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Office of Emergency and Remedial Response
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September 1992
PB93-963821

EPA

Superfund Record of Decision:

Endicott Village Well Field, NY

50272-101

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15. Supplementary Notes

PB93-963821

16. Abstract (Limit: 200 words)

The 16-acre Endicott Village Well Field site is an inactive landfill in the Village of Endicott, Broome County, New York. The site includes a municipal drinking water supply well, known as the Ranney well, that provides 47 percent of the total water supply to the Village, and lies on the boundaries of En-Joie Golf Course and Tri-Cities Airport. The portion of the site adjacent to the Tri-Cities Airport extends into an 8-acre area designated by the Federal Aviation Administration as a controlled activity area (CAA). Land use in the area is primarily industrial. A wetlands area is located along the east and west banks of Nanticoke Creek, north of the Susquehanna River. In addition, part of the site lies within the 100-year floodplain of the Susquehanna River. From the late 1950's to 1977, Endicott Village used the site for storing municipal solid waste, as well as residential, and industrial refuse. In May 1981, EPA detected vinyl chloride and other VOCs in the Ranney well discharge. Subsequently, the state closed the supply lines to the well and installed diffused air aeration equipment to reduce VOCs levels in the soil and ground water. As a result of additional onsite investigations, the state installed 9 monitoring wells in 1983, and in 1984, installed a purge well and additional

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Endicott Village Well Field, NY
Third Remedial Action - Final
Contaminated Media: soil, debris, gw
Key Contaminants: VOCs (benzene, 1,2-DCE, PCE, TCE, toluene, vinyl chloride, xylenes), other organics (PAHs, PCBs, pesticides), metals (lead)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 71
	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)

monitoring wells. Onsite contamination was determined to be the result of a plume of contaminated ground water emanating from the onsite Landfill #1. Two prior RODs signed in 1987 and 1991, addressed ground water contamination at the Ranney public supply well, and provided for additional ground water control and treatment measures using a purge well, as OU1 and OU3, respectively. This ROD addresses the Endicott Village landfill #1, the source of the site contamination, as OU2. The primary contaminants of concern affecting the soil, debris, and ground water are VOCs including 1,2-DCE, benzene, PCE, TCE, toluene, vinyl chloride, and xylenes; other organics including PAHs, PCBs, and pesticides; and metals, including lead.

The selected remedial action for this site includes capping the majority of landfill #1 with a low permeability soil cap; covering the Tri-Cities Airport Controlled Activity Area and the compost facility area with a bituminous (asphalt) cap; backfilling or mitigating any affected wetlands; performing an explosive gas investigation, and installing a passive gas venting system; collecting and treating the ground water and leachate seep using an air stripper, with onsite discharge of the treated water and leachate to the Susquehana River or transporting the ground water and leachate offsite to a local POTW; maintaining the landfill cap and venting system; conducting long-term air and ground water monitoring; and implementing institutional controls including deed restrictions, and site access restrictions such as fencing. The estimated present worth cost for this remedial action ranges from $16,684,200 to $16,889,400, which includes an annual O&M cost ranging from $248,000 to $258,900.

PERFORMANCE STANDARDS OR GOALS:

Chemical-specific goals for ground water are based on TCE 5 ug/l; chromium 5 ug/l; and lead 5 ug/l. Leachate collection, treatment, and disposal will be designed to comply with SPDES discharge requirements and air emission standards will be adhered to for the air stripper.

ROD FACT SHEET

SITE

Site name: Endicott Well Field

Site location: Village of Endicott, Broome County, New York

HRS score: 35.57

ROD

ROD signed: September 30, 1992

Selected remedy: Low permeability landfill cap; gas venting system; leachate seep collection, treatment and discharge; access restrictions; 5-year review

Capital cost: $12,710,300 to 12,833,100

O & M cost: $248,000 to 258,900/yr

Present-worth cost: $16.7 to 16.9 million

LEAD

Lead: PRP (IBM Corporation)

Primary Contact: Alison A. Hess, (212) 264-6040

Secondary Contact: Melvin Hauptman, (212) 264-7681

Main PRPs: Endicott Johnson Corp.
George Industries, Inc.
International Business Machines Corp.
Midstate Litho
Town of Union
Village of Endicott

PRP Contact: Tom Morris (203) 973-7944

WASTE

Waste type: residential and industrial trash containing VOCs

Waste origin: municipal solid waste disposal, industrial disposal

Estimated waste quantity: avg. depth of waste is 15-20 feet over approximately 60 acres

Contaminated media: ground water, soil

RECORD OF DECISION

Endicott Well Field

Village of Endicott, Broome County, New York

United States Environmental Protection Agency
Region II
New York, New York
September 1992

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Endicott Well Field Site

Village of Endicott, Broome County, New York

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Endicott Well Field Site (the "Site"), which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended ("CERCLA"), and the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"). This decision document explains the factual and legal basis for selecting the remedy for this Site.

The New York State Department of Environmental Conservation ("NYSDEC") concurs with the selected remedy. A letter of concurrence from NYSDEC is attached to this document (Appendix IV).

The information supporting this remedial action decision is contained in the Administrative Record file for this Site. The index to the Administrative Record file is attached (Appendix III).

ASSESSMENT OF THE SITE

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

DESCRIPTION OF THE SELECTED REMEDY

This operable unit ("OU") is OU #2, the third and final OU planned for the Site. EPA issued RODs for OU #1 and OU #3 in September 1987 and March 1991, respectively. The ROD for OU #1 addressed ground water contamination at the ranney well public water supply system, which was the immediate threat to human health posed by the Site, by requiring the installation of an air stripper on the ranney well and continued extraction and treatment of contaminated ground water using the existing purge well on the En-Joie Golf Course. The ROD for OU #3 provided additional ground water control and treatment by requiring the use of a supplemental purge well. This OU #2 ROD addresses the source of ground water contamination, identified as the Endicott Landfill ("Landfill #1" or the "Landfill"), through landfill capping, gas venting, and control and treatment of the leachate seep. Long term management will be required to maintain these systems.

The major components of the selected remedy include the following:

* Capping the majority of the surface of Landfill #1 with a low permeability soil barrier cap, with a variance of 6NYCRR Part 360 requirements, to allow for a minimum of 12 inches of protective barrier fill with a permeability of 10^{-5} cm/sec or less; in a ridge and swale configuration, with ridges having slopes of 4 percent and synthetic liner in the swales;

* Capping with bituminous (asphalt) caps the 6-acre parcel of Landfill #1 where the Village of Endicott has a permitted yard waste composting facility and the 8-acre Controlled Activity Area (CAA) of the Tri-Cities Airport regulated by the Federal Aviation Administration;

* Pe ming an explosive gas investigation and installing a gas venting system, as necessary, based on the results of a landfill gas investigation. A passive system with one vent per acre is envisioned, but this will be further evaluated during the remedial design phase;

* Collecting, treating, and disposing the leachate seep into the Susquehanna River or to a publicly owned treatment works. If installation of the cap reduces leachate generation to the extent that the seep no longer exists, this may not be warranted. The specific treatment and disposal option will be further evaluated during the remedial design phase, based on implementability;

* Recommending that institutional controls be established in the form of deed restrictions on future uses of Landfill #1;

* Fencing or other acceptable access restrictions to ensure protection of the Landfill #1 cap;

* Performing long term operation and maintenance of the Landfill #1 cap, gas venting, and leachate systems to provide for inspections and repairs;

* Performing long term air and water quality monitoring;

* Evaluating Site conditions at least once every five years to determine if a modification to the selected remedy is necessary.

Remediation of ground water is expected to be achieved by continued operation and maintenance of the ground water collection and treatment remedial measures already selected for the Site, which are the air stripper at the ranney well, the existing purge well, and the supplemental purge well.

DECLARATION OF STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action and is cost effective. The selected remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable. Due to the large size of Landfill #1 and the absence of hot spots representing major sources of contamination, Landfill #1 could not practicably be excavated and treated. Therefore, the selected remedy does not satisfy the statutory preference for treatment as a principal element of the remedy with respect to source control.

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

Constantine Sidamon-Eristoff
Regional Administrator

9/30/92
Date

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SITE NAME, LOCATION AND DESCRIPTION

The Endicott Well Field Superfund Site (the "Site") is located on South Grippen Street at the western end of the Village of Endicott, New York (Figure 1). The Site consists of the ranney well, which is a municipal drinking water supply well, and its zone of influence on area ground water. The boundaries of this area have been generally delineated by Main Street to the north, the eastern boundary of the En-Joie Golf Course to the east, the Susquehanna River to the south, and the Tri-Cities Airport and Airport Road to the west. The Site is composed primarily of flat to gently rolling open land associated with the En-Joie Golf Course, facilities of the Village of Endicott Sewage Treatment Plant ("STP"), and the Endicott Landfill ("Landfill #1"). A portion of Landfill #1 adjacent to the Tri-Cities Airport extends into an approximately 8-acre area designated by the Federal Aviation Administration ("FAA") as the Controlled Activity Area ("CAA"), which includes the Runway Object Free Area ("ROFA") (Figure 2). A 6-acre parcel on Landfill #1 near the entrance to the STP is currently permitted for use by the Village of Endicott to compost yard waste (Figure 2); approximately 2 acres of the composting area are paved. There are two inactive landfills (Landfill #2 and Landfill #3) and a few industrial tracts north of the Site. Private homes are not located within the Site.

The Susquehanna River flows to the west along the southern boundary of the Site. The southerly flowing Nanticoke Creek is a tributary to the Susquehanna River and generally bisects the Site. Dead Creek, an intermittent stream, originally flowed across Landfill #1 into the Susquehanna River. In the early 1970's, Dead Creek was rerouted by the Village of Endicott to flow into Nanticoke Creek and the abandoned portion of the creek bed was filled in. Several man-made ponds on the En-Joie Golf Course are kept filled by water treated and discharged from the existing purge well, golf course irrigation, and precipitation. Excess water is ultimately discharged into Nanticoke Creek under a New York State Pollutant Discharge Elimination System ("SPDES") permit, which requires monthly sampling and analysis of water from the existing purge well, the pond discharge, and three monitoring wells.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

Landfill #1 accepted municipal refuse and industrial waste from approximately the late 1950's until 1977. During a routine inspection in May 1981, EPA detected vinyl chloride and trace amounts of other volatile organic compounds ("VOCs") in the discharge from the ranney well, which provides approximately 47 percent of the total water supply to the Village of Endicott Municipal system. Subsequent sampling by EPA and the New York State Department of Health confirmed EPA's initial findings and, as a result, four of the lateral supply lines to the well were closed and diffused air aeration equipment was installed to reduce the levels of VOCs.

Beginning in April 1983, additional studies were undertaken by the New York State Department of Environmental Conservation ("NYSDEC") Division of Water. The first study included the installation of nine monitoring wells and the sampling and analysis of ground water from selected wells. A pump test was also performed in September 1983 by turning off the ranney well for a period of 24 hours and measuring recovery rates in nearby monitoring wells. The results of this study indicated that the source of contamination was located either west or northwest of the ranney well.

Based on the results of these investigations, in July 1984, a purge well designed to pump approximately 600 gallons per minute ("gpm") and three additional monitoring wells were installed on the En-Joie Golf Course to intercept and monitor ground water contamination before it reached the ranney well. Water from this purge well is pumped to the golf course pond system where it is aerated before it is ultimately discharged to Nanticoke Creek.

The Site was proposed on the EPA's National Priorities List ("NPL") on October 15, 1984 and final NPL listing occurred on June 10, 1986. Since that time, the Site has been divided into three smaller units called operable units ("OUs"). In July 1987, contractors for NYSDEC, pursuant to a cooperative agreement with EPA, completed a Remedial Investigation and Feasibility Study ("RI/FS") at the Site that investigated the nature and extent of contamination at the ranney well (OU #1). On September 25, 1987, EPA issued a Record of Decision ("ROD") that selected air stripping at the ranney well and the continued use of the existing purge well system to ensure that the community is prevented from drinking contaminated ground water, which is the immediate risk that was posed by the Site. Construction of the air stripping tower at the ranney well was completed by the Village of Endicott in the Fall of 1991. This remedial action is being implemented pursuant to a Consent Decree entered into by EPA, the Town of Union, and the Village of Endicott, which was entered by the U.S. District Court for the Northern District of New York on January 10, 1989.

The RI/FS concluded that the information obtained then was inadequate to confirm the source(s) of the VOCs in the ground water at the ranney well. Therefore, in the 1987 ROD, EPA also required that a supplemental RI/FS be initiated to further investigate the nature and extent of contamination in suspected source areas and to evaluate possible source control measures. The supplemental RI/FS work and the subsequent source control measures, which are the subject of this ROD, constitute OU #2.

On September 19, 1988, EPA, International Business Machines Corporation ("IBM"), the Village of Endicott, and the Town of Union entered into an Administrative Order on Consent for implementation of the supplemental RI/FS. The RI/FS activities were undertaken in two phases and were performed by IBM through its consultants, Lozier/Groundwater Associates, Inc.

The RI Report for the Phase I study was approved by EPA in November 1990. The results of Phase I indicated that additional remedial measures were needed to control the plume of contaminated ground water emanating from Landfill #1. Therefore, EPA established OU #3 and in March 1991 issued a ROD for interim action, selecting extraction through a supplemental purge well and treatment of contaminated ground water. The OU #3 work is being performed by the Village of Endicott, through its consultant Malcolm Pirnie, Inc., pursuant to a Consent Decree entered into by EPA, Endicott Johnson Corp., the Village of Endicott, the Town of Union, and George Industries, Inc. This Consent Decree was entered by the U.S. District Court for the Northern District of New York on March 25, 1992. EPA approved the preliminary design for the supplemental purge well in July 1992 and expects to approve the final design by March 1993.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The RI Report, FS Report, the Risk Assessment Report, and the Proposed Plan for OU #2 for the Site were released to the public for comment on August 28, 1992. These documents were made available to the public in the Administrative Record file at the EPA Region II Records Center, New York and the local information repository at the Village of Endicott Clerk's Office, Municipal Building, 1009 East Main Street, Endicott, New York 13760. The notice of availability for the above-referenced documents was published in the Binghampton Press & Sun Bulletin on August 28, 1992. The public comment period on these documents was held from August 28, 1992 to September 26, 1992.

On September 15, 1992, EPA conducted a public meeting for OU #2 at the Village of Endicott Municipal Building to inform local officials and interested citizens about the Superfund process, to review current and planned remedial activities at the Site, and to respond to any questions from area residents and other attendees.

Responses to the comments received at the public meeting and in writing during the public comment period are contained in the Responsiveness Summary, which is included as Appendix V of this ROD.

SCOPE AND ROLE OF OPERABLE UNIT

EPA has separated the response actions at the Site into three distinct OUs. This ROD is for OU #2, the third and final OU planned for the Site. OU #1 provided the community with a safe and reliable supply of drinking water by requiring the installation of an air stripper at the ranney well to prevent ingestion of contaminated ground water. OU #1 also addressed control and treatment of contaminated ground water through continued use of a purge well. OU #3 addressed remediation of the contaminated ground water by requiring extraction and treatment through a supplemental purge well. This OU #2 ROD addresses the source of the contaminated ground water, which is Landfill #1.

The lead agency for this operable unit is the U.S. Environmental Protection Agency. The support agency is the New York State Department of Environmental Conservation.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives are specific goals to protect human health and the environment. These objectives are based on available information and standards such as applicable, or relevant and appropriate requirements ("ARARs") and risk-based levels established in the Risk Assessment.

The following remedial action objectives were established for OU #2:

* Ground water control to prevent migration of the VOC-contaminated plume;

* Remediation of contaminated ground water emanating from Landfill #1 to drinkable levels;

* Landfill waste containment and control of associated landfill gas;

* Control and treatment of the leachate seep to levels acceptable for proper disposal.

SUMMARY OF SITE CHARACTERISTICS

The RI was conducted in two phases. EPA issued the ROD for OU #3 upon completion of Phase I, which included air sampling, a surface geophysical investigation, a soil gas survey, drilling and installation of monitoring wells, and sampling and analysis of leachate, surface water, sediments, and ground water. The field activities for Phase II were conducted following approval of the final Phase II scope of work in May 1991 and included the drilling of eight (8) soil borings, the installation of 12 additional monitoring wells and five (5) monitoring points, excavation of six (6) test pits, drum sampling, and leachate and ground water sampling. This ROD is based upon data presented in the RI Report, which incorporated both Phase I and Phase II data.

The RI Report identified Landfill #1, which accepted municipal refuse and industrial wastes from approximately the late 1950's to 1977, as the source of contaminants. Landfills #2 and #3 reportedly accepted contruction and demolition debris and were not identified as sources of contaminants. A summary of the results of the RI follows.

A. Geology and Hydrology

The Site is located in the Susquehanna River Valley. Valley walls of bedrock have been filled up with unconsolidated sediments. The bedrock consists primarily of Upper Devonian interbedded shales and siltstones. A bedrock knob, known locally as Round Top Hill, crops out to the east of the Site. Ground water flow within the bedrock is restricted by the fine-grained nature of the siltstones and shales; fractures and joints would be expected to yield a limited quantity of poor quality ground water. The bedrock is overlain by more than 100 feet of unconsolidated glacial and alluvial deposits. The glacial sediments consist of a dense heterogeneous till and fine-grained lacustrine sediments overlain by coarse-grained outwash and ice contact deposits. Recent alluvial sediments at the Site consist of interbedded sands, silts, and clays deposited by the Susquehanna River, Nanticoke Creek, and Dead Creek.

The base of the aquifer has been defined as the top of the till and, where present, the lacustrine sediments. The ice contact and outwash deposits make up the aquifer, which serves as an abundant source of ground water. At the Site, the thickness of the aquifer ranges from less than 40 to more than 140 feet. Under non-pumping conditions the ground water flow in the aquifer is from the northeast to the southwest. However, ground water flow at the Site has been locally reversed to a southeastern direction under the combined influence of the ranney well and existing purge well, which have pumping rates of 3,700 gpm and 600 gpm, respectively.

Landfills #1, #2, and #3 were originally swampy, floodplain areas that have since been built up by landfilling activities. The surface of Landfill #1 has been built up by as much as 15 to 20 feet of residential and industrial trash, sidewalk sections, and other chunks of concrete. Landfills #2 and #3 apparently received only construction and demolition debris and are built up as much as 15 and 20 to 25 feet, respectively.

B. Chemical Characteristics

A ground water plume containing VOCs is migrating from Landfill #1 eastward under the combined pumping influence of the ranney well and existing purge well. The primary VOCs identified are chloroethane (up to 2.9 parts per million ["ppm"]), 1,2-dichloroethene (up to 2.7 ppm), and vinyl chloride (up to 130 parts per billion ["ppb"]).

A leachate seep at location LF-1-5 emanates from Landfill #1 in the vicinity of the former Dead Creek channel, on the southeastern edge of Landfill #1. Flow ranges from approximately 5 gpm to no flow during dry periods. The leachate seep is contaminated primarily with VOCs, mostly chloroethane and chlorobenzene, up to almost 1 ppm.

Air sampling results showed no significant concentrations of VOCs emanating from Landfill #1. Landfill gas sampling results indicated the presence of VOCs, primarily benzene, toluene, and xylene, in the soil gas at several locations across Landfill #1. Methane is passively dissipating from the entire Landfill #1.

Subsurface soil samples were collected from soil borings, test pits, and monitoring well borings collected from Landfills #1 and #2. The results of these samples showed that VOCs, including benzene, toluene, ethylbenzene, and xylene (the "BTEX" compounds), are present in the wastes of Landfill #1. The highest level of total BTEX detected was 20 ppm (V-4 at a depth of 4 feet), but most waste samples had total BTEX concentrations of less than 1 ppm. Chlorinated VOCs were detected in waste samples from Landfill #1 in concentrations of up to 110 ppm of trichloroethene and 15 ppm of 1,2-dichloroethene (SB-3 at 12 feet). The VOC contamination occurs at various depths and locations within Landfill #1 and no specific areas of contamination (hot spots) were identified.

Surface water samples were collected from the Susquehanna River, Nanticoke Creek and Dead Creek, and the golf course pond. VOCs were detected above detection limits only in samples taken from the golf course pond, which receives discharge from the existing purge well. The discharge from the pond to Nanticoke Creek is currently permitted by NYSDEC.

Sediment samples were collected concurrently with the surface water samples, at the same locations. No significant VOC concentrations were detected in the sediment samples.

C. Sensitive Environments

Wetlands were identified at the Site on the floodplains along the east and west banks of Nanticoke Creek and on the north bank of the Susquehanna River (Figures 3 and 4). A small area (0.6 acre) of man-made wetlands, developing in an abandoned borrow pit, was identified on Landfill #1 just south of the STP. The majority of Landfill #1 is within the 100-year floodplain (± 829 feet elevation) and in the floodway of the Susquehanna River.

An endangered species evaluation was completed to assess the potential existence of endangered species or their critical habitats at the Site. No State or Federal-designated endangered species of plants or animals are known to exist at the Site.

SUMMARY OF SITE RISKS

EPA conducted a baseline Risk Assessment to evaluate the potential risks to human health and the environment associated with the Endicott Well Field Site in its current state. The baseline Risk Assessment began with selecting contaminants of concern that would be representative of Site risks. Contaminants of concern for human health receptors included VOCs, semi-volatile organic compounds, and metals in various media, and are listed in Table [a]. Information of concentration levels detected for each contaminant is listed in Table [b]. Several of the contaminants, such as vinyl chloride, carcinogenic polycyclic aromatic hydrocarbons ("PAHs") and arsenic are known to cause cancer in laboratory animals and are suspected or known to be human carcinogens.

The baseline Risk Assessment evaluated the health effects that could result from exposure to contamination as a result of inhalation, ingestion, or dermal contact. Current use and future use, based on proposed construction at the Site, were considered. The reasonable maximum exposure was evaluated. The baseline Risk Assessment evaluated a total of 20 exposure pathways, which are listed in Table [c].

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

Potential carcinogenic risks are evaluated using the cancer slope factors developed by EPA for the contaminants of concern. Cancer slope factors ("SFs") have been developed by EPA's Carcinogenic Risk Assessment Verification Endeavor for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. SFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of 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 SF. Use of this approach makes the underestimation of the risk highly unlikely. The SFs for the compounds of concern at the Site are presented in Table [d].

For known or suspected carcinogens, EPA considers excess upper-bound individual lifetime cancer risks of between 10^{-4} to 10^{-6} to be acceptable. This range indicates that an individual has approximately a one in ten thousand to one in one 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 a site.

The results of the baseline Risk Assessment are contained in the Final Risk Assessment Report, RI/FS Oversight, Endicott Well Field Site, Endicott, New York, dated June 1992, which was prepared by Ebasco Services, Inc. under contract to EPA. These results indicate that ingestion of contaminated ground water at the Site is the primary pathway of concern. Excess carcinogenic risks of 1×10^{-3} for resident adults and 4×10^{-4} for children were calculated for the present and future use scenario. These risk numbers mean that 1 additional adult in 1000 and 4 additional children in 10,000 who drink ground water from the Site would be at risk of developing cancer if the Site is not remediated. The carcinogenic risk to adult residents from ingestion of contaminated ground water is greater than EPA's acceptable risk range. The excess risk at the Site is primarily due to vinyl chloride, carcinogenic PAHs, total polychlorinated biphenyls ("PCBs"), and the metals arsenic and beryllium. Of these compounds, the presence of PCBs was not confirmed by subsequent ground water sampling, the carcinogenic PAHs were detected in subsurface soils and sediment but not in ground water samples, and beryllium was detected in unfiltered but not in filtered ground water samples. The risk calculations used various conservative assumptions about the likelihood of a person being exposed to contaminants, such as drinking untreated ground water from the Site. A complete listing of excess cancer risk for each exposure pathway considered is presented in Tables [e], [f], and [g].

Noncarcinogenic risks were assessed using a hazard index ("HI") approach. EPA has developed reference doses ("RfDs"), expressed in units of mg/kg-day, which are estimates of daily exposure levels for humans (including sensitive individuals) that are thought to be safe over a lifetime. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) are compared to the RfD to derive the hazard quotient for the contaminant in the particular medium. The HI is obtained by adding the hazard quotients for all compounds across all media that could impact a particular receptor population.

An HI greater than 1 indicates the potential for noncarcinogenic health effects to occur as a result of site-related exposures. The HI provides a useful means of assessing the potential significance of multiple contaminant exposures within a single medium or across media. The RfDs for the compounds of concern at the Site are presented in Table [d]. A summary of the noncarcinogenic risks associated with these chemicals across various exposure pathways is found in Table [e] for resident adults, Table [f] for resident children, and Table [g] for construction workers.

The HI for noncarcinogenic effects from ingestion of ground water (reasonable maximum exposure) is 14 for adult residents, 28 for children, and 5 for future construction workers (see Tables [e], [f], and [g], respectively). Therefore, noncarcinogenic effects may occur from the exposure routes evaluated in the Risk Assessment. The noncarcinogenic risk was attributable to several compounds, including the metals manganese, vanadium, and antimony. Of these metals, only manganese was detected in filtered samples and its water quality standard is based on aesthetic rather than health-based considerations.

Ecological Risk Assessment

Ecological assessments of the adverse effects of contaminants on ecosystems are conducted using exposure and toxicity data to estimate the potential impact on the ecosystem. Surface water and sediment samples collected from the Susquehanna River, Nanticoke Creek, and Dead Creek showed no significant concentrations of VOCs. Therefore, it appears that the Site is not adversely impacting ecological receptors.

Uncertainties

The quantitative assessment of health effects at Superfund sites is inherently uncertain. The uncertainty arises from the need to predict potential future health impacts in the absence of observed health effects and on the basis of limited data concerning contaminant levels, transport mechanisms, receptor behavior, and the toxicological behavior of the chemicals present. The major sources of uncertainty are listed in Table [h]. However, it is highly unlikely that risks related to the Site would be underestimated because EPA uses conservative assumptions in its Risk Assessments.

Based on the results of the Risk Assessment, EPA has determined that actual or threatened releases of hazardous substances from the Site, if not addressed by the selected remedy or one of the other active measures considered, may present a current or potential threat to public health, welfare or the environment.

DESCRIPTION OF REMEDIAL ALTERNATIVES

CERCLA requires that each selected site remedy be protective of human health and the environment, be cost effective, comply with other statutory laws, and utilize permanent solutions, alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. In addition, the statute includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances.

This ROD evaluates in detail five (5) remedial alternatives for addressing the contamination associated with the Site. The construction time provided for each alternative is the time that would be required to construct or implement the remedy and does not include the time required to design the remedy, negotiate with the potentially responsible parties ("PRPs"), or procure contracts for design and construction.

These alternatives are:

ALTERNATIVE 1: NO ACTION

CERCLA requires that the "no-action" alternative be considered as a baseline for comparison with other alternatives. Under this alternative, no action would be taken to contain wastes, reduce infiltration into Landfill #1, eliminate areas of exposed waste, or control and treat leachate discharging from Landfill #1. Because this alternative would result in contaminants remaining on-site, CERCLA requires that the Site conditions be reviewed at least once every five years.

Capital Cost: $ 0
O & M Cost: $ 0/yr
Present Worth Cost: $ 0
Construction Time: None

ALTERNATIVE 2: INSTITUTIONAL CONTROLS

This alternative would consist of deed and access restrictions. The deed restrictions would be designed to prevent direct contact with the subsurface waste material in Landfill #1 by limiting future Site use. Access would be restricted by the construction of a six-foot high chain link fence, approximately 8,000 feet long, around most of Landfill #1. A six-foot frangible (break-away) wooden fence would be constructed around the Tri-Cities Airport ROFA, in coordination with the FAA and airport management. Access to the Landfill by authorized personnel would be through one or more 20-foot wide lockable gates. No remedial action would be taken with regard to the leachate seep. Five-year site reviews would again be required.

Capital Cost: $ 214,700
O & M Cost: $ 7,800/yr
Present Worth Cost: $ 390,900
Construction Time: 6 months

ALTERNATIVE 3: NATIVE SOIL CAP

This alternative would include the deed restrictions and fencing described in Alternative 2 above with the addition of the following remedial measures:

* Filling of depressions with an estimated 50,000 cubic yards ("CY") of suitable off-site clean fill;
* Landfill gas migration monitoring;
* Addition of soil to cover exposed areas; and
* One of three leachate options:
  Option B - Collection and treatment by air stripper and SPDES-permitted discharge to the Susquehanna River
  Option C - Collection and trucking to publicly owned treatment works ("POTW") for treatment and disposal, or
  Option D - Collection and piping to POTW for treatment and disposal.

This alternative would require the backfilling of approximately 0.6 acre of the man-made wetlands area within the limits of Landfill #1 waste. The native soil cap would not extend into the CAA of the Tri-Cities Airport. Leachate Options C and D may require treatment prior to acceptance by the POTW. Five-year site reviews and deed and access restrictions would also be included. Fencing is included in this alternative to prevent unauthorized access to Landfill #1 to protect the cap.

Capital Cost: 3/B $ 2,968,600
3/C 2,845,800

	3/D	2,882,700
O & M Cost:	3/B	$ 132,500/yr
	3/C	139,300
	3/D	121,600
Present Worth Cost:	3/B	$ 5,080,900
	3/C	5,062,500
	3/D	4,875,700

Construction Time: 1 year

ALTERNATIVE 4: LOW PERMEABILITY BARRIER CAP CONSISTENT WITH 6NYCRR PART 360

For this alternative, a low permeability barrier cap and gas venting system would be constructed over Landfill #1 consistent with NYSDEC regulations for municipal landfills (6NYCRR Part 360 Section 360-2.15). The cap would cover the limits of Landfill #1 waste, including the compost area but not the CAA. Landfill #1 would be regraded to a 4 percent slope by the addition of suitable off-site clean fill. This would elevate the middle of Landfill #1 to about 25 feet higher than the adjacent Tri-Cities Airport runway. Approximately 0.6 acre of man-made wetlands would be backfilled. Deed restrictions, fencing, landfill gas venting, five year site reviews, and one of the tree leachate seep collection, treatment, and disposal options described in Alternative 3 would be included. The cap system would consist of the following:

* 6 inches of top soil (estimated 55,000 CY)
* 24 inches of protective barrier fill (estimated 219,000 CY)
* 40-mil thick geosynthetic membrane liner
* 2 layers of filter fabric
* a gas venting layer (1 foot of gravel with a minimum permeability of 1×10^{-3} cm/sec) and gas venting risers (minimum one vent per acre)
* soil fill of varying thickness to establish a 4 percent slope (estimated 970,000 CY)

Capital Cost:	4/B	$ 39,384,600
	4/C	39,261,800
	4/D	39,298,700
O & M Cost:	4/B	$ 381,300/yr
	4/C	388,100
	4/D	370,400
Present Worth Cost:	4/B	$ 45,202,600
	4/C	45,184,200
	4/D	44,997,400

Construction Time: 1 1/2 years

ALTERNATIVE 5A: LOW PERMEABILITY BARRIER CAP WITH 6NYCRR PART 360 VARIANCE

This alternative would consist of a low permeability soil cap on Landfill #1, placed over a series of ridges and swales in a terraced or "washboard" design. The ridges would have a 4 percent slope to promote drainage. The Tri-Cities Airport CAA and the compost area would be covered by bituminous (asphalt) caps, having 2 percent and 1 percent slopes, respectively. Deed restrictions, fencing, landfill gas venting, five year site reviews, and one of the three leachate seep collection, treatment, and disposal options described in Alternative 3 would be included. The cap would consist of the following components:

* 6 inches topsoil
* 12 inches protective barrier fill with a permeability of 10^{-5} cm/sec or lower
* synthetic liner in swales
* passive gas venting system (gas venting layer and a minimum of one vent per acre)

Capital Cost:	5A/B	$ 12,833,100
	5A/C	12,710,300
	5A/D	12,747,200

O & M Cost:	5A/B	$ 258,900/yr
	5A/C	265,700
	5A/D	248,000

Present Worth Cost:	5A/B	$ 16,889,400
	5A/C	16,871,000
	5A/D	16,684,200

Construction Time: 1 1/2 years

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative was assessed utilizing nine evaluation criteria as set forth in the NCP and the Office of Solid Waste and Emergency Response Directive 9355.3-01. These criteria were developed to address the requirements of Section 121 of CERCLA to ensure that a range of important factors are considered in remedy selection decisions.

The following "threshold" criteria are the most important, and must be satisfied by any alternative in order to be eligible for selection:

1. *Overall protection of human health and the environment* addresses whether or not a remedy provides adequate protection and describes how risks posed through each exposure pathway (based on a reasonable maximum exposure

scenario) are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. *Compliance with ARARs* addresses whether or not a remedy would meet all of the applicable, or relevant and appropriate requirements of Federal and State environmental statutes and requirements or provide grounds for invoking a waiver.

The following "primary balancing" criteria are used to make comparisons and to identify the major trade-offs between alternatives:

3. *Long term effectiveness and permanence* 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. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.

4. *Reduction of toxicity, mobility, or volume through treatment* is the anticipated performance of a remedial technology, with respect to these parameters, that a remedy may employ.

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

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

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

The following "modifying" criteria are considered fully after the formal public comment period on the Proposed Plan is complete:

8. *State acceptance* indicates whether, based on its review of the RI/FS and the Proposed Plan, the State supports, opposes, and/or has identified any reservations regarding the preferred alternative.

9. *Community acceptance* refers to the public's general response to the alternatives described in the Proposed Plan and the RI/FS Reports. Factors of community acceptance to be discussed include support, reservation, and opposition by the community.

Following is a comparative analysis of the remedial alternatives based upon the evaluation criteria noted above.

- Overall Protection of Human Health and the Environment

Alternatives 3, 4, and 5A would provide permanent overall protection of human health and the environment by containing waste with a landfill cap; controlling landfill gas through monitoring or venting, as appropriate; and controlling and treating the leachate seep. Alternatives 4 and 5A, which include low permeability barrier caps, are more effective than Alternative 3 because they require a thicker cap of low permeability material and a 4 percent slope to reduce infiltration and promote runoff, thereby reducing the generation of leachate, which mobilizes contaminants into the ground water.

Alternative 1 (No Action) and Alternative 2 (Institutional Controls) are not protective of human health and the environment because they do not minimize infiltration into the Landfill #1, thereby preventing further leaching of contaminants into the aquifer. In addition, Alternatives 1 and 2 do not provide control or treatment of the leachate seep. Therefore, Alternatives 1 and 2 were eliminated from consideration and will not be discussed further.

- Compliance with ARARs

Chemical-specific ARARs identified for ground water include the more stringent of Federal and State Maximum Contaminant Levels ("MCLs") or non-zero Maximum Contaminant Level Goals ("MCLGs") (Table [i]). Examples of these levels are 5 ppb for chloroethane, 5 ppb for 1,2-dichloroethene, 2 ppb for vinyl chloride, and 50 ppb for arsenic. Chemical-specific ARARs for ground water are expected to be met by continued operation and maintenance of the ground water collection and treatment remedial measures already selected for the Site, which are the air stripper at the ranney well, the existing purge well, and the supplemental purge well.

Action-specific ARARs include 6NYCRR Part 360 requirements for closure and post-closure of municipal landfills and the NYSDEC SPDES program. The Part 360 regulations require that the landfill cap promote runoff, minimize infiltration, and maintain vegetative growth for slope stability. Typically, this is accomplished through a final cover system consisting of a 12-inch thick gas venting layer overlain by an 18-inch thick low permeability barrier layer or geosynthetic membrane layer placed on a slope of 4 percent, a 24-inch thick barrier protection layer, and a 6-inch thick topsoil layer. Alternative 4 is consistent with the cap design and slope requirements as specified in 6NYCRR Part 360. Alternative 5A complies with 6NYCRR Part 360 requirements because NYSDEC has determined it would promote runoff and reduce infiltration sufficiently, while minimizing to the maximum extent practicable the cover material to be brought on-site, to justify invoking the variance provisions set forth in Section 360-1.7(c). The variance provisions are justified based on site-specific conditions that exist at Landfill #1, including the location of the majority of Landfill #1 in the floodway and floodplain of the Susquehanna River and location of the CAA in an area that falls under strict FAA regulations. Alternative 5A contains a variance to Section 360-2.15(b): Landfill closure and post-closure criteria, which specifies that the final cover system must meet the requirements of Section 360-2.13(p): Gas venting layer, Section 360-2.13(q): Low permeability barrier soil cover or Section 360-2.13(r): Geomembrane cover, and Section 360-2.13(s): Topsoil. Specifically, Alternative 5A invokes a variance to Sections 360-2.13(q)(2)(i) and (iii) to allow the low permeability soil barrier cap over the majority of Landfill #1 and a variance to Sections 360-2.13(p),(q), and (s) to allow the bituminous (asphalt) caps in the CAA and yard waste composting portions of Landfill #1. Alternative 3 does not comply with 6NYCRR Part 360 because it would not promote runoff or minimize infiltration sufficiently to justify a variance. Section 360-2.15(a)(1)(i), regarding a hydrogeologic investigation, and Section 360-2.15(c), regarding a surface leachate investigation, have already been complied with as part of the OU #2 RI/FS.

Location-specific ARARs include the New York State Floodplain Management Criteria for State Projects (6NYCRR Part 502 Section 16), the Federal Aviation Regulations for Objects Affecting Navigable Airspace (49 C.F.R. Part 77), and the National Historic Preservation Act. The FAA regulates construction within the CAA and requires notice of proposed construction having a slope greater than 1 percent within 20,000 feet of an airport that has a runway longer than 3,200 feet, such as the Tri-Cities Airport. Policies to be considered are Executive Order 11990 (Federal Protection of Wetlands), which requires an evaluation of possible measures to mitigate wetlands loss and Executive Order 11988 (Federal Floodplains Management), which requires evaluation of modifications to 100-year and 500-year floodplains. An hydraulic evaluation to be performed during the remedial design phase, to assess the modification of the Susquehanna River floodway caused by the landfill cap, will fulfill the requirements of the 6NYCRR Part 502 regulations and Executive Order 11988. Alternatives 3, 4 and 5A would result in the backfilling of approximately 0.6 acre of man-made wetlands and modification of the Susquehanna River floodway and the navigable airspace of the Tri-Cities Airport; mitigation measures for these wetlands would be evaluated during remedial design. Compliance with the location-specific ARARs is expected to be achievable for Alternatives 3, 4, and 5A.

The options for leachate collection, treatment and disposal considered under Alternatives 3, 4, and 5A would be designed to ensure compliance with their associated ARARs, including SPDES limits for discharge to surface water and air emission standards for an air stripper.

- o <u>Long Term Effectiveness and Permanence</u>

A landfill cap is considered a reliable remedial measure that, when properly designed and installed, provides a high level of protection. Of the three alternatives considered in detail, Alternative 3 would be the least reliable in protecting human health and the environment, because it allows precipitation to infiltrate through Landfill #1. Alternative 5A would be much more reliable, because it utilizes a low permeability soil barrier layer to restrict infiltration. Alternative 4 is expected to be slightly more effective in the long term than Alternative 5A, because it meets the most stringent standards for a low permeability cap.

Post-closure operation and maintenance requirements would ensure the continued effectiveness of the landfill cap, landfill gas control system, and any of the three leachate system options.

o Reduction in Toxicity, Mobility, or Volume

None of the alternatives proposed reduces the toxicity or volume of waste in Landfill #1. Compared to Alternative 3, Alternatives 4 and 5A provide greater reduction in mobility and volume of contaminants by restricting infiltration through a low permeability landfill cap, which would reduce the further leaching of contaminants to ground water (leachate would still be generated when the Susquehanna River rises during flooding). Alternative 3 would allow, rather than restrict, the mobility of contaminants by allowing precipitation to infiltrate through Landfill #1 and flush contaminants into the ground water, which would then be intercepted by the ranney well, the existing purge well, and the supplemental purge well.

Options B, C, and D for leachate seep collection, treatment, and discharge considered for Alternatives 3, 4, and 5A would all effectively reduce the toxicity, mobility, and volume of contaminants in the leachate seep.

o Short Term Effectiveness

There are limited short term risks associated with Alternatives 3, 4, and 5A. These alternatives include caps, which would involve clearing, grubbing, and regrading of Landfill #1. Increase in traffic flow along local roads would be the greatest for Alternative 4, because it requires transportation of a total of 66,100 truckloads of soil, as compared to 11,710 truckloads for Alternative 5A and 3,700 for Alternative 3. This traffic would raise dust and increase noise levels locally. However, this activity is expected to be of short duration and proper construction techniques and operational procedures would minimize these impacts.

Short term risks to workers could be increased to the extent that surficial wastes are encountered during landfill capping activities. However, these risks are not expected to be significant based on EPA's risk assessment, which calculated an acceptable risk for dermal contact to wastes in Landfill #1. In addition, this risk would be minimized through the use of personal protection equipment. Once the surface of Landfill #1 ias completely covered, these short term impacts to the community, workers, and the environment would no longer be present.

Alternatives 4 and 5A are more effective in the short term than Alternative 3 because they limit leachate production, allowing more effective clean-up of ground water. Alternative 3 does not limit leachate production and is therefore not as protective of human health and the environment over the short term. Alternative 3 can be implemented the most quickly, in 1 year, while Alternatives 4 and 5A are estimated to each take 1 1/2 years.

o Implementability

Alternatives 3, 4, and 5A are implementable from an engineering standpoint and utilize commercially available products and accessible technology. Construction methods for capping are well established, although some technical problems may be encountered at particularly large construction projects such as this. The potential for design and construction problems would be reduced under Alternative 3, because the native soil cap would not require installation of a synthetic impermeable barrier. The synthetic liner specified in Alternatives 4 and 5A requires special handling during installation to ensure integrity. Alternatives 4 and 5A are technically and administratively feasible. Alternative 3 is technically, but not administratively, feasible because NYSDEC does not consider it an acceptable variance to its 6NYCRR Part 360 landfill closure requirements.

The treatment of the leachate seep under Options B, C, or D is implementable. Discharge of the treated leachate to the Susquehanna River (Option B) would require a SPDES permit, which is considered feasible based on the existing permit for purge well discharge to Nanticoke Creek. Discharge of the leachate to a local POTW, either by trucking (Option C) or piping (Option D), would require revision of the existing SPDES permit or pretreatment of the leachate to remove inorganics prior to discharge. However, Options C and D may present implementability problems if the local POTW chooses not to accept the leachate.

Alternative 3 would be easier to implement than Alternatives 4 and 5A, because it requires the least amount of cover brought on-site and may not require more than a 1 percent slope to the Landfill cap. A slope greater than 1 percent would require coordination with the FAA and airport management, as well as formal notice of construction affecting navigable airspace.

o <u>Cost</u>

Alternative 3 has the lowest capital and O & M costs, resulting in a net present worth of $4.9 to 5.1 million, because it uses the existing vegetative cover and minimal fill. Alternative 5A has an intermediate cost with a net present worth ranging from $16.7 to 16.9 million, because it utilizes a low permeability soil barrier cap placed over soils in a terraced or "washboard" design to attain the 4 percent slope. Alternative 4 has the highest cost, with a net present worth ranging from $45.1 to $45.3 million, because it would use an estimated 970,000 CY to create a base for the landfill cap that has a 4 percent slope.

The costs noted above include the costs to implement leachate Options B, C, and D, which have net present worths ranging from $1.4 to $1.6 million.

o <u>State Acceptance</u>

The State of New York concurs with the selected remedy (see Appendix IV).

o <u>Community Acceptance</u>

The majority of comments submitted during the public comment period were from state and local officials and PRPs, and indicated support for Alternative 3. EPA's response to all written comments submitted during the public comment period, as well as all questions and concerns raised during the public meeting, are provided in the Responsiveness Summary (Appendix V).

SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the detailed analysis of the alternatives, and public comments, EPA has determined, in consultation with NYSDEC, that Alternative 5A is the appropriate remedy for the Site.

The major components of the selected remedy include the following:

* Capping the majority of the surface of Landfill #1 with a low permeability barrier cap, with a variance of 6NYCRR Part 360 requirements, to allow for a minimum of 12 inches of protective barrier fill with a permeability of 10^{-5} cm/sec or less; in a ridge and swale configuration, with ridges having slopes of 4 percent and synthetic liner in the swales;

* Capping with bituminous (asphalt) caps the 6-acre parcel of Landfill #1 where the Village of Endicott has a permitted yard waste composting facility and the 8-acre CAA of the Tri-Cities Airport regulated by the Federal Aviation Administration;

* Performing an explosive gas investigation and installing a gas venting system, as necessary, based on the results of the landfill gas investigation. A passive system with one vent per acre is envisioned, but this will be further evaluated during remedial design;

* Collecting, treating, and disposing of the leachate seep by treating at an air stripper and discharging to the Susquehanna River or piping or trucking to a POTW for treatment and disposal. If installation of the cap reduces leachate generation to the extent that the seep no longer exists, this may not be warranted. The specific treatment and disposal option will be further evaluated during the remedial design phase, based on implementibility;

* Recommending that institutional ntrols be established in the form of deed restrictions on future uses of Landfill #1;

* Fencing or other acceptable access restrictions to ensure protection of the landfill cap;

* Performing long term operation and maintenance of the landfill cap, gas venting, and leachate systems to provide for inspections and repairs;

* Performing long term air and water quality monitoring;

* Evaluating Site conditions at least once every five years to determine if a modification to the selected alternative is necessary.

Remediation of ground water is expected to be achieved by continued operation and maintenance of the ground water collection and treatment remedial measures already selected for the Site, which are the air stripper at the ranney well, the purge well, and the supplemental purge well.

The selected alternative provides the best balance of trade-offs among alternatives with respect to the evaluating criteria. EPA and NYSDEC believe that the selected alternative will be protective of human health and the environment, comply with ARARs, be cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Due to the large size of Landfill #1 and the absence of hot spots representing major sources of contamination, Landfill #1 could not practicably be excavated and treated. Therefore, this remedy does not satisfy the statutory preference for treatment as a principal element of the remedy with respect to source control.

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

STATUTORY DETERMINATIONS

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

Protection of Human Health and the Environment

The selected remedy will provide permanent overall protection of human health and the environment by containing waste with a landfill cap, by controlling landfill gas through monitoring and venting, and by controlling and treating the leachate seep. By reducing leachate production, the remedy limits further contamination of the ground water and thereby builds upon the RODs for OU #1 and OU #3, which required use of the air stripper at the ranney well, treatment at the existing purge well, and treatment at the supplemental purge well to remediate ground water.

Compliance with ARARs

The selected remedy will comply with all Federal and State ARARs. Chemical-specific ARARs identified for ground water include the more stringent of Federal and State MCLs and non-zero MCLGs. These ARARs are expected to be met by the continued operation and maintenance of the ground water collection and treatment remedial measures already selected for the Site, which are the air stripper at the ranney well, the purge well, and the supplemental purge well.

Action-specific ARARs include 6NYCRR Part 360 requirements for closure and post-closure of municipal landfills and the NYSDEC SPDES. The 6NYCRR Part 360 regulations require that the cap for Landfill #1 promote runoff, minimize infiltration, and maintain vegetative growth for slope stability. The selected remedy complies with 6NYCRR Part 360 by invoking the variance provisions set forth in Section 360-1.7(c), based on site-specific conditions. The selected remedy invokes a variance to Section 360-2.15(b): Landfill closure and post-closure criteria, which requires that the final cover system comply with Sections 360-2.13(p), (q) or (r), and (s). Specifically, the selected remedy invokes a variance to Sections 360-2.13(q)(2)(i) and (iii) for the majority of Landfill #1 and a variance to Sections 360-2.13(p),(q), and (s) for the CAA and yard waste composting portions of Landfill #1. Leachate seep collection, treatment and disposal will be designed to ensure compliance with their associated ARARs, including SPDES for discharge to surface water and air emission standards for an air stripper.

Location-specific ARARs include the New York State Floodplain Management Criteria for State Projects (6NYCRR Part 502 Section 16), the Federal Aviation Regulations for Objects Affecting Navigable Airspace (49 C.F.R. Part 77), and the National Historic Preservation Act. The FAA regulates construction within the CAA and requires notice of proposed construction having a slope greater than 1 percent within 20,000 feet of the Tri-Cities Airport. Policies to be considered include Executive Order 11990 (Federal Protection of Wetlands), which requires an evaluation of possible measures to mitigate wetlands loss and Executive Order 11988 (Federal Floodplains Management Executive Order), which requires evaluation of modification to the 100-year and 500-year floodplains. An hydraulic evaluation to be performed during the remedial design phase, to assess the modification of the Susquehanna River floodway caused by the landfill cap, will fulfill the requirements of the 6NYRCC Part 502 regulations and Executive Order 11988. The selected remedy will result in the backfilling of approximately 0.6 acre of man-made wetlands and modification of the Susquehanna River floodway and the navigable airspace of the Tri-Cities Airport. The selected remedy will achieve compliance with these ARARs.

Cost Effectiveness

The selected remedy affords overall effectiveness proportionate to its costs because, among other things, it uses a terraced or "washboard" design to attain a 4 percent slope to promote runoff, thereby reducing infiltration and leachate generation.

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

The selected remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable through collection, treatment, and proper disposal of the leachate seep.

Preference for Treatment as a Principal Element

The statutory preference for remedies that employ treatment as a principal element cannot be satisfied for Landfill #1 itself, because treatment of the Landfill #1 waste is not practicable. The size of Landfill #1 and the fact that there are no identified hot spots that represent major sources of contamination preclude a remedy in which contaminants could be excavated and treated effectively. The remedies selected for the two previous OUs include treatment of contaminated ground water and, therefore, satisfy the preference for treatment. In addition, this selected remedy calls for treatment of the leachate seep at the Site and, hence, satisfies the preference for treatment for this portion of the remedy.

DOCUMENTATION OF SIGNIFICANT CHANGES

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

APPENDIX I

FIGURES

Figures

Figure 1: Site Location

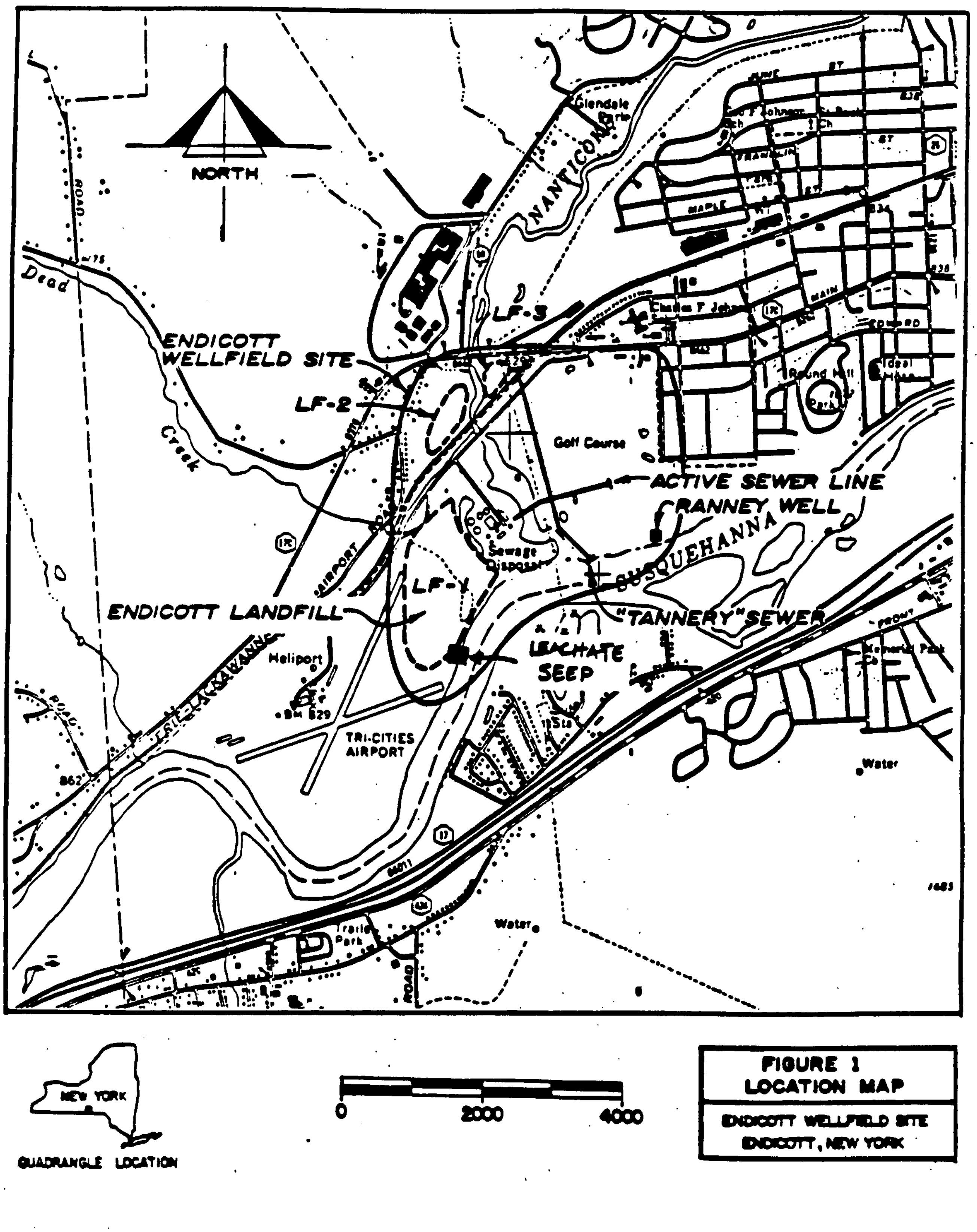


FIGURE 1
LOCATION MAP

ENDICOTT WELLFIELD SITE
ENDICOTT, NEW YORK

Figure 2: Endicott Landfill

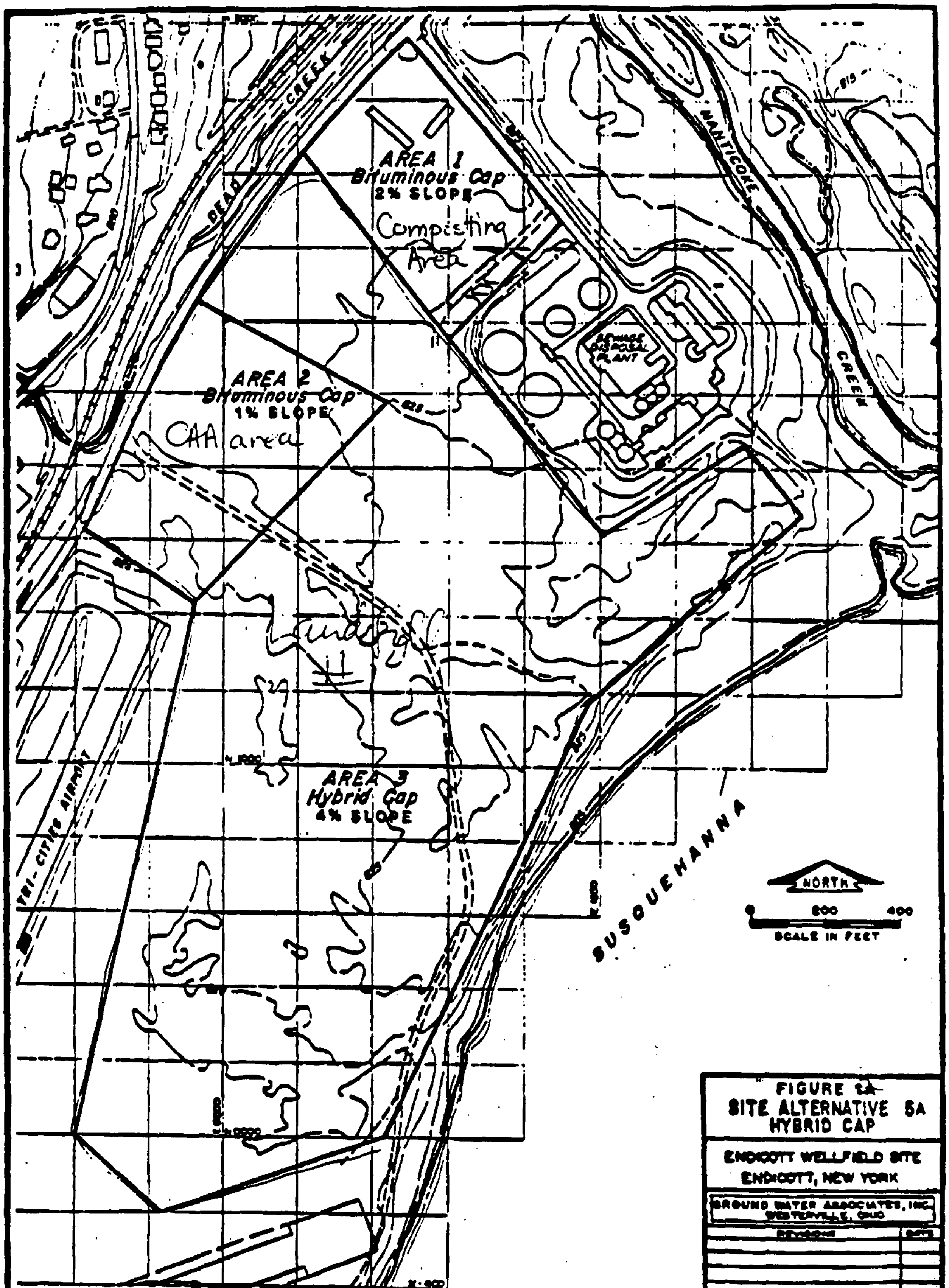


Figure 3: Wetlands (east bank of Nanticoke Creek and north bank of Susquehanna River east of Nanticoke Creek)

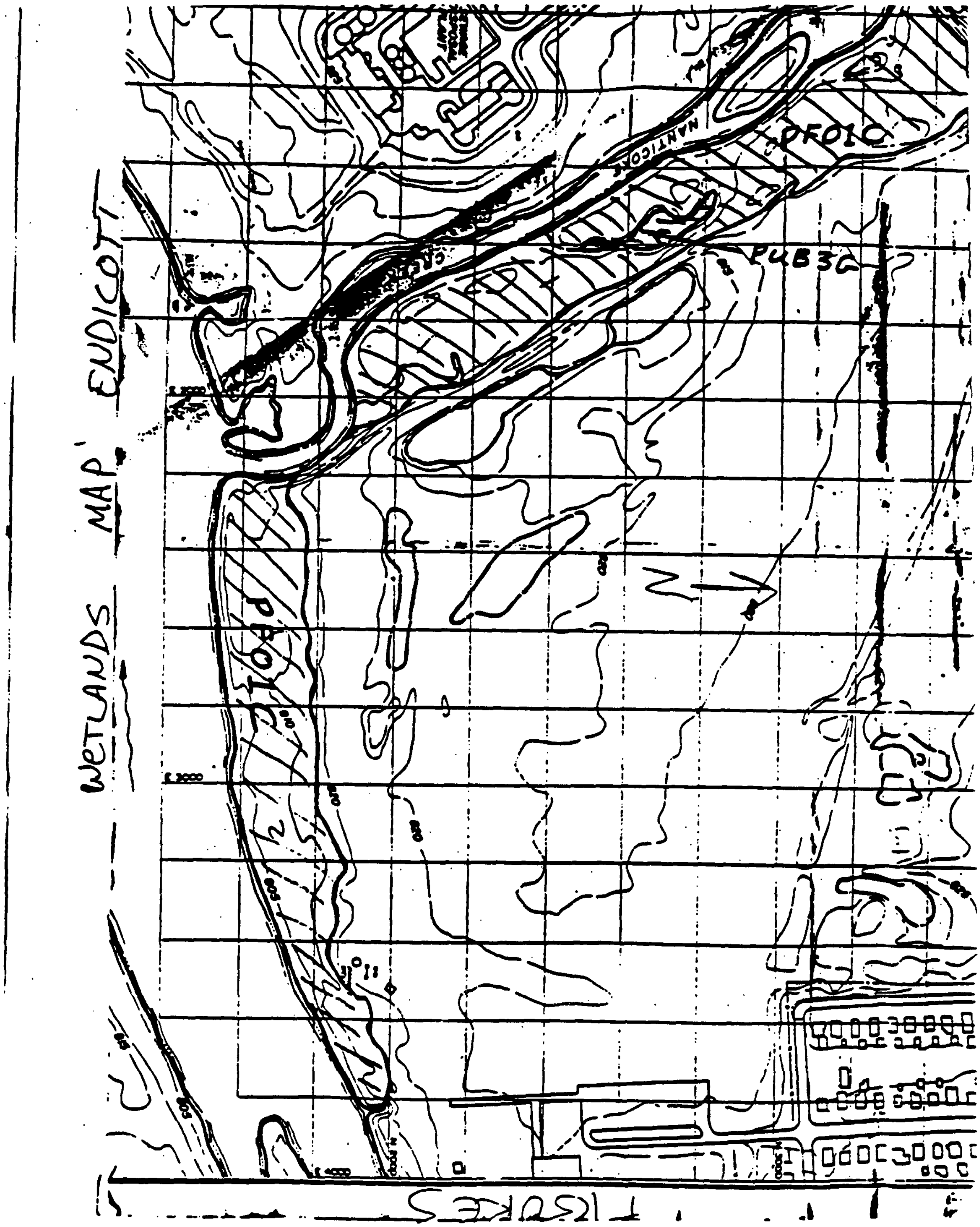
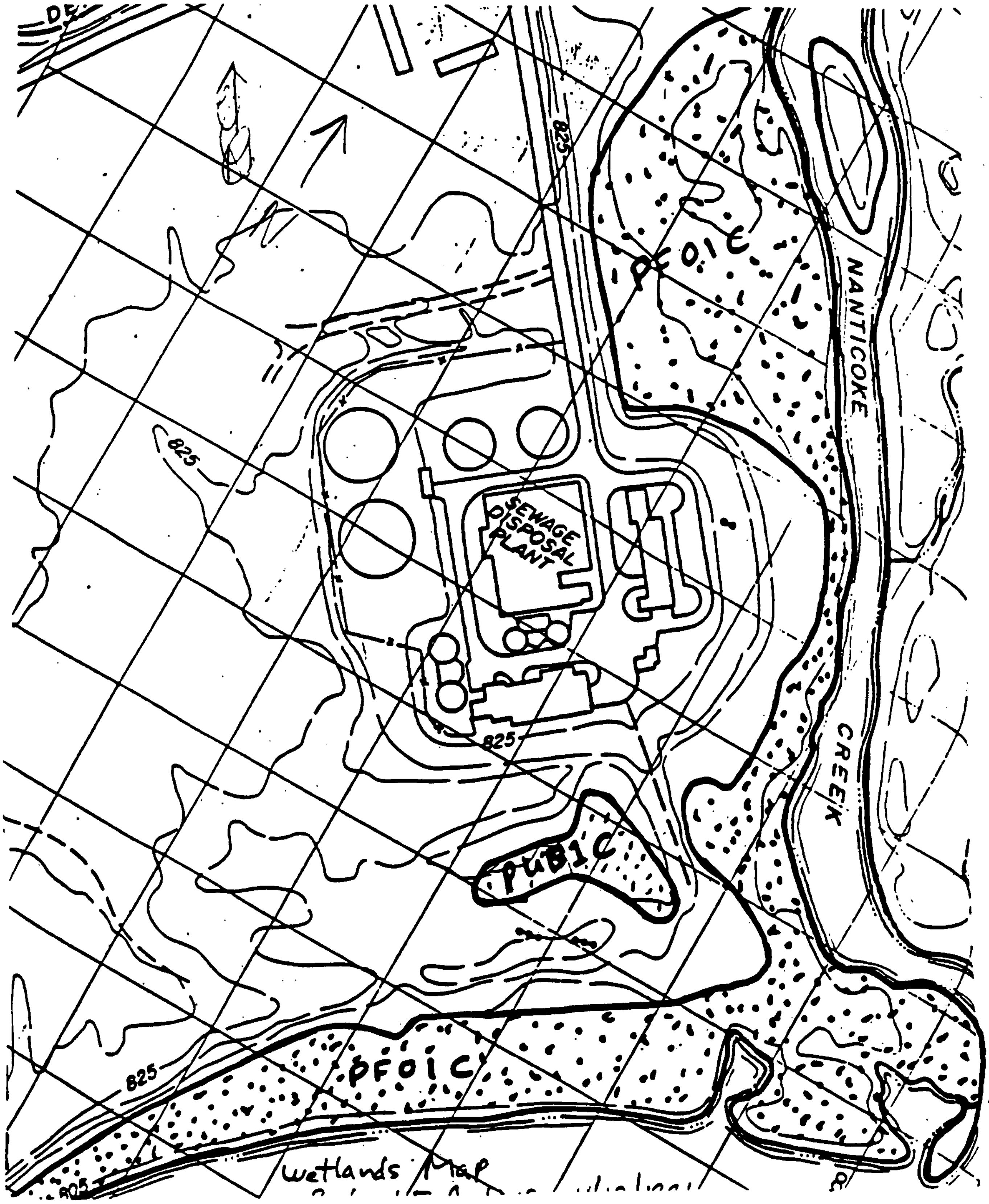


Figure 4: Wetlands (west bank of Nanticoke Creek and north bank of Susquehanna River west of Nanticoke Creek)



APPENDIX II

TABLES

Tables

TABLE 2-1

ENDICOTT WELLFIELD SITE

INDICATOR CONTAMINANTS OF POTENTIAL CONCERN

BY MATRIX

Chemicals	Subsurface Soil	Pond Water	Surface Water	Sediments	Ground Water	Indicator Contaminant	"No" Justification	"Yes" Justification
Volatiles:								
Acetone	X	-	X	X	X	Y	-	8
Benzene	X	-	-	-	X	Y	-	5,6,8
2-Butanone	X	-	-	-	X	Y	-	8
Carbon Disulfide	X	-	-	-	X	N	1,3,4	-
Chlorobenzene	X	-	-	-	X	Y	-	8
Chloroform	X	-	-	-	-	Y	-	6
1,1-Dichloroethane	X	X	-	-	X	N	1,3,4	-
1,2-Dichloroethane	X	-	-	-	X	Y	-	6
1,1-Dichloroethene	-	-	-	-	X	Y	-	6,7,8
trans-1,2-Dichloroethene	-	-	-	-	X	Y	-	7,8
trans-1,3-Dichloropropene	-	-	-	-	X	Y	-	6
Ethylbenzene	X	-	-	-	X	Y	-	8
2-Hexanone	X	-	-	-	X	N	2	-
Methylene Chloride	X	X	X	X	X	Y	-	6,8
4-Methyl-2-Pentanone	X	-	-	-	-	Y	-	8
Styrene	X	-	-	-	-	Y	-	6
Tetrachloroethene	X	-	-	-	X	Y	-	6,7,8
1,1,2,2-Tetrachloroethane	X	-	-	-	-	Y	-	6
Toluene	X	-	-	-	X	Y	-	8
Total Xylenes	X	-	-	-	X	Y	-	8
1,1,1-Trichloroethane	X	-	-	-	X	N	1,3,4	-
1,1,2-Trichloroethane	X	-	-	-	-	Y	-	6
Trichloroethene	X	-	-	-	X	Y	-	6,8
Vinyl Acetate	-	-	-	-	X	N	1,3,4	-
Vinyl Chloride	X	X	-	-	X	Y	-	5,6

Table [a]

TABLE 2-1
ENDICOTT WELLFIELD SITE
INDICATOR CONTAMINANTS OF POTENTIAL CONCERN

BY MATRIX

Chemicals	Subsurface Soil	Pond Water	Surface Water	Sediments	Ground Water	Indicator Contaminant	"No" Justification	"Yes" Justification
Semi-Volatiles;								
Benzoic Acid	X	-	-	-	X	Y	-	8
Bis(2-ethylhexyl)phthalate	X	-	-	X	X	Y	-	6,7,8
Butyl benzyl phthalate	X	-	-	-	X	Y	-	8
4-Chloro-3-Methylphenol	X	-	-	-	X	N	2	-
2-Chlorophenol	-	-	-	-	X	N	2	-
1,2-Dichlorobenzene	-	-	-	-	X	N	2	-
1,3-Dichlorobenzene	X	-	-	-	-	N	2	-
1,4-Dichlorobenzene	X	-	-	-	X	Y	-	6,8
3,3-Dichlorobenzidine	X	-	-	-	-	Y	-	6,7
Diethylphthalate	X	-	-	-	X	Y	-	8
2,4-Dimethylphenol	X	-	-	-	X	Y	-	7
Dimethylphthalate	-	-	-	-	X	Y	-	8
Di-n-butyl phthalate	X	-	-	X	X	Y	-	8
Di-n-octyl phthalate	X	-	-	-	-	Y	-	7,8
Hexachloroethane	X	-	-	-	X	Y	-	6
2-Methylnaphthalene	X	-	-	-	X	N	2	-
2-Methylphenol	X	-	-	-	-	N	2	-
4-Methylphenol	X	-	-	X	X	Y	-	8
3-Nitroaniline	-	-	-	-	X	Y	-	8
4-Nitroaniline	X	-	-	-	-	N	2	-
n-Nitrosodipropylamine	X	-	-	X	-	Y	-	6,7
n-Nitrosodiphenylamine	X	-	-	-	-	Y	-	6,8
Pentachlorophenol	X	-	-	-	-	Y	-	6,8
Phenol	X	-	-	-	X	Y	-	8
2,2,4-Trichlorobenzene	X	-	-	-	-	N	2	

TABLE 2-1
ENDICOTT WELLFIELD SITE
INDICATOR CONTAMINANTS OF POTENTIAL CONCERN

BY MATRIX

Chemicals	Subsurface Soil	Pond Water	Surface Water	Sediments	Ground Water	Indicator Contaminant	"No" Justification	"Yes" Justification
Carcinogenic PAHs								
Benzo(a)anthracene	X	-	-	X	-	Y	-	6,8
Benzo(a)pyrene	X	-	-	X	-	Y	-	6,8
Benzo(b)Fluoranthene	X	-	-	X	-	Y	-	6,8
Benzo(k)Fluoranthene	X	-	-	X	-	Y	-	6,8
Chrysene	X	-	-	X	-	Y	-	6,8
Dibenzo(a,h)anthracene	X	-	-	-	-	N	2	-
Indeno(1,2,3-cd-pyrene)	X	-	-	X	-	Y	-	6,8
Noncarcinogenic PAHs								
Acenaphthene	X	-	-	-	-	Y	-	8
Acenaphthylene	X	-	-	-	-	N	2	-
Anthracene	X	-	-	X	X	Y	-	8
Benzo(g,h,i)pyrene	-	-	-	X	-	N	2	-
Dibenzofuran	X	-	-	-	X	N	2	-
Fluoranthene	X	-	-	X	-	Y	-	8
Fluorene	X	-	-	-	-	Y		8
Naphthalene	X	-	-	-	-	Y		8
Phenanthrene	-	-	-	X	-	N	2	
Pyrene	X	-	-	X	-	Y	-	8

TABLE 2-1
ENDICOTT WELLFIELD SITE
INDICATOR CONTAMINANTS OF POTENTIAL CONCERN

BY MATRIX

Chemicals	Subsurface Soil	Pond Water	Surface Water	Sediments	Ground Water	Indicator Contaminant	"No" Justification	"Yes" Justification
PCBs And Pesticide:								
Aldrin	X	-	-	-	X	Y	-	6,8
Alpha-BHC	X	-	-	-	-	N	2	-
Beta-BHC	X	-	-	-	-	Y		6,8
Delta-BHC	X	-	-	-	-	N	2	-
Gamma-BHC	X	-	-	-	-	N	2	-
Chlordane(1)	X	-	-	-	X	Y	-	6,8
Alpha Chlordane	X	-	-	-	X	Y	-	8
Gamma Chlordane	X	-	-	-	-	Y	-	8
4,4'-DDD	X	-	-	-	-	Y	-	6,8
4,4'-DDE	X	-	-	-	X	Y	-	6,8
4,4'-DDT	X	-	-	-	-	Y	-	6,8
Dieldrin	X	-	-	-	X	Y	-	6,7,8
Endosulfan (2)	X	-	-	-	-	Y	-	8
Endosulfan I	X	-	-	-	X	Y	-	8
Endosulfan II	X	-	-	-	X	N	1,3,4	-
Endosulfan Sulfate	X	-	-	-	X	N	2	-
Endrin	X	-	-	-	X	Y	-	8
Endrin Ketone	X	-	-	-	-	N	2	-
Heptachlor	X	-	-	-	X	Y	-	6,8
Heptachlor Epoxide	X	-	-	-	X	Y	-	6,8
Methoxychlor	X	-	-	-	X	Y	-	8
Total PCBs (3)								
Aroclor 1242	X	-	-	-	X	Y	-	6
Aroclor 1248	X	-	-	-	-	Y	-	6
Aroclor 1254	X	-	-	-	X	Y	-	6,8
Aroclor 1260	X	-	-	-	-	Y	-	6

TABLE 2-1

ENDICOTT WELLFIELD SITE

INDICATOR CONTAMINANTS OF POTENTIAL CONCERN

BY MATRIX

Chemicals	Subsurface Soil	Pond Water	Surface Water	Sediments	Ground Water	Indicator Contaminant	"No" Justification	"Yes" Justification
Inorganics:								
Aluminum	X	-	-	-	X	N	2	-
Antimony	X	-	-	-	X	Y	-	7
Arsenic	X	-	-	-	X	Y	-	6,7,8
Barium	X	X	-	X	X	Y	-	7,8
Beryllium	X	-	-	-	X	Y	-	6,7,8
Cadmium	X	-	-	-	X	Y	-	6,7,8
Calcium	X	X	X	X	X	N	2	-
Chromium	X	-	-	-	X	Y	-	7,8
Cobalt	X	-	-	-	X	N	2	-
Copper	X	-	-	-	X	N	2	-
Iron	X	X	X	X	X	N	2	-
Lead	X	-	-	X	X	N	2	-
Magnesium	X	X	-	X	X	N	2	-
Manganese	X	X	-	X	X	Y	-	7,8
Mercury	-	-	-	-	X	Y	-	7,8
Nickel (1)	X	-	-	X	X	Y	-	5,7,8
Potassium	X	-	-	-	X	N	2	-
Silver	-	-	-	X	X	Y	-	8
Sodium	X	-	-	-	X	N	2	-
Vanadium	X	-	-	-	X	Y	-	7,8
Zinc	X	X	X	X	X	Y	-	7,8

X: Indicates the contaminant was detected in the matrix.
-: Indicates the contaminant was not detected in the matrix.
*: Both trivalent and hexavalent chromium are considered although justification 5, 6 and 7 refer to hexavalent chromium only.
(1): Contaminant does not contribute 0.1% to the total risk for the matrix using the toxicity screening analysis.
(2): EPA approved toxicity indices do not exist to quantitatively evaluate the contaminant.
(3): Contaminant does not exceed a 5% frequency of detection.
(4): Contaminant is not a Group A carcinogen.
(5): Contaminant is a Group A carcinogen.
(6): Contaminant is a carcinogen (or potential) with detections above 1 ug/l (groundwater and surface water) or 1 mg/kg (subsurface soil ,surface soils and sediments-inorganic) or 1 ug/kg (surface soil , subsurface soils and sediments - organics).
(7): Contaminant contributes 0.1% or more to the total risk for the matrix using the toxicity screening analysis.
(8): Contaminant exceeds a 5% frequency of detection in one or more matrices.
(9): All Aroclor concentrations are summed and evaluated as total PCBs.
(10): Essential and nonessential elements (aluminum, calcium, magnesium, potassium, and sodium) are not evaluated.

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ENDICOTT WELLFIELD SITE
SUMMARY OF CHEMICAL COMPOUNDS (DETECTS + UNDETECTS/2)
GROUND WATER

COMPOUND	VALID	OCCUR	UN-DETECT	EST	REJECT	FREQ DETECT	MINIMUM DETECTED CONCENTRATION	SAMPLE ID	MAXIMUM DETECTED CONCENTRATION	SAMPLE ID	MEDIAN CONCENTRATION	GEOMETRIC MEAN	MEAN CONCENTRATION	LOWER QUARTILE	UPPER QUARTILE	STNDRD. DEV.	95% UPP
(1 Volatile (VOA) ug/L																	
(Halogenated Volatiles)																	
1,1,1-TRICHLOROETHANE	204	32	172	17	0	0.16	0.600	EW-15-6	710.000	MW-23-6	1.000	1.224	11.987	0.500	1.000	3.474	
1,1-DICHLOROETHANE	206	92	114	25	0	0.45	0.300	MW-2-3	200.000	MW-9a-6	1.000	1.999	9.143	0.900	5.000	4.136	
1,1-DICHLOROETHENE	207	13	194	8	0	0.06	0.500	MP-3-5	16.000	MW-5-3	1.000	1.084	4.260	0.500	1.000	2.738	
1,2-DICHLOROETHANE	207	2	205	2	0	0.01	0.700	MW-27-4	1.000	EW-15-3	1.000	1.042	4.086	0.500	1.000	2.611	
BROMOCHLOROMETHANE	122	1	121	1	0	0.01	74.000	MW-7-6	74.000	MW-7-6	0.500	0.982	6.016	0.500	1.000	3.223	
CHLOROBENZENE	205	46	159	16	0	0.22	0.600	EW-15-2	190.000	MW-7-3	1.000	1.358	7.990	0.500	1.000	3.621	
CHLOROETHANE	187	86	101	8	0	0.46	0.600	MW-10a-2	2900.000	MW-7-6	1.000	3.477	75.481	0.950	18.500	8.788	
METHYLENE CHLORIDE	207	184	23	19	0	0.89	0.500	EW-4-1	270.000	MW-23-6	3.000	2.653	8.936	1.000	4.000	3.425	
TETRACHLOROETHENE	206	7	199	0	0	0.03	3.000	MW-5-1	13.000	EW-11-3	1.000	1.096	4.284	0.500	1.000	2.754	
TRANS-1,2-DICHLOROETHENE	118	18	100	11	0	0.15	0.600	MW-23-4	89.000	EW-11-1	0.550	1.152	7.680	0.500	1.000	3.914	
TRANS-1,3-DICHLOROPROPENE	206	1	205	0	0	0.00	1.000	EW-8-3	1.000	EW-8-3	0.500	0.737	3.184	0.500	0.500	2.720	
TRICHLOROETHENE	202	45	157	15	0	0.22	0.500	MP-3-6	1100.000	MW-5-6	1.000	1.373	10.761	0.500	2.000	3.507	
VINYL CHLORIDE	203	67	136	12	0	0.33	0.500	MW-28-4	110.000	MW-13d-2	1.000	1.761	7.571	0.600	3.500	3.936	
					TOTAL	=====>	83.400		5674.000								
(Non-Halogenated Volatiles)																	
2-BUTANONE	207	3	204	0	0	0.01	6.000	MW-12-1	23000.000	EW-12-1	2.500	3.689	120.966	2.500	2.500	2.983	
2-HEXANONE	206	1	205	0	0	0.00	11.000	MW-6a-1	11.000	MW-6a-1	2.500	3.452	15.847	2.500	2.500	2.859	
4-METHYL-2-PENTANONE	206	2	204	0	0	0.01	3.000	MW-2-3	3.000	MW-6d-3	1.500	2.113	10.345	1.000	2.500	3.242	
ACETONE	207	29	178	7	0	0.14	2.000	EW-3a-2	378.000	MW-22a-4	2.500	4.162	18.739	2.500	4.750	2.999	
BENZENE	206	63	143	26	0	0.31	0.500	EW-5-6	18.000	MW-24-4	1.000	1.389	5.018	0.600	2.000	3.072	
CARBON DISULFIDE	207	5	202	3	0	0.02	0.600	MW-25d-6	7.000	MW-14-6	1.500	1.337	6.413	0.500	1.500	2.837	
ETHYLBENZENE	206	15	191	8	0	0.07	0.500	MW-6a-2	30.000	MW-7-1	1.000	1.095	4.454	0.500	1.000	2.810	
TOLUENE	206	37	169	15	0	0.18	0.600	MW-21-4	27.000	MW-8a-3	1.000	1.235	4.622	0.500	1.000	2.908	
TOTAL XYLENES	205	35	170	7	0	0.17	0.500	EW-11-2	190.000	MW-7-6	1.000	1.353	7.992	0.500	1.500	3.637	

NOTE: (X), IN 95% CI COLUMN, INDICATES VALUE IS GREATER THAN MAXIMUM CONCENTRATION; (*), ASTERISKS, INDICATE THAT THE NUMBER OF OCCURRENCES IS TOO SMALL TO ALLOW CALCULATION

Table [b]

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ENDICOTT WELLFIELD SITE
SUMMARY OF CHEMICAL COMPOUNDS (DETECTS + UNDETECTS/2)
GROUND WATER

COMPOUND	VALID	OCCUR	UN-DETECT	EST	REJECT	FREQ DETECT	MINIMUM DETECTED CONCENTRATION	SAMPLE ID	MAXIMUM DETECTED CONCENTRATION	SAMPLE ID	MEDIAN CONCENTRATION	GEOMETRIC MEAN	MEAN CONCENTRATION	LOWER QUARTILE	UPPER QUARTILE	STNDRD. DEV.	95% C UPPER
VINYL ACETATE	120	3	117	2	0	0.03	3.000	EW-7-1	26.000	MW-20-1	2.500	2.841	14.171	2.500	2.500	2.382	
					TOTAL	=====>	27.700		23682.000								
() Base Neutral Acid (BNA) ug/L																	
(Phenols)																	
2,4-DIMETHYLPHENOL	72	4	68	4	0	0.06	3.000	MW-23-4	8.000	MW-7-2	5.000	4.927	4.958	5.000	5.000	1.125	
2-CHLOROPHENOL	72	1	71	1	0	0.01	2.000	MW-7-2	2.000	MW-7-2	5.000	4.937	4.958	5.000	5.000	1.116	
4-CHLORO-3-METHLYPHENOL	72	1	71	1	0	0.01	3.000	MW-7-2	3.000	MW-7-2	5.000	4.965	4.972	5.000	5.000	1.062	
4-METHYLPHENOL	72	8	64	7	0	0.11	1.000	MP-3-4	10.000	MP-5-4	5.000	4.810	4.917	5.000	5.000	1.274	
PHENOL	72	13	59	13	0	0.18	1.000	MW-26-4	6.000	MW-22d-5	5.000	4.351	4.556	5.000	5.000	1.414	
					TOTAL	=====>	10.000		29.000								
(Polycyclic Aromatic Hydrocarbons)																	
2-METHYLNAPHTHALENE	72	3	69	3	0	0.04	1.000	MW-23-4	4.000	MW-7-2	5.000	4.840	4.903	5.000	5.000	1.221	
ACENAPHTHENE	72	1	71	1	0	0.01	4.000	MW-3-1	4.000	MW-3-1	5.000	4.985	4.986	5.000	5.000	1.027	
INDENO(1,2,3-CD)PYRENE	72	1	71	1	0	0.01	6.000	MW-23-4	6.000	MW-23-4	5.000	5.013	5.014	5.000	5.000	1.022	
NAPHTHALENE	72	7	65	5	0	0.10	3.000	MW-23-4	16.000	MW-7-2	5.000	5.040	5.167	5.000	5.000	1.223	
					TOTAL	=====>	14.000		30.000								
(Benzenes)																	
1,2-DICHLOROBENZENE	72	6	66	6	0	0.08	2.000	MW-22a-4	5.000	MW-7-2	5.000	4.818	4.861	5.000	5.000	1.179	

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ENDICOTT WELLFIELD SITE
SUMMARY OF CHEMICAL COMPOUNDS (DETECTS + UNDETECTS/2)
GROUND WATER

COMPOUND	VALID	OCCUR	UN-DETECT	EST	REJECT	FREQ DETECT	MINIMUM DETECTED CONCENTRATION	SAMPLE ID	MAXIMUM DETECTED CONCENTRATION	SAMPLE ID	MEDIAN CONCENTRATION	GEOMETRIC MEAN	MEAN CONCENTRATION	LOWER QUARTILE	UPPER QUARTILE	STNDRD. DEV.	95% CI UPPER
1,4-DICHLOROBENZENE	72	7	65	7	0	0.10	1.000	MW-22s-4	6.000	MW-23-4	5.000	4.697	4.806	5.000	5.000	1.290	
					TOTAL	=====>	3.000		11.000								
(Phthalate Esters)																	
BENZOIC ACID	51	5	46	5	0	0.10	4.000	MW-20-1	28.000	MW-6s-2	25.000	22.146	23.529	25.000	25.000	1.550	
BIS(2-ETHYLHEXYL)PHTHALATE	71	45	26	23	0	0.63	1.000	MP-3-4	740.000	EW-12-1	5.000	7.197	20.606	5.000	10.000	2.730	
BUTYL BENZYL PHTHALATE	72	1	71	1	0	0.01	5.000	MW-2-1	5.000	MW-2-1	5.000	5.000	5.000	5.000	5.000	1.000	
DI-n-BUTYLPHTHALATE	72	7	65	4	0	0.10	1.000	MW-26-4	50.000	MW-25d-4	5.000	4.933	5.764	5.000	5.000	1.632	
DI-n-OCTYL PHTHALATE	72	7	65	4	0	0.10	3.000	MW-6d-1	48.000	EW-12-1	5.000	5.387	6.153	5.000	5.000	1.449	
DIETHYLPHTHALATE	72	6	66	6	0	0.08	1.000	MP-1-4	6.000	MW-7-2	5.000	4.570	4.778	5.000	5.000	1.452	
DIMETHYL PHTHALATE	72	4	68	4	0	0.06	1.000	MP-3-4	2.000	MW-25d-4	5.000	4.661	4.806	5.000	5.000	1.354	
					TOTAL	=====>	16.000		879.000								
() Pesticide/Polychlorinated Biphenyl (PEST/PCB) ug/L																	
(Pesticides)																	
4-4-DDD	72	2	70	1	0	0.03	0.055	MW-28-6-T	0.180	MW-28-4	0.050	0.052	0.053	0.050	0.050	1.170	
4-4-DDE	72	1	71	1	0	0.01	0.006	MW-21-4	0.006	MW-21-4	0.050	0.049	0.050	0.050	0.050	1.292	
4-4-DDT	72	3	69	2	0	0.04	0.007	MW-22s-4	0.110	MW-9d-1	0.050	0.049	0.050	0.050	0.050	1.386	
ALDRIN	72	2	70	2	0	0.03	0.005	MW-21-5	0.023	MW-21-4	0.025	0.025	0.025	0.025	0.025	1.218	
ALPHA CHLORDANE	72	1	71	1	0	0.01	0.010	MW-21-4	0.010	MW-21-4	0.250	0.124	0.181	0.027	0.250	2.928	
ALPHA-BHC	72	2	70	2	0	0.03	0.003	MP-1-4	0.011	MW-21-4	0.025	0.024	0.025	0.025	0.025	1.314	
DIELDRIN	72	2	70	2	0	0.03	0.013	MW-21-6-T	0.015	MW-26-4	0.050	0.049	0.050	0.050	0.050	1.246	
ENDOSULFAN I	72	3	69	3	0	0.04	0.007	MP-3-4	0.028	MP-5-4	0.025	0.024	0.025	0.025	0.025	1.231	
ENDOSULFAN II	72	1	71	1	0	0.01	0.055	MW-26-4	0.055	MW-26-4	0.050	0.051	0.051	0.050	0.050	1.052	
ENDRIN KETONE	72	1	71	1	0	0.01	0.004	MP-5-4	0.004	MP-5-4	0.050	0.049	0.050	0.050	0.050	1.355	
GAMMA-BHC	72	2	70	2	0	0.03	0.005	MW-21-6-T	0.009	MW-22s-4	0.025	0.024	0.025	0.025	0.025	1.260	

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ENDICOTT WELLFIELD SITE
SUMMARY OF CHEMICAL COMPOUNDS (DETECTS + UNDETECTS/2)
GROUND WATER

COMPOUND	VALID	OCCUR	UN-DETECT	EST	REJECT	FREQ DETECT	MINIMUM DETECTED CONCENTRATION	SAMPLE ID	MAXIMUM DETECTED CONCENTRATION	SAMPLE ID	MEDIAN CONCENTRATION	GEOMETRIC MEAN	MEAN CONCENTRATION	LOWER QUARTILE	UPPER QUARTILE	STNDRD. DEV..	95% C UPPER
HEPTACHLOR	72	8	64	7	0	0.11	0.003	MW-24-4	0.100	MW-25d 4	0.025	0.023	0.025	0.025	0.025	1.626	
HEPTACHLOR EPOXIDE	72	2	70	2	0	0.03	0.004	MW-23-4	0.014	MW-22s 4	0.025	0.025	0.025	0.025	0.025	1.263	
METHOXYCHLOR	72	4	68	4	0	0.06	0.011	MW-26-4	0.032	MW-23-4	0.250	0.220	0.241	0.250	0.250	1.827	
					TOTAL	=====>	0.188		0.597								
(PCBs)																	
AROCLOR 1242	72	1	71	0	0	0.01	7.300	MW-7-2	7.300	MW-7-2	0.250	0.329	0.433	0.250	0.500	1.663	
AROCLOR 1254	72	3	69	0	0	0.04	1.300	MW-21-4	6.700	MW-7-2	0.500	0.551	0.669	0.500	0.500	1.523	
					TOTAL	=====>	8.600		14.000								
I) Inorganic (INORG) ug/L																	
ALUMINUM	78	76	2	0	0	0.97	213.000	MW-1-1	129000.000	MW-10s-2	8290.000	5223.769	20883.295	1180.000	28500.000	8.263	1:
ANTIMONY	78	1	77	0	0	0.01	96.400	EW-7-1	96.400	EW-7-1	10.500	13.438	14.621	10.500	16.500	1.411	
ARSENIC	35	8	27	0	0	0.23	11.200	EW-6-1	37.200	EW-12-1	1.500	3.015	6.197	1.500	2.750	2.976	
BARIUM	58	58	0	0	0	1.00	206.000	PURGE-1	8210.000	EW-12-6-T	551.500	588.686	875.724	380.000	746.000	2.082	
BERYLLIUM	55	1	54	0	0	0.02	5.100	MW-26-4-T	5.100	MW-26-4-T	0.500	0.522	0.584	0.500	0.500	1.368	
CADMIUM	83	4	79	0	0	0.05	5.700	MW-20-4-T	7.000	EW-11-1	2.500	2.518	2.594	2.500	2.500	1.240	
CALCIUM	85	85	0	0	0	1.00	16400.000	MW-30-4-T	550000.000	MW-15s-1	102000.000	95572.243	112944.706	68150.000	145000.000	1.845	1
CHROMIUM	55	33	22	0	0	0.60	10.400	MW-9s-1	195.000	MW-10s-2	16.300	12.760	32.205	2.500	39.050	4.619	
COBALT	29	10	19	0	0	0.34	53.500	EW-9-1	175.000	MW-10s-2	3.000	7.511	34.124	1.500	76.350	6.457	
COPPER	62	50	12	0	0	0.81	25.300	MW-11-3	422.000	MW-11-2	50.700	38.002	87.623	26.600	112.000	5.018	
IRON	68	68	0	0	0	1.00	135.000	EW-11-1	303000.000	MW-10s-2	22550.000	14626.628	51929.441	2510.000	88000.000	7.328	2
LEAD	36	29	7	0	0	0.81	3.700	MW-8s-1	92.000	MW-19-3	11.600	11.131	24.514	5.500	39.700	4.452	
MAGNESIUM	82	82	0	0	0	1.00	5340.000	MP-5-4-T	68600.000	MW-22s-4-T	23500.000	23126.939	26877.439	16900.000	32600.000	1.758	
MANGANESE	77	77	0	0	0	1.00	28.500	MW-8d-1	24300.000	MW-19-2	2740.000	2296.113	4906.875	1190.000	5350.000	4.103	
MERCURY	82	12	70	0	0	0.15	0.230	MW-22s-4-T	1.400	MW-7-1	0.100	0.126	0.172	0.100	0.100	1.834	

EBASCO F-111
06/17/92

ENDICOTT WELLFIELD SITE
SUMMARY OF CHEMICAL COMPOUNDS (DETECTS + UNDETECTS/2)
GROUND WATER

COMPOUND	VALID	OCCUR	UN-DETECT	EST	REJECT	FREQ DETECT	MINIMUM DETECTED CONCENTRATION	SAMPLE ID	MAXIMUM DETECTED CONCENTRATION	SAMPLE ID	MEDIAN CONCENTRATION	GEOMETRIC MEAN	MEAN CONCENTRATION	LOWER QUARTILE	UPPER QUARTILE	STNDRD. DEV.	95% UPP
NICKEL	75	42	33	0	0	0.56	41.800	MW-9s-6-1	352.000	MW-10s-2	53.100	41.203	66.899	14.500	90.600	2.724	
POTASSIUM	56	45	11	0	0	0.80	5350.000	EW-15-3	77100.000	MW-13d-1	10235.000	7953.354	13912.321	6160.000	16900.000	3.424	
SODIUM	67	67	0	0	0	1.00	5190.000	MW-9s-6-1	622000.000	MW-6s 1	20400.000	21785.846	32776.716	16600.000	28550.000	1.975	
VANADIUM	19	13	6	0	0	0.68	51.200	MW-24-4-1	149.000	MW-25s-4-1	59.500	22.548	52.200	2.750	62.350	5.896	
ZINC	55	55	0	0	0	1.00	21.000	MW-10d-1	12500.000	MP-1-4-1	190.000	191.971	881.800	76.000	310.500	4.300	
					TOTAL	====>	33187.530		1596242.900								

ENDICOTT WELLFIELD SITE
SUMMARY OF CHEMICAL COMPOUNDS (DETECTS + UNDETECTS/2)
PURGE SAMPLES ONLY

COMPOUND	VALID	OCCUR	UN-DETECT	EST	REJECT	FREQ DETECT	MINIMUM DETECTED CONCENTRATION	SAMPLE ID	MAXIMUM DETECTED CONCENTRATION	SAMPLE ID	MEDIAN CONCENTRATION	GEOMETRIC MEAN	MEAN CONCENTRATION	LOWER QUARTILE	UPPER QUARTILE	STNDRD. DEV.	95% CI UPPER LIMIT
I] Volatile (VOA) ug/L																	
(Halogenated Volatiles)																	
1,1-DICHLOROETHANE	4	4	0	0	0	1.00	4.000	PURGE-6	6.000	PURGE-2	5.500	4.949	5.000	5.000	6.000	1.181	6.881 X
CHLOROETHANE	3	3	0	0	0	1.00	44.000	PURGE-6	49.000	PURGE-3	49.000	46.288	46.333	0.000	0.000	1.056	51.497 X
METHYLENE CHLORIDE	4	4	0	0	0	1.00	0.700	PURGE-2	14.000	PURGE-6	7.500	1.769	4.175	1.000	14.000	4.012	31191283.093 X
TRANS-1,2-DICHLOROETHENE	2	1	1	0	0	0.50	35.000	PURGE-1	35.000	PURGE-1	35.000	5.916	18.000	0.000	0.000	12.354	2657034.017 X
TRICHLOROETHENE	4	1	3	1	0	0.25	0.600	PURGE-2	0.600	PURGE-2	1.000	0.880	0.900	1.000	1.000	1.291	1.667 X
VINYL CHLORIDE	3	3	0	0	0	1.00	35.000	PURGE-6	39.000	PURGE-3	39.000	37.294	37.333	0.000	0.000	1.058	41.691 X
					TOTAL	=====>	119.300		143.600								
(Non-Halogenated Volatiles)																	
BENZENE	4	1	3	1	0	0.25	0.600	PURGE-2	0.600	PURGE-2	1.000	0.880	0.900	1.000	1.000	1.291	1.667 X
					TOTAL	=====>	0.600		0.600								
I] Inorganic (INORG) ug/L																	
BARIUM	1	1	0	0	0	1.00	206.000	PURGE-1	206.000	PURGE-1	0.000	206.000	206.000	0.000	0.000	1.000	************* X
CALCIUM	1	1	0	0	0	1.00	91800.000	PURGE-1	91800.000	PURGE-1	0.000	91800.000	91800.000	0.000	0.000	1.000	************* X
IRON	1	1	0	0	0	1.00	1310.000	PURGE-1	1310.000	PURGE-1	0.000	1310.000	1310.000	0.000	0.000	1.000	************* X
MAGNESIUM	1	1	0	0	0	1.00	19400.000	PURGE-1	19400.000	PURGE-1	0.000	19400.000	19400.000	0.000	0.000	1.000	************* X
MANGANESE	1	1	0	0	0	1.00	1290.000	PURGE-1	1290.000	PURGE-1	0.000	1290.000	1290.000	0.000	0.000	1.000	************* X
SODIUM	1	1	0	0	0	1.00	24400.000	PURGE-1	24400.000	PURGE-1	0.000	24400.000	24400.000	0.000	0.000	1.000	************* X
					TOTAL	=====>	138406.000		138406.000								

NOTE: (X), IN 95% CI COLUMN, INDICATES VALUE IS GREATER THAN MAXIMUM CONCENTRATION; (*), ASTERISKS, INDICATE THAT THE NUMBER OF OCCURRENCES IS TOO SMALL TO ALLOW CALCULATION

ENDICOTT WELLFIELD SITE
SUMMARY OF CHEMICAL COMPOUNDS (DETECTS + UNDETECTS/2)
SURFACE WATER (WITHOUT GOLF COURSE POND SAMPLES)

COMPOUND	VALID	OCCUR	UN DETECT	EST	REJECT	FREQ DETECT	MINIMUM DETECTED CONCENTRATION	SAMPLE ID	MAXIMUM DETECTED CONCENTRATION	SAMPLE ID	MEDIAN CONCENTRATION	GEOMETRIC MEAN	MEAN CONCENTRATION	LOWER QUARTILE	UPPER QUARTILE	STNDRD. DEV.	95% CI UPPER LIMIT
II Volatile (VOA) ug/L																	
(Halogenated Volatiles)																	
METHYLENE CHLORIDE	20	14	6	3	0	0.70	0.500	SW-W11-2	11.000	SW-07-2	2.500	1.926	2.850	1.000	4.000	2.627	5.642
					TOTAL	=====>	0.500		11.000								
(Non-Halogenated Volatiles)																	
ACETONE	20	1	19	1	0	0.05	3.000	SW-W1-2	3.000	SW-W1-2	5.000	3.568	3.775	2.500	5.000	1.417	4.437 X
					TOTAL	=====>	3.000		3.000								
II Inorganic (INORG) ug/L																	
ALUMINUM	5	5	0	0	0	1.00	235.000	SW-W11-1	680.000	SW-S5-1	430.000	378.654	486.200	335.000	563.000	1.511	757.846 X
CALCIUM	10	10	0	0	0	1.00	12900.000	SW-W11-1	21800.000	SW-S4-1	17200.000	16296.700	16570.000	13500.000	19800.000	1.211	18719.063
IRON	7	7	0	0	0	1.00	281.000	SW-W1-1	867.000	SW-S5-1	566.000	487.564	520.286	378.500	549.000	1.482	760.183
MANGANESE	9	8	1	0	0	0.89	20.300	SW-D10-1	139.000	SW-W3-1	43.600	26.237	45.722	28.050	54.200	4.894	2629.645 X
ZINC	2	1	1	0	0	0.50	58.700	SW-W3-1	58.700	SW-W3-1	58.700	5.418	29.600	0.000	0.000	29.072	7695259586.32 X
					TOTAL	=====>	13495.000		23552.700								

NOTE: (X), IN 95% CI COLUMN, INDICATES VALUE IS GREATER THAN MAXIMUM CONCENTRATION; (*), ASTERISKS, INDICATE THAT THE NUMBER OF OCCURRENCES IS TOO SMALL TO ALLOW CALCULATION

ENDICOTT WELLFIELD SITE
SUMMARY OF CHEMICAL COMPOUNDS (DETECTS + UNDETECTS/2)
SURFACE WATER

COMPOUND	VALID	OCCUR	UN-DETECT	EST	REJECT	FREQ DETECT	MINIMUM DETECTED CONCENTRATION	SAMPLE ID	MAXIMUM DETECTED CONCENTRATION	SAMPLE ID	MEDIAN CONCENTRATION	GEOMETRIC MEAN	MEAN CONCENTRATION	LOWER QUARTILE	UPPER QUARTILE	STNDRD. DEV.	95% CI UPPER LIMIT
() Volatile (VOA) ug/L																	
(Halogenated Volatiles)																	
1,1-DICHLOROETHANE	23	2	21	0	0	0.09	2.000	SW-P8-2	2.000	SW-P8-3	2.500	1.646	1.804	1.000	2.500	1.570	2.207
CHLOROETHANE	23	2	21	0	0	0.09	9.000	SW-P8-3	13.000	SW-P8-2	5.000	2.656	3.783	1.000	5.000	2.468	6.545
METHYLENE CHLORIDE	23	17	6	3	0	0.74	0.500	SW-W11-2	11.000	SW-D7-2	3.000	2.113	3.000	1.000	4.000	2.544	5.442
VINYL CHLORIDE	23	2	21	0	0	0.09	4.000	SW-P8-3	7.000	SW-P8-2	5.000	2.496	3.304	1.000	5.000	2.281	5.378
					TOTAL	=====>	15.500		33.000								
(Non-Halogenated Volatiles)																	
ACETONE	23	1	22	1	0	0.04	3.000	SW-W1-2	3.000	SW-W1-2	5.000	3.510	3.717	2.500	5.000	1.417	4.297
					TOTAL	=====>	3.000		3.000								
() Inorganic (INORG) ug/L																	
ALUMINUM	5	5	0	0	0	1.00	235.000	SW-W11-1	680.000	SW-S5-1	430.000	378.654	406.200	335.000	563.000	1.511	757.846
BARIUM	1	1	0	0	0	1.00	215.000	SW-P8-1	215.000	SW-P8-1	0.000	215.000	215.000	0.000	0.000	1.000	*************
CALCIUM	11	11	0	0	0	1.00	12900.000	SW-W11-1	97400.000	SW-P8-1	17200.000	19172.859	23910.182	13550.000	18500.000	1.764	34513.400
IRON	8	8	0	0	0	1.00	281.000	SW-W1-1	867.000	SW-S5-1	599.500	503.736	534.375	430.000	639.000	1.456	767.643
MAGNESIUM	1	1	0	0	0	1.00	21400.000	SW-P8-1	21400.000	SW-P8-1	0.000	21400.000	21400.000	0.000	0.000	1.000	*************
MANGANESE	10	9	1	0	0	0.90	20.300	SW-D10-1	1160.000	SW-P8-1	45.050	38.324	157.150	23.200	61.900	6.805	7586.041
ZINC	3	2	1	0	0	0.67	58.700	SW-W3-1	63.300	SW-P8-1	63.300	12.293	40.833	0.000	0.000	16.014	*************
					TOTAL	=====>	35110.000		121793.300								

NOTE: (#), IN 95% CI COLUMN, INDICATES VALUE IS GREATER THAN MAXIMUM CONCENTRATION; (*), ASTERISKS, INDICATE THAT THE NUMBER OF OCCURRENCES IS TOO SMALL TO ALLOW CALCULATION

ENDICOTT WELLFIELD SITE
SUMMARY OF CHEMICAL COMPOUNDS (DETECTS + UNDETECTS/2)
SURFACE WATER (GOLF COURSE POND SAMPLES ONLY)

COMPOUND	VALID	OCCUR	UN-DETECT	EST	REJECT	FREQ DETECT	MINIMUM DETECTED CONCENTRATION	SAMPLE ID	MAXIMUM DETECTED CONCENTRATION	SAMPLE ID	MEDIAN CONCENTRATION	GEOMETRIC MEAN	MEAN CONCENTRATION	LOWER QUARTILE	UPPER QUARTILE	STNDRD. DEV.	95% CI UPPER LIMIT
[] Volatile (VOA) ug/L																	
(Halogenated Volatiles)																	
1,1-DICHLOROETHANE	3	2	1	0	0	0.67	2.000	SW-PB-2	2.000	SW-PB-3	2.500	2.154	2.167	0.000	0.000	1.138	2.933 X
CHLOROETHANE	3	2	1	0	0	0.67	9.000	SW-PB-3	13.000	SW-PB-2	13.000	8.363	9.000	0.000	0.000	1.619	85.927 X
METHYLENE CHLORIDE	3	3	0	0	0	1.00	3.000	SW-PB-1	5.000	SW-PB-3	5.000	3.915	4.000	0.000	0.000	1.292	8.513 X
VINYL CHLORIDE	3	2	1	0	0	0.67	4.000	SW-PB-3	7.000	SW-PB-2	7.000	5.192	5.333	0.000	0.000	1.325	12.249 X
					TOTAL	=====>	18.000		27.000								
[] Inorganic (INORG) ug/L																	
BARIUM	1	1	0	0	0	1.00	215.000	SW-PB-1	215.000	SW-PB-1	0.000	215.000	215.000	0.000	0.000	1.000	************* X
CALCIUM	1	1	0	0	0	1.00	97400.000	SW-PB-1	97400.000	SW-PB-1	0.000	97400.000	97400.000	0.000	0.000	1.000	************* X
IRON	1	1	0	0	0	1.00	633.000	SW-PB-1	633.000	SW-PB-1	0.000	633.000	633.000	0.000	0.000	1.000	************* X
MAGNESIUM	1	1	0	0	0	1.00	21400.000	SW-PB-1	21400.000	SW-PB-1	0.000	21400.000	21400.000	0.000	0.000	1.000	************* X
MANGANESE	1	1	0	0	0	1.00	1160.000	SW-PB-1	1160.000	SW-PB-1	0.000	1160.000	1160.000	0.000	0.000	1.000	************* X
ZINC	1	1	0	0	0	1.00	63.300	SW-PB-1	63.300	SW-PB-1	0.000	63.300	63.300	0.000	0.000	1.000	************* X
					TOTAL	=====>	120871.300		120871.300								

NOTE: (X), IN 95% CI COLUMN, INDICATES VALUE IS GREATER THAN MAXIMUM CONCENTRATION; (*), ASTERISKS, INDICATE THAT THE NUMBER OF OCCURRENCES IS TOO SMALL TO ALLOW CALCULATION

ENDICOTT WELLFIELD SITE
SUMMARY OF CHEMICAL COMPOUNDS (DETECTS + UNDETECTS/2)
SEDIMENT SAMPLES

COMPOUND	VALID	OCCUR	UN-DETECT	EST	REJECT	FREQ DETECT	MINIMUM DETECTED CONCENTRATION	SAMPLE ID	MAXIMUM DETECTED CONCENTRATION	SAMPLE ID	MEDIAN CONCENTRATION	GEOMETRIC MEAN	MEAN CONCENTRATION	LOWER QUARTILE	UPPER QUARTILE	STNDRD. DEV.	95% CI UPPER LIMIT
I) Volatile (VOA) ug/kg																	
(Halogenated Volatiles)																	
CHLOROFORM	22	1	21	1	0	0.05	1.000	SED-H1-1	1.000	SED-H1-1	4.000	3.714	3.886	3.500	4.500	1.417	4.560
METHYLENE CHLORIDE	22	22	0	0	0	1.00	11.000	SED-H2-?	76.000	SED-S4-2	25.000	22.965	25.364	17.000	29.000	1.543	30.458
					TOTAL	=====>	12.000		77.000								
(Non-Halogenated Volatiles)																	
ACETONE	22	21	1	0	0	0.95	9.000	SED-D10-2	180.000	SED-S5-1	33.000	30.000	41.116	17.000	43.000	2.205	61.071
					TOTAL	=====>	9.000		180.000								
II) Base Neutral Acid (BNA) ug/kg																	
(Phenols)																	
4-METHYLPHENOL	11	1	10	1	0	0.09	190.000	SED-S4-1	190.000	SED-S4-1	250.000	230.983	233.182	210.000	252.500	1.154	254.182
					TOTAL	=====>	190.000		190.000								
(Polycyclic Aromatic Hydrocarbons)																	
ANTHRACENE	11	2	9	2	0	0.18	69.000	SED-S6-1	95.000	SED-H2-1	220.000	195.911	209.455	200.000	237.500	1.580	296.761
BENZO(a)ANTHRACENE	11	4	7	4	0	0.36	79.000	SED-H3-1	160.000	SED-S4-1	215.000	172.748	184.909	155.000	215.000	1.519	252.821
BENZO(a)PYRENE	11	5	6	5	0	0.45	89.000	SED-S6-1	250.000	SED-S5-1	215.000	181.047	189.455	165.000	215.000	1.399	239.116
BENZO(b)FLUORANTHENE	11	4	7	4	0	0.36	130.000	SED-H2-1	200.000	SED-S4-1	215.000	190.057	205.000	167.500	217.500	1.303	243.846
BENZO(G,H,I)PERYLENE	11	1	10	1	0	0.09	91.000	SED-S4-1	91.000	SED-S4-1	250.000	216.031	224.182	210.000	252.500	1.369	279.279
BENZO(k)FLUORANTHENE	11	4	7	4	0	0.36	87.000	SED-H2-1	200.000	SED-S4-1	215.000	191.720	201.091	167.500	217.500	1.412	255.545

NOTE: (X), IN 95% CI COLUMN, INDICATES VALUE IS GREATER THAN MAXIMUM CONCENTRATION; (*), ASTERISKS, INDICATE THAT THE NUMBER OF OCCURRENCES IS TOO SMALL TO ALLOW CALCULATION

COMPOUND	VALID	OCCUR	UN-DETECT	EST	REJECT	FREQ DETECT	MINIMUM DETECTED CONCENTRATION	SAMPLE ID	MAXIMUM DETECTED CONCENTRATION	SAMPLE ID	MEDIAN CONCENTRATION	GEOMETRIC MEAN	MEAN CONCENTRATION	LOWER QUARTILE	UPPER QUARTILE	STNDRD. DEV.	95% CI UPPER LIMIT
CHRYSENE	11	4	7	4	0	0.36	94.000	SED-S6-1	210.000	SED S4-1	215.000	181.582	191.273	167.500	215.000	1.434	245.8
FLUORANTHENE	11	5	6	5	0	0.45	60.000	SED P8-1	1500.000	SED-S6-1	220.000	240.255	332.727	200.000	240.000	2.121	606.9
INDENO(1,2,3-CD)PYRENE	11	1	10	1	0	0.09	84.000	SED-S4-1	84.000	SED-S4-1	250.000	214.465	223.545	210.000	252.500	1.400	283.3
PHENANTHRENE	11	4	7	4	0	0.36	62.000	SED-S6-1	330.000	SED-N2-1	215.000	186.708	204.545	200.000	217.500	1.648	300.3
PYRENE	11	4	7	4	0	0.36	49.000	SED-N1-1	230.000	SED-N2-1	215.000	151.049	177.818	140.000	215.000	2.017	352.6
					TOTAL	=====>	894.000		3510.000								
(Phthalate Esters)																	
BIS(2-ETHYLHEXYL)PHTHALATE	11	7	4	7	0	0.64	54.000	SED-N1-1	500.000	SED-S4-1	200.000	149.747	183.727	101.500	202.500	1.991	329.4
DI-n-BUTYLPHTHALATE	11	2	9	2	0	0.18	420.000	SED-S4-1	510.000	SED-P8-1	260.000	264.402	277.273	215.000	260.000	1.359	339.4
					TOTAL	=====>	474.000		1010.000								
(Others)																	
N-NITROSODIPHENYLAMINE	11	1	10	1	0	0.09	69.000	SED-S4-1	69.000	SED-S4-1	250.000	210.464	222.182	210.000	252.500	1.400	294.6
					TOTAL	=====>	69.000		69.000								
II Inorganic (INORG) mg/kg																	
ALUMINUM	11	11	0	0	0	1.00	6930.000	SED-S4-1	14300.000	SED-P8-1	11000.000	10534.882	10739.091	9500.000	11250.000	1.244	12366.2
BARIUM	7	7	0	0	0	1.00	57.200	SED-D10-1	108.000	SED-P8-1	60.000	71.040	73.557	62.950	67.150	1.256	89.83
BERYLLIUM	9	1	8	0	0	0.11	1.500	SED-P8-1	1.500	SED-P8-1	0.155	0.182	0.292	0.120	0.167	2.235	0.6
CALCIUM	8	8	0	0	0	1.00	1100.000	SED-D10-1	7140.000	SED-N3-1	1870.000	1975.186	2356.250	1520.000	2090.000	1.738	4023.8
CHROMIUM	11	11	0	0	0	1.00	12.600	SED-N1-1	225.000	SED-S6-1	16.600	20.851	35.736	14.650	17.150	2.258	61.37
COBALT	4	4	0	0	0	1.00	14.000	SED-N11-1	16.300	SED-07-1	15.000	15.170	15.200	15.200	16.300	1.064	16.7
IRON	11	11	0	0	0	1.00	16200.000	SED-S4-1	37000.000	SED-07-1	26200.000	25276.613	26345.455	21050.000	28200.000	1.362	32504.81

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03/18/92

ENDICOTT WELLFIELD SITE
SUMMARY OF CHEMICAL COMPOUNDS (DETECTS + UNDETECTS/2)
SEDIMENT SAMPLES

COMPOUND	VALID	OCCUR	UN-DETECT	EST	REJECT	FREQ DETECT	MINIMUM DETECTED CONCENTRATION	SAMPLE ID	MAXIMUM DETECTED CONCENTRATION	SAMPLE ID	MEDIAN CONCENTRATION	GEOMETRIC MEAN	MEAN CONCENTRATION	LOWER QUARTILE	UPPER QUARTILE	STNDRD. DEV.	95% CI UPPER LIMIT
LEAD	11	11	0	0	0	1.00	7.700	SED-S5-1	34.500	SED-S6-1	19.200	17.479	18.500	16.800	19.300	1.438	23.741
MAGNESIUM	11	11	0	0	0	1.00	2500.000	SED-S4-1	4870.000	SED-D9-1	4050.000	3587.809	3655.455	3210.000	4090.000	1.278	4166.151
MANGANESE	11	11	0	0	0	1.00	156.000	SED-S5-1	998.000	SED-D10-1	498.000	458.837	517.636	351.000	513.500	1.700	786.134
NICKEL	11	11	0	0	0	1.00	17.500	SED-N2-1	34.900	SED-D9-1	28.400	25.175	25.782	20.500	29.350	1.273	30.075
SILVER	10	1	9	0	0	0.10	11.300	SED-S6-1	11.300	SED-S6-1	0.450	0.576	1.507	0.380	0.460	2.872	3.616
ZINC	11	11	0	0	0	1.00	71.300	SED-S5-1	117.000	SED-S6-1	104.000	96.212	97.027	89.200	104.000	1.148	105.461
					TOTAL	=====>	27159.100		64856.500								

NOTE: (X) IN 95% CI COLUMN, INDICATES VALUE [illegible]

ENDICOTT WELLFIELD SITE
SUMMARY OF CHEMICAL COMPOUNDS (DETECTS + UNDETECTS/2)
SUBSURFACE SOIL

COMPOUND	VALID	OCCUR	UN-DETECT	EST	REJECT	FREQ DETECT	MINIMUM DETECTED CONCENTRATION	SAMPLE ID	MAXIMUM DETECTED CONCENTRATION	SAMPLE ID	MEDIAN CONCENTRATION	GEOMETRIC MEAN	MEAN CONCENTRATION	LOWER QUARTILE	UPPER QUARTILE	STNDRD. DEV.	95% CI UPPER LIMIT
DIETHYLPHTHALATE	47	8	39	8	0	0.17	43.000	SBMW-27-12	500.000	TP-1-5	205.000	238.905	455.681	190.000	215.000	2.346	459.573
					TOTAL	=====>	258.000		90630.000								
(Others)																	
3,3'-DICHLOROBENZIDINE	47	1	46	1	0	0.02	2900.000	SBMW-22-14	2900.000	SBMW-22-14	375.000	350.167	468.956	210.000	420.000	1.910	527.009
4-NITROANILINE	47	1	46	1	0	0.02	61.000	SB-7-14	61.000	SB-7-14	900.000	824.464	1336.956	500.000	1000.000	2.258	1516.164 X
N-NITROSO-DIPROPYLAMINE	47	2	45	2	0	0.04	67.000	SB-7-14	400.000	SB-6-14	210.000	252.616	448.340	195.000	215.000	2.104	424.200 X
N-NITROSODIPHENYLAMINE	47	3	44	3	0	0.06	77.000	SB-7-14	610.000	SB-6-14	205.000	250.395	450.170	192.500	215.000	2.150	430.257
					TOTAL	=====>	3105.000		3971.000								

II Pesticide/Polychlorinated Biphenyl (PEST/PCB) ug/kg

COMPOUND	VALID	OCCUR	UN-DETECT	EST	REJECT	FREQ DETECT	MINIMUM DETECTED CONCENTRATION	SAMPLE ID	MAXIMUM DETECTED CONCENTRATION	SAMPLE ID	MEDIAN CONCENTRATION	GEOMETRIC MEAN	MEAN CONCENTRATION	LOWER QUARTILE	UPPER QUARTILE	STNDRD. DEV.	95% CI UPPER LIMIT
(Pesticides)																	
4-4-DDD	47	8	39	5	0	0.17	0.200	SBMW-24-14	37.000	SBMW-26-14	8.500	4.715	7.123	2.125	9.600	2.602	10.479
4-4-DDE	47	7	40	6	0	0.15	0.260	SBMW-24-14	18.000	TP-5-6	4.300	3.910	5.604	2.075	9.500	2.654	8.922
4-4-DDT	46	7	39	6	0	0.15	0.250	SB-1-14	17.000	SBMW-23-14	3.050	3.854	5.600	2.050	9.500	2.734	9.634
ALDRIN	46	4	42	4	0	0.09	0.180	SB-8-14	1.600	SB-7-14	1.050	2.017	2.723	1.050	4.750	2.309	3.820 X
ALPHA CHLORDANE	46	8	38	4	0	0.17	0.180	SBMW-24-14	13.000	TP-5-6	9.900	6.710	22.342	1.100	47.500	6.500	112.004 X
ALPHA-BHC	47	10	37	10	0	0.21	0.190	SB-1-14	1.400	TP-4-6	1.300	1.762	2.586	1.050	4.675	2.615	3.944 X
BETA-BHC	47	3	44	3	0	0.06	2.300	TP-1-5	2.600	TP-5-6	2.300	2.176	2.783	1.075	4.675	2.076	3.595 X
DELTA-BHC	46	2	44	2	0	0.04	0.270	TP-2-5	0.440	TP-4-6	1.950	2.049	2.743	1.050	4.750	2.260	3.798 X
DIELDRIN	46	7	39	5	0	0.15	0.160	SBMW-23-14	13.000	SBMW-26-14	5.200	4.063	5.755	2.100	9.500	2.606	9.505
ENDOSULFAN I	47	4	43	4	0	0.09	0.200	SB-7-14	0.780	SB-8-14	1.700	1.977	2.693	1.050	4.675	2.332	3.776 X
ENDOSULFAN II	45	1	44	1	0	0.02	1.400	SBMW-26-14	1.400	SBMW-26-14	2.750	4.137	5.490	2.075	9.500	2.170	7.252 X
ENDOSULFAN SULFATE	45	6	39	6	0	0.13	0.220	SB-2-14	7.500	SBMW-26-14	6.400	3.076	5.572	2.075	9.500	2.607	9.111 X
ENDRIN	46	5	41	5	0	0.11	0.260	SB-1-14	7.200	SBMW-26-14	3.400	4.056	5.556	2.100	9.500	2.434	8.186 X
ENDRIN KETONE	47	6	41	6	0	0.13	0.260	SBMW-23-14	2.500	SBMW-22-14	2.500	3.681	5.247	2.050	9.500	2.510	7.811 X

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04/03/92

ENDICOTT WELLFIELD SITE
SUMMARY OF CHEMICAL COMPOUNDS (DETECTS + UNDETECTS/2)
SUBSURFACE SOIL

COMPOUND	VALID	OCCUR	UN-DETECT	EST	REJECT	FREQ DETECT	MINIMUM DETECTED CONCENTRATION	SAMPLE ID	MAXIMUM DETECTED CONCENTRATION	SAMPLE ID	MEDIAN CONCENTRATION	GEOMETRIC MEAN	MEAN CONCENTRATION	LOWER QUARTILE	UPPER QUARTILE	STNDRD. DEV.	95% CI UPPER LIMIT
GAMMA CHLORDANE	44	8	36	6	0	0.18	0.140	TP-6-5	9.000	SB-6-14	7.350	6.407	22.854	1.100	48.000	7.103	136.856
GAMMA-BHC	44	7	37	7	0	0.16	0.097	SB-1-14	0.740	SB-7-14	1.875	1.760	2.696	1.050	4.000	2.932	4.918
HEPTACHLOR	47	3	44	3	0	0.06	0.730	SB-2-14	1.800	SBMW-26-14	1.700	2.034	2.706	1.075	4.675	2.234	3.695
HEPTACHLOR EPOXIDE	46	7	39	6	0	0.15	0.200	SB-4-14	3.100	TP 3-6	1.550	1.964	2.710	1.050	4.750	2.387	3.869
METHOXYCHLOR	47	6	41	6	0	0.13	0.900	SB-7-14	19.000	SB-6-14	17.000	19.035	26.764	10.500	46.750	2.536	40.915
					TOTAL	=====>	0.057		157.060								
(PCBs)																	
AROCLOR 1248	47	1	46	0	0	0.02	69.000	SBMW-27-12	69.000	SBMW-27-12	42.000	32.075	35.052	21.000	47.750	1.537	39.769
AROCLOR 1254	47	12	35	3	0	0.26	6.500	TP-5-10	960.000	TP-5-6	90.000	64.241	126.011	21.000	100.000	3.059	188.496
AROCLOR 1260	47	1	46	1	0	0.02	21.000	SB-2-14	21.000	SB-2-14	33.500	42.117	54.777	21.000	95.000	2.111	70.963
					TOTAL	=====>	96.500		1050.000								
(I Inorganic (INORG) mg/kg																	
ALUMINUM	47	47	0	0	0	1.00	1430.000	SB-1-14	24900.000	SBMW-26-14	12500.000	11055.555	12019.149	9860.000	14200.000	1.592	14059.249
ARSENIC	30	25	5	0	0	0.83	2.000	SB-1-14	21.700	TP-1-5	5.000	[illegible].409	5.490	3.000	5.900	2.041	7.026
BARIUM	37	37	0	0	0	1.00	50.900	MW-3-30	2000.000	TP-3-6	87.200	99.301	156.603	77.300	113.500	1.955	157.354
BERYLLIUM	10	2	8	0	0	0.20	0.730	MW-9d-20	3.300	MW-14-20	0.160	0.225	0.519	0.110	0.255	3.035	1.602
CADMIUM	46	9	37	0	0	0.20	1.700	SBMW-22-14	6.900	TP-1-5	0.600	0.706	1.140	0.500	0.650	2.009	1.314
CALCIUM	20	20	0	0	0	1.00	1340.000	MW-5-15	65100.000	MW-17-30	4105.000	4940.552	13307.500	1560.000	10200.000	3.003	30171.096
CHROMIUM	40	40	0	0	0	1.00	7.300	MW-15d-10	3090.000	SBMW-22-14	20.550	27.957	131.155	16.300	35.000	3.205	95.517
COBALT	13	13	0	0	0	1.00	11.700	MW-3-30	21.400	MW-2-45	15.400	15.063	15.205	13.700	17.000	1.195	16.009
COPPER	44	44	0	0	0	1.00	11.000	MW-12-25	701.000	TP-1-5	21.000	29.318	61.161	16.200	34.100	2.567	64.700
IRON	31	31	0	0	0	1.00	7470.000	SB-1-14	145000.000	SBMW-22-14	24900.000	24610.431	28300.710	21950.000	26700.000	1.603	32477.204
LEAD	7	7	0	0	0	1.00	5.500	MW-15d-10	55.200	MW-9d-20	12.200	11.314	15.000	6.550	11.600	2.107	42.110
MAGNESIUM	43	43	0	0	0	1.00	1160.000	SB-1-14	10100.000	MW-15d-10	3710.000	3707.206	3962.326	3200.000	4170.000	1.445	4407.831

ENDICOTT WELLFIELD SITE
SUMMARY OF CHEMICAL COMPOUNDS (DETECTS + UNDETECTS/2)
SUBSURFACE SOIL

COMPOUND	VALID	OCCUR	UN-DETECT	EST	REJECT	FREQ DETECT	MINIMUM DETECTED CONCENTRATION	SAMPLE ID	MAXIMUM DETECTED CONCENTRATION	SAMPLE ID	MEDIAN CONCENTRATION	GEOMETRIC MEAN	MEAN CONCENTRATION	LOWER QUARTILE	UPPER QUARTILE	STNDRD. DEV.	95% CI UPPER LIMIT
MANGANESE	40	40	0	0	0	1.00	115.000	SB-1-14	1450.000	SBMW-22-14	467.500	435.513	475.475	366.000	568.000	1.537	545.358
NICKEL	46	46	0	0	0	1.00	10.500	MW-15d 10	112.000	SBMW-22-14	24.700	25.360	28.052	21.400	27.600	1.501	30.947
POTASSIUM	14	9	5	0	0	0.64	1090.000	SBMW-21-14	2320.000	MW-10d-15	1455.000	659.146	1105.500	160.000	1500.000	3.505	5612.676
SODIUM	13	2	11	0	0	0.15	1160.000	MW-2-45	2080.000	SB-1-14	188.500	238.701	395.538	181.250	198.250	2.366	603.342
VANADIUM	36	36	0	0	0	1.00	12.900	MW-18-20	30.000	SBMW-26-14	17.100	17.070	17.453	14.600	19.600	1.231	18.575
ZINC	29	29	0	0	0	1.00	50.600	MW-17-30	1460.000	TP-1-5	81.000	113.889	200.831	68.450	163.000	2.394	269.062
					TOTAL	=====>	13930.630		258531.500								

TABLE 3-1
Endicott Wellfield Exposure Pathway Analysis

Pathway	*Receptor*	*Timeframe Evaluated*		*Degree of Assessment*		*Rationale for Selection or Exclusion*
		Present	Future	Quant.	Qual.	
GROUND WATER						
Ingestion	Adult/child resident	Yes	Yes	X		Affected aquifer is public water supply source.
	Construction Worker	No	Yes	X		Private wells are in use. Construction workers expected to drink local water during time on job s
Inhalation	Adult/child resident	Yes	Yes	X		Volatile organics are present in water supply aqui
	Construction Worker	No	Yes		X	Exposure to workers expected to be minimal.
Dermal Contact	Adult/child resident	Yes	Yes	X		Contaminants are present in water supply aquifer
	Construction Worker	No	Yes		X	Exposure to workers expected to be minimal.
SURFACE WATER						
Ingestion	Adult/child recreation	Yes	Yes	X		Incidental ingestion during swimming/wading.
Inhalation	Adult recreation(golfers)	Yes	Yes	X		VOCs detected only in golf course ponds.
	Other adult recreation	No	No			
	Child recreation	No	No			No significant levels of VOCs detected in other surface water bodies.
Dermal Contact	Adult/child recreation	Yes	Yes	X		Direct contact during swimming/wading.
Fish Consumption	Sub-population	Yes	Yes		X	No biota sampling. Evaluated potential for bioaccumulation.

Table [c]

Table 3-1
Endicott Wellfield Exposure Pathway Analysis

Pathway	*Receptor*	*Timeframe Evaluated*		*Degree of Assessment*		*Rationale for Selection or Exclusion*
		Present	Future	Quant.	Qual.	
SEDIMENT						
Ingestion	Adult/Child recreation	No	No			Sediment ingestion assumed not to occur. Not included in scope of work.
Inhalation	Adult/Child Recreation	No	No			No volatile contaminants detected in sediment.
Dermal Contact	Adult/Child Recreation	Yes	Yes	X		Dermal contact assumed to occur.
SURFACE SOIL						
Ingestion	Adult/child resident	No	No			No surface soil samples taken. Future residential development unlikely.
	Adult/child recreation	Yes	Yes		X	See above. Contact with surface soil at proposed golf course unlikely.
	Adult worker	No	Yes		X	
Inhalation	Adult/child resident	No	No			No surface soil samples taken. Future residential development unlikely.
	Adult/child recreation	Yes	Yes		X	See above. Contact with surface soil at landfill or proposed golf course unlikely.
	Adult worker	No	Yes		X	

Table 3-1
Endicott Wellfield Exposure Pathway Analysis

Pathway	*Receptor*	*Timeframe Evaluated*		*Degree of Assessment*		*Rationale for Selection or Exclusion*
		Present	Future	Quant.	Qual.	
Dermal Contact	Adult/child resident	No	No			No surface soil samples taken. Future residential development unlikely.
	Adult/child recreation	Yes	Yes		X	See above. Contact with surface soil at
	Adult worker	No	Yes		X	proposed golf course unlikely.
SUBSURFACE SOIL/WASTE						
Ingestion	Adult/child resident (trespasser)	No	No			Occupational incidental ingestion of soil during proposed highway construction.
	Construction Worker	No	Yes	X		
Inhalation	Adult/child resident (trespasser)	No	No			Occupational inhalation of dusts/VOCs during proposed highway construction.
	Construction Worker	No	Yes	X		
Dermal contact	Adult/child resident (trespasser)	No	No			Occupational direct contact with subsurface soil during proposed highway construction.
	Construction Worker	No	Yes	X		

TABLE 4-1
ENDICOTT WELLFIELD SITE
TOXICITY DATA FOR NONCARCINOGENIC AND POTENTIAL CARCINOGENIC EFFECTS
DOSE RESPONSE EVALUATION

Chemical Name	Noncarcinogen Reference Dose		Subchronic Noncarcinogen Reference Dose		Carcinogen Slope Factor				Compound w/o Criteri
	RfD(oral) (mg/Kg-day)	RfD(inhalation) (mg/Kg-day)	RfD (oral sub) (mg/Kg-day)	RfD(inhalation, sub) (mg/Kg-day)	Oral SF (mg/Kg-day)-1	Weight	Inhalation SF (mg/Kg-day)-1	Weight	
Volatiles:									
Acetone	1.00E-01	NA	1.00E+00	NA	NA	D	NA	D	2-Hexanon
Benzene	NA	NA	NA	NA	2.90E-02	A	2.90E-02	A	
2-Butanone	5.00E-02	9.00E-02	5.00E-01	9.00E-01	NA	D	NA	D	
Carbon Disulfide	1.00E-01	1.00E-02	1.00E-01	ND	NA	NA	NA	NA	
Chlorobenzene	2.00E-02	5.00E-03	2.00E-01	5.00E-02	NA	D	NA	D	
Chloroethane	NA	2.90E+00	NA	2.90E+00	NA	NA	NA	NA	
Chloroform	1.00E-02	NA	1.00E+00	NA	6.10E-03	B2	8.10E-02	B2	
1,1-Dichloroethane*	1.00E-01	1.00E-01	1.00E+00	1.00E+00	NA	C	NA	C	
1,2-Dichloroethane	NA	NA	NA	NA	9.10E-02	B2	9.10E-02	B2	
1,1-Dichloroethene	9.00E-03	ND	9.00E-03	ND	6.00E-01	C	1.20E+00	C	
Trans -1,2- Dichloroethene*	2.00E-02	ND	2.00E-01	ND	NA	NA	NA	NA	
Trans-1,3-Dichloropropene*	3.00E-04	2.00E-02	3.00E-03	2.00E-02	1.80E-01	B2	1.30E-01	B2	
Ethylbenzene	1.00E-01	2.90E-01	1.00E+00	2.90E-01	NA	D	NA	D	
Methylene Chloride	6.00E-02	8.60E-01	6.00E-02	8.60E-01	7.50E-03	B2	1.65E-03	B2	
4-Methyl-2-pentanone	5.00E-02	2.00E-02	NA	NA	NA	NA	NA	NA	
Styrene	2.00E-01	ND	2.00E+00	ND	3.00E-02	B2	2.00E-03	B2	
Tetrachloroethene	1.00E-02	NA	1.00E-01	NA	5.10E-02	B2	1.80E-03	B2	
1,1,2,2-Tetrachloroethane	NA	NA	NA	NA	2.00E-01	C	2.00E-01	C	
Toluene	2.00E-01	2.00E+00	2.00E+00	2.70E-01	NA	D	NA	D	
Total Xylenes	2.00E+00	8.60E-02	4.00E+00	8.60E-02	NA	D	NA	D	
1,1,1-Trichloroethane	9.00E-02	3.00E-01	9.00E-01	3.00E+00	NA	D	NA	D	
1,1,2-Trichloroethane*	4.00E-03	ND	NA	NA	5.70E-02	C	5.70E-02	C	
Trichloroethene*	NA	NA	NA	NA	1.10E-02	B2	1.70E-02	B2	
Vinyl Chloride	NA	NA	NA	NA	1.90E+00	A	2.90E-01	A	
Vinyl Acetate	1.00E+00	2.00E-01	1.00E+00	2.00E-01	NA	NA	NA	NA	

TABLE 4-1
ENDICOTT WELLFIELD SITE
TOXICITY DATA FOR NONCARCINOGENIC
AND POTENTIAL CARCINOGENIC EFFECTS
DOSE RESPONSE EVALUATION

Chemical Name	Noncarcinogen Reference Dose		Subchronic Noncarcinogen Reference Dose		Carcinogen Slope Factor				Compoun w/o Criter
	RfD(oral) (mg/Kg-day)	RfD(inhalation) (mg/Kg-day)	RfD (oral sub) (mg/Kg-day)	RfD(inhalation, sub) (mg/Kg-day)	Oral SF (mg/Kg-day)-1	Weight	Inhalation SF (mg/Kg-day)-1	Weight	
Semi-Volatiles:									
Benzoic Acid	4.00E+00	NA	4.00E+00	NA	NA	D	NA	D	Acenaphthy
Bis(2-ethylhexyl)phthalate	2.00E-02	NA	2.00E-02	NA	1.40E-02	B2	NA	B2	Benzo(g,h,i)Pe
Butyl benzyl phthalate	2.00E-01	ND	2.00E+00	ND	NA	C	NA	C	2-Chloronapht
1,4-Dichlorobenzene	NA	2.00E-01	NA	NA	2.40E-02	C	NA	C	4-Chloro-3-Meth
3,3-Dichlorobenzidine	NA	NA	NA	NA	4.50E-01	B2	NA	B2	Dibenzofu
Diethylphthalate	8.00E-01	ND	8.00E+00	NA	NA	D	NA	D	1,3-Dichlorobe
2,4-Dimethylphenol*	2.00E-02	ND	2.00E-01	ND	NA	NA	NA	NA	2-Methylnapht
Di-n-butyl phthalate	1.00E-01	NA	1.00E+00	NA	NA	D	NA	D	3-Nitroanil
Di-n-octyl phthalate	2.00E-02	ND	2.00E-02	NA	NA	NA	NA	NA	4-Nitroanil
Hexachloroethane*	1.00E-03	ND	1.00E-02	ND	1.40E-02	C	1.40E-02	C	Phenanthr
2-Methylphenol	5.00E-02	NA	NA	NA	NA	C	NA	C	2,2,4-Trichlorob
4-Methylphenol	5.00E-02	NA	NA	NA	NA	C	NA	C	
n-Nitrosodipropylamine*	NA	NA	NA	NA	7.00E+00	B2	NA	B2	
n-Nitrosodiphenylamine	NA	NA	NA	NA	4.90E-03	B2	NA	B2	
Pentachlorophenol*	3.00E-02	ND	3.00E-02	NA	1.20E-01	B2	ND	B2	
Phenol	6.00E-01	ND	6.00E-01	NA	NA	D	NA	D	
Carcinogenic PAHs									
Benzo(a)pyrene	NA	NA	NA	NA	1.15E+01	B2	6.10E+00	B2	
Noncarcinogenic PAHs									
Acenaphthene	6.00E-02	NA	6.00E-01	NA	NA	D	NA	D	
Anthracene	3.00E-01	NA	3.00E+00	NA	NA	D	NA	D	
Fluoranthrene	4.00E-02	NA	4.00E-01	NA	NA	NA	NA	NA	
Fluorene	4.00E-02	NA	4.00E-01	NA	NA	D	NA	D	
Naphthalene	4.00E-03	NA	4.00E-02	NA	NA	D	NA	D	
Pyrene	3.00E-02	NA	3.00E-01	NA	NA	D	NA	D	

TABLE 4-1
ENDICOTT WELLFIELD SITE
TOXICITY DATA FOR NONCARCINOGENIC
AND POTENTIAL CARCINOGENIC EFFECTS
DOSE RESPONSE EVALUATION

Chemical Name	Noncarcinogen Reference Dose RfD(oral) (mg/Kg-day)	Noncarcinogen Reference Dose RfD(Inhalation) (mg/Kg-day)	Subchronic Noncarcinogen Reference Dose RfD (oral sub) (mg/Kg-day)	Subchronic Noncarcinogen Reference Dose RfD(Inhalation, sub) (mg/Kg-day)	Carcinogen Slope Factor Oral SF (mg/Kg-day)-1	Weight	Carcinogen Slope Factor Inhalation SF (mg/Kg-day)-1	Weight
PCBs And Pesticide:								
Aldrin	3.00E-05	NA	3.00E-05	NA	1.70E+01	B2	1.70E+01	B2
Beta-BHC	NA	NA	NA	NA	1.80E+00	C	1.80E+00	C
Chlordane(1)	6.00E-05	ND	6.00E-05	ND	1.30E+00	B2	1.30E+00	B2
4,4'-DDD	NA	NA	NA	NA	2.40E-01	B2	NA	B2
4,4'-DDE	NA	NA	NA	NA	3.40E-01	B2	NA	B2
4,4'-DDT	5.00E-04	ND	5.00E-04	NA	3.40E-01	B2	3.40E-01	B2
Dieldrin	5.00E-05	ND	5.00E-05	NA	1.60E+01	B2	1.60E+01	B2
Endosulfan (2)	5.00E-05	ND	1.00E-04	NA	NA	NA	NA	NA
Endrin	3.00E-04	ND	5.00E-04	NA	NA	D	NA	D
Heptachlor*	5.00E-04	ND	5.00E-04	NA	4.50E+00	B2	4.50E+00	B2
Heptachlor Epoxide	1.30E-05	NA	5.00E-04	NA	9.10E+00	B2	9.10E+00	B2
Methoxychlor	5.00E-03	ND	5.00E-03	NA	NA	D	NA	D
Total PCBs (3)	NA	ND	NA	NA	7.70E+00	B2	NA	B2

Compoun w/o Criter
Alpha-BH
Delta-BH
Endosulfan S
Endrin Ket
Gamma-B

(1). Alpha Chlordane and Gamma chlordane are evaluated as chlordane
(2) Endosulfan I and Endosulfan II are evaluated as endosulfan
(3) All PCBs are evaluated as Aroclor 1260

TABLE 4-1
ENDICOTT WELLFIELD SITE
TOXICITY DATA FOR NONCARCINOGENIC
AND POTENTIAL CARCINOGENIC EFFECTS
DOSE RESPONSE EVALUATION

Chemical Name	Noncarcinogen Reference Dose		Subchronic Noncarcinogen Reference Dose		Carcinogen Slope Factor				Compounds w/o Criteria
	RfD(oral) (mg/Kg-day)	RfD(Inhalation) (mg/Kg-day)	RfD (oral sub) (mg/Kg-day)	RfD(Inhalation, sub) (mg/Kg-day)	Oral SF (mg/Kg-day)-1	Weight	Inhalation SF (mg/Kg-day)-1	Weight	
Inorganics:									
Antimony	4.00E-04	NA	4.00E-04	NA	NA	NA	NA	NA	
Arsenic	1.00E-03	NA	1.00E-03	NA	1.75E+00	A	1.50E+01	A	Aluminium
Barium	7.00E-02	1.00E-04	5.00E-02	1.00E-03	NA	NA	NA	NA	Calcium
Beryllium	5.00E-03	ND	5.00E-03	NA	4.30E+00	B2	8.40E+00	B2	Cobalt
Cadmium	1.00E-03food	NA	NA	NA	NA	B1	6.30E+00	B1	Copper
	5.00E-04water								Iron
Chromium (III)	1.00E+00	2.00E-06	1.00E+01	2.00E-05	NA	NA	NA	NA	Lead
Chromium (VI)	5.00E-03	2.00E-06	2.00E-02	2.00E-05	NA	NA	4.20E+01	A	Magnesium
Manganese	1.00E-01	4.00E-04	1.00E-01	1.10E-04	NA	D	NA	D	Potassium
Mercury	3.00E-04	8.60E-05	3.00E-04	8.60E-05	NA	D	NA	D	Sodium
Nickel (1)	2.00E-02	NA	2.00E-02	ND	NA	A	8.40E-01	A	
Silver	3.00E-03	NA	0.003*	NA	NA	D	NA	D	
Vanadium	7.00E-03	NA	7.00E-03	NA	NA	NA	NA	NA	
Zinc	2.00E-01	NA	2.00E-01	NA	NA	D	NA	D	

EPA Weight of Evidence Classifications are as follows:

Group A:-	Human Carcinogen. Sufficient evidence from epidemiologic studies to support a causal association between exposure and cancer.
Group B1:-	Probable Human Carcinogen. Limited evidence of carcinogenicity in human from epidemiological studies.
Group B2:-	Probable Human Carcinogen. Sufficient evidence of carcinogenicity in animals. Inadequate evidence of carcinogenicity in humans.
Group C:-	Possible Human Carcinogen. Limited evidence of carcinogenicity in animals.
Group D:-	Not Classified. Inadequate ebedence of carcinogenicity in animals.

Note:
All toxicity Values unless otherwise noted are from Integrated Risk Information System (IRIS) June 1991 sessions.
* Toxicity values are from Health Effects Assessment Summary Tables (HEAST)-1991 Annual (USEPA, 1991).
NA :Not Available
ND : Not Detected
(1) The oral RfD represents the soluble salt form of nickel. The inhalation SF represents the nickel refinery dust form of the chemical for conservatism.

Table 5-25
Endicott Wellfield Site
Risk Levels and Hazard Index Values
Summary Across Exposure Pathways
Present/Future Use Scenarios - Resident Adults

Present/Future Use Scenarios: Adult Residents	Carcinogenic Risk Levels Reasonable Maximum Exposure	Noncarcinogenic Hazard Index Values Reasonable Maximum Exposure
1) Exposure to Ground Water		
Inhalation	7.90E-05	1.00E-01
Ingestion	1.11E-03	1.36E+01
Dermal Contact	3.74E-06	5.20E-02
2) Exposure to Creek/River Water		
Ingestion	2.66E-08	2.60E-03
Dermal Contact	2.69E-10	4.89E-06
4) Exposure to Sediment		
Dermal Contact	9.70E-07	1.04E-02

Total health Risk = Ground water ingestion + Ground water volatile inhalation + Ground water dermal contact + River/Creek water ingestion + River/Creek water dermal contact + Golf Course Pond volatile inhalation + River/Creek sediment dermal contact

SUMMATION RESULTS

Carcinogens

Reasonable Maximum Exposure = 1.19E-03

Noncarcinogens

Reasonable Maximum Exposure = 1.38E+01

Table 5-26
Endicott Wellfield Site
Risk Levels and Hazard Index Values
Summary Across Exposure Pathways
Present/Future Use Scenarios - Resident Children

Present/Future Use Scenarios: Child Residents	Carcinogenic Risk Levels Reasonable Maximum Exposure	Noncarcinogenic Hazard Index Values Reasonable Maximum Exposure
1) Exposure to Ground Water		
Inhalation	1.69E-05	2.15E-01
Ingestion	4.44E-04	2.83E+01
Dermal Contact	1.03E-06	6.86E-02
2) Exposure to Creek/River Water		
Ingestion	1.48E-08	7.24E-03
Dermal Contact	2.36E-11	6.45E-06
3) Exposure to Sediment		
Dermal Contact	1.80E-07	9.72E-03

Total health risk = Ground water ingestion + Ground water volatile inhalation + Ground water dermal Contact + River/Creek water ingestion + River/Creek water dermal contact +

SUMMATION RESULTS

Carcinogens
Reasonable Maximum Exposure = 4.62E-04

Noncarcinogens
Reasonable Maximum Exposure = 2.86E+01

Table [f]

Table 5-27
Endicott Wellfield Site
Risk Levels and Hazard Index Values
Summary Across Exposure Pathways
Future Use Scenario - Construction Workers

Future Use Scenario: Construction Workers	Carcinogenic Risk Levels Reasonable Maximum Exposure	Noncarcinogenic Hazard Index Values Reasonable Maximum Exposure
1) Exposure to Ground Water		
Ingestion	3.97E-05	4.79E+00
2) Exposure to Subsurface Soil/Waste		
Ingestion	2.64E-06	3.30E-03
Inhalation	5.52E-09	2.29E-02
Dermal Contact	2.36E-06	8.50E-04

Total health risk = Ground water ingestion + subsurface soil ingestion + subsurface soil inhalation + subsurface soil dermal contact

SUMMATION RESULTS

Carcinogens
Reasonable Maximum Exposure = 4.47E-05

Noncarcinogens
Reasonable Maximum Exposure = 4.82E+00

Table [g]

TABLE 6-1
Endicott Wellfield Site
Sources of Uncertainty in the Risk Assessment

Source of Uncertainty	*Likely Magnitude of Uncertainty*	*Level of Bias Introduced*
1. Sampling/Analytical Procedures		
Reasonable maximum case exposure point concentrations calculated using 95% UCLs on the geometric mean of all analyses.	Low to moderate	Slight downward bias.
Highest contaminant levels used to develop reasonable maximum case exposure estimates when exceeded by 95% UCL.	Low	Gives realistic contaminant level for calculation of reasonable maximum risk.
Contaminant levels from borings into landfill materials used to develop subsurface soil pathways.	Moderate	Moderate upward bias of exposure estimates.
2. Exposure/Intake Assessment Methods		
Potential for varying future land use.	Low	Slight upward bias, highway construction would likely result in greater exposures than golf course development. No residential use expected.
Particulate generation and transport	Moderate to high; estimates of hard to quantify conditions, processes and parameters are required.	Moderate upward bias of exposure estimates.

Table 6-1
Endicott Wellfield Site
Sources of Uncertainty in the Risk Assessment

Exposure estimates assume contaminants are conservative over time	Moderate for future use scenario exposures	Slight to moderate upward bias for future scenarios; landfill contaminant output may
Estimates of physiological, behavioral parameters for receptors	Low - parameters are defined for special populations	Slight, if any.
Estimates of exposure frequency/duration	Low to moderate - scenarios incorporate ranges of uncertainties concerning likely exposures	Slight upward bias.
Estimates of contaminant contact rates, intake factors.	Moderate	Moderate upward bias for soil ingestion and inhalation, dermal contact likely conservative.
Use of model to calculate golfer exposure to volatile contaminants.	Moderate	Moderate upward bias.
3. Toxicologic/Risk Characterization Methods		
RfD/CDI ratios to characterize non-cancer health effects.	Moderate to high - data supporting RfD developments are highly variable; uncertainty factors vary by orders of magnitude.	RfDs are likely to be defined conservatively for most pollutants.
Lack of toxicity criteria for lead, chloroethane, and other chemicals.	Low to moderate; concentrations and distribution of chemicals in site matrices vary; potential health effects vary.	Calculated risks for media may be understated.

Table 6-1
Endicott Wellfield Site
Sources of Uncertainty in the Risk Assessment

Speciation of Chromium - 95% Cr III to 5% Cr VI ratio.	Moderate	Unknown - inadequate data on speciation of chromium on-site.
SFs, linear low-dose model to assess cancer risks.	Moderate to high - most SFs are derived from animal bioassay data.	Likely upward bias; SFs are 95% UCLs of cancer risk slopes.
Assumption that effects of multiple contaminant exposures are additive.	Low to moderate.	Unknown if synergies or antagonisms exist among contaminants.

CHEMICAL-SPECIFIC ARARS

Chemical	SDWA[a] MCLs	SDWA[a] MCLGs	N.Y.[b] MCLs	N.Y. Ground Water[c] Quality Criteria	N.Y. Surface Water[d] Quality Criteria
	mg/l	mg/l	mg/l	ug/l	ug/l
VOLATILES:					
Acetone	--(e)	--	0.05(f)	--	--
Benzene	0.005	0	0.005(g)	0.7	0.7
2-Butanone	--	--	0.05(f)	--	--
Chlorobenzene	--	--	0.005(g)	5(h)	5A/20H(i)
Dibromochloromethane	--	--	0.1(j)	0.1(j)	--
1,2-Dichloroethane	0.005	0	0.005(g)	5(h)	0.8
1,1-Dichloroethene	0.007	0.007	0.005(g)	5(h)	--
trans-1,2-Dichloroethene	0.1	0.1	0.005(g)	5(h)	--
trans-1,3-Dichloropropene	--	--	0.005(g)	5(h)	--
Ethylbenzene	0.7	0.7	0.005(g)	5(h)	--
Methylene Chloride	0.005	0	0.005(g)	5(h)	--
4-Methyl-2-Pentanone	--	--	0.05(f)	--	--
Tetrachloroethene	0.005	0	0.005(g)	5(h)	--
Toluene	1	1	0.005(g)	5(h)	--
Total Xylenes	10	10	0.005(g)	5(h)	--
Trichloroethene	0.005	0	0.005(g)	5(h)	--
Vinyl Chloride	0.002	0	0.002	2	--
SEMIVOLATILES:					
Benzoic Acid	--	--	0.05(f)	--	--
Bis(2-ethylhexyl)phthalate	--	--	0.05(f)	50	0.6
Butyl benzyl phthalate(k)	0.1	0	0.05(f)	--	--
1,4-Dichlorobenzene	0.075	0.075	0.005(g)	4.7	5A/30 H(i)
Diethylphthalate	--	--	0.05(f)	--	--
2,4-Dimethylphenol	--	--	0.05(f)	1(l)	5A/1H(m)
Dimethylphthalate	--	--	0.05(f)	--	--
Di-n-butyl phthalate	--	--	0.05(f)	50	--
Hexachloroethane	--	--	0.005(g)	5(h)	--
4-Methylphenol	--	--	0.05(f)	1(l)	5A/1H(m)
3-Nitroaniline	--	--	0.005(g)	5(h)	--
Phenol	--	--	0.05(f)	1(l)	5A/1H(i,m)
Carcinogenic PAHs(k)	0.0002	0	0.05(f)	ND (n,o)	--
Anthracene	--	--	0.05(f)	--	--
PCBs AND PESTICIDES:					
Aldrin	--	--	0.05(f)	ND	0.001
Chlordane	0.002	0	0.05(f)	0.1	0.001A/0.01H(i)
4,4-DDE	--	--	0.05(f)	ND	--
Dieldrin	--	--	0.05(f)	ND	0.001
Endosulfan	--	--	0.05(f)	--	0.009
Endrin	0.002	0.002	0.0002	ND	0.2(p)
Heptachlor	0.0004	0	0.05(f)	ND	0.001A/0.009H(i)
Heptachlor Epoxide	0.0002	0	0.05(f)	ND	0.001A/0.009 H(i)
Total PCBs	0.0005	0	0.05(f)	0.1	0.001A/0.01 H(i)

Chemical	SDWA[a] MCLs	SDWA[a] MCLGs	N.Y.[b] MCLs	N.Y. Ground Water[c] Quality Criteria	N.Y. Surface Water[d] Quality Criteria
	mg/l	mg/l	mg/l	ug/l	ug/l
INORGANICS:					
Antimony	0.006	0.006	–	–	–
Arsenic	0.05	–	0.05	25	50
Barium	2(q)	2(q)	1.0	1000	1000
Beryllium	~~0.004~~	0.004	–	–	11/1100(r)
Cadmium	0.005	0.005	0.01	10	*/10(s)
Chromium	0.1	0.1	0.05	50	50
Lead(t)	0.05	–	0.05	25	*/50(u)
Manganese	0.05(v)	–	0.3(v)	300(w)	300
Mercury	0.002	0.002	0.002	2	2
Nickel	0.1	0.1	–	–	(x)
Silver	0.05(v)	–	0.05	50	0.1A(y)/50 H(i)

---

a. Federal Safe Drinking Water Act (SDWA), maximum contaminant levels (MCLs) and maximum contaminant level goals (MCLGs), 40 CFR 141.
b. New York Public Water Supply Regulations, MCLs, 10 NYCRR 5.
c. New York Class GA groundwater quality criteria; taken from Table 1 in 6 NYCRR 703.5
d. New York Class A/AA surface water quality criteria; taken from Table 1 in 6 NYCRR 703.5
e. "–" denotes "not listed."
f. A N.Y. MCL of 0.005 mg/l is assumed, because this compound is classified as a principal organic contaminant (10 NYCRR 5-1.1) and has no specific N.Y. MCL (10 NYCRR 5-1.52).
g. Because this compound has no specific N.Y. MCL (10 NYCRR 5-1.52) and is not classified as a principal organic contaminant (10 NYCRR 5-1.1), the N.Y. MCL for unspecified organic contaminants of 0.05 mg/l is assumed (10 NYCRR 5-1.52).
h. A standard for principal organic contaminants of 5 ug/l is given for those compounds classified as such (6 NYCRR 702.1) and are not listed in Table 1 of 6 NYCRR 703.5.
i. "A" follows the aquatic life criterion; "H" follows the human health criterion.
j. Total trihalomethanes.
k. SDWA MCL and MCLG values shown are proposed; current promulgated MCL and MCLG values do not exist.
l. A level of 1 ug/l is the standard for total phenolic compounds.
m. The criterion based on toxicity to aquatic life (5 ug/l) is that for total unchlorinated phenols. The criterion based on human toxicity (1 ug/l) is that for total phenols.
n. Criteria for benzo(a)pyrene are used to represent carcinogenic PAHs.
o. "ND" means "not detectable" using the prescribed analytical method (6 NYCRR 700).
p. A value of 0.002 ug/l is given if estimated bioaccumulation is considered in the derivation of the criterion.
q. The proposed MCL and MCLG for barium is 2 mg/l. The current MCL is 1 mg/l.
r. 11 ug/l when hardness is less than or equal to 75 ppm. 1100 ug/l when hardness is greater than 75 ppm.
s. The surface water criterion based on toxicity to aquatic life (*) is exp (0.7852 [ln (ppm hardness)] - 3.490). The human health criterion is 10 ug/l.
t. Effective December 8, 1992, a treatment technique will be used in lieu of an MCL, and the MCLG will be zero, action level 0.015 mg/l
u. The criterion based on toxicity to aquatic life (*) is exp (1.266 [ln (ppm hardness)] - 4.661). The criterion for human toxicity is 50 ug/l.
v. Secondary MCL based on aesthetic qualities instead of health-based considerations; not promulgated.
w. The groundwater criterion for iron and manganese combined is 500 ug/l.
x. The surface water criterion for nickel is exp (0.76 [ln (ppm hardness)] + 1.06).
y. Applies to ionic silver.

APPENDIX IV

STATE LETTER OF CONCURRENCE

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233

Thomas C. Jorling
Commissioner

SEP 29 1992

Ms. Kathleen C. Callahan
Director
Emergency & Remedial Response Division
U.S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, New York 10278

Dear Ms. Callahan:

Re: Endicott Wellfield Site, Village of Endicott, Broome County, New York, Site No. 7-04-008

The New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) have reviewed the Draft Record of Decision (ROD). This ROD is for operable Unit 2 (OU2), the final ROD for this site. Alternative 5A is selected by the ROD as the preferred remedial action.

Alternative 5 offers protection of human health and the environment, compliance with Applicable or Relevant and Appropriate Requirements (ARARs), and is the best proposal for reducing contamination in the groundwater. Alternative 3 as listed in the Proposed Remedial Action Plan is unacceptable to the State of New York.

The NYSDEC and the NYSDOH concur with this ROD.

Sincerely,

Michael J. O'Toole Jr.

Michael J. O'Toole, Jr.
Director
Division of Hazardous Waste Remediation

cc: C. Petersen, USEPA
M. Hauptman, USEPA
A. Hess, USEPA
A. Carlson, NYSDOH

Post-it™ brand fax transmittal memo 7671	# of pages ▸ 1
To ALISON HESS	From BOB SCHICK
Co. EPA Reg II	Co. NYSDEC
Dept.	Phone #
Fax # (212) 264 7611	Fax #