closest downgradient private wells were located, and whether EPA had sampled any residential wells in the area for metal or volatile organic compound contamination.**

EPA Response: There are no private wells downgradient of the site. Contaminated ground water at the site flows toward the Great Egg Harbor River, and the ground water on the other side of the river also flows toward the river. Once the ground water reaches the river, it flows downstream. No residential wells have been sampled because EPA tested monitoring wells beyond the extent of the contaminant plume and these wells have met drinking water standards. The area of the plume is well defined by the monitoring wells installed at and around the site and on both sides of the river. These data indicate that the contaminant plume is located in an area between the site and the river.

4. **A resident questioned whether the ground-water contaminant plume reaches the Great Egg Harbor River.**

EPA Response: Yes, contamination has been detected in the river's surface water in levels exceeding ambient water quality criteria. It is estimated that the highest contaminant levels in the ground water are presently halfway between the site and the river.

5. **An Evesham Township resident wanted to know what the flow rate of the ground water is, and whether significant amounts of contamination could reach the river within a couple of years.**

EPA Response: The ground water at the site has been calculated as flowing at a rate of about one foot per day (or 430 feet per year). However, contaminants in the ground water move at a much slower rate than the ground water itself; the highest concentrations of contaminants in the ground water have taken about 15 years to move approximately 500 feet which is about half the distance from the site to the river. If a pump and treat system is not implemented at the site, it is estimated that the highest levels of contaminants in the ground water would probably begin to reach the river in 30 to 40 years.

6. **Several residents asked whether any contamination from the KOP site extended as far as Gloucester County, and whether any water wells have been sampled and tested on the other side of Great Egg Harbor River.**

EPA Response: No contamination has been detected on the other side of the river in Gloucester County. Two ground-water monitoring wells located on the other side of the river in Gloucester County were sampled. Analyses of these samples indicated no contamination.

B. Operable Unit One Feasibility Study/Remedial Alternatives

1. **A resident asked whether the PRPs help determine the remedial treatment that will be implemented at the site.**

EPA Response: As part of the Feasibility Study, the PRPs identified and evaluated a number of remedial alternatives. Based on this assessment, the PRPs recommended a series of remedial components to EPA. EPA, however, independently reviewed the PRPs' effort and made the final decision regarding the remedies that will be implemented at the site.

2. **A resident commented that new remedial technologies are constantly being developed. The resident asked whether different proven technologies for remediating the site could be implemented later on, to replace the current chosen technology, if it becomes outdated within a few years.**

EPA Response: Generally, a Record of Decision will specify the cleanup levels or goals which will be achieved by implementing the remedy. In some cases, particular treatment technologies may also be specified. If, after the remedial action had begun, a new technology becomes available which can achieve the same or greater degree of protectiveness in the same or shorter time frame, EPA could consider using such a technology, if significant cost or time savings would be realized in doing so. EPA believes, however, that the likelihood of such a cost or time savings would be small.

3. **A resident asked whether EPA would be remediating the soil and ground water concurrently at the site, or if they would be remediated separately.**

EPA Response: The remedial systems for the soil and the ground water will be designed simultaneously. Ideally, it would be easier to treat the ground water, if the source of the contamination in the soil had already been removed. To expedite the total site cleanup, however, all remedial components will begin concurrently.

4. **Two residents commented that the Great Egg Harbor River is being proposed for designation as a Wild and Scenic River. They asked if this would be used as a reason to ensure the cleanup of the KOP site, and whether the treated ground water could potentially be discharged to the river.**

EPA Response: The proposed designation does indicate that river has high resource value and one of the goals of site remediation is to prevent adverse impacts to the river and meet applicable or relevant and appropriate requirements (ARARs) for the river. The treated ground water will not be discharged to the river, due to a Pinelands Commission regulation which prohibits surface-water discharge of ground water extracted from the aquifer.

5. **A member of the Winslow Township Environmental Commission asked if there is any aspect of the remedial process which would involve incineration, and if there is any risk of fire, explosions or emissions associated with any process of the remedial action.**

EPA Response: Incineration is not proposed as part of the remediation for the KOP site. As with any construction activities, there may be risks of fire or explosion. Since hazardous substances are involved, there is also a degree of risk associated with emissions or air releases of these materials. As a result, all activities will be conducted according to an EPA-approved Health and Safety Plan, which will describe procedures and precautions to minimize risks resulting from remedial activities.

6. **A resident questioned whether the proposed ground-water pump and treat system had been successfully utilized at any other Superfund sites.**

EPA Response: Ground-water extraction/treatment technology has been used extensively at Superfund sites around the country. It has not been in operation for long periods at all the sites, but recent studies have proven it to be an effective technology for significantly improving ground-water quality.

7. **A resident asked if the proposed reinjection of the treated ground water could disperse the contaminant plume.**

EPA Response: No, the design for the extraction/treatment/reinjection system during the remedial design will be developed to assure that this will not occur. The system will be designed to capture the contaminated ground water from extraction wells and reinject water treated to drinking-water standards in a closed circulation system.

8. **A resident asked how EPA will determine what soils are excavated and what concentrations are included in excavation and treatment.**

EPA Response: Soil sampling and analysis conducted during the Remedial Investigation and Feasibility Study provided a good characterization of the areas and volume of soil above the cleanup goals. All soils with contaminants in concentrations above the cleanup levels will be excavated and treated. Additional sampling conducted during the remedial design phase as well as after soil remediation has been conducted, will ensure that all of the soils contaminated above cleanup levels are identified and remediated. The levels to which the soils will be remediated are presented in Table 17 of the Record of Decision.

9. **A resident wanted to know when the KOP site property would be remediated to the point where it could be used for other purposes.**

EPA Response: The surface contamination problem will be remediated within several years, but the property will remain a Superfund site until the ground water has been restored. This could require 30 years or longer.

10. **A Gloucester County resident asked whether there will be any potential for release of air-borne contaminants during the remedial action.**

EPA Response: All operations occurring at the site will be carried out in an environmentally safe manner to both residents and on-site workers. The ground-water treatment system will capture volatile contaminants. Other operations, such as soil washing, will also effectively control air-borne contaminants. EPA will also be conducting air monitoring during the implementation of the remedial action to ensure that all operations are within acceptable limits.

C. <u>Health and Safety Issues</u>

1. **A resident commented that EPA had released a report in September 1989 stating that it could be harmful to the health of a 90-pound child, if that child ate half a pound of fish per day from the KOP site area of the Great Egg Harbor River. The resident asked whether that assessment was still valid a year later.**

EPA Response: The report referred to is the Endangerment Assessment for the KOP site. The example of the 90-pound child which was used in the Endangerment Assessment is a hypothetical one, because the assessment considers a worst-case scenario to determine human health risks. For example, the assessment was done on the assumption that the fish in the Great Egg Harbor are actually contaminated. However, no biologic studies have been conducted on the fish to determine if they contain contaminants.

2. **Several residents asked why samples of fish had not yet been taken from the river and tested for contaminants, and wanted to know when this will occur.**

   EPA Response: Investigations of sites are normally done in stages. EPA has already sampled the river water and the sediments near the KOP site which show low, but detectable concentrations of contaminants in the river. These data indicate minimal risk to human health. During the next stage of investigation, additional types of testing will be conducted and this concern will be addressed.

3. **A resident asked whether a flood of the KOP site area would result in significant spreading of the on-site contaminants. He also asked whether there is an emergency plan that EPA would implement in the event of a flood.**

   EPA Response: There is no specific emergency plan that EPA would implement in the event of a flood. However, areas planned for remedial activities and all the areas with significant concentrations of contamination are above the 500-year flood plain. Thus, flooding would not be likely to spread any significant additional contamination.

4. **A representative of the Winslow Board of Health questioned whether it is safe for hunters to consume game animals, such as deer, which may have foraged in the KOP site area.**

   EPA Response: EPA consulted with a representative from the Agency for Toxic Substances and Disease Control Registry to develop this response. It is thought that consuming game animals in the KOP site area would be safe, with the exception of their internal organs (i.e., kidneys or livers). While EPA would have to analyze animal tissue in order to determine whether an animal had accumulated harmful levels of contaminants due to ingestion of plants in the area, mammals (i.e., deer) do not bioaccumulate inorganic contaminants in tissues (flesh). Contaminants, if ingested by animals, would be concentrated in internal organs (e.g., kidneys or livers) which could present a health risk if consumed. The areas with the greatest contaminant concentrations have been fenced and are not accessible to most mammals that are likely to be consumed.

5. **A resident asked whether it would be possible for EPA to fence the drainage swale near the site in order to prevent animals from potentially drinking water from the swale.**

   EPA Response: EPA will investigate whether the levels in the swale would constitute a significant threat to indigenous species warranting fencing.

D. Removal Actions

1. **A resident asked how many carboys were excavated and how many drums could potentially be buried in the drum area.**

EPA Response: One hundred twenty carboys were excavated. EPA estimates 80 to 90 fifty-five gallon drums to be buried at the site. There is, however, considerable uncertainty with the drum estimate; the number will not be known until the drums are excavated.

2. **A resident asked if EPA will furnish Winslow Township with an Emergency Response Plan the next time trucks have to remove material from the site and travel through the township.**

EPA Response: Yes, when the project approaches the stage of excavation and site disturbance, EPA will prepare and provide an Emergency Response Plan which will be a component of the Health and Safety Plan for the site. The Emergency Response Plan will address emergency evacuation routes, hospital locations, medical concerns and personnel responsibilities regarding possible fires, explosions, spills, leaks or releases.

E. Future Activities

1. **Several residents asked EPA to outline the schedule for the remedial action, and they also asked if there is any way to expedite the schedule.**

EPA Response: Implementation of the remedial action is expected to begin within two years. The overall remedy is a long-term project. The sequential steps required for implementation are:

1) EPA's decision on remedy selection, anticipated by September 1990;
2) Settlement activities for implementation of the Remedial Action (six to nine months);
3) Remedial design activities 12 to 18 months;
4) Construction activities - These will take one to two years to remove surface materials and treat contaminated materials and many years (possibly decades) of operation of the ground-water pumping and treatment system to achieve the remedial goals.

EPA will expedite the removal of the drums. This activity is expected to begin by the end of 1990 and should be completed by the summer of 1991. Due to the extent and complexity of the contaminants at the site, however, the long-term Remedial Action will proceed according to the process and time frame described above.

IV. Summary of Comments from Other Interested Parties and EPA Responses.

This Section contains written questions and comments received during the public comment period from the King of Prussia Technical Corporation Site Committee representing Cabot Corporation, Carpenter Technology Corporation, Ford Electronics and Refrigeration Corporation, Johnson-Matthey Corporation, LNP Corporation and Ruetgers-Nease Chemical Company, Inc. and their technical consultants, Environmental Resources Management, Inc.

It is noted that references to the Feasibility Study (FS) apply to the document prepared by the King of Prussia Technical Corporation Site Committee's technical consultant Environmental Resources Management, Inc. (ERM). The Supplemental Feasibility Study (SFS) document was developed by EPA and its contractor.

A. Summary of King of Prussia Technical Corporation Site Committee's Comments (refer to complete letter in Appendix B).

1. **The KOP Site Committee maintains that the recommended alternative (E-2A from the Feasibility Study) will meet ARARs, remediate the ground water as much as is technically practical and be protective of human health. The Site Committee also maintains that the EPA's selected remedy is, "not based on proven and reliable technologies," is not cost-effective, and that drinking-water standards should be waived since they are not appropriate objectives for the ground water at the KOP site. The KOP Site Committee recommended alternative E2-A from the FS which consists of: "removal and off-site disposal of drums, the consolidation, soil vacuuming, stabilization and capping of contaminated sludges and soils, and institutional controls, consisting of site access and land use restrictions and future monitoring, including a five-year groundwater pump and treat review to assess the effectiveness of the groundwater treatment approach and appropriateness of the proposed applicable or relevant appropriate requirements (ARARs) for groundwater."**

   EPA Response: Alternative E-2A was evaluated by EPA and rejected because it was not the most protective remedy, i.e., would not meet all ARARs (e.g., drinking-water standards for ground water). Also, Alternative E-2A would not remove contaminants in the soils or the ground water and would not restore the site for unrestricted use. EPA's selected remedy achieves ARARs and removes contaminants that present a human health risk. The selected remedial action components are cost-effective because they provide the highest degree of protectiveness for human health and the environment among the alternatives evaluated, while representing a reasonable value for the cost and will allow for unrestricted future use of the site.

The KOP Site Committee's comments are addressed more fully below in EPA responses to page specific comments on the Proposed Plan made by the Committee's technical consultant, Environmental Resources Management, Inc. (ERM).

B. Comments, by the King of Prussia Technical Corporation Site Committees technical consultant, Environmental Resources Management, Inc. (ERM).

1. **Proposed Plan Reference:** p.7, 2nd complete paragraph, 1st sentence: "The cancer risk from drinking contaminated ground water is 2.4 x 10^{-2}, although presently there are no users of the ground water in the proximity of the site."

ERM: This is an oversimplification of the potential risk associated with drinking contaminated ground water at the site. First, the risk level of 2.16 x 10^{-2} is for the maximum VOC concentrations detected. The risk level based on average concentrations, which represents the most probable exposure condition, is lower, at 2.5 x 10^{-3}. This is the appropriate risk level to be cited for the residential use scenario.

Second, ERM believes that residential development is not the most likely future land use at the site. The most plausible future land use scenario for the site is recreational use, as the site is within the Pine Barrens, adjacent to a wildlife management area, and owned by the township. ERM believes that the carcinogenic risk level from the EA which corresponds to that type of land use should accordingly be presented as the existing site risk in the final ROD. That risk level is 4.9 x 10^{-5}.

EPA Response: EPA policy is to present the maximum possible risk when discussing human health risks. Therefore, both maximum and average cancer risks were presented in the Endangerment Assessment.

While recreational use is a possible future use for the site, residential use should not be precluded due to partial site restoration. Also, to restrict residential development because of incomplete remediation would require permanent institutional controls.

2. **Proposed Plan Reference:** p. 7, 2nd complete paragraph, 2nd sentence: "The proposed remedial activities will reduce contaminant concentrations to Maximum Contaminant Levels (MCLs) that are drinking water standards."

ERM: This sentence indicates that MCLs will be achieved via ground water remediation. While this may be possible for the organic contaminants, it has been clearly demonstrated in the site FS that metals in the ground water will not be reduced to MCLs in any foreseeable time period. The presentation of this concept in the PRAP results in a misleading oversimplification of the site ground water remedy, which will create unrealistic public expectations for the ultimate degree of cleanup.

EPA Response: While it is not a certainty that MCLs (i.e., ARARs) are achievable using an extraction/treatment/ reinjection system for ground-water remediation, EPA maintains there is a solid basis that makes this a reasonable expectation. ERM's FS does not clearly demonstrate that ground-water remediation cannot achieve MCLs. Pages 3-31 and 3-32 of the FS state: "Attainment of Potential Ground Water ARARs...It should be noted that the exact conditions attainable under ground water recovery cannot be accurately simulated; they can only be determined during operation of a long-term recovery system." EPA maintains that regardless of the final cleanup levels obtained by the pumping and treatment system, a significant removal of contaminants will be achieved and, therefore, will aid in protecting the Great Egg Harbor River and accelerate aquifer restoration. These concepts are continually neglected in ERM reports and comments.

3. **Proposed Plan Reference:** p.7, 3rd complete paragraph: "The RI indicates metals contamination may present a threat to stream biota due to metals contamination in the sediments and possible bioaccumulative effects. Additional data on contaminant concentrations and biologic effects are necessary."

ERM: The EA, not the RI, discusses potential threats to stream biota. The EA concluded that the concentration of metals detected suggest a "minimal potential for adverse effects to aquatic receptors...", noting, however, that no definitive conclusions are possible with the available data. The EA conclusion of minimal impact potential is not accurately reflected in the PRAP language. Furthermore, if the potential for impact is truly minimal, as concluded in the EA, there should be no need for additional data collection.

EPA Response: The EA mentions that only minimal average concentrations of contaminants were detected in the river to date. The EA also states, however, that these average concentrations are above background levels and maximum concentrations exceed Ambient Water Quality Criteria. Thus, the river has been adversely impacted by site-related contamination. Furthermore, the river has not been adequately characterized and additional data are required to determine the full extent of contamination and its impacts on stream biota. Monitoring is also necessary to determine the effect of the ground-water treatment system on surface water and sediments of the river.

4. **Proposed Plan Reference:** p.14, Component 5, Surface Waters and Sediments of the Great Egg Harbor River; p. 16, Selection of Remedy for Component 5: "Sampling and analysis of the Great Egg Harbor River's surface waters and sediments will further characterize contaminants concentrations and distribution in the river. This will include biological sampling to evaluate organisms responses to changes in the river environmental related to contamination. A determination will then be made if remediation of the Great Egg Harbor River waters and/or sediments will be necessary."

ERM: As discussed above, the site EA determined that minimal potential for impacts exists in the Great Egg Harbor River. The purpose of collecting the RI data was to provide the basis for preliminary determination of the likelihood of impact. On the basis of those data, it was determined that long-term protection of the river would be achieved by removal of metals from the ground water system via pump and treat technology. Further remediation of the river would require dredging to remove metals from the sediments, which would in itself cause adverse impacts to the river by mobilizing metals in suspension and destroying benthic habitats. Given the unlikelihood of current impacts, further remediation by dredging of sediments clearly represents a greater potential for adverse impact on the river than does the current condition.

EPA Response: The selected remedy of extraction, treatment and reinjection of contaminated ground water will be designed to control contaminants discharging to the river. This is expected to result in a reduction in contaminant concentrations in the river over time. One of the goals of site remediation is to ensure that the site does not cause nonattainment of ARARs in the river. EPA maintains, therefore, that it is necessary to sample and analyze river surface water and sediments and further monitor the effects of the ground water remediation system on the river. EPA is not proposing any remedial activities for the river (e.g., dredging) at this time, since any such recommendation would be premature. Rather, EPA's selected remedy includes obtaining additional data before and during implementation of the ground-water treatment system. If site contaminants are adversely impacting the river, the river will become a separate operable unit, and a focused feasibility study will evaluate all appropriate remedial alternatives, including modifications of the ground-water treatment system, to ensure that river ARARs are met.

5. Proposed Plan Reference: p.15, paragraph 2: Selection of remedy for Component 1 (Metals-Contaminated Soils, Sediments, and Sludges):

ERM: The PRAP selects contaminant extraction for this component of the site remedy. The FS recommendation was for stabilization and containment in the former lagoon area. ERM has several observations regarding the remedy proposed in the PRAP:

- Contaminant extraction is an emerging technology which has not been performed at full scale to any significant extent. Thus, there are many unknowns associated with the performance of contaminant extraction, including its ultimate effectiveness. Treatability studies will be required to determine the degree of effectiveness at the KOP site. Until such evaluation are done, it is premature to select this technology as the remedy for Component 1.

- No evaluations have been done to determine if this technology is the most cost-effective method of achieving protectiveness at the site. Until such evaluation are done, it is premature to select this technology as the remedy for Component 1.

- The contaminant extraction technology would remove the metals from the site media and merely transfer them to another location, as they are not destructible. Since it is well documented that the site ground water will not likely be usable for future significant development of the site, no added value to relocating the site contaminants has been demonstrated.

- Stabilization is a well-established, proven technology for treatment of metals-contaminated soils and sludges and, as such, has been designated as Best Demonstrated Available Technology (BDAT) under the Land Disposal Restrictions. Stabilization and capping of the soils and sludges on site would effectively encapsulate the contaminated soils, preventing both contaminated soils, preventing both continued leaching to ground water and direct contact. Thus, under the most reasonable future land use for recreational purposes, on-site stabilization with capping is both technically feasible and protective.

Given the factors described above, we believe that on-site stabilization is the appropriate Component 1 remedy for application at the site. However, should contaminant extraction be specified in the final ROD, it should include a requirement for treatability testing. Given the fact that contaminant extraction is unproven, such a ROD should also provide for a contingent on-site stabilization remedy.

EPA Response: Above ground contaminant extraction has been demonstrated to be effective for removal of inorganic (and organic) contaminants at NPL sites. These data support successful application of this technology for removal of inorganic contaminants, especially where sandy and silty soils are treated (as at the KOP site). This experience also indicates economic competitiveness with other remedial technologies (Raghavan, R., Coles, E., and Dietz, D, 1990, Cleaning Excavated Soil Using Extraction Agents: A State-of-the-Art Review, EPA/600/S2-89/034). Other considerations in the selection of contaminant extraction is that it removes contaminants above health-based cleanup levels, is permanent, and restores the site for unrestricted use. Treatability Studies are included as part of the remedial design to determine optimum extraction agents and system design parameters for the Extraction and Contaminant Extraction Alternative.

To presuppose that ground water at the site will not be used because there will be no future development is premature and is not consistent with EPA's policy for returning ground water to beneficial use. Residual materials (e.g., residual sludges from the treatment processes) will be removed and treated and/or disposed at an approved off-site facility. This is consistent with EPA policy of a preference for treatment and reduction in mobility, volume, toxicity of contaminants at the site.

Although stabilization is a proven technology, it would be less protective than the selected remedy, since its protectiveness assumes proper maintenance of the capping system and requires permanent monitoring of the ground water. Additionally, the site would not be fully restored for unrestricted use, as contaminants would remain at the site.

6. **Proposed Plan Reference:** p. 15, last paragraph, to p. 16: Selection of remedy for Component 4 (Ground Water):

ERM: The remedy selected is a ground water recovery, treatment, and reinjection program which was evaluated in the S[illegible]. This program incorporates numerous recovery and injection wells throughout the ground water contamination

plume, with the intent that ground water remediation will be conducted until the ground water ARARs are met. By contrast, the ground water remediation program designed in the FS takes into account the technical constraints shown in the FS to preclude reaching of metals ARARs using pump and treat technology. The FS design includes one line of recovery wells located in the area of highest concentration in the plume, with the intent that VOCs would be reduced to either ARARs or to practical minima within a reasonable period of time, while coincident mass removal of metals would protect the Great Egg Harbor River over the long term.

It is ERM's opinion that the proposed remedy selected in the PRAP fails to take into account the technical constraints on reaching metals ARARs, as described in detail in the site FS. This results in several issues being inadequately addressed by the PRAP, including the following.

- The ability of the SFS system design to meet ARARs: The PRAP assumes that ARARs can be met, while the FS demonstrates that this will not be the case.

- Remedial goals/expectations: The PRAP sets the remedial goal as attainment of ARARs, which has been demonstrated in the FS to be infeasible.

- Time period to remediation: The PRAP appears to be inconsistent on the issue of time to achieve remediation.

- The SFS design vs. the FS design: The SFS design has been assumed by the EPA to be superior to the FS design, but again, this assumption ignores the constraints on metals removal.

- Degree of environmental protection: The PRAP has failed to consider the deleterious effects on the environment of installing the more complex SFS system design.

- Evaluation of remedy effectiveness: The PRAP has failed to take into account the need to evaluate the effectiveness of the ground water recovery system during its operation, the effects of system design on the evaluation process, and the effects of the evaluation on reexamining remedial goals.

- Consistency of the PRAP with EPA internal guidance on ground water remedies: The PRAP has failed to follow the guidance provided in the EPA internal memo of October 18, 1989 regarding evaluation of ground water recovery systems, flexibility in ground water recovery systems, flexibility in ground water recovery RODs, and the need to address contingent remedies and potential waivers of ARARs in RODs.

EPA Response: See comments A.1, B.7, B.8, B.9, B.10, B.11, B.12, B.13, and B.14.

7. **ERM:**

Ability of the SFS System to Achieve ARARs

In the modeling performed in the SFS, the ultimate goal of the ground water recovery program is not clearly defined. The PRAP indicates the goals of the ground water recovery program to be attainment of ARARs and prevention of metals discharge to the Great Egg Harbor River. Like the FS modeling, the SFS effort was focused on time to remediation of VOCs in the ground water. In theory, the SFS design remediates VOCs more quickly than the FS design, leading EPA to the conclusion that the SFS design is superior for the purpose of meeting ARARs. However, unlike the FS, the SFS did not address the problems inherent in meeting ARARs for metals due to their high retardation in soils. It is well established that metals generally exhibit very low rates of partitioning from soils to ground water. This factor was shown in the FS to severely restrict the potential for any ground water recovery system to achieve ARARs for metals, even over the very long term.

The SFS ground water recovery modeling was limited to a demonstration of the time frame for theoretically meeting the VOC ARARs at the site. Metals were ignored. However, the metals are actually more limiting for ground water usage potential than the VOCs. Treatment of metals to potable levels for water supply is generally not practiced due to technical and economic limitations, while treatment of water supplies for VOC removal is a proven, cost-effective technology. Thus the PRAP, by ignoring the metals issue, fails to address the more significant technical limitation on ground water remediation at the site.

EPA Response: Metals contaminants were not specifically addressed in EPA's SFS because the purpose of the modeling exercise was to compare the relative cleanup times of different designs developed in the SFS. The modeling completed in the SFS was not meant to quantify actual cleanup times, rather the goal of the modeling was to determine the relative effectiveness for different conceptual designs of various extraction and reinjection systems. EPA's SFS, as well ERM's FS, did not address metals contamination in the ground water because data generated during the RI/FS were insufficient to define retardation factors accurately for metals contaminants for the site.

Treatment of metals to achieve aquifer restoration ("potable levels for water supply") is a commonly used technology at Superfund Sites. Of 31 sites with ground-water metals contaminants in an EPA study, 26 have aquifer remediation as the goal (EPA, 1989, Evaluation of Ground-Water Extraction Remedies, EPA/540/2-89/054).

It should be noted that the conceptual design utilized in the Proposed Plan was taken from the SFS but is not necessarily the final design that will be implemented. The conceptual design will be refined based on the collection of additional data obtain during the Remedial Design.

8. **ERM:**

Remedial Goals/Expectations

By ignoring the metals issue as addressed in the FS, the PRAP reaches the erroneous and misleading conclusion that ARARs will be met in ground water by using the SFS recovery system. Again, it was clearly demonstrated on a technical basis in the FS that it is highly unlikely that the metals concentrations can be reduced to the levels of ARARs in the foreseeable future and that organics may or may not be reduced to the ARARs. Given this knowledge, the ROD for the site should discuss the constraints of ground water recovery at the site and should set reachable goals, based on technical realities. To do any less is considered by ERM to be overly optimistic and misleading; it can only create unrealistic expectations in the minds of the public regarding the degree of and time frame required for site remediation.

Given the inability of ground water recovery to achieve metals ARARs, the FS proposed that mass removal of metals from the upper aquifer should be conducted until the reduction would be permanently protective of the river. This provides a goal for permanent protectiveness that recognizes and takes into account the technological limitations on ground water remediation at the site. Since the ground water will never be usable without treatment for metals (and possibly for VOCs), the FS goal concept should be incorporated into the final ROD.

EPA Response: As discussed previously, EPA maintains that achieving ARARs for complete restoration of the aquifer is a reasonable goal. In addition, remediation of the upper aquifer should also be conducted to evaluate that ARARs are met in the Great Egg Harbor River. EPA's selected alternative of pumping and treating ground water, in combination with monitoring the river, will achieve this goal. Protection of the river can only be confirmed by river sampling and analysis before and during the operation of the ground-water remediation system. The remedial alternative proposed in ERM's FS would not achieve complete protection of the river since the inorganic contaminants, although slightly reduced, would continue to discharge to the river at relatively high levels.

9. **ERM:**

Time to Remediation [sic]

The PRAP appears to select the SFS ground water recovery system because it will theoretically meet the VOC ARARs faster than the FS system design. However, the cost estimate for the remedy is based on 30 years of operation, presumably due to the presence of the metals, which was not addressed in the SFS. Since the time required to remediate the metals will determine the duration of system operation, it is inappropriate to base the recovery system design on the VOC ARARs. The FS showed that even 30 years of operation is unlikely to achieve the metals ARARs. As also demonstrated in the FS, if realistic (i.e., truly achievable) goals are set for the remediation [in terms of VOCs], the duration of system operation may be considerably less than 30 years.

EPA Response: Since the time required for remediation of the aquifer is uncertain and could be longer than 30 years for complete aquifer remediation (achieving ARARs for both organic and inorganic contaminants), EPA's policy is to assume a period of performance of 30 years for costing purposes.

10. **ERM:**

SFS Design vs. FS Design

It is not clear that the SFS system design will provide superior cleanup performance, despite higher pumping rates and injection of treated water. The sorption/desorption equilibria for metals in soils are very complex. At the present time, it is unknown whether the rates of metals release and/or mass removal would increase, remain essentially the same, or decrease under the SFS system design. The increase in flow velocity, along with the injection of treated water, may result in the appearance of remediation on a concentration basis during operation of the system. However, the ultimate remediation is dependent on mass removal by partitioning from the soils. If the SFS system were to inadvertently reduce mass partitioning, the metals concentrations in ground water would be expected to rise after the system was shut down, as the original equilibrium conditions returned. Thus, it not clear whether

the SFS design is superior to, or possibly inferior to, the FS design for metals removal.

EPA Response: EPA's SFS design was developed to consider additional extraction and reinjection designs than those presented in ERM's FS. The conceptual design utilized in the Proposed Plan for costing purposes was based on one of the design scenarios presented in EPA's SFS, but did not represent the final specification of the ground-water remediation system. The final design of the ground-water remediation system will be based on additional data and modeling and analysis and will be prepared during the remedial design phase. This effort will consider factors mentioned in this comment and other considerations such as pulsed pumping, different extraction/reinjection well designs, impacts to wetlands, effective contaminant capture and control (both vertically and horizontally), etc.

11. ERM:

Environmental Protection

The expansive SFS system will place wells and piping systems throughout the area from the site to the river. This configuration would be far more environmentally destructive than the FS design. The construction and maintenance of this system would unnecessarily disrupt a currently undisturbed area of the Pinelands between the Fire Road and the river over the very long term. This factor constitutes a long term adverse impact which was unaccounted for in the SFS evaluation and the PRAP.

EPA Response: EPA recognizes that there will be some disturbance to the site and adjacent area to construct the components of the ground-water remediation system. However, these temporary effects are necessary to restore the site and provide adequate protection of public health and the environment.

12. ERM:

Evaluation of Remedial Action

The ground water recovery system must be re-evaluated, by law, on a five-year basis. The selection of a system in the PRAP has failed to take into consideration the needs of the evaluation process. Current scientific understanding of metals remediation in the subsurface is limited. If EPA hopes to maximize metals remediation at the KOP site, a serious effort must be undertaken to evaluate the mobility of metals in the soil and water phases on a site-specific basis. The SFS system will produce a complex potentiometric surface and high spatial variability in water quality. This will complicate evaluation of remedial progress and the mechanisms affecting remediation. For example, as described previously, if desorption of contaminants from the soil is reduced by dilution and increasing flow rate, the effectiveness of the SFS system may be inadvertently overestimated.

The FS, on the other hand, has presented a system which would remediate VOCs in ground water and provide long-term protection of the river, while providing the simplicity to allow more effective evaluation of the remedial process for metals. Based on the five-year findings, the FS system could be modified to optimize metals removal, if necessary, or might possibly be terminated, if sufficient metals removal had been achieved.

EPA Response: EPA disagrees with this comment. The ground-water remediation system will actively remove both organic and inorganic contaminants from the aquifer and will not complicate the evaluation of the effectiveness of the remedial action. The system presented in the FS would only provide partial aquifer remediation as it would primarily address volatile organic compounds. The ground-water remediation system will be monitored on a regular basis and adjusted as warranted by the performance data.

13. ERM:

<u>Inconsistency of PRAP with EPA Internal Guidance</u>

As detailed above, the PRAP fails to adequately address the issues of metals remediation and system performance evaluation in the selection of a ground water recovery system for the KOP site. The EPA's own internal memo of October 18, 1989 indicates that such factors should be taken into account in site RODs. Specifically, Recommendation 2 (p.4) calls for ROD flexibility and contingent remedies, where appropriate. The contingent remedy, when appropriate, should be discussed "in equal detail to the primary remedial option and should provide substantive criteria by which the Agency will decide whether or not to implement the contingency." (p.5). Based on the technical findings of the site FS and on the EPA's internal guidance memo, the issues of metals removal limitations, system performance evaluation, and contingent remedies should be fully addressed in the final site ROD.

In conclusion, it is not at all clear that the technical basis for the ground water remedy specified in the PRAP is correct. Nor is it clear that the proposed remedy is more environmentally protective than the FS system design. It is clear, however, that the PRAP appears to be inconsistent with EPA internal guidance on selection of ground water remedies. ERM's design is in agreement with the technical considerations which form the basis for the EPA internal guidance; we believe that it should be followed in the ROD for the KOP site.

EPA Response: The ground-water remedy described in the Proposed Plan is consistent with EPA's internal guidance. Furthermore, EPA maintains that providing a contingency remedy is premature and inappropriate at this time because removal of metals contaminants from ground-water has been shown to be effective.

The remedy would provide flexibility where appropriate, as the ground-water remediation system will be carefully monitored on a regular basis and adjusted as warranted by the performance data collected during operation. Modeling results from the FS and SFS indicate the ERM's proposed design would not restore the aquifer as efficiently as that conceptual design presented in EPA's SFS.

14. Proposed Plan Reference: p. 16, Selection of Remedy for Component 4 (Ground Water): "Additional monitoring wells be required to provide data to define more completely the vertical extent of contamination."

ERM: The EPA feels that since the lower subzone aquifer wells are not screened immediately below the middle confining subzone, the potential exists for significant contamination to be present in the lower aquifer. The RI data and evaluations of the lower aquifer clearly demonstrate the absence of significant impact on the aquifer. For example, the vertical hydraulic conductivity (K) of the confining unit was shown to be 2.7×10^{-7} cm/sec from the pump test and 1.8×10^{-5} cm/sec (maximum) as calculated using analytical data. Using Darcy's Law (Q flow) = k x i (hydraulic gradient) x A (cross sectional area of flow) and RI data on the confining and lower aquifer subzones, it can be calculated from the data that the dilution factor from a unit area of the confining unit into the 5-foot upper thickness of the lower aquifer is a minimum of 4200 times. The maximum metals concentrations detected in the upper subzone aquifer were 1040 ug/l chromium, 12,500 ug/l copper, and 4670 ug/l nickel (all at well MW 5-S). Thus, the maximum potential contribution to the lower aquifer is 0.25 ug/l chromium, 3.0 ug/l copper, and 1.1 ug/l nickel, all below MCLs or other possible drinking water standards.

Except for one anomalous detection of chromium above its MCL (at well MW 14-D), all data collected from the lower aquifer confirm this analysis. The average chromium concentration in the lower aquifer was approximately 11 ug/l (below the MCL of 50 ug/l), with 6 of 8 samples below the detection limit of 1 ug/l.

When the ground water recovery system in the upper subzone aquifer goes on line, the downward hydraulic gradient will be reduced, possibly even to an upward gradient. Thus, not only do the current conditions clearly indicate no threat to the lower aquifer, but the ground water remediation program in the upper aquifer will further protect the lower aquifer. Furthermore, any ground water recovery program in the lower subzone aquifer would diminish the protection provided by the upper aquifer recovery program and might risk inducing additional discharge through the confining subzone, thus possibly creating an impact where none now exists.

In summary, ERM has concluded that the lower subzone aquifer is not adversely affected by the site and will be best protected for the long term by the upper subzone aquifer recovery system. Given these conditions, the lower subzone aquifer is adequately monitored, and no additional monitoring wells are needed.

EPA Response:

EPA maintains that the aquifer lithologies and sample analysis data indicate significant additional contamination of the deeper aquifer. Correlation of electric logs and detailed delineation of site stratigraphy clearly indicate that the confining nature of the middle sub-zone aquifer is oversimplified and misrepresented in the RI/FS. The clay thickness of the intermediate subzone is thinner directly under site source areas (lagoons, buried drums, etc.) than where off-site pump tests were conducted and the type-log (MD-8D) was selected. The pump test data are not necessarily representative of permeabilities in the site source area due to lateral heterogeneities of the intermediate aquifer across the area. The clay layer is thinner, sandier and relatively permeable in the site source areas where contaminants are migrating vertically downward to the deeper aquifer. The maximum potential contributions cited in the above comment are theoretical and may be flawed due to the considerations discussed above. The well with the "anomalous" detection of chromium must be considered to represent additional contamination in the deep aquifer.

The remedial design will consider the effects that will be induced by the ground-water remediation system and will be designed to assure that no adverse impacts are created by the operation of the system.

An additional consideration of deeper aquifer contamination relates to the monitoring wells previously identified as screened in the intermediate subzone. Electric log correlations with intermediate wells lithology descriptions for the intermediate wells clearly show that previously identified "intermediate wells" are not screened in the intermediate subzone, but are screened in the upper portion of the deeper aquifer (or just below the intermediate aquifer). Samples from these wells represent deep aquifer contamination whose data are incorrectly labelled in the RI/FS as representing ground-water from the intermediate aquifer. Two wells previously identified as intermediate wells have contaminant concentrations as follows:

	MW-2i	MW-4i	Cleanup Goals
Beryllium	**29 ppb**	**31 ppb**	1 ppb
Chromium	20 ppb	26 ppb	50 ppb
Copper	**3,070 ppb**	**2,830 ppb**	1000 ppb
Nickel	**783 ppb**	**899 ppb**	210 ppb
Zinc	232 ppb	627 ppb	5000 ppb

Concentrations which exceed cleanup goals are **bold** in the listing above. The only other well that is screened in the deep aquifer and previously identified as an intermediate well is MW-6i in which no contamination was detected.

In addition to considerations discussed above, contamination may also be under-represented since all ground-water analyses were conducted for filtered samples which would not include contaminants in the colloidal or suspended phases and thereby not reflect the total concentration of contaminants in the samples.

Additional monitoring wells are needed along with a detailed stratigraphic analysis using electric logs wherever possible to define the nature of intermediate subzone relationship to contamination in the deep aquifer. The ground-water remediation system will be modified to address deeper contamination since the conceptual design does not consider remediation of the deeper aquifer.

The remedial design will consider in detail, ground-water remedial designs that will best remediate the deeper aquifer. It may be possible that extraction wells are not actually screened in the deeper aquifer, but any contamination above MCLs in the deeper aquifer must be considered to ensure that it is captured and treated concurrently with the upper aquifer.

Thus, further delineation of contamination in the deep aquifer is required.

15. Proposed Plan Reference: p.17, Alternative S-4, first paragraph

ERM: The need for treatability testing and the fact that this is an emerging technology should be included.

EPA Response: See comment B.5.

16. Proposed Plan Reference: p. 18, last paragraph, to p. 19, Alternative GW-3

ERM: The comments presented above for pp. 15 to 16, Selection of Remedy for Ground Water, apply here as well.

EPA Response: See comments A.1, B.7, B.9, B.10, B.11, B.12, B.13, and B.14.

17. ERM Comment: The issue of institutional restrictions for the site is not included in the PRAP. Because the ground water will not be remediated in the foreseeable future, institutional measures such as deed restrictions will be necessary to ensure that no land use will ever occur which is incompatible with site conditions. These restrictions are also necessary to ensure that the integrity of any on-site remedial actions is maintained and that the property is not used in a way that would create environmental problems in the future. For example, if a long-term ground water recovery system was installed, as proposed by EPA, deed restrictions would be necessary to ensure that future land uses would not contribute new contaminants to the ground water. As shown in the site FS, institutional restrictions are needed under any of the remedial alternatives.

EPA Response: Institutional controls will be imposed until the ground water achieves drinking water standards.

18. The cost estimates presented for the ground water recovery scenarios assume a 30-year period of operation. It is ERM's opinion that a recovery effort of as long as 30 years' duration is not necessary. The FS has shown that MCLs for metals are highly unlikely to have been achieved in that time frame; thus achieving MCLs is not a feasible goal for the operation of the recovery system. However, protection of the Great Egg Harbor River is an achievable goal that is capable of being met by both the systems presented in the FS and in the SFS. As discussed in the FS, protection of the river may be obtained in a shorter period than 30 years,

thus providing equivalent protectiveness at a lower cost that the 30-year system.

EPA Response: EPA maintains that the goal of the ground-water remediation system is to return the ground water to its beneficial uses. It is premature and inappropriate to provide a contingency at this time because insufficient information does not exist which would indicate that the goal cannot be achieved.

Furthermore, to equate a long period of treatment with the inability to achieve the cleanup goals is erroneous. Even if 30 years or longer of ground-water treatment are required to achieve cleanup goals, EPA's preference is to return the ground water to beneficial use.

At this time it is uncertain how long would be required to return the aquifer to drinking-water quality and the river to meet ARARs. The system will be carefully monitored on a regular basis and adjusted as warranted by the performance data.

C. Summary of Comments received from The Pinelands Commission (refer to complete letter in Appendix C)

The Commissions generally agrees with EPA's preferred alternatives for remediation of soils, sediments, sludges, tankers and buried drums and additional river sampling.

EPA's proposal to treat contaminated ground water to meet drinking-water standards, however, is not acceptable. The Commission believes that this proposal would not comply with the nondegradation standard of the New Jersey Comprehensive Management Plan which requires that no development be permitted which degrades surface- or ground-water quality. The Commission believes that the nondegradation standard should be the goal of ground-water remediation.

As the ground-water plume has been identified as the source of contamination of the Great Egg Harbor River surface water and sediments, the remedial goals for ground water must consider the effects of the plume on the river. The state's surface-water standards within the Pinelands require that surface water must be maintained at its existing quality or that quality necessary to protect the designated uses of the river.

EPA Response: EPA's proposed cleanup action should not be considered new development which may degrade water quality in the Pinelands. Rather, the ground water in the aquifer underlying the Site is contaminated as a result of improper hazardous waste disposal. By extracting and treating this ground water, the water quality will be significantly improved. For this reason, EPA does not believe that the nondegradation objective of the Pinelands CMP is an applicable requirement.

In addition, the ground water underlying the Site is considered to be Class GW2. Accordingly, drinking water standards, or Maximum Contaminant Levels (MCLs) established under the New Jersey Safe Drinking Water Act, N.J.A.C. 7:10-16.7, are the applicable cleanup standards for the Site.

Concerning the potential adverse impacts to the Great Egg Harbor River, EPA agrees that further information is needed to characterize present contaminant levels more completely and assess the impact of the ground-water treatment system on the river. Monitoring will be conducted during Remedial Design and during the operation of the system for this purpose. If it is determined during operation of the system that the river is being degraded by site-related contamination, the river will be addressed as a separate operable unit. Appropriate remedial alternatives, including additional treatment of the ground water will be evaluated, to ensure that the remedial action is protective of the river and will meet river ARARs.

Appendix A

Proposed Plan

Public Notice

Public Meeting Attendance Sheet

Notice of Public Comment Extension

KING OF PRUSSIA TECHNICAL CORPORATION SITE
Winslow Township, New Jersey

PROPOSED REMEDIAL ACTION PLAN

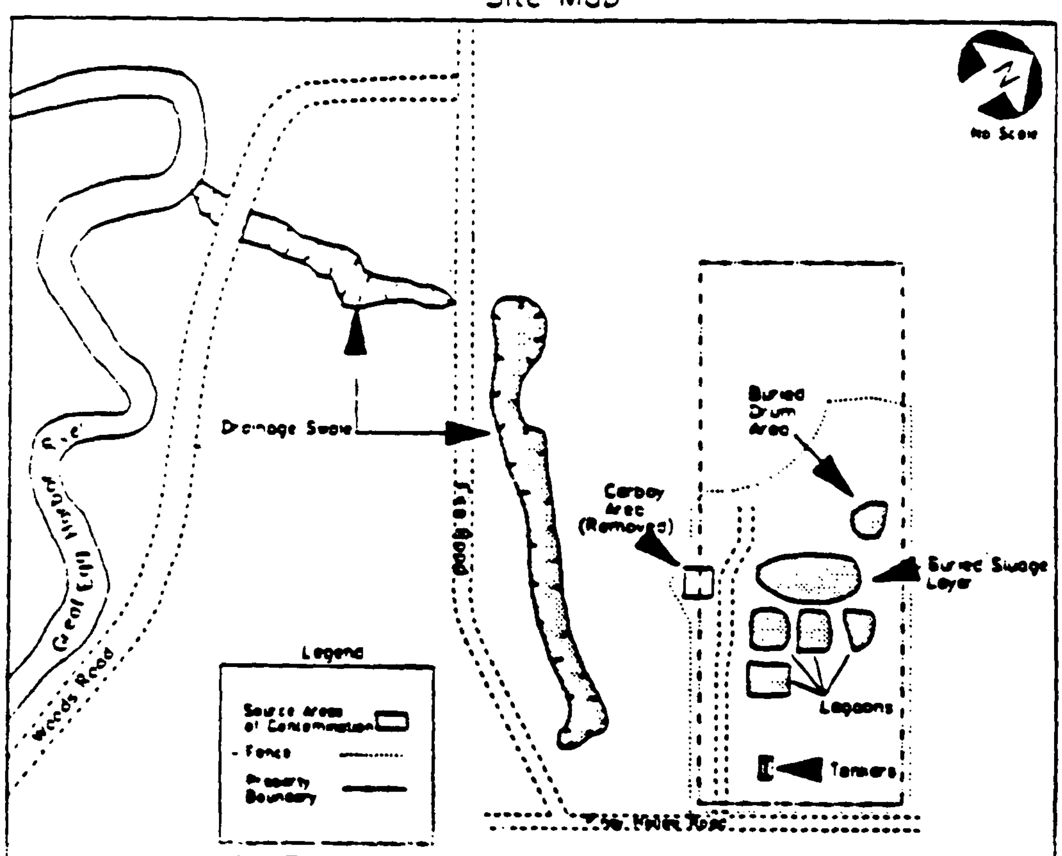
July 1990

PURPOSE OF THE PROPOSED PLAN

This document describes the preferred alternatives for remediation of contaminated ground water, sludges and soils at the King of Prussia (KOP) Superfund site in Winslow Township, Camden County, New Jersey. It also describes the preferred remedial alternatives for the drainage swale adjacent to the site.

The plan was developed by the U.S. Environmental Protection Agency (EPA) in conjunction with the New Jersey Department of Environmental Protection (NJDEP). The plan also outlines all of the remedial alternatives which were evaluated and the rationale

Site Map



that EPA used to make the preliminary selection. The preferred remedial alternatives are primarily based on four key documents:

- the Remedial Investigation (RI) report which characterizes the nature and extent of the contamination present,
- the Endangerment Assessment (EA) which addresses potential impacts to human health and the environment,
- the Feasibility Study (FS) report which describes how the various remedial alternatives were developed and evaluated, and
- a Supplemental Feasibility Study (SFS), a companion document to the FS, which describes additional remedial alternatives to those presented in the FS.

The proposed plan is being distributed, along with the RI, EA, Draft Final FS and SFS reports to solicit public comment regarding the most acceptable methods to remediate the contaminated sludges, soils, sediments and ground water at the King of Prussia site. Detailed information on all of the material included in the proposed plan may be found in these reports. The documents listed above have been placed at the following information repositories:

* Winslow Township Municipal Hall
  Route 73
  Braddock, New Jersey 08073
  (609) 567-0700

* Camden County Library
  Echelon Urban Center
  Laurel Road
  Voorhes, New Jersey 08043
  (609) 772-1636

Additional documentation regarding the remedy selection is available in the administrative record for the site. The administrative record is being established at the Camden County Library, Echelon Urban Center, Laurel Road, Voorhes, New Jersey 08043.

COMMUNITY ROLE IN SELECTION PROCESS

EPA relies on public comment and discussion to ensure that the problem being addressed and the remedial alternatives being evaluated for each Superfund site are fully understood, and that the needs of the local community have been considered. To this end, this Proposed Remedial Action Plan (PRAP) is being distributed to the public. EPA is providing a 30-day public comment period to give the local community an opportunity to have input into this selection process. During this period EPA staff will visit the community to discuss the PRAP, RI, FS and SFS, and to answer questions. The Agency will hold a public meeting on August 1, 1990 at the Winslow Township Municipal Hall on Route 73 in Braddock, New Jersey.

Written and verbal comments on the PRAP and the RI, FS and SFS reports will be welcomed through August 15, 1990 and will be documented by EPA in the subsequent Record of Decision (ROD), the formal document that describes the selected remedy.

All written comments should be addressed to:

James Hahnenberg
Project Manager
U.S. Environmental Protection Agency
Room 720
26 Federal Plaza
New York, NY 10278

It is important to note that while the option described herein is EPA's preferred alternative for this site, the final decision will be made only after consideration of all comments received during the public comment period on any of the remedial alternatives addressed in the PRAP, the FS and SFS.

SITE BACKGROUND

The site, approximately ten acres in size, is in a rural area within the Pinelands National Reserve. It is also adjacent to the State of New Jersey's Winslow Wildlife Refuge. The nearest residence is a single family home approximately one mile northeast (upgradient) of the site. The Great Egg Harbor River, located approximately 1000 feet southwest and downgradient of the site, is used for recreational purposes and has been proposed as a Nationally designated Wild and Scenic River. A swale, which drains most of the site runoff, lies between the site and the river. Stressed vegetation and trees have been observed in the upper swale area and is believed to be caused by metals-contaminanted runoff from the site.

The King of Prussia Technical Corporation purchased the site from Winslow Township in 1970 to process and recycle hazardous waste. Six lagoons were used to process liquid industrial waste with the intention to convert these wastes to useful chemicals and construction materials. Sometime between 1973 and 1975 operations ceased and the site was abandoned. In 1976, Winslow Township foreclosed on the property and resumed ownership because the company failed to pay taxes.

Records indicate that six lagoons were originally utilized for industrial waste processing. Three of the lagoons are still evident, and a fourth may be identified by a slight depression. These lagoons are located in a slightly elevated area near the center of the property (refer to Site Map).

Two rusting and torn tankers are lying on a concrete pad between Piney Hollow Road and the lagoons on the southeast part of the site. Toward the back of the site is an area with an undetermined number of buried drums and containers. The site has sandy soil and is mostly barren of vegetation.

The site property was fenced in July 1988 to restrict access and prevent the public from coming into direct contact with the contaminants. The fence was also installed to prevent illegal dumping.

Buried plastic containers (carboys) and surrounding soils with visible contamination, located inside the fence west of the lagoons, were excavated and containerized by EPA in September 1989. Final removal and off-site disposal of these materials is anticipated to occur during the fall of 1990.

Currently, EPA is evaluating the removal of buried drums and aboveground tankers.

In April 1985 EPA entered into an Administrative Order on Consent with five Potentially Responsible Parties (PRPs) to conduct the RI and FS activities. In 1988 and 1989, EPA identified additional PRPs bringing the total number of PRPs to fourteen. EPA's search for additional PRPs is continuing.

REMEDIAL INVESTIGATION SUMMARY

The RI for the KOP site was conducted in two phases, with the final report approved in August 1989. The first phase was completed in July 1987, at which time EPA determined that sufficient data and information had not been obtained to characterize site-related contamination adequately. In March 1988, EPA requested that the PRPs initiate a second phase of the investigation to provide additional information on contaminant source areas and more complete definition of aquifer contamination. On September 19, 1989, EPA representatives met with local citizens and interested parties to present the findings of the RI.

The objectives of the RI were to: characterize the nature and extent of contamination associated with the site, identify off-site contamination and its impact on the environment and public health, and determine the need for remedial measures to mitigate the impact of the site on public health and the environment. These objectives were met by examining all available information regarding the site and by performing field investigations to gather additional data.

The following tasks were accomplished during the RI:

- Pre-existing geological, geophysical, hydrological and chemical information were reviewed and evaluated.
- Two hundred and ten test pits and boreholes were drilled/dug to sample soils, sediments and sludges to determine the types and concentrations of contamination.
- Twenty-seven monitoring wells and one observation well were installed to define the site geology and determine the types and concentrations of contaminants in the ground water.
- Conductivity, magnetometer and resistivity surveys were conducted to determine the location of areas with potential contamination.
- Surface-water and stream-bottom sediments were sampled at fourteen locations to characterize contamination in the Great Egg Harbor River.
- The contents of tankers, a buried drum and carboys were sampled and analyzed.

The findings of the RI report are as follows:

- Lagoon sludges and soils adjacent to the lagoons indicated high concentrations of chromium, copper, nickel and zinc as well as other metals. These are contaminant source areas for metals contamination detected in the upper aquifer.
- Silty sediments in the portion of the swale upslope from the fire road also showed high concentrations of chromium, copper, nickel and zinc as well as other metals. This is believed to be a source of metals contamination in the upper aquifer.
- Carboys and tankers contents were found to have high levels of chromium, copper, nickel and zinc as well as other metals.
- A sample analysis from a buried drum located in the rear (northwest) of the site indicated high concentrations of volatile and semi-volatile organic compounds above cleanup levels. Limited sampling indicates soils in this area had significant concentrations of volatile organic compounds.

This area is believed to be the source for organic contamination of the ground water.

- Two aquifers within the Kirkwood-Cohansey Aquifer System were identified at the KOP site. The upper aquifer begins 15 feet below the surface and extends to approximately 35 feet. A second aquifer extends downward from 50 feet below the surface to an undetermined depth. A 10 to 30-foot semi-confining layer composed primarily of silt and clay separates the two aquifers.

- The highest levels of ground-water contamination have been identified in the upper aquifer. Metals, including chromium, copper and nickel were identified at concentrations in excess of acceptable Federal and State levels established under the Safe Drinking Water Act. The upper aquifer also contained volatile organic compounds. Some metals contamination has been identified in the lower aquifer.

- Ground-water contamination has migrated toward the Great Egg Harbor River, with contaminants in the upper aquifer discharging to the river. The highest contaminant concentrations have not reached the river and are approximately 500 feet east of the river. The deeper aquifer is not believed to discharge a significant volume of water to the Great Egg Harbor River.

- The Great Egg Harbor River has low levels of metals contamination in both the sediments and the surface waters. The upper aquifer is believed to be the source of these metals into the river. No organic compounds were detected above background levels in surface water or in river sediments.

SUMMARY OF SITE RISKS

An Endangerment Assessment (EA) was conducted by EPA to determine risks presented by hazardous substances at the site. Indicator chemicals from each media were selected to ensure that representative contaminants from all exposure routes at the site would be evaluated.

The following exposure routes were assessed: 1) breathing dust contaminated from site soils and swale sediments; 2) ingestion of site soils, sludges and swale sediments; 3) skin contact with contaminants in the groundwater, site soils and sludges, and swale sediments; 4) drinking the groundwater at the site; 5) inhalation of contaminants volatilizing from ground water during showering; and 6) eating fish from the Great Egg Harbor River. These analyses indicate that the greatest risks to human health at the site are from ingesting site soils, sludges and swale sediments, and from drinking the groundwater.

Human health risks from soil ingestion are calculated to have a Hazard Index of 3.7. A Hazard Index greater than 1 is considered to exceed the maximum recommended exposure. The soil remediation proposed in this plan will reduce human health risk to a Hazard Index of less than 1.

The cancer risk from drinking contaminated ground water is 2.4 x 10^{-2} although presently there are no users of the ground water in the proximity of the site. The proposed remedial activities will reduce contaminant concentrations to Maximum Contaminant Levels (MCLs) which are drinking water standards.

The RI indicates metals contamination may present a threat to stream biota due to metals contamination in the sediments and possible bioaccumulative effects. Additional data on contaminant concentrations and biologic effects are necessary.

SCOPE AND ROLE OF PROPOSED RESPONSE ACTION AND SUMMARY OF REMEDIAL ALTERNATIVES EVALUATED

Due to the wide variety of contaminants and multiple migration routes presented at the KOP site, EPA has divided the site into the five components listed below to effectuate a more protective remedial action. The alternatives considered for each of these components are based on those evaluated in the FS, which was initiated during the spring of 1989, and the SFS conducted by the EPA during the spring of 1990.

Component 1:
Metals-contaminated soils adjacent to lagoons, sludges in lagoons, and sediments in the swale.

Component 2:
Buried drums and soils contaminated with volatile organic compounds located toward the rear (northwest) of the site.

Component 3:
Tankers and contents located near the front (southeast) of the site. Soils under and adjacent to the tankers will be addressed as part of Component 1.

Component 4:
Organic and metals contaminated ground water.

Component 5:
Surface waters and sediments of the Great Egg Harbor River.

SPECIAL EPA INSERT

SUMMARY OF ALTERNATIVES EVALUATED

The Superfund law requires each site remedy selected to be protective of human health and the environment, and in accord with statutory requirements. Permanent solutions to contamination problems are to be achieved wherever possible. The following provides a description of all remedial alternatives evaluated for the King of Prussia Technical Corporation Site. The numbers assigned to the alternatives correspond to those used in the FS and SFS reports.

COMPONENT 1- METALS CONTAMINATED SOILS, SEDIMENTS AND SLUDGES

The objective of Remedial Component 1 is to achieve removal of contaminants from site soils, lagoon sludges and swale sediments that do not meet cleanup standards developed during the FS. These standards were developed based on risk to public health. Although these standards are not considered applicable or relevant and appropriate requirements (ARARs), cleanup to these levels will ensure that the contaminants do not continue to migrate into the ground water and risks to recreational users or inhabitants at the site are reduced to an acceptable level.

ALTERNATIVE S-1: NO ACTION

Construction Cost: 0
Annual O&M Costs: $7,000
Present Worth: $79,000
Months to Implement: 2

The No Action alternative for metals-contaminated soils, sludges and sediments provides a baseline against which other alternatives may be compared. No remedial activities would be performed but long-term ground-water monitoring would be conducted. Potential health risks would not be reduced as there would be no reduction in toxicity, mobility or volume of metals contaminants in the soils, sediments and sludges.

ALTERNATIVE S-2: LIMITED ACTION

Construction Cost: $43,000
Annual O&M Costs: $9,000
Present Worth: $144,000
Months to Implement: 6

The Limited Action alternative for metals-contaminated soils consists of site and deed restrictions, additional fencing around the swale and long-term ground-water monitoring. Potential public health risks would be somewhat reduced by limiting access to contaminated soils, sediments and sludges. However, there would be no reduction in toxicity, mobility or volume of metals contaminants in the soils, sediments and sludges. Contaminants from these materials would also continue to migrate to the ground water and eventually discharge to the Great Egg Harbor River. This would pose minor risks to current recreational users and higher risks to future users when higher concentrations of contaminants are anticipated to reach the river.

ALTERNATIVE S-3: LIMITED EXCAVATION OF SEDIMENTS AND SOILS; CONSOLIDATION; CAPPING

Construction Cost: $1,550,000
Annual O&M Costs: $17,000
Present Worth: $1,740,000
Months to Implement: 12

This alternative consists of excavation and consolidation of 1,000 cubic yards of swale sediments and 350 cubic yards of site soils outside of the area to be capped. These materials would be consolidated in the lagoons and adjacent area followed by installation of a multi-layer cap covering 2.6 acres. Long term ground-water monitoring would also be conducted to determine contaminant degradation and/or migration. Potential health risks would be reduced by eliminating direct contact with these materials, but there would be no reduction in toxicity or volume of metals contaminants in the soils, sediments and sludges. Migration of contaminants from these materials to the ground water would be reduced but not eliminated.

ALTERNATIVE S-4: COMPLETE EXCAVATION OF SOILS, SEDIMENTS AND SLUDGES; CONTAMINANT EXTRACTION; REDEPOSITION ON SITE

Construction Cost: $8,050,000*
Annual O&M Cost: 0
Present Worth: $8,050,000*
Months to Implement: 18

This consists of excavating and treating 20,150 cubic yards of contaminated soils, sediments and sludges in a multi-stage soil washing/extraction process which reduces the concentration of contaminants so that they are no longer hazardous. Treated materials would be redeposited to their approximate former locations. Contaminants would be removed from treated materials and the site would be restored for unrestricted use.

* Note: Costs presented here were developed in the SFS; EPA believes these costs to be a more realistic estimate than costs presented for this alternative in the FS.

ALTERNATIVE S-5: IN SITU STABILIZATION/SOLIDIFICATION; CAPPING

Construction Cost: $3,182,000*
Annual O&M Costs: $10,000
Present Worth: $3,336,000*
Months to Implement: 18

This alternative consists of excavation and consolidation of 1,000 cubic yards of swale sediments and 350 cubic yards of site soils outside of the area to be treated and capped. The area of consolidation, stabilization and capping includes a 2.6-acre area of the lagoons and adjacent area toward the rear of the site. After consolidation, in situ stabilization would be performed using a system of injection and mixing augers and a multi-layer cap constructed. Mobility of contaminants would be reduced; treated materials could then be rendered "non-characteristic." Long-term ground-water monitoring would be required and site access restricted.

* Note: Costs presented here were developed in the SFS; EPA believes these costs to be a more realistic estimate than costs presented for this alternative in the FS.

ALTERNATIVE S-5a: COMPLETE EXCAVATION OF SOILS, SEDIMENTS AND SLUDGES; STABILIZATION/SOLIDIFICATION; CAPPING

Construction Cost: $5,402,000
Annual O&M Costs: $10,000
Present Worth: $5,555,000
Months to Implement: 18

This alternative is similar to S-5, except all contaminated soils, sediments and sludges would be excavated and stabilized above ground. After excavation and consolidation these materials would be mixed with cementing and stabilizing agents to create a structurally strong and inert matrix. A multi-layer cap would then be constructed over a 2.6-acre area over the lagoons and adjacent area. Long-term monitoring would be required and site access restricted.

Note: This alternative is presented in the SFS.

ALTERNATIVE S-6: COMPLETE REMOVAL; OFF-SITE DISPOSAL

Construction Cost: $11,500,000
Annual O&M Costs: 0
Present Worth: $11,500,000
Months to Implement: 12

This alternative consists of the removal and off-site disposal at a permitted facility of 20,150 cubic yards of untreated contaminated soils, sludges and sediments. All soils, sludges and sediments above action levels would be removed from the site, replaced with clean fill and revegetated.

COMPONENT 2- BURIED DRUMS AND SOILS CONTAMINATED WITH VOLATILE ORGANIC COMPOUNDS

The objective of Remedial Component 2 is to achieve removal of drums and contaminated adjacent soil.

ALTERNATIVE DR-1: NO ACTION

Construction Cost: $0
Annual O&M Costs: $7,000
Present Worth: $79,000
Months to Implement: 2

The No Action alternative for organically contaminated soils in the buried drum area provides a baseline against which other alternatives may be compared. The number and condition of buried drums would remain undetermined and contaminants would continue to migrate into the ground water.

Note: This Alternative is identical to Alternative BD-1 presented in the FS.

ALTERNATIVE DR-2: DRUM REMOVAL AND OFF-SITE DISPOSAL; SAMPLING AND ANALYSIS OF SOILS

Construction Cost: $386,000
Annual O&M Costs: $0
Present Worth: $386,000
Months to Implement: 12

This consists of drum removal and off-site disposal followed by sampling and analysis of nearby soils. The volume of materials that would require off-site treatment and disposal is estimated to be approximately 250 cubic yards. Followup soil sampling and analysis will define contaminant types, concentrations and soil volumes that may require remediation. If further remediation of soils in the area of buried drums is necessary, a focused Feasibility Study will be conducted to evaluate remedial alternatives. This Feasibility Study may include treatability testing as there would be a preference for treatment in remediating the organically contaminated soils.

Note: This alternative is presented in the SFS.

COMPONENT 3- TANKERS AND CONTENTS

The objective of Remedial Component 3 is to achieve removal of tankers and contents. Contaminated soils under and adjacent to the tankers would be addressed as part of Component 1.

ALTERNATIVE TK-1: NO ACTION

Construction Cost: $0
Annual O&M Costs: $0
Present Worth: $0
Months to Implement: 0

This alternative does not require any remedial activity.

ALTERNATIVE TK-2: TANKER REMOVAL AND OFF-SITE DISPOSAL

Construction Cost: $22,000
Annual O&M Costs: $0
Present Worth: $22,000
Months to Implement: 2

This consists of removing the tankers and contents and their disposal at an off-site facility. This would permanently reduce mobility, toxicity and volume of tanker wastes at the site. This would eliminate risks posed by this source area.

COMPONENT 4- GROUND WATER

Ground-water extraction scenarios were designed for aquifer restoration and to prevent migration of contaminated ground water to the Great Egg Harbor River.

ALTERNATIVE GW-1: NO ACTION

Construction Cost: $0
Annual O&M Costs: $11,000
Present Worth: $122,000
Months to Implement: 2

The No Action alternative provides a baseline against which to compare other alternatives. This alternative includes sampling existing monitoring wells installed during the remedial investigations to conduct long-term monitoring of ground-water contaminants. The Great Egg Harbor River would also be sampled to determine current and future levels of contamination in the river.

ALTERNATIVE GW-2: LIMITED ACTION

Construction Cost: $0
Annual O&M Costs: $11,000
Present Worth: $122,000
Months to Implement: 6

This alternative is the same as GW-1 with the addition of institutional controls such as deed and/or zoning restrictions to prevent use of contaminated ground water at the site.

ALTERNATIVE GW-3*: GROUND WATER PUMPING, TREATMENT AND REINJECTION WITHIN THE PLUME

Construction Cost: $2,043.000
Annual O&M Costs: $285,000
Present Worth: $6,431,000
Months to Implement: 360

This alternative involves pumping ground water at 240 gallons per minute from extraction wells southwest and downgradient from the site to capture the contaminant plume. This will capture contaminated ground water currently discharging to the Great Egg Harbor River. Extraction would be followed by treating the ground water to drinking water standards. Treated water would be reinjected to the aquifer at 240 gallons per minute until contaminants in the aquifer fall below ARARs.

* Note: Alternative GW-3 discussed above is a modification of the design presented in the FS; additional information can be found in the SFS.

ALTERNATIVE GW-4*: GROUND WATER PUMPING, TREATMENT AND DISCHARGE TO THE GREAT EGG HARBOR RIVER

Construction Cost: $2,766,000
Annual O&M Costs: $406,000
Present Worth: $9,016,000
Months to Implement: 360

This alternative involves pumping ground water at 460 gallons per minute from extraction wells southwest and downgradient from the site. This will capture contaminated ground water currently discharging to the Great Egg Harbor River. Extraction would be followed by treating the ground water to drinking water standards and then discharged to the Great Egg Harbor River until contaminants in the aquifer fall below ARARs. This would require a waiver of Pinelands regulations that restrict surface water discharge.

* Note: Alternative GW-4 discussed above is a modification of the design presented in the FS; additional information can be found in the SFS.

COMPONENT 5- SURFACE WATERS AND SEDIMENTS OF THE GREAT EGG HARBOR RIVER

Sampling and analysis of the Great Egg Harbor River's surface waters and sediments will further characterize contaminants concentrations and distribution in the river. This will include biological sampling to evaluate organisms responses to changes in the river environment related to contamination. A determination will then be made if remediation of the Great Egg Harbor River waters and/or sediments will be necessary. Costs and detailed discussion of this alternative are included as part of the Component 4 cost and discussion of ground-water alternatives in the FS and SFS.

Preferred Alternatives

After careful consideration of all reasonable alternatives, EPA proposes utilizing the following alternatives for the remedial action for the KOP site:

COMPONENT 1- METALS CONTAMINATED SOILS, SEDIMENTS AND SLUDGES

ALTERNATIVE S-4: COMPLETE EXCAVATION; CONTAMINANT EXTRACTION; REPLACEMENT ON SITE
This consists of excavation of metals-contaminated soils that do not meet the cleanup objectives in the area adjacent to the lagoons, sediments in the swale and sludges in the lagoons. Extraction of metals contaminants will continue until the cleanup objectives are met. This alternative will reduce human health risks to a protective Hazard Index of less than 1. After excavation, these materials would be consolidated and contaminant extraction would be performed in a multi-stage batch process. The treated soils, sediments, and sludges would then be redeposited in their original locations after meeting the cleanup objectives.

COMPONENT 2- BURIED DRUMS AND SOILS CONTAMINATED WITH VOLATILE ORGANIC COMPOUNDS

ALTERNATIVE DR-2: DRUM REMOVAL AND OFF-SITE DISPOSAL; SAMPLING AND ANALYSIS OF SOILS
This consists of removal and off-site disposal of the buried drums and visibly contaminated soils followed by sampling and post-removal analysis of nearby soils to define types and concentrations of residual contaminants. This will provide a complete characterization of soils contamination and volumes that may require further remediation. If further remediation is warranted, a focused feasibility study will be conducted to evaluate remedial alternatives.

COMPONENT 3- TANKERS AND CONTENTS

ALTERNATIVE TK-2: TANKER REMOVAL AND OFF-SITE DISPOSAL
This involves removing the tankers and their contents for off-site disposal.

COMPONENT 4- GROUND WATER

ALTERNATIVE GW-3: GROUND WATER PUMPING, TREATMENT AND REINJECTION
This involves pumping the contaminated ground water from the

upper aquifer and treating to MCLs. Treated ground water would be reinjected into the aquifer. This process will continue until MCLs are achieved in the aquifer. The treatment system will also prevent contaminants in the upper aquifer from discharging into the river. Additional monitoring wells will be required to provide data to define more completely the vertical extent of contamination. The pumping, treatment and reinjection design may need to be modified, if data indicate contamination in the deeper aquifer.

COMPONENT 5- SURFACE WATER AND SEDIMENTS OF THE GREAT EGG HARBOR RIVER

Additional sampling of the Great Egg Harbor River's surface waters and sediments will be conducted to define contamination more completely, assess biological impacts and to monitor future contaminants concentrations in the river. This information will be used to determine if remediation of the Great Egg Harbor River waters and/or sediments will be necessary. Costs and detailed discussion are presented in the ground-water alternatives in the FS and SFS.

Rationale for Selection

The nine criteria used to evaluate all remedial alternatives fall into four categories: environmental/public health, compliance with required cleanup standards, technical performance and cost. In addition, the selected remedy should result in permanent solutions and should use treatment to the maximum extent practicable. The criteria are summarized below:

- 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.

- Compliance with ARARs addresses whether or not a remedy will meet all of the Applicable or Relevant and Appropriate Requirements (ARARs) of federal and state environmental statutes and/or provides a basis for a waiver.

- Long-term effectiveness refers to the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

- Reduction of toxicity, mobility or volume is the anticipated performance of the remedy in terms of reducing the toxicity, mobility or volume of the contaminants of site hazardous landfill sites, and costliness. Moreover, excavation and disposal would not meet the statutory preference for a remedy that involves treatment as a principal element.

COMPONENTS 2- BURIED DRUMS AND SOILS CONTAMINATED WITH VOLATILE ORGANIC COMPOUNDS

ALTERNATIVE DR-2: DRUM REMOVAL AND OFF-SITE DISPOSAL;

Removal and off-site disposal of drums would be effective and permanent in removing risks to recreational users and any inhabitants of the site. It would also eliminate the major source of organic contaminants migrating to the aquifer.

Additional characterization of soils contamination will provide the basis to determine if additional action is required.

The No Action Alternative would offer no reduction in toxicity, mobility or volume of contaminants in the drums. Deterioration of the drums could result in increased levels of contamination being released to soils and the ground water.

COMPONENT 3- TANKERS AND CONTENTS

ALTERNATIVE TK-2: TANKER REMOVAL AND OFF-SITE DISPOSAL

Removal of tankers and their contents would be effective and permanent in removing risks to any recreational users and any inhabitants of the site.

The No Action Alternative would offer no reduction in toxicity, mobility or volume of contaminants in the tankers. Deterioration of the tankers could result in increased levels of contamination being released to soils and the ground water.

COMPONENT 4- GROUND WATER

ALTERNATIVE GW-3: GROUND WATER PUMPING, TREATMENT AND REINJECTION

The pumping of contaminated ground water from the upper aquifer until required cleanup levels are met, and the treatment of the ground water to drinking water standards (MCLs), followed by reinjection to the upper aquifer will be protective of human health and the environment. Long-term effectiveness and permanence would be achieved once the ground-water cleanup level is reached. Toxicity, mobility and volume of the ground-water contaminants would be reduced, and discharge of ground-water contaminants to the Great Egg Harbor River would be eliminated.

concern in the environment.

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

- Implementability refers to the technical and administrative feasibility of implementing a remedy, including availability of materials and services required to implement a particular option.

- Cost includes estimated capital and operation and maintenance costs of the remedy, and the net present worth cost.

- State Acceptance indicates whether, based on its review of the RI and FS and the Proposed Remedial Action Plan (PRAP), the state concurs with the preferred alternative.

- Community Acceptance will be assessed in the Record of Decision following a review of the public comments received on the RI, FS and SFS reports and the Proposed Plan.

EPA in consultations with NJDEP, is required to select the remedial alternatives which offer the best balance among the nine criteria. The manner in which the preferred alternatives meets the criteria are presented briefly below. Community comments and acceptance are being solicited at this time.

COMPONENT 1- METALS-CONTAMINATED SOILS, SEDIMENTS AND SLUDGES

ALTERNATIVE S-4: COMPLETE EXCAVATION; CONTAMINANT EXTRACTION; REPLACEMENT ON SITE

Excavation of metals-contaminated soils, sediments and sludges and extraction of metals contaminants would be effective and permanent in removing risks to recreational users and any future inhabitants of the site. This soil alternative permanently removes contamination, completely restores the site and allows for future unrestricted use. Toxicity, mobility and the volume of contaminants would be reduced once cleanup goals are met. Human health risks would be reduced to a Hazard Index of less than 1.

Competing alternatives such as stabilization/solidification or containment are less attractive because they do not remove contaminants and would limit future use of the site. In addition, other alternatives such as excavation and disposal may not be implementable due to the uncertainties of available off-

The ground water would be returned for use as a potable water source.

This remedy is highly implementable because reliable commercial operations are available for pumping and treatment. The cost for this alternative is reasonable relative to the protectiveness of this remedy.

Competing alternatives such as No Action or Limited Action are less attractive because contaminants will not be removed and will continue to discharge to the Great Egg Harbor River. Furthermore, alternatives such pumping, treatment and discharge to the river may not be implementable due to regulatory restrictions (e.g., pumping, treatment and discharge to the river).

COMPONENT 5- SURFACE WATER AND SEDIMENTS OF THE GREAT EGG HARBOR RIVER

Additional sampling and analysis of surface waters and sediments of the Great Egg Harbor River will allow a determination on whether further remediation of the river system may be necessary to protect the public health and environment. The monitoring program is included in the ground-water alternatives in the FS and SFS.

SUMMARY

The preferred alternatives represent the best balance among the criteria used to evaluate remedial actions. Based on the information available at this time, EPA believes that the preferred alternatives would be more protective than competing alternatives, attain ARARs, be cost effective and would use permanent and complete treatment technologies to the maximum extent practicable.

Selected Alternatives and Costs are summarized below:

Component	Alternative	Present Worth*
1- Metals Contamination of Soils, Sediments & Sludges	S-4: Excavation/Extraction and Redeposit	$8,050,000
2- Buried Drums and Soils Contaminated with Volatile Organic Compounds	DR-2: Drum Removal & Off Site Disposal/Soil Sampling and Analysis	386,000
3- Tankers & Contents	TK-2: Tanker Removal and Off Site Disposal (including Tanker contents)	22,000
4- Contaminated Ground Water	GW-3: Pumping, Treatment and Reinjection into the aquifer	6,431,000
5- Great Egg Harbor River	Additional Sampling: included in GW-3	-----
	ESTIMATED TOTAL COST	$ 14,889,000

*: Present Worth is the amount of money needed to invest now at a discount rate of 5% interest in order to have the appropriate funds available at the time the remedial action is implemented.

KING OF PRUSSIA TECHNICAL CORPORATION SITE

SUMMARY OF REMEDIAL ALTERNATIVES

REMEDIAL ALTERNATIVE	PRESENT WORTH COST (1,000)	DURATION OF REMEDIAL ACTION (YEARS)	COMMENTS
* COMPONENT ONE (METALS CONTAMINATED SOILS, SEDIMENTS AND SLUDGES)			
S-1: No Action	79	0.2	Inadequate to protect human health and the environment.
S-2: Limited Action (Fencing and Institutional controls)	144	1	Inadequate to protect human health and the environment.
S-3: Limited Excavation/ Consolidation/Capping	1,740	1	Limited protectiveness; not permanent; contaminants remain on-site.
S-4: Complete Excavation/ Extraction/Redeposit Soils On-Site	8,050	2	Protective; permanent; contaminated soil cleaned; contaminants disposed off-site; complete restoration of site.
S-5: In-Situ Stabilization & Solidification/Capping	3,336	2	Protective; contaminants immobilized but remain on-site; completeness uncertain; no reduction in toxicity or volume; site topography affected; contaminants would be rendered "non-characteristic."
S-5a*: Complete Excavation/ Stabilization & Solidification/Capping	5,402	2	Protective; contaminants immobilized but remain on-site; no reduction in toxicity or volume; site topography affected; contaminants would be rendered "non-characteristic."
S-6: Complete Removal/ Off-Site Disposal	11,500	1	Protective; permanent; contaminants disposed off-site; complete restoration of site; high relative cost.

REMEDIAL ALTERNATIVE	PRESENT WORTH COST (1,000)	DURATION OF REMEDIAL ACTION (YEARS)	COMMENTS
• COMPONENT TWO (BURIED DRUMS AND CONTAMINATED SOILS)			
DR-1[#]: No Action	79	0.2	Inadequate to protect human health and the environment.
DR-2*: Drum Removal & Disposal/Soil Sampling & Analysis	**386**	**1**	**Protective; soils sampling results will determine if further is remediation is required.**
• COMPONENT THREE (TANKERS)			
TK-1: No Action	0	0.2	Inadequate to protect human health and the environment.
TK-2: Tanker Removal & Disposal	**22**	**1**	**Protective; permanent; contaminants disposed off-site; low cost.**
• COMPONENT FOUR (GROUND WATER)			
GW-1: No Action	122	0.2	Inadequate to protect human health and the environment; monitoring of the Great Egg Harbor River (GEHR).
GW-2: Limited Action (Institutional controls)	122	1	Inadequate to protect human health and the environment; monitoring of the GEHR.
GW-3*: Downgradient Capture/Treatment/ Reinjection	**6,431**	**30**	**Treatment reduces toxicity; eliminates contaminant discharge to the GEHR; monitoring of the GEHR.**
GW-4*: Downgradient Capture/Treatment/	9,016	30	Treatment reduces toxicity; eliminates contaminant discharge to the GEHR; waiver of surface water discharge restrictions required; includes monitoring of GEHR.
COMPONENT FIVE (GREAT EGG HARBOR RIVER)			
All Groundwater Alternatives	**@**	**30**	**Sampling of the GEHR surface waters and sediments to provide additional characterization of contamination; further remediation will be considered.**

Notes

* Presented in the SFS.

Identical to Alternative BD-1 presented in the FS.

@ Costs included with GW alternatives.

PREFERRED ALTERNATIVES ARE IN BOLD

... Agency

...nces A Public Meeting on the Proposed Remedial Alternatives for the King Of Prussia Technical Corporation Site

Winslow Township, New Jersey

The U.S. Environmental Protection Agency (EPA) in conjunction with the New Jersey Department of Environmental Protection (NJDEP) recently completed a Remedial Investigation/Feasibility Study (RT/FS) and a Supplemental Feasibility Study (SFS) for the King Of Prussia Technical Corporation Site, which is located in Winslow Township, New Jersey. Based on the results of these studies, EPA has developed a Proposed Remedial Action Plan (PRAP) to cleanup the site. A Public Meeting will be held at the Winslow Township Municipal Hall, located on Route 73 in Braddock, New Jersey, on Wednesday, August 1, 1990 at 7:00 pm to discuss the RI/FS, the SFS and to present the PRAP. The public is invited to discuss the RI/FS report, the SFS and the PRAP at the public meeting and to submit oral and written comments to EPA during the public comment period, which concludes on August 15, 1990. EPA and NJDEP welcome the public's comments on all alternatives identified below. EPA will choose the final remedy after the public comment period ends and consultation with NJDEP is concluded. EPA may select an option other than the perferred alternatives presented in the PRAP, after consideration of all comments is concluded. The following gare the alternatives, presented in the PRAP, for the King Of Prussia Technical Corporation Site.

Soil Remediation

Alternative S-1: No Action

Alternative S-2: Limited Action

Alternative S-3: Limited Excavation of Soils, Sediments and Sludges, Contaminant Extraction, Redeposition On-Site

Alternative S-4: In Situ Stabilization, Solidification and Capping:

Alternative S-5a: Complete Excavation of Soils, Sediments and Sludges, Stabilization, Solidification and Capping

Alternative S-6: Complete Removal and Off-Site Disposal

Drum Removal Alternative

Alternative DR-1: No Action

Alternative DR-2: Drum Removal and Off-Site Disposal and the Sampling and Analysis of Soils.

The Tankers and Contents Remediation Alternatives

Alternative TK-1: No Action

Alternative TK-2: Tanker Removal and Off-Site Disposal

Groundwater Remediation Alternatives

Alternative GW-1: No Action

Alternative GW-2: Limited Action

Alternative GW-3: Groundwater pumping, treatment and reinjection within the plume

Alternative GW-4: Groundwater pumping, treatment and discharge to the Great Egg Harbor River.

The last proposed remedial alternative also includes sampling and analysis of the Great Egg Harbor River's surface waters and sediments.

After careful consideration of the remedial alternatives, EPA and NJDEP's preferred alternatives are:

Alternative S-4: Complete Excavation, Contaminant Extraction and Replacement On-Site, for remediation of the metals-contaminated soils, sediments and sludges

Alternative DR-2: Drum Removal and Off-Site Disposal, Sampling and Analysis of Soils for remediation of the buried drums and soils contaminated with volatile organic compounds

Alternative TK-2: Tanker removal and off-site disposal for remediation of the tankers and contents

Alternative GW-3: Groundwater pumping, treatment and reinjection, and additional sampling of the surface water and sediments of the Great Egg Harbor River.

The public can review documents, including the RI/FS report, the Supplemental FS and the PRAP at the following locations:

Winslow Township Municipal Hall
Route 73
Braddock, New Jersey [illegible]
(609) 567-0700

Camden County Library
Echelon Urban Center
Laurel Road
Voorhees, New Jersey 08043
(609) 772-1636

Written comments should be sent to Mr. James Hahnenberg, Remedial Project Manager, at the U.S Environmental Protection Agency, Room 720, 26 Federal Plaza, New York, New York 10278.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
PUBLIC INFORMATION MEETING
FOR

King of Prussia
August 1, 1990

ATTENDEES

(Please Print)

NAME	STREET	CITY	ZIP	PHONE	REPRESENTING	MAILING LIST
Rhonda Porter	21 Lenore Ct.	Winslow	08037	561 5432		
Tom Parker	21 Lenore Ct.	"	"	"		
P. Ohara	NJ DOH	Trenton	086025	609-633-2043	NJ DOH	✓
Rudi Wilson	3 KARR Ave	Winslow Berlin	[illegible]	768-4163	Winslow Env. Comm.	
P.V. DeCrescenzo	13 Vernon Ct.	Sicklerville	08081	629-7190	Win. Twp. Env. Comm.	
[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	
M.P. Levering	316 Ellis St.	Glassboro	08028	881-1153		✓
June Fletcher	1 Spruce Ave	Hammonton	08037	567-3533	Winslow Env	Comm
Terry Rubba	Bx 127 Piney Hollow Rd #1	Williamstown	08094	629 3726	Monroe Twsp	
Andy Williams					GC Times	
William H O'Brien	45 Westerly Dr	Sicklerville	08081	728-2112		
Eliz. Tyrten	Piney Hollow Rd	Cecil	08094			
Jim Powell	57 [illegible] Rd	[illegible] Blue Anchor	08037	561 3703	Twp Committee	

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
PUBLIC INFORMATION MEETING
FOR

King of Prussia
August 1, 1990

ATTENDEES

(Please Print)

NAME	STREET	CITY	ZIP	PHONE	REPRESENTING	MAILING LIST
Albert Braun	RD#5 276 Braddock Ave	Braddock NJ.	08037	567-2064		✓
Sue Ann Metzner	11 Cedar Hill Dr	Sicklerville	08081	728-5044	Winslow Township Committee	
Patricia A. Hall	395A - RD 3 Rd Mays Landing	Hammonton	08037	561-4905	Winslow Twp. Board of Health Sec	
Kathleen Edwards	28 White Horse Pike	Barrington	08007	757-5353	Senator Lautenberg	✓
[illegible]	Black Horse Pike	Williamstown	08094	629-7890	Williamstown	✓
Russell Bates	21 Peachton	Sicklerville	08081	728-2064	Twp. Comm.	✓
Frank P. Cavallo, Jr	2746 Braddock	Braddock NJ	08037	567-9650		✓
Alberta Greene	227 No. 9th	Atco	08004	768-0620	Winslow	✓
Aquila Randall	205 Main St.	Albion	08009	767-2945		✓
[illegible]	14 Pinesfield	Sicklerville	08081	728-3236	Winslow	✓
Marianne Carrigan	12 Lenore Ct	Winslow	08037	561-7334		
Elaine Mcomber	RFD #3 Box H1	Hammonton	08037	567-2297	Winslow	✓
Bill [illegible]	P.O. Box 387	Marlton NJ	08053	768-1010	[illegible]	✓

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
PUBLIC INFORMATION MEETING
FOR

King of Prussia
August 1, 1990

ATTENDEES

(Please Print)

NAME	STREET	CITY	ZIP	PHONE	REPRESENTING	MAILING LIST
Joseph E. Mathews	Blue Anchor	Winslow	08037	561-4107		
John Dargan	Sicklerville	Winslow	08081	629-8771	Winslow Am.	
James Sullivan Jr.	12 Grove St	Sicklerville	08081	567-0382		✓
Edward J. Green	[illegible] Rd	Winslow	08037	561-6265	Self	
CHRIS ROBINSON	11 LINLEE PL	BLUE ANCHOR	08037	561-7935	WINSLOW CITIZEN	✓
Jane Nigaki	223 park	Atco	08004	767-1110	C.A.T.	
Jamie Hammond	8 Rockledge	Marlton	08053	767-6526		✓
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	✓

90(   ) Pat Seppi (212)264-9369

FOR RELEASE:

EPA EXTENDS PUBLIC COMMENT PERIOD FOR THE KING OF PRUSSIA SUPERFUND SITE

NEW YORK -- The U.S. Environmental Protection Agency has extended the public comment period for the King of Prussia Superfund site in Winslow Township, N.J. to Friday, September 14, 1990.

Copies of the Proposed Plan, which discusses the preferred remedial alternative, as well as copies of the Remedial Investigation and Feasibility Study (RI/FS), which discusses the nature and extent of contamination and evaluated alternatives for addressing the contamination, can be reviewed at the following repositories:

Winslow Township Municipal Hall
Route 73
Braddock, N.J. 08073

Camden County Library
Echelon Urban Center
Laurel Road
Voorhees, N.J. 08043

All written comments on the RI/FS and the preferred alternative may be sent to James Hahnenberg, Remedial Project Manager, U.S. EPA, Region II, Emergency and Remedial Response Division, 26 Federal Plaza, Room 720, New York, NY 10278.

Appendix B

King of Prussia Technical Corporation Site Committee Comments on the Proposed Plan and Supplemental Feasibility Study

September 14, 1990

VIA FEDERAL EXPRESS

Mr. James Hahnenberg
Project Manager
U.S. Environmental Protection Agency
Room 720
2600 Federal Plaza
New York, NY 10278

Mr. George Pavlou
Associate Director for Enforcement Programs
Emergency and Remedial Response Division
U.S. Environmental Protection Agency
Region II
Jacob K. Javits Federal Building
New York, NY 10278

Re: **Proposed Remedial Action Plan**
King of Prussia Technical Corporation Site
Winslow Township, New Jersey

Dear Sirs:

The following comments are submitted on behalf of the signatories to the Administrative Consent Order and Agreement dated April 17, 1985 ("KOP Site Committee") concerning the proposed remedial action plan dated July 1990 ("PRAP") issued by the United States Environmental Protection Agency ("EPA") at this site. It is the Site Committee's understanding that these comments, and previous correspondence between the EPA and Site Committee representatives, are part of the administrative record and will be considered prior to issuance of a record of decision ("ROD").

PROPOSED REMEDIAL ACTION PLAN

ERM COMMENTS

In a letter dated September 14, 1990 to the Site Committee, its technical consultant, Environmental Resources Management, Inc. ("ERM") has prepared comments on the PRAP which are appended hereto ("Attachment 1"). The members of the Site Committee adopt and incorporate ERM's comments as their own.

ADDITIONAL COMMENTS

In addition to ERM's comments, the Site Committee submits the following comments on the PRAP.

In the Feasibility Study Report dated April 6, 1990, ERM and the KOP Site Committee recommended selection of Alternative E-2A as the appropriate remedy for this site. The position of the KOP Site Committee continues to be that Alternative E-2A should be selected by EPA as the remediation plan.

Alternative E-2A calls for the removal and off-site disposal of drums, the consolidation, soil-vacuuming, stabilization and capping of contaminated sludges and soils, and institutional controls, consisting of site access and land use restrictions and future monitoring, including a five-year groundwater pump and treat program to assess the effectiveness of the groundwater treatment approach and appropriateness of the proposed applicable or relevant and appropriate requirements (ARARs) for groundwater. Alternative E-2A will be protective of the public health and the environment. As noted in ERM's comments (Attachment 1), it is unlikely that even the proposed remedial plan will meet drinking water standards for metals.

The KOP Site Committee objects to the PRAP as an excessive and unreasonable remedy in light of the conditions found at this site. The remedy in the PRAP is not necessary to protect human health or the environment, not justified by data from the RI/FS, not cost-effective, not based on proven and reliable remedial technologies, and not based on realistic remedial objectives. The thirty-year pump and treat program for groundwater and the contaminant extraction treatment program for soils depend on remedial technologies which are not proven or cost-effective. They are not based upon a realistic assessment of future land uses for this site or realistic remedial objectives for groundwater. In light of background conditions and the limited public health and environmental risks at this site, especially after implementation of the other remedial components of Alternative E-2A, drinking water standards are not appropriate requirements for this site or should be waived. The groundwater and soil component remedies in the PRAP are not cost-effective or necessary to protect public health or the environment.

As pointed out in the attached ERM comments, ingestion of groundwater or soils by residents living on or near the site is an unlikely and unrealistic exposure scenario. There are no residences on or in the immediate vicinity of the site, nor are there any plans for such residential development known to the Site Committee. In fact, such residential development is unlikely given existing development restrictions in present laws and regulations respecting the Pine Barrens, the Wildlife Management Area, landfills, floodplains and wetlands. With the adoption of institutional controls for the site, including land use and site access restrictions in keeping with the Pine Barrens Protection District and nearby Wildlife Management Area, the theoretical risk of harmful human exposure to residually-contaminated soils, even if any such risk exists after stabilization and capping, can easily controlled.

Additionally, the KOP Site Committee objects to the PRAP as not cost-effective. The estimated cost of the PRAP is $14.8 million (Table 1)--almost three times the $5.75 million cost of Alternative E-2A (Table 4-2 of the Feasibility Study Report). The KOP Site Committee is not aware of anything in the Remedial Investigation and Feasibility Study (RI/FS) Reports or administrative record demonstrating that the expenditure of an additional $9 million is a cost-effective remedial approach for this site or will substantially enhance protection of the public health and the environment. See ERM's attached comments.

Simpler and more cost-effective remedial alternatives achieving substantially the same objectives have been identified in the FS Report or are otherwise available, including Alternative E-2A, which are fully capable of addressing the limited risks at this site and should be adopted by EPA.

SUPPLEMENTAL FEASIBILITY STUDY

On April 6, 1990, ERM submitted the KOP Site Committee's final FS Report to EPA. Subsequently, EPA issued a Supplemental Feasibility Study ("SFS") Report. To the extent that the SFS Report is inconsistent with, or fails to incorporate, the comments and recommendations of the KOP Site Committee's RI/FS Reports, and other recommendations and comments of ERM, the Site Committee objects to the findings of the SFS Report.

CONCLUSION

Please accept these comments by the KOP Site Committee and ERM in the spirit of cooperation to assist EPA in review and selection of an appropriate and reasonable remedial plan for this site. Nothing in these comments should be construed as an admission of any responsibility, fault or legal liability on the part of the Site Committee or any of its members.

Should you have any questions or wish to discuss the matters set forth above, please do not hesitate to contact the Site Committee representatives. Thank you for your careful attention to the views expressed herein.

Respectfully submitted,

Cabot Corporation

Carpenter Technology Corporation

Ford Electronics and Refrigeration Corporation

Johnson-Matthey Corporation

LNP Corporation

Ruetgers-Nease Chemical Company, Inc.

Attachment
cc: Joseph McVeigh, Esq,
U.S. Environmental Protection Agency

14 September 1990

KOP Site Committee
c/o Lynn Wright, esq.
Edwards and Angell
750 Lexington Avenue
New York, NY 10022

Dear Members of the Site Committee:

Environmental Resources Management, Inc. (ERM) has reviewed the EPA's Proposed Remedial Action Plan (PRAP) for the KOP site in Winslow Township, New Jersey. Based on our review of the PRAP, the EPA's Supplemental Feasibility Study (SFS), and the site feasibility study (FS), we are submitting a number of comments for consideration by the EPA in preparation of the final Record of Decision (ROD) for the site. Our major comments relate principally to:

- the EPA's preliminary selection of contaminant extraction for the Component 1 remedy,
- our continued opinion that on-site stabilization and capping is appropriate as the Component 1 remedy, and
- inadequate consideration on EPA's part of metals in ground water when selecting the ground water remediation goals and system.

Our specific comments on the PRAP are as follows.

- p. 7, 2nd complete paragraph, 1st sentence: "The cancer risk from drinking contaminated ground water is 2.4×10^{-2}, although presently there are no users of the ground water in the proximity of the site."

  This is an oversimplification of the potential risk associated with drinking contaminated ground water at the site. First, the risk level of 2.16×10^{-2} is for the maximum VOC concentrations detected. The risk level based on average concentrations, which represents the most probable exposure condition, is lower, at 2.5×10^{-3}. This is the appropriate risk level to be cited for the residential use scenario.

Second, ERM believes that residential development is not the most likely future land use at the site. The most plausible future land use scenario for the site is recreational use, as the site is within the Pine Barrens, adjacent to a wildlife management area, and owned by the township. ERM believes that the carcinogenic risk level from the EA which corresponds to that type of land use should accordingly be presented as the existing site risk in the final ROD. That risk level is 4.9×10^{-5}.

p. 7, 2nd complete paragraph, 2nd sentence: "The proposed remedial activities will reduce contaminant concentrations to Maximum Contaminant Levels (MCLs) that are drinking water standards."

This sentence indicates that MCLs will be achieved via ground water remediation. While this may be possible for the organic contaminants, it has been clearly demonstrated in the site FS that metals in the ground water will not be reduced to the MCLs in any foreseeable time period. The presentation of this concept in the PRAP results in a misleading oversimplification of the site ground water remedy, which will create unrealistic public expectations for the ultimate degree of cleanup.

- **p. 7, 3rd complete paragraph: "The RI indicates metals contamination may present a threat to stream biota due to metals contamination in the sediments and possible bioaccumulative effects. Additional data on contaminant concentrations and biologic effects are necessary."**

The EA, not the RI, discusses potential threats to stream biota. The EA concluded that the concentrations of metals detected suggest a "minimal potential for adverse effects to aquatic receptors...", noting, however, that no definitive conclusions are possible with the available data. The EA conclusion of minimal impact potential is not accurately reflected in the PRAP language. Furthermore, if the potential for impact is truly minimal, as concluded in the EA, there should be no need for additional data collection.

- **p. 14, Component 5, Surface Waters and Sediments of the Great Egg Harbor River; p 16, Selection of Remedy for Component 5: "Sampling and analysis of the Great Egg Harbor River's surface waters and sediments will further characterize contaminants concentrations and distribution in the river. This will include**

biological sampling to evaluate organisms responses to changes in the river environment related to contamination. A determination will then be made if remediation of the Great Egg Harbor River waters and/or sediments will be necessary."

As discussed above, the site EA determined that minimal potential for impacts exists in the Great Egg Harbor River. The purpose of collecting the RI data was to provide the basis for preliminary determination of the likelihood of impact. On the basis of those data, it was determined that long-term protection of the river would be achieved by removal of metals from the ground water system via pump and treat technology. Further remediation of the river would require dredging to remove metals from the sediments, which would in itself cause adverse impacts to the river by mobilizing metals in suspension and destroying benthic habitats. Given the unlikelihood of current impacts, further remediation by dredging of sediments clearly represents a greater potential for adverse impact on the river than does the current condition.

- **p. 15, paragraph 2: Selection of remedy for Component 1 (Metals-Contaminated Soils, Sediments, and Sludges):**

  The PRAP selects contaminant extraction for this component of the site remedy. The FS recommendation was for stabilization and containment in the former lagoon area. ERM has several observations regarding the remedy proposed in the PRAP:

  - Contaminant extraction is an emerging technology which has not been performed at full scale to any significant extent. Thus, there are many unknowns associated with the performance of contaminant extraction, including its ultimate effectiveness. Treatability studies will be required to determine the degree of effectiveness at the KOP site. Until such evaluations are done, it is premature to select this technology as the remedy for Component 1.
  - No evaluations have been done to determine if this technology is the most cost-effective method of achieving protectiveness at the site. Until such evaluations are done, it is premature to select this technology as the remedy for Component 1.
  - The contaminant extraction technology would remove the metals from the site media and merely transfer them to

another location, as they are not destructible. Since it is well documented that the site ground water will not likely be usable for future significant development of the site, no added value to relocating the site contaminants has been demonstrated.

- Stabilization is a well-established, proven technology for treatment of metals-contaminated soils and sludges and, as such, has been designated as Best Demonstrated Available Technology (BDAT) under the Land Disposal Restrictions. Stabilization and capping of the soils and sludges on site would effectively encapsulate the contaminated soils, preventing both continued leaching to ground water and direct contact. Thus, under the most reasonable future land use for recreational purposes, on-site stabilization with capping is both technically feasible and protective.

Given the factors described above, we believe that on-site stabilization is the appropriate Component 1 remedy for application at the site. However, should contaminant extraction be specified in the final ROD, it should include a requirement for treatability testing. Given the fact that contaminant extraction is unproven, such a ROD should also provide for a contingent on-site stabilization remedy.

- **p. 15, last paragraph, to p. 16: Selection of remedy for Component 4 (Ground Water):**

  The remedy selected is a ground water recovery, treatment, and reinjection program which was evaluated in the SFS. This program incorporates numerous recovery and injection wells throughout the ground water contamination plume, with the intent that ground water remediation will be conducted until the ground water ARARs are met. By contrast, the ground water remediation program designed in the FS takes into account the technical constraints shown in the FS to preclude reaching of metals ARARs using pump and treat technology. The FS design includes one line of recovery wells located in the area of highest concentration in the plume, with the intent that VOCs would be reduced to either ARARs or to practical minima within a reasonable period of time, while coincident mass removal of metals would protect the Great Egg Harbor River over the long term.

It is ERM's opinion that the proposed remedy selected in the PRAP fails to take into account the technical constraints on reaching metals ARARs, as described in detail in the site FS. This results in several issues being inadequately addressed by the PRAP, including the following.

- The ability of the SFS system design to meet ARARs: The PRAP assumes that ARARs can be met, while the FS demonstrates that this will not be the case.
- Remedial goals/expectations: The PRAP sets the remedial goal as attainment of ARARs, which has been demonstrated in the FS to be infeasible.
- Time period to remediation: The PRAP appears to be inconsistent on the issue of time to achieve remediation.
- The SFS design vs. the FS design: The SFS design has been assumed by the EPA to be superior to the FS design, but again, this assumption ignores the constraints on metals removal.
- Degree of environmental protection: The PRAP has failed to consider the deleterious effects on the environment of installing the more complex SFS system design.
- Evaluation of remedy effectiveness: The PRAP has failed to take into account the need to evaluate the effectiveness of the ground water recovery system during its operation, the effects of system design on the evaluation process, and the effects of the evaluation on reexaming remedial goals.
- Consistency of the PRAP with EPA internal guidance on ground water remedies: The PRAP has failed to follow the guidance provided in the EPA internal memo of October 18, 1989 regarding evaluation of ground water recovery systems, flexibility in ground water recovery RODs, and the need to address contingent remedies and potential waivers of ARARs in RODs.

These issues are addressed in greater detail as follows.

Ability of the SFS System to Achieve ARARs

In the modeling performed in the SFS, the ultimate goal of the ground water recovery program is not clearly defined. The PRAP indicates the goals of the ground water recovery program to be attainment of ARARs and prevention of metals discharge to the Great Egg Harbor River. Like the FS modeling, the SFS effort was focused on time to remediation of VOCs in the ground water. In theory, the SFS design remediates VOCs more quickly than the FS design, leading EPA to the conclusion that the SFS design is superior for the purpose of meeting ARARs. However, unlike the FS, the SFS did not address the problems inherent in meeting ARARs for metals due to their high retardation in soils. It is well established that metals generally exhibit very low rates of partitioning from soils to ground water. This factor was shown in the FS to severely restrict the potential for any ground water recovery system to achieve ARARs for metals, even over the very long term.

The SFS ground water recovery modeling was limited to a demonstration of the time frame for theoretically meeting the VOC ARARs at the site. Metals were ignored. However, the metals are actually more limiting for ground water usage potential than the VOCs. Treatment of metals to potable levels for water supply is generally not practiced due to technical and economic limitations, while treatment of water supplies for VOC removal is a proven, cost-effective technology. Thus the PRAP, by ignoring the metals issue, fails to address the more significant technical limitation on ground water remediation at the site.

Remedial Goals/Expectations

By ignoring the metals issue as addressed in the FS, the PRAP reaches the erroneous and misleading conclusion that ARARs will be met in ground water by using the SFS recovery system. Again, it was clearly demonstrated on a technical basis in the FS that it is highly unlikely that metals concentrations can be reduced to the levels of ARARs in the foreseeable future and that organics may or may not be reduced to the ARARs. Given this knowledge, the ROD for the site should discuss the constraints of ground water recovery at the site and should set reachable goals, based on technical realities. To do any less is considered by ERM to be overly optimistic and misleading; it can only create unrealistic expectations in the minds of the public regarding the degree of and time frame required for site remediation.

Given the inability of ground water recovery to achieve metals ARARs, the FS proposed that mass removal of metals from the upper aquifer should be conducted until the reduction would be permanently protective of the river. This provides a goal for permanent protectiveness that recognizes and takes into account the technological limitations on ground water remediation at the site. Since the ground water will never be usable without treatment for metals (and possibly for VOCs), the FS goal concept should be incorporated into the final ROD.

Time to Remediation

The PRAP appears to select the SFS ground water recovery system because it will theoretically meet the VOC ARARs faster than the FS system design. However, the cost estimate for the remedy is based on 30 years of operation, presumably due to the presence of the metals, which was not addressed in the SFS. Since the time required to remediate the metals will determine the duration of system operation, it is inappropriate to base the recovery system design on the VOC ARARs. The FS showed that even 30 years of operation is unlikely to achieve the metals ARARs. As also demonstrated in the FS, if realistic (i.e., truly achievable) goals are set for the remediation, the duration of system operation may be considerably less than 30 years.

SFS Design vs. FS Design

It is not clear that the SFS system design will provide superior cleanup performance, despite higher pumping rates and injection of treated water. The sorption/desorption equilibria for metals in soils are very complex. At the elevated ground water velocities induced by the SFS design, the metals desorption rate from soils may change. At the present time, it is unknown whether the rates of metals release and/or mass removal would increase, remain essentially the same, or decrease under the SFS system design. The increase in flow velocity, along with the injection of treated water, may result in the appearance of remediation on a concentration basis during operation of the system. However, the ultimate remediation is dependent on mass removal by partitioning from the soils. If the SFS system were to inadvertently reduce mass partitioning, the metals concentrations in ground water would be expected to rise after the system was shut down, as the original equilibrium conditions returned. Thus, it not clear whether the SFS design is superior to, or possibly inferior to, the FS design for metals removal.

Environmental Protection

The expansive SFS system will place wells and piping systems throughout the area from the site to the river. This configuration would be far more environmentally destructive than the FS design. The construction and maintenence of this system would unnecessarily disrupt a currently undisturbed area of the Pinelands between the Fire Road and the river over the very long term. This factor constitutes a long term adverse impact which was unaccounted for in the SFS evaluation and the PRAP.

Evaluation of Remedial Action

The ground water recovery system must be re-evaluated, by law, on a five-year basis. The selection of a system in the PRAP has failed to take into consideration the needs of the evaluation process. Current scientific understanding of metals remediation in the subsurface is limited. If EPA hopes to maximize metals remediation at the KOP site, a serious effort must be undertaken to evaluate the mobility of metals in the soil and water phases on a site-specific basis. The SFS system will produce a complex potentiometric surface and high spatial variability in water quality. This will complicate evaluation of remedial progress and the mechanisms affecting remediation. For example, as described previously, if desorption of contaminants from the soil is reduced by dilution and increasing flow rate, the effectiveness of the SFS system may be inadvertently overestimated.

The FS, on the other hand, has presented a system which would remediate VOCs in ground water and provide long-term protection of the river, while providing the simplicity to allow more effective evaluation of the remedial process for metals. Based on the five-year findings, the FS system could be modified to optimize metals removal, if necesssary, or might possibly be terminated, if sufficient metals removal had been achieved.

Inconsistency of PRAP with EPA Internal Guidance

As detailed above, the PRAP fails to adequately address the issues of metals remediation and system performance evaluation in the selection of a ground water recovery system for the KOP site. The EPA's own internal memo of October 18, 1989 indicates that such factors should be taken into account in site

RODs. Specifically, Recommendation 2 (p.4) calls for ROD flexibility and contingent remedies, where appropriate. The contingent remedy, when appropriate, should be discussed "in equal detail to the primary remedial option and should provide substantive criteria by which the Agency will decide whether or not to implement the contingency." (p.5). Based on the technical findings of the site FS and on the EPA's internal guidance memo, the issues of metals removal limitations, system performance evaluation, and contingent remedies should be fully addressed in the final site ROD.

In conclusion, it is not at all clear that the technical basis for the ground water remedy specified in the PRAP is correct. Nor is it clear that the proposed remedy is more environmentally protective than the FS system design. It is clear, however, that the PRAP appears to be inconsistent with EPA internal guidance on selection of ground water remedies. ERM's design is in agreement with the technical considerations which form the basis for that EPA internal guidance; we believe that it should be followed in the ROD for the KOP Site.

- p. 16, Selection of Remedy for Component 4 (Ground Water): "Additional monitoring wells will be required to provide data to define more completely the vertical extent of contamination."

The EPA feels that since the lower subzone aquifer wells are not screened immediately below the middle confining subzone, the potential exists for significant contamination to be present in the lower aquifer. The RI data and evaluations of the lower aquifer clearly demonstrate the absence of significant impact on that aquifer. For example, the vertical hydraulic conductivity (K) of the confining unit was shown to be 2.7×10^{-7} cm/sec from the pump test and 1.8×10^{-5} cm/sec (maximum) as calculated using analytical data. Using Darcy's Law (Q (flow) = K x i (hydraulic gradient) x A (cross sectional area of flow)) and RI data on the confining and lower aquifer subzones, it can be calculated from the RI data that the dilution factor from a unit area of the confining unit into the 5-foot upper thickness of the lower aquifer is a minimum of 4200 times. The maximum metals concentrations detected in the upper subzone aquifer were 1040 ug/l chromium, 12,500 ug/l copper, and 4670 ug/l nickel (all at well MW 5-S). Thus, the maximum potential contribution to the lower aquifer is 0.25 ug/l chromium, 3.0 ug/l copper, and 1.1 ug/l nickel, all below MCLs or other possible drinking water standards.

Except for one anomalous detection of chromium above its MCL (at well MW 14-D), all data collected from the lower aquifer confirm this analysis. The average chromium concentration in the lower aquifer was approximately 11 ug/l (below the MCL of 50 ug/l), with 6 of 8 samples below the detection limit of 1 ug/l.

When the ground water recovery system in the upper subzone aquifer goes on line, the downward hydraulic gradient will be reduced, possibly even to an upward gradient. Thus, not only do the current conditions clearly indicate no threat to the lower aquifer, but the ground water remediation program in the upper aquifer will further protect the lower aquifer. Furthermore, any ground water recovery program in the lower subzone aquifer would diminish the protection provided by the upper aquifer recovery program and might risk inducing additional discharge through the confining subzone, thus possibly creating an impact where none now exists.

In summary, ERM has concluded that the lower subzone aquifer is not adversely affected by the site and will be best protected for the long term by the upper subzone aquifer recovery system. Given these conditions, the lower subzone aquifer is adequately monitored, and no additional monitoring wells are needed.

- **p. 17, Alternative S-4, first paragraph, Comments:**

  The need for treatability testing and the fact that this is an emerging technology should be included.

- **p. 18, last paragraph, to p. 19, Alternative GW-3:**

  The comments presented above for pp. 15 to 16, Selection of Remedy for Ground Water, apply here as well.

- **General Comments:**

  The issue of institutional restrictions for the site is not included in the PRAP. Because the ground water will not be remediated in the foreseeable future, institutional measures such as deed restrictions will be necessary to ensure that no land use will ever occur which is *incompatible* with site conditions. These restrictions are also necessary to ensure that the integrity of any on-site remedial actions is maintained and that the property is not used in a way that would create environmental problems in the future. For example, if a long-term ground water recovery system was installed, as proposed by EPA, deed restrictions would be necessary to ensure that future land uses would not contribute new contaminants to the ground water. As shown in the site FS, institutional restrictions are needed under any of the remedial alternatives.

The cost estimates presented for the ground water recovery scenarios assume a 30-year period of operation. It is ERM's opinion that a recovery effort of as long as 30 years' duration is not necessary. The FS has shown that MCLs for metals are highly unlikely to have been achieved in that time frame; thus, achieving MCLs is not a feasible goal for the operation of the recovery system. However, protection of the Great Egg Harbor River is an achievable goal that is capable of being met by both the systems presented in the FS and in the SFS. As discussed in the FS, protection of the river may be obtained in a shorter period than 30 years, thus providing equivalent protectiveness at a lower cost than the 30-year system.

The above comments represent ERM's opinion of the technical issues related to the EPA's PRAP. In short, we continue to support on-site stabilization with capping for the soils and sludges and the FS design for a ground water recovery system as the most appropriate remedies for the site. If you have any questions concerning this submission, please contact either Joe Hochreiter (609-520-8779) or me (215-524-3512).

Sincerely,

Marilyn Hewitt
Project Director

Appendix C

The Pinelands Commission Comments on the Proposed Plan

U.S. EPA Response

The Pinelands Commission

P.O. Box 7, New Lisbon, N. J. 08064 (609) 894-9342

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August 15, 1990

Mr. James Hahneberg
U.S. Environmental Protection Agency
Room 720
26 Federal Plaza
New York, New York 10278

Re: King of Prussia
Winslow Township

Dear Mr. Hahneberg:

The Pinelands Commission staff has reviewed the "Supplemental Feasibility Study Report" (SFS) and the Proposed Remedial Action Plan (PRAP) issued by your agency for the King of Prussia Superfund site in Winslow Township, New Jersey.

As you are aware, the site is located within the Pinelands Protection Area as established by the National Parks and Recreation Act of 1978 (P.L. 95-625, Section 502) and the Pinelands Protection Act (N.J.S.A. 13A-1 et seq.). The Pinelands Comprehensive Management Plan (N.J.A.C. 7:50-1.1 et seq.) was adopted pursuant to the federal and state legislation. The regulations and standards contained in the Pinelands Comprehensive Management Plan (PCMP) were adopted in order to protect the significant and unique natural and ecological resources of the Pinelands as required by the Federal Act and the Pinelands Protection Act.

Please consider the following comments regarding the consistency of the preferred remedial alternatives with the requirements and standards of the PCMP:

Groundwater

The PRAP indicates that the applicable, relevant and appropriate requirements (ARARs) are the state MCL's or drinking water standards. As the Commission staff has previously indicated to your office, the water quality standards of the PCMP prohibit development that would degrade the quality of surface or groundwater. These standards should be considered as ARARs and the remedial goals should be to reduce the concentrations of all contaminants to natural background levels.

It should also be considered that the State has set "PL" surface water standards for the Great Egg Harbor River within the Pinelands. These standards require that surface water must be maintained at its existing quality or that quality necessary to protect the designated uses of the water (including "maintenance and propagation of the natural and established biota indigenous to this unique ecological system"). As the groundwater plume has been identified as the source of contamination of the river surface water and sediments, the remedial goals for the groundwater must consider the effects of the groundwater plume upon the surface water.

The proposal to continue to treat the groundwater until the State MCL's are met will result in a degradation of the quality of both the ground and surface waters of the Pinelands. The groundwater plume would be a continued source of contamination to the river. The levels of several of the inorganic contaminants in the plume discharging to the river would exceed the State's Water Quality Criteria for the Protection of Aquatic Life if the treatment of groundwater was to cease when the MCL's are attained.

Therefore, the proposed remedial alternative for groundwater requirements cannot be considered to be consistent with the Pinelands Comprehensive Management Plan, the Federal Act or the Pinelands Protection Act.

Surface Water and Sediments of the Great Egg Harbor River

The Commission staff agrees that additional sampling is necessary to fully define the extent of contamination of the sediments and surface water of the river. As the source of this contamination has been identified as the discharge of contaminated groundwater, it is likely that any future proposal for remediation of the river will effect the design of the groundwater treatment facilities. Any record of decision on groundwater remediation will directly effect the possibility of remediation of the river. Therefore, the proposed remedial alternative for groundwater should be designed to provide for treatment of groundwater to meet the non-degradation standards for both surface and groundwater and the State's PL standards for surface water.

Metals Contaminated Soils, Sediment and Sludges

It appears that the proposal to excavate, treat and replace the contaminated soils, sediments and sludges will be consistent with the requirements of the PCMP if the material is adequately treated. The PCMP does contain specific requirements that may effect the design of the on-site treatment system and the methods of storage and removal of the resulting concentrate.

Buried Drums, VOC Contaminated Soils, Tankers and Contents

The Commission supports the proposal to remove and dispose of these materials off-site at an appropriate facility.

In summary, the PRAP is not consistent with the water quality standards of the Pinelands Comprehensive Management Plan, the Pinelands Protection Act or the National Parks and Recreation Act of 1978. The Commission will object to any record of decision that is not consistent with these water quality standards.

If there are any questions concerning this matter, please contact me.

Sincerely,

William F. Harrison, Esquire
Assistant Director

WFH/scb
cc: Mr. Anthony Farro, Director,
Division of Hazardous Site
Mitigation - NJ DEP
Mr. Leroy Cattaneo, Acting
Deputy Director, Division of
Water Resources - NJ DEP
Ms. Kathleen Swigon

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II

JACOB K. JAVITS FEDERAL BUILDING

NEW YORK, NEW YORK 10278

SEP 21 1990

Mr. William F. Harrison, Esq.
Assistant Director
The Pinelands Commission
P.O. Box 7
New Lisbon, New Jersey 08064

Dear Mr. Harrison:

This is in response to your letter, dated August 15,1990, to James Hahnenberg of my staff, which provided comments on the Supplemental Feasibility Study and the Proposed Plan for the King of Prussia Technical Corporation (KOP) Superfund site in Winslow Township, New Jersey.

In accordance with the U.S. Environmental Protection Agency's (EPA's) community relations policy and guidance and the public participation requirements of the Superfund Program, EPA established a public comment period from July 16, 1990 to September 14, 1990. After review of all comments which EPA has received, EPA intends to select a remedial solution for the site that is protective of human health and the environment, cost-effective, and attains federal and state requirements that are applicable or relevant and appropriate.

As part of the Feasibility Study and Supplemental Feasibility Study, numerous alternatives were evaluated to identify a permanent remedy for the first operable unit. These alternatives will be discussed in detail in the Record of Decision (ROD) for the KOP site. The remedial action proposed by EPA includes the following: excavation and contaminant extraction of metal contaminated soils, sediments and sludges; drum removal and off-site disposal; tanker removal and off-site disposal; a ground-water extraction, treatment and reinjection system; and additional monitoring of the Great Egg Harbor River.

In your letter, you indicated that the Pineland's Commission supported some of the remedial action components proposed by EPA. You also indicated, however, that elements of the Proposed Plan were inconsistent with the Pinelands Comprehensive Management Plan (CMP). Specifically, you stated that the proposed cleanup goals for ground water should be set at natural background levels for all substances, based on the nondegradation standard of the Pinelands CMP. You also noted that the Pinelands CMP prohibits development which may degrade the surface-water and ground-water resources of the Pinelands.

EPA would like to make a number of points relative to these comments. As you are aware, the ground water in the aquifer underlying the KOP site is contaminated as a result of improper hazardous waste disposal. Extracting and treating this ground water will result in significant improvement in ground-water quality. For this reason, EPA does not believe that the non-degradation objectives are applicable or relevant and appropriate requirements (ARARs) for the site.

Although the site is located in the New Jersey Pinelands, it is not in the preservation area or the central Pine Barrens. As such, it would not be subject to the more stringent nondegradation requirements, or restoration of ground water to background conditions.

The ARARs or cleanup goals for the contaminants at the KOP site, are drinking-water standards or Maximum Contaminant Levels (MCLs), established under the New Jersey State Drinking Water Act N.J.A.C. 7:10-16.7.

Your letter also expressed concern regarding ground-water cleanup levels and potential adverse impacts to the Great Egg Harbor River. EPA agrees with your comment that further information is needed to characterize present contaminant levels more completely and assess the impact of the ground-water treatment system to sediments, surface waters and biota of the river. Monitoring will be conducted during Remedial Design and during the operation of the ground-water remediation system to assess the impact of the system on the river. If it is determined during operation of the system that the river is being degraded by site-related contamination, the river will be addressed as a separate operable unit, and a focused feasibility study will be conducted to evaluate appropriate remedial alternatives. The feasibility study will consider all appropriate alternatives including additional treatment of the ground water, to ensure that the remedial action is protective of designated uses of the river water and the river's biota.

Your cooperation in providing comments on our proposed remedial action is appreciated. I hope that the concerns raised by the Pinelands Commission have been fully addressed. Should you have any further questions in this matter, do not hesitate to contact me at (212) 264-8673, or have your staff call James Hahnenberg, the project manager for the KOP site, at (212) 264-5387.

Sincerely yours,

Richard L. Caspe, P.E.
Director
Emergency and Remedial Response Division

cc: J. Schnitzer, NJDEP