U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FINAL
REPORT OF INVESTIGATION

FORMER RARITAN ARSENAL
SITE-WIDE SURFACE WATER AND
SEDIMENT INVESTIGATION REPORT

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EXECUTIVE SUMMARY

This report presents the results of a site-wide investigation of surface water and sediment performed at the former Raritan Arsenal from 1 August 1994 through 3 February 1995 as part of the Phase II Remedial Investigation (RI). The objectives of this document are to: (1) review physical site characteristics pertaining to surface water hydrology, drainage history, and wetlands at the former Arsenal; (2) present results of surface water and sediment sampling conducted in August 1994, as well as limited soil sampling conducted in Area 10 during the same period; and (3) identify potential contaminants of concern, as well as their potential sources and migration pathways in surface water. Results of surficial and subsurficial soil sampling, and groundwater investigations are presented in separate reports.

The results of the Phase II RI surface water and sediment investigation indicate that most of the southern two thirds of the former Arsenal consists of tidal estuarine wetlands dominated by common reed-grass (*Phragmites communis*), while most portions of the northern third of the site which have not been developed consist primarily of palustrine (freshwater) forested and emergent wetlands. Site drainage is in a southerly direction toward the Raritan River. Surface waters on site are classified by NJDEP as freshwater (FW-2) or estuarine (SE-1). The dividing line between freshwater and estuarine areas of the site corresponds approximately with the 100-year floodplain, except that past activities in the eastern portion of Area 16 and in Area 14 have altered surface hydrology so that waters over much of these areas are no longer estuarine. On the basis of field reconnaissance and review of aerial photography, seven major drainage areas were identified according to present surface flow patterns. These are the East Ditch Drainage, Black Ditch Drainage, Red Root Creek Drainage, Central Ditch Drainage, Area 12 Ditch Drainage, Old Red Root Creek Drainage and County Park Drainage. All site drainage discharges to the Raritan River.

The results of the previous Phase I investigation and the site-wide Phase II surface water/sediment investigation indicated that concentrations of trichloroethene (TCE), polycyclic aromatic hydrocarbons (PAHs), heptachlor epoxide, and metals (arsenic, lead, copper, nickel, zinc, cadmium, chromium, mercury) detected in surface water are of potential concern at selected areas sampled on the former Arsenal site. In sediment, concentrations of PAHs, DDT compounds, heptachlor epoxide, aldrin, and metals (arsenic, lead, copper, nickel, zinc, cadmium, chromium, mercury, silver) were identified as contaminants of potential concern in selected areas of the site.

Contaminants present at concentrations exceeding either surface water standards/criteria or sediment quality guidelines do not immediately warrant remediation or ecological concern. In many cases the criteria were adopted with other intentions (e.g. effluent regulation or drinking water criteria), or were developed on the basis of incomplete information or using data from a variety of studies unrelated to the Raritan Arsenal investigation. Hence, exceedances of these guidelines merely represent *potential* areas of concern, and should be interpreted with caution.

The intent of comparing analytical results to these published criteria/guidelines has been to focus the Phase II investigation on specific potential contaminants and physical areas of concern at the former Arsenal. It is recommended that the following general investigations be carried out prior to any further investigation of specific surface/water sediment areas of concern at the former Arsenal:

- "Background" or "Reference Area" sampling should be undertaken to facilitate interpretation of the site-specific sampling results.

- Surface water and sediment should be sampled within the Raritan River, both upstream and downstream of the former Arsenal site to ascertain background levels of metals and other contaminants.

- Development activities and plans for the Raritan Center Industrial Park and other areas within the former Arsenal should be identified, as construction activities undertaken during and following the completion of the sediment and water investigation have resulted in further alteration of site hydrology and have potentially affected contaminant migration and transport.

- Further evaluation of contaminant source areas is required; including identification of potential non-DOD sites potentially contributing contaminants to the former Arsenal, a more detailed identification of the stormwater collection and distribution system layout for the developed portions of the former Arsenal, and additional research to determine the exact nature and circumstances related to the historical dredging/filling operations which have impacted Areas 11, 12, and 14. The results of this research will determine whether dredge areas qualify under Defense Environmental Restoration Program (DERP) guidelines for DOD-lead remediations.

- If the mean concentration of surface water or sediment contaminants in an area of concern are present at concentrations exceeding reasonable "background/reference" levels in the Raritan River and reference locations, and are attributable to historical DOD activities, then a tiered ecological risk assessment should be initiated in order to further evaluate the potential toxicity of compounds of concern. The purpose of the first tier or phase of this risk assessment would be to evaluate existing levels of a select group of contaminants to determine if aquatic biota are at risk. Total and dissolved metals analyses should be conducted for any future surface water sampling, to determine whether metals present in the surface water are adsorbed to suspended solids in the water column, or are present in the dissolved state. If the first tier results were inconclusive or predicted adverse effects, then the objective of the second tier would be to conduct appropriate site-specific studies to test or further resolve the extent of ecological effects posed by contaminants, and to ultimately establish site-specific cleanup levels for contaminants of concern.

SECTION 1.0

INTRODUCTION

1.1 PURPOSE OF THE REPORT

Roy F. Weston, Inc. (WESTON®) was awarded an Indefinite Delivery Contract (DACA41-92-D-8002) by the U.S. Army Corps of Engineers (USACE), Kansas City District (KCD), to carry out an additional environmental evaluation of the former Raritan Arsenal (former Arsenal). The work covered under the contract scope of work (SOW) involves the professional services necessary to complete a Remedial Investigation/Feasibility Study (RI/FS), a Remedial Design (RD), and Title II services for contaminated areas of concern (AOCs) at the former Arsenal. The USACE is conducting the RI/FS/RD activities at the former Arsenal under the Defense Environmental Restoration Program (DERP) for Formerly Used Defense Sites (FUDS). Administrative responsibility for the Phase II RI was transferred from the KCD to the New England Division (NED) of the USACE. The United States Environmental Protection Agency (EPA) and the New Jersey Department of Environmental Protection (NJDEP) have oversight and review responsibilities for the project.

This report presents the results of a site-wide sampling investigation of surface water and sediment performed in August 1994 as part of the Phase II RI. It also includes subsequent field observations on surface hydrology and wetlands made in December 1994 and January 1995. Results of this investigation will be used to assist in the evaluation of potential ecological risks posed by site contamination.

1.2 SITE BACKGROUND

1.2.1 Area Description

The former Arsenal encompasses approximately 3,227 acres and is located in Edison and Woodbridge Townships, Middlesex County, New Jersey. The site is bordered to the north and northwest by Woodbridge Avenue, to the southwest by Mill Road and the ILR Landfill, and to the south and east by the Raritan River (Figure 1-1).

1.2.2 Site History

Prior to the U.S. Army construction of the former Arsenal in 1917, the property consisted of tidal marsh, clay and sand pit quarries, and farmland with several residences. The site was developed by the Army to ease congestion of Atlantic seaboard ports and to facilitate military shipments to Europe during World War I. It was originally designed to be a temporary depot

for the storage, staging, and shipment of munitions. However, by 1922, the former Arsenal was considered a permanent military establishment. Originally comprised of 2,137 acres, it eventually expanded to 3,227 acres[1].

The former Arsenal was used extensively by the Army from 1917 to 1963. During this time, the marsh areas immediately adjacent to the Raritan River were filled with sediments dredged from the Raritan River and Raritan Bay. Roads and railways were built on embankments created from fill material, to elevate them above tides and frequent floods. The prospectus issued by the Army in 1961 indicates that there were 446 permanent and semi-permanent buildings, 80 miles of railroad track, three rail spurs, 108.5 acres of primary and secondary roads, 81.3 acres of parking, over 2.1 million square feet of storage in magazines and warehouse buildings, 2.1 acres of sidewalks, five miles of pipe, 22,000 square ft of sewage disposal area, 190,000 linear ft of sewage collection lines, 1.35 million gallons of water storage capacity in two large tanks, 88,000 linear ft of water lines to provide for a daily consumption of 400,000 gallons, and associated infrastructure to provide for 15,000 people[1].

Operations at the site included the receipt, storage, shipment, and/or decommissioning of ordnance, arms, and machinery and their subsequent shipment to Europe. Storage was typically in warehouse and magazine buildings and, in some instances, outdoors. The material was shipped by rail, roadway, and from the dock area on the Raritan River. The decommissioning activities included equipment and ordnance dismantlement for subsequent disposal.

During this period, some waste materials, including ordnance and chemical agents (mustard, red nitric acid and miscellaneous chemicals within Area 5 only), were reportedly buried on site. It also has been reported that explosive materials routinely were destroyed by surface burning or burning in chambers or pits. Accidental explosions in magazine buildings and outdoor storage areas reportedly scattered explosive materials over large areas, and drove ordnance fragments into the ground[2].

Operations at the former Arsenal were phased out between 1961 and 1963. Decontamination of the site was initially performed under the direction of former Arsenal personnel in 1963, and later under the direction of personnel from the Letterkenny Army Depot (LEAD) and Army Material Command Safety Office. LEAD designated 17 AOCs as potentially contaminated in a study during 1963[3]. Subsequently, the Army recommended that each area be designated for "Unrestricted Use," "Surface-Use Only," or "Non-Use" as deemed appropriate. Areas designated "Surface-Use Only" and "Non-Use" included pits possibly holding potassium cyanide and mustard containers, and areas which potentially contained live ordnance.

In 1964, after the decontamination of the site by LEAD, the General Services Administration (GSA) sold 2,000 acres of the former Arsenal to the Visceglia family. This family formed the company Federal Storage Warehouses. In 1975, Federal Storage Warehouses divided into two companies (Summit Associates, Inc. and Federal Business Centers) and built Raritan Center, a

major industrial park complex. Continuing development is still occurring in Raritan Center, which is now mostly light industrial, warehouses, and office space. Of the 17 AOCs designated as potentially contaminated, 14 are currently owned by either Summit Associates or Federal Business Centers[2].

GSA also sold a parcel of land, located on the western part of the site, to Middlesex County. The county developed the area into Thomas A. Edison County Park and Middlesex County College (MCC). MCC, Thomas A. Edison County Park, U.S. Environmental Protection Agency offices, and Raritan Center occupy the majority of the former Arsenal.

The southern half of the site has remained primarily marshland, with limited development since the former Arsenal closed in 1963. The ILR Landfill, which operated in the 1970s and closed by a court order in 1985, is located immediately adjacent to the southwest border of the former Arsenal[1].

In addition to the 17 AOCs identified during the LEAD decontamination activities, eight potentially contaminated AOCs have been identified during two subsequent investigations. O'Brien and Gere (OBG), under contract to the USACE, began a contamination evaluation study in September of 1987. The objectives of this evaluation were to perform field investigations and make preliminary determinations of whether chemical and/or ordnance contamination were present at the site. OBG's findings were presented in a 1989 report[1]. Dames and Moore, Inc., under contract to the USACE, began a study to characterize and determine the extent of the chemical contamination, including explosive-related contaminants in soil and groundwater, in selected areas of the site. The information gathered from this investigation was to be the basis for a RI/FS of the former Arsenal. Dames and Moore, Inc. presented their findings in a draft report[4] dated 2 October 1992.

Most recently, WESTON, under contract to the USACE, prepared a Phase II RI Work Plan[5] in July 1993 with the objectives of addressing data gaps regarding the extent of contamination related to the Army's prior use of the site, and confirming results of previous site investigations. The Work Plan was updated in December 1993[6] to include sediment and surface water sampling in 12 of the 26 AOCs at the former Arsenal. These are Areas 1, 4-6, 8, 11-12, 14, 16, 18, 19 and 20. Sampling in Areas 4, 10 and 18A was described in the July 1993 Work Plan. A USACE memorandum dated 28 March 1994 amended the Work Plans.

WESTON and USACE representatives met with the EPA Biological Technical Assistance Group (BTAG) on 24 March 1994 to present an approach for ecological assessment and characterization of site surface water and sediment. The surface water/sediment sampling plan presented in the Work Plan was modified, and the overall approach was approved by EPA Region II and NJDEP. As a result of this meeting, a total of 150 locations were identified for sediment and surface water sampling on a proposed site-wide sampling location map, 30 of which would be sampled at both high and low slack tide periods. The USACE was given sufficient latitude by the EPA

and NJDEP to modify the proposed sampling plan in the field to sample depositional areas or to enhance the overall distribution of sampling locations, based upon site observations.

1.2.3 Previous Surface Water/Sediment Investigations

During the preliminary contamination evaluation of the former Arsenal[1], OBG collected a total of six surface water samples, focusing on specific AOCs. Samples were analyzed for VOCs, petroleum hydrocarbons, metals, explosives (with the exception of one sample), and general indicator parameters such as calcium, sodium, potassium and bicarbonate. Results of the investigation indicated the presence of VOCs, explosives, cadmium, chromium, and lead in surface water. A detailed discussion of the OBG surface water investigation is provided in Section 4.1.

Dames and Moore, Inc. subsequently collected a total of nine surface water and nine sediment samples during the Phase I RI[4] again focusing on specific AOCs. In general, the sediment and surface water samples collected during the Phase I RI were analyzed for VOCs, SVOCs, metals, explosives, and pesticides. One sediment and one surface water sample were collected in the "marshy portion" of Area 3. This surface water feature was not sampled during the site-wide Phase II RI, but is scheduled for further investigation under the Work Plan Addendum. Two surface water and two sediment samples were collected in the drainage ditch in Area 4 near Clover Place. One surface water sample and one sediment sample were collected in Area 6 within the ponds adjacent to the former LaPlace sulfuric acid plant. One surface water and one sediment sample were collected within Area 8 at a pond just north of Olympic Avenue. One sediment and one surface water sample each were collected from the ditch in Area 11 identified in a previous report[7] as the Central Ditch. A discussion of the results of the above investigations is presented in Section 4.1.1.

SECTION 2.0

STUDY AREA INVESTIGATION

2.1 SURFACE WATER HYDROLOGY REVIEW

Available information was reviewed in order to characterize past and present drainage patterns of the site, in order to identify potential contamination pathways. WESTON reviewed published and unpublished documents, historical aerial photography, floodplain maps, site plans and other pertinent information, including the Environmental Inventory of the Raritan Center Study Area[7] and the Raritan Arsenal Archive Report[8]. Information was integrated with aerial photography (1" = 400 ft scale) taken by WESTON in April 1994 and field observations made during the August 1994 sampling event. This information was supplemented by subsequent field visits made in December 1994, and in January and February 1995, to verify and describe current site drainage patterns.

2.2 SITE WETLANDS REVIEW

Several resources were reviewed in order to determine the approximate extent of wetlands at the former Arsenal. These included prior site-specific studies[7,8], aerial photographs, U.S. Fish and Wildlife Service (FWS) National Wetland Inventory (NWI) maps, the U.S. Soil Conservation Service (SCS) Soil Survey of Middlesex County[9], state and federal regulations, and the reference list of Hydric Soils of New Jersey[10]. In addition, a brief site-wide field survey was undertaken in December 1994 to verify the general presence of wetlands, with a focus on areas mapped as wetlands on the NWI maps. As outlined in the Work Plan, the fieldwork was of a preliminary nature. A precise wetland delineation using the three-parameter approach (vegetation, soils, hydrology) may be necessary in the future should potential remedial actions infringe on site wetland areas.

2.3 SURFACE WATER, SEDIMENT, AND SOIL SAMPLING

2.3.1 Preliminary Reconnaissance

All proposed surface water/sediment sampling locations were evaluated in the field prior to sampling, to insure that the sampling plan would meet the objectives of the Phase II RI Work Plan. Sampling locations were spaced to insure adequate coverage of the site, yet still allow detailed investigation of suspected areas of contamination. Locations were selected based on the past land use activities, prior analytical results, proximity to potential point sources, and the presence or absence of surface water, depositional areas, and tidal influence. Additional factors

considered included the potential of a location as terrestrial or aquatic wildlife habitat, and its accessibility.

During the preliminary reconnaissance, some proposed sampling locations identified on the proposed sampling map submitted to the BTAG were moved to more suitable locations within the same vicinity of the site. In some cases, locations proposed for high and low tide sampling were moved to areas where surface water features were apparently influenced to a greater extent by tidal fluctuations, or to increase site coverage of tidally influenced waters. Once selected, sampling locations were marked in the field using 4-foot long wooden stakes, and identified with the sampling location number.

During the two-week period prior to field sampling, tidal fluctuations were observed and recorded at selected locations. Also, since several sampling locations were located in thick stands of common reed (*Phragmites communis*), access lanes for sampling teams were cut in advance.

2.3.2 Surface Water Sampling

During the August 1994 sampling event (1-16 August 1994), surface water samples were collected at 114 locations. The original sampling plan indicated 150 locations would be sampled. However, 10 locations in Area 12 could not be sampled for surface water or sediment due to ongoing unexploded ordnance (UXO) removal activities being carried out by the USACE Huntsville Division. These locations will be sampled at a later date, following Huntsville's clearance for safe intrusive activities. In addition, 18 proposed sampling locations were dry in August.

Another eight locations proposed for sediment and water sampling exhibited upland conditions, and were considered "soil" samples. The soils in these areas were not hydric, and there were no surface hydrological indicators of wetland conditions which would result in these samples being characterized as "sediment".

At 30 of the 114 surface water sampling locations, water samples were collected during both high and low tide periods (Figure 2-1) in order to ascertain potential effects of the Raritan River on contaminant levels. Both "high" and "low" tide samples were collected on the same day, so that comparisons between tidal periods at a given location were unaffected by precipitation or other variables which could differ between days.

Low tide samples were collected as close as possible to mean slack tide. This period was easy to identify, as most of the tidal creeks sampled ran nearly dry. High tide samples were collected when water levels were close to the high water marks on vegetation or creek embankments. High tide water sampling was usually initiated at least 4 hours after the low tide samples were

collected, but this delay was not always necessary. Water levels at some locations (such as SW-1215, SW-1216) fluctuated from minimum to maximum levels very quickly.

At all locations, the surface water samples were collected before the sediment samples, using the Direct Method[6]. Samples were collected by directly immersing the sample container below the surface of the water body to be sampled, without disturbing the sediment. The sample bottle was placed facing upstream, at a point upstream of the person sampling. Stream locations were sampled from downstream to upstream, to avoid any potential cross contamination between locations.

The number and type of sample bottles collected varied by location, according to the sampling plan summarized in Table 2-1 and 2-2. All locations were sampled and analyzed according to a "standard" set of analyses. The bottles filled for the standard analyses were as follows:

- (4) 40-milliliter (ml) vials for analysis of volatile organic compounds (VOCs);
- (2) 950-ml narrow-mouthed amber glass bottles for analysis of semi-volatile organic compounds (SVOCs);
- (1) 950-ml narrow-mouthed amber glass bottle for analysis of pesticides and polychlorinated biphenyls (PCBs);
- (1) 950-ml narrow-mouthed amber glass bottle for analysis of explosives by Method 8330;
- (1) 250-ml clear wide-mouthed glass jar for analysis of mercury;
- (1) 1-liter (L) polypropylene bottle for analysis of metals.

The standard analyses included priority pollutant (PP) metals, plus Barium. However, at 40 of the locations, the surface water was analyzed for target analyte list (TAL) metals instead of PP metals. At TAL metals locations, an additional 1-L polypropylene bottle was collected for cyanide (CN) analysis. An additional 40-ml vial was collected at 28 selected locations where historical conditions suggested the possible presence of thiodiglycol (Table 2-1). Likewise, a 950-ml amber glass bottle was collected for analysis of dioxins/furans at 11 locations where historical activities suggested the possible presence of these compounds (Table 2-1).

At all locations, the four 40-ml vials for VOC analysis were collected first. Each vial was inverted immediately after the sample was taken, to check for bubbles. If bubbles were observed, the vial was emptied and the sample retaken. VOC samples were preserved immediately after sample collection using the procedures outlined in Section 2.2.4.

After the remaining bottles were filled, water quality measurements were taken using a portable electronic dissolved oxygen (DO) meter and conductivity meter (YSI, Inc.). The following parameters were recorded: temperature, salinity, conductivity, DO, and pH (Appendix A). Where possible, the depth and tidal fluctuation of the water body sampled was estimated and recorded. Tidal fluctuations were estimated by noting differences in the water marks on vegetation or the wooden sampling stake placed at each location. Observations of color, turbidity, surface sheen, flow, flocculent, odor, or other characteristics were also recorded in site logbooks (notes summarized in Appendix A).

2.3.3 Sediment Sampling

Sediment samples were collected at 132 of the original 150 locations proposed for sampling. Of the 18 locations not sampled, 8 were the locations in Area 10 classified as "soil samples", and 10 were the locations within Area 12 where UXO activities were underway.

During the August 1994 sampling event, sediment locations were saturated close to the surface, but not all were inundated. However, all locations sampled for sediment were apparently inundated for a sufficient time period during the growing season to promote the growth of hydrophytic vegetation, and hence would be considered wetlands. For the purposes of this investigation, this distinction is used to differentiate between "sediment" and "soil", as agreed upon during the March 1994 meeting of the BTAG.

Most samples collected were located in shallow water areas less than 1 ft deep. At these locations, sediment was collected according to the following procedures. Sediment for VOC analysis was collected using a decontaminated stainless steel teaspoon directly into a 125-ml amber glass sample jar, while minimizing disturbance to the sediment profile.

For the remainder of the analyses, additional sediment was collected at each location using a decontaminated stainless steel trowel or bucket auger, depending upon the depth of the aqueous layer. Sediment was collected to a depth of 6 inches. Individual grabs were taken within a 1 ft radius of the VOC sample, and homogenized in a decontaminated stainless steel bowl in the field. The resultant homogenate was apportioned into the sample containers using a decontaminated trowel.

Seven sampling locations required the use of a boat and Ponar dredge to collect sediment. Sediment was collected with the dredge and placed into a decontaminated stainless steel bucket. The VOC sample was taken directly from the sediment in the bucket, using a stainless steel teaspoon. The sample was taken from the first grab from the dredge, before homogenization. The remaining sediment was collected according to the procedures outlined above.

At each location, the following sample jars were filled for the "standard" set of analyses and analyzed according to the methods outlined in Table 2-3.

- 125-ml glass jar for analysis of VOCs;
- 500-ml amber glass jar for analysis of SVOCs and pesticide/PCBs;
- 250-ml glass jar for analysis of metals and pH;
- 40-ml vial for analysis of Total Organic Carbon (TOC);
- 500-ml amber glass jar for analysis of Grain Size.

At 35 locations, sediment was analyzed for TAL metals and CN, instead of PP metals. In addition, at 125 sampling locations, a 125-ml amber jar was collected for 2,4,6 trinitrotoluene (TNT) screening, using the Jenkins method. At the remaining seven locations, as well as 25 additional locations, an additional 125-ml amber jar of sediment homogenate was collected for analysis of explosives using Method 8330.

A description of each sampling location, as well as sediment characteristics, was recorded in field logbooks. Information recorded included sediment color, texture, organic content, surrounding vegetation, channel characteristics, odor, and presence of potential nearby contamination sources (Appendix A).

2.3.4 Soil Sampling

During the preliminary reconnaissance, 8 proposed "surface water and sediment" sampling locations within the portion of Area 10 previously identified[4] as the "marshy woods" were identified as upland, and were sampled as "soil" (see Section 2.3.3). These areas were sampled, but were considered soil samples in applying regulatory criteria. Samples were collected with a decontaminated stainless steel trowel, and handling procedures were identical to those for sediment samples.

2.3.5 Quality Assurance/Quality Control Sampling

Additional surface water and sediment samples were taken for quality assurance/quality control (QA/QC) purposes. A summary of QA/QC samples is provided in Table 2-2. The QA/QC sampling program encompassed several elements. These included:

(1) blind QC duplicate samples collected at nine surface water and eight sediment sampling locations, for analysis by WESTON's analytical laboratories, to measure sample variability at a given location;

(2) matrix-spike, matrix-spike duplicate (MS/MSD) samples analyzed at ten locations by WESTON's analytical laboratories, to measure analytical precision;

(3) QA duplicate samples collected at the nine QC duplicate locations for analysis by the USACE Missouri River Division (MRD) laboratory for verification of results;

(4) split samples collected at three locations by WESTON and split with the EPA oversight contractor (ICF Kaiser, Inc.) for verification of appropriate sampling technique, as well as results;

(5) field blanks (a total of 11) prepared at sediment/soil sampling locations in the field once per day, per lab, per parameter, and analyzed by WESTON's analytical laboratories;

(6) trip blanks (a total of 16) sent with each shipment of VOC aqueous samples, and analyzed by WESTON's analytical laboratories.

(7) Sediment VOC samples were collected prior to homogenization.

QC duplicate, MS/MSD, and MRD QA duplicate samples were collected at the same nine locations in order to facilitate efficient sample collection as well as interpretation of results (the tenth MS/MSD sample was collected at SW-1201). At these locations (Table 2-2), additional sample containers were filled with water and sediment for each of the analytical parameters specified. Additional sediment volume was collected as necessary, and homogenized before being apportioned into sample jars.

Duplicate analyses were not conducted for grain size or TOC analyses. In addition, all duplicate samples were analyzed for explosives via Method 8330, and did not undergo a TNT screening via the Jenkins method. QC duplicate sample bottles were labeled with a unique location number, to insure that the laboratory received the samples in a "blind" fashion (Table 2-2). QA duplicate samples sent to the MRD lab were identified with the sample location number, and a prefix number "2742". For MS/MSD analyses it was not necessary to collect additional volume of sediment. MS/MSD locations were identified on the chain of custody forms.

Split samples were collected at three locations (SW-1604, SW-1909, SW-0616L) by the EPA oversight contractor (ICF Kaiser, Inc., Edison, NJ). At these locations, extra water and sediment samples were collected for each analyte, with sediment being apportioned into jars after homogenization.

In addition, 16 trip blanks were prepared and analyzed for VOCs, and 11 field blanks were prepared and analyzed for all applicable analytical parameters (VOCs, SVOCs, pesticides/PCBs, TAL metals, CN, pH, explosives by Method 8330, mercury, thiodiglycol, and dioxins/furans). Trip blanks were prepared in WESTON's Lionville laboratory by filling a 40-ml vial with boiled deionized (DI) water. The trip blanks were sent to the site with the empty sample bottles, and were sent back to the laboratory with each shipment of VOC samples. Field blanks were

prepared by pouring either boiled DI water (for VOC samples) or high purification liquid chromatography (HPLC) water over decontaminated sediment sampling equipment and into the bottles. The bottle requirements for field blank analytical parameters were the same as those indicated in section 2.3.2. The VOC field blank vials were always filled first. Preservation, handling and shipping procedures were identical to those for the field-collected water samples, described in section 2.2.8.

2.3.6 Sampling Equipment Decontamination Procedures

All sampling equipment was decontaminated between sediment sampling locations using the following decontamination sequence:

(1) physical removal of sediment;
(2) brush with soap and potable water;
(3) potable water rinse;
(4) distilled water rinse;
(5) air dry.

2.3.7 Sample Preservation, Handling and Shipment

The 40-ml vials collected for analysis of VOCs were preserved at the sampling location upon collection, before the caps were sealed. This was accomplished by first using a test vial to determine the pH of the surface water, then adding a sufficient volume of HCl to adjust the pH of the test sample to a value <2. Once the required HCl volume was determined, the same number of drops was added to each sample vial, and the test vial was subsequently discarded.

The remaining water samples requiring preservation included samples for metals, mercury, and CN analyses. These samples were preserved in the field immediately after collection at a central staging area. Metals samples were preserved to $pH<2$ using nitric acid (HNO_3), while CN samples were preserved to $pH>12$ with sodium hydroxide (NaOH).

All surface water and sediment samples were labeled with the sample location number, date and time of collection, and analytical parameter(s). The samples were placed in coolers on ice immediately following collection to maintain them at a temperature of 4°C. Samples were packed and shipped in coolers with vermiculite and ice on a daily basis to the analytical laboratory via overnight courier.

Surface water and sediment samples collected from Areas 8, 11, 12, 14, 16 and 18 were sent directly to the WESTON Gulf Coast Analytical Laboratory in Oakville, Illinois. Samples from the remaining areas sampled were sent to the WESTON Lionville Analytical Laboratory in Lionville, Pennsylvania. A portion of the samples received by the Lionville laboratory were

directed to the WESTON Stockton Analytical Laboratory in Stockton, California, due to unanticipated laboratory capacity exceedances in Lionville.

QA duplicate samples were shipped to the USACE MRD laboratory in Omaha, Nebraska. The EPA split samples were taken into custody directly by ICF Kaiser, Inc., the EPA oversight contractor.

2.4 DEVIATIONS FROM THE WORK PLAN

The sampling plan for this investigation specified that 150 locations would be sampled for sediment and water, 30 of which would also be sampled for surface water during both high and low slack tide periods. A map of proposed sampling locations was provided to the BTAG for review in March 1994. The USACE was granted sufficient latitude to select actual sampling locations in the field, based on field observations, in order to strengthen the study design.

Of the 150 locations, 10 locations were not sampled due to ongoing Huntsville Division UXO removal activities in Area 12, which prevented all intrusive sampling work. These samples will be collected at a future date if deemed necessary. Another 8 locations in Area 10 were identified as "upland" and were sampled as soil locations, leaving a total of 132 sediment and surface water sampling locations. Of these, 18 were dry in August 1994; 144 surface water samples were collected at 114 different locations (see Sections 2.3.2 and 2.3.4). The 18 dry locations are not planned for future sampling.

Sediment samples were collected at all 132 accessible locations. However, one location (SW-1902) inadvertently was not sampled for metals in sediment. This should not significantly affect the study design.

These seven samples (SD-1809, SD-1609, SD-1612, SD-1626, SD-1906, SD-1005, SD-0801) were analyzed for explosives using Method 8330 instead of the Jenkins screening method; however, Method 8330 is considered more accurate. The plan submitted to the BTAG called for 132 locations to be sampled for explosives and screened using the Jenkins technique, with 10% confirmation by Method 8330. WESTON actually sampled a total of 125 locations and screened them using the Jenkins method. A total of 17 of these were confirmed using Method 8330. WESTON sampled an additional seven locations for analysis by Method 8330 only.

SECTION 3.0

PHYSICAL CHARACTERISTICS OF THE STUDY AREA

3.1 SURFACE WATER HYDROLOGY

3.1.1 Hydrologic Setting

The former Arsenal site is located on the northern side of the Raritan River, which discharges to Raritan Bay approximately 5 miles to the east. The Raritan River is influenced by semidiurnal tidal fluctuations, which affect both discharge and salinity levels of tidal creeks and ditches in the lower portion of the site. The tidally-influenced portion of the Raritan River extends to the Fieldville Dam in New Brunswick, approximately 10 miles upstream from the site. Ashley and Renwick[11] divided the river into 3 parts: the upper, middle, and lower estuaries. The upper estuary is located from 11 to 14 miles upstream of the river mouth, and has salinity values normally ranging near 3 ppt (parts per thousand). The middle estuary is located from 7.5 to 11 miles upstream from the mouth, and has salinity values normally ranging up to 19 ppt. The lower estuary, which borders the former Arsenal, extends from the mouth to 7.5 miles upstream, and is characterized by salinity values ranging from 18 to 21 ppt.

Much of the former Arsenal site lies within the 100-year floodplain of the Raritan River as calculated by the federal Emergency Management Agency (FEMA) (Figure 3-1). Regulatory jurisdiction and calculation of the 100-year flood elevation was reviewed in the Environmental Inventory[7]. Technical disagreement still exists between agencies involved in the regulatory jurisdiction of the floodplain. FEMA shows the present 100-year flood elevation at 10.1 feet (Figure 3-1), based on a study finalized in 1984[12]. The NJDEP Bureau of Floodplain Management maintains that the 100-year flood elevation at the former Raritan Arsenal is 12.1 feet, based on results of prior studies[13]. Reportedly, no map is presently available which shows the 12.1 foot line.

The FEMA 500-year floodplain line is located slightly north of the FEMA 100-year line (Figure 3-1), with a portion of the two lines being shared. Both lines follow site topography: north of these lines, site elevation rises abruptly[7].

3.1.2 Site Drainage History

The principal drainage feature on the former Arsenal site is Red Root Creek, which has been significantly altered by historical activities, as documented in the Archive Report[8]. Early maps from the 1700's[8] show Red Root Creek as a tidal creek extending from the Raritan River into Great Pond, a former open water area in the marsh area which now covers the lower portion of

the site. The flow in this creek was presumably unimpeded, and it drained the entire marsh area.

By the mid to late 1800's, Great Pond had disappeared, and the first ditches began appearing on maps of the area. The upper portion of Red Root Creek extended in an east-west direction, and received drainage from several tributaries from the north[8]. On early maps, the "Town Ditch" ran in a southwesterly direction from the western part of Red Root Creek. Portions of this ditch may yet remain, and appear to coincide with the ditch sampled at sampling locations SW-1610 and SW-1611 (Figure 2-1). Red Root Creek remained the major surface water feature; and still presumably flowed tidally and relatively unimpeded.

During the First World War, construction at the Arsenal site resulted in diking and construction of railroad beds, which subsequently altered surface water drainage patterns[8]. Surface water flow in the northern portion of the site was altered by construction of the railroads crossing the paths of major tributaries. The main channel of Red Root Creek was filled at two locations by railroad construction; however, pipes under the rail lines allowed it to continue flowing tidally. Aerial photos from 1918 also show Red Root Creek as having a major tributary leading into it from the northeast, identified in the Archive report as "Black Creek"[8]. This feature did not appear on earlier maps, but appears to have been a natural tributary carrying drainage from the northeast.

By 1934, flow between the eastern and western portions of Red Root Creek was connected only by a lengthy concrete culvert. A 1949 photograph[8] shows Black Creek, and a newly constructed "Black Ditch" in the same area. Black Ditch (Figure 2-1) and a parallel ditch were presumably constructed in order to drain the northeastern portion of the Raritan Arsenal.

Three additional ditches are visible in the 1949 photo. A large unnamed ditch apparently constructed between 1934 and 1949 carried drainage from the northern part of the former Arsenal directly into Red Root Creek. Two small ditches immediately upstream may have carried flow into Black Creek. None of these ditches presently exist.

Apparently, extensive changes in the drainage pattern of the Raritan Arsenal occurred between 1949 and 1963. The 1963 photo shows an extensive storm drainage network in place, and several additional changes to the surface water drainage system. Much of the storm drainage system apparent on the photo is labeled as "above ground" in the Archive Report[8]. Given the irregular shape of much of the channels shown, it is not clear how much of this "network" represents constructed ditches, or natural flow patterns which may have been enhanced by pipes or additional digging.

Features appearing on the 1963 photo include:

- Two ditches in the lower portion of the site, one presently referred to as the Southwest Ditch, the other no longer exists;
- An underground sewer pipe shown running along the western edge of the site, in the present location of West Ditch;
- A filled area approximately 2500 feet wide between Red Root Creek and Old Red Root Creek appears, much of which is now covered with ponds;
- A ditch presently referred to as Central Ditch;
- A much reduced Black Creek, appearing as a minor ditch connecting Black Ditch with Red Root Creek; and
- A filled area in place of the drainage ditch shown on the 1949 photo, which had carried flow from Area 18 to Red Root Creek.

Construction activities involving placement of fill material from the 1960's onward have furthered disrupted the original site hydrology. In summary, while nearly all site drainage originally fed into Red Root Creek, historical alterations have resulted in several flow pathways, as described below.

3.1.3 Present Site Drainage Conditions

Surface water features on the former Arsenal site can be categorized as either freshwater or estuarine. Based on field salinity measurements and observations of tidal flow described below, the approximate extent of freshwater (FW-2) and estuarine (SE-1) waters is shown in Figure 3-2. This estimated boundary is based on instantaneous field measurements, and does not take into account salinity fluctuations which might occur due to changes in precipitation, seasonal or annual fluctuations in ground water, tides, or sampling variability.

The northern third of the site contains several freshwater features, defined as having salinity values less than 3.5 ppt. These include streams, ponds, and wetlands (Figure 3-3). Additional freshwater features include the upper reaches of Red Root Creek near location SW-0602, and some of the ponded areas in the southeastern portion of the site. Most of the lower portion of the site, however, is estuarine, consisting of tidal marsh areas which are drained by Red Root Creek as well as a network of ditches.

Field observations during the August 1994 sampling event indicate that tidal flow in these ditches occurs at a different rate than in the Raritan River. The flow rate in the ditches may be partially influenced by a series of tidal gates at the base of major ditches such as Black Ditch, Central Ditch, Southwest Ditch and West Ditch. Nearly all of these gates remain open at present, but

the presence of headwalls, culverts, and in some cases, closed or partially closed gates, may act to influence the rate of tidal flow.

As a result of the surface water review, seven major present drainage patterns were identified on the former Arsenal site. Five of these drainage areas originate within freshwater areas, but are estuarine in their lower sections, due to the influence of the Raritan River (Figure 3-3). The seven drainages identified are listed below:

(1) East Ditch Drainage;
(2) Black Ditch Drainage;
(3) Red Root Creek Drainage;
(4) Central Ditch Drainage;
(5) Area 12 Drainage;
(6) Old Red Root Creek Drainage; and
(7) County Park Area Drainage.

Surface water features are discussed below as they occur within each drainage area. This approach is consistent throughout this report, to facilitate reporting of analytical results as well as to identify potential contaminant migration pathways. Due to the level terrain of much of the site, and the nature of past disturbance to site hydrology, these drainage areas are only an approximation, and in some cases the drainages are in hydraulic communication with each other. Detailed delineation of watersheds would require analysis and mapping beyond the scope of this investigation.

The seven major drainage areas are described in an east to west direction (Figure 3-3). Individual surface water features within these drainages are described from upstream to downstream, with a focus on water bodies sampled for surface water and sediment during this investigation. For comparison, a list of surface water and sediment locations organized by drainage area is given in Table 3-1.

3.1.3.1 The East Ditch Drainage

The East Ditch Drainage (Figure 3-3) described in this report refers to surface water features in the northeastern portion of the site, including all surface water features within the area historically known as Area 14. Surface water features addressed in this drainage area include a small freshwater marsh on the eastern side of the East Patrol Road, and two streams. These areas are identified in this report as the upgradient *Scirpus* marsh, the unnamed tributary, and the East Ditch.

Upgradient *Scirpus* Marsh

A small (less than 1 acre) marshy area (hereafter referred to as the "upgradient Scirpus marsh") was sampled during the August 1994 sampling event. This area was fairly dry in August 1994, but was apparently sufficiently saturated during the growing season to support a dominance of woolgrass (*Scirpus cyperinus*), a wetland species. A single sediment sample was collected in this location, which appears to be hydrologically isolated from other features within the drainage area.

Unnamed Tributary

An unnamed tributary runs parallel to the eastern site boundary, and is freshwater in its upper reaches. The stream is only 2-3 feet wide in some locations, runs through thick *Phragmites* stands, and is shallow (< 1 feet). It eventually flows into the Raritan River, near the mouth of Black Ditch and Red Root Creek.

At the locations sampled, the water depth of this stream ranged from 1-inch deep in its upper section, to approximately 3 feet deep near its mouth. Salinity values in this stream ranged from 7 to 10 ppt, and the pH values were close to neutral, ranging from 6-7 units.

East Ditch

East Ditch receives off-site inputs from the north and west, and drains much of the northeastern portion of Raritan Center, near Clearview Road and King Georges Post Road[14]. The ditch is freshwater upstream of a dam located at sampling location SW-1406.

During the August 1994 sampling event, the East Ditch ranged from 2 inches to 3 feet deep, and was flowing slowly. The water was greenish brown and turbid at some locations. Water quality measurements indicated that salinity was 0 ppt at all five locations sampled above the dam. The pH at these locations ranged from 5-7.

Below the dam, however, East Ditch is strongly influenced by the tide. At sample point SW-1407, salinity was recorded at 27 ppt and the pH value was 7. Further downstream it flows into Black Ditch, close to its mouth with the Raritan River, at a point below the Black Ditch tidal gates. A broken 60-inch steel culvert pipe is visible at this location (SW-1408), and the tide flows freely. A salinity measurement at this location (SW-1408) recorded 25 ppt.

3.1.3.2 The Black Ditch Drainage

The Black Ditch Drainage originates north of Areas 4 and 5, and includes these areas, as well as part of Area 6. It extends southward to include all of Black Ditch, located in the eastern portion of the site (Figure 3-3). Identifiable surface water features within this drainage include the Area 4 drainage ditch, a small pond in Area 5, Black Ditch itself, and the former sulfur plant ponds in Area 6.

Area 4 Drainage Ditch

A narrow (4-foot wide) drainage ditch with a shallow channel exists in Area 4, which held less than 1 inch of water when sampled in August 1994. Subsequent observations in December 1994 revealed that water levels in this ditch may be as deep as 1 foot in this ditch during winter months. The head of the ditch, located about 100 feet north of Clover Place, contains fill material, and does not appear to be fed by other pipes. The ditch drains southward through a 24-inch cement pipe leading into a forested wetland area on the south side of Clover Place, and then into a narrow ditch running parallel to the railroad tracks in Area 6 (Figure 3-3). The latter ditch flows into a tidal *Phragmites* wetland which in turn flows downgradient into Black Ditch.

Water quality measurements were collected at only one location (SW-0406) due to the lack of surface water in the Area 4 drainage ditch. Salinity measured 0 ppt, and the pH value was 4.5.

Area 5 Pond

A small freshwater pond, hereafter referred to as the Area 5 pond, exists to the south of the UPS facility, just east of Black Ditch. It is nearly surrounded by *Phragmites* vegetation. Surface water and sediment samples were collected from this pond. Its depth was estimated at 2-4 feet, and its areal extent is less than 0.1 acres. The surface water in this pond was brownish and turbid, and its salinity was recorded at 1 ppt. The water was slightly acidic, with a pH value of 5 units.

Black Ditch

The northern portion of Black Ditch, above sampling location SW-0408, is about 15 feet wide, and collects runoff from Areas 4, 5 and 15. Field observations indicate that tidal fluctuations were minimal in August 1994 (Appendix A). During the WESTON tidal influence study[15] in January 1995, water levels in this section of the ditch fluctuated about 1 foot or less. Salinity values of 0 ppt were recorded during the August 1994 sampling event and January 1995 tidal influence study. This section of the ditch is lined with rip-rap on both banks, and has an artificial, rocky substrate. Flow is fairly rapid, and the banks are steep. Water depths ranged from 1 inch near the shoreline to 1.5 feet in pools toward the center of the ditch. The water in this section of the ditch was fairly clear, but a whitish foam was observed on the surface in January 1995.

Downgradient of sampling location SW-0408, Black Ditch is tidally influenced. The ditch curves between sample location SW-0408 and SW-0505, which may affect its flow characteristics. At sample location SW-0505 near the base of the curve, tidal fluctuations were obvious, with most of the bed dry at low tide. The salinity at both high and low tide was measured at 0.5 ppt at this location. At location SW-0506, about 450 feet further downstream,

the water level appeared to fluctuate approximately 4 feet from low to high tide during the August sampling event. The salinity increased from 1 ppt at low tide to 10.5 ppt at high tide.

At sampling location SW-0506 and further downstream, the ditch is straight, about 30 feet wide, and exhibits daily tidal fluctuations of about 3 to 4.5 feet[15]. Low tide depths ranged from 0 inches to 3 feet. At its lower end, Black Ditch divides into two channels where it crosses the East Patrol Road (Figure 3-3). Flow south of the road is influenced by tidal gates located in each channel. Each gate consists of a concrete headwall, and 60-inch steel gate cover. During a field visit in January 1995, the cover of the western channel was closed, and nearly all flow was exiting through the eastern pipe, which was wide open. The two channels reconverge shortly thereafter, and flow eventually converges with the East Ditch in Area 14, before discharging into the Raritan River.

The water in this lower section of Black Ditch is nearly always greenish brown and turbid, due to tidal flow. Salinity values at low tide ranged from 1-6 ppt, while at high tide the salinity ranged from 1.5-18 ppt. A gradient in salinity was apparent from the headwaters to the mouth of the ditch.

Recent (April 1994) aerial photographs suggest two possible connections between Black Ditch and Red Root Creek. These were investigated in the field in December 1994. The first of these is a small stream, which is the remnant of the former Black Creek. This stream passes through 24-inch culverts under both railroad lines located between Black Ditch and Red Root Creek. In December 1994 this stream was only about 2 feet wide and 2 inches deep at a point in the marsh near its confluence with Black Ditch. At this same location, flow was in the direction of Black Ditch as the tide was going out. Due to its elevation and location within the tidal marsh, the stream is very likely tidal toward the Black Ditch end. However, at a point about halfway to Red Root Creek (SW-0602), this stream exists as a small (<0.1 acre) open water feature, and appears to be stagnant.

The second possible connection point between Black Ditch and Red Root Creek exists further downgradient, near SW-0618. At Black Ditch, this stream appears to be a significant tributary; but at the point where it passes under the railroad tracks about 200 feet to the west, it consists of a narrow (2 feet wide) breach in the railroad. No pipe or culvert was found carrying flow further westward, and no connection was found with Red Root Creek.

3.1.3.3 The Red Root Creek Drainage

The Red Root Creek Drainage includes streams located or originating in Areas 1, 18A, 18B and 18C in the northwestern portion of the former Arsenal. These drain in a southeasterly direction into Red Root Creek. The drainage area also includes a drainage ditch in Area 20, and ponded areas in Areas 6 (sulfur plant) and Area 8.

Area 18B and 18C Streams:

An extensive network of unnamed tributaries is present in the northwestern portion of the site, which eventually lead into Red Root Creek via a stormwater drainage system. These streams carry runoff from the GSA Raritan Depot area southward along two major forks located northeast and southwest of Pershing Avenue, respectively. The northeastern stream lies entirely within Area 18C, and is hereafter referred to as the Area 18C stream. The southwestern stream lies mostly within Area 18B (although tributaries originate in Area 18A) and is hereafter referred to as the Area 18B stream. The lower portion of this stream lies in Area 1, and is listed separately on report analytical tables, due to differences in land use history.

Each of the Area 18B and 18C streams has 3 discrete tributaries, which were sampled by WESTON for surface water and sediment during the August 1994 sampling event. A separate, minor stream near sampling locations SD-1801 and SD-1802 (Figure 2-1) flows into the Old Red Root Creek Drainage, and is described in Section 3.1.3.6 of this report as the "dry tributary".

In August 1994, both the Area 18B and 18C streams were flowing moderately, at a depth of approximately 4 inches. However, some areas of these streams ran nearly completely dry, while others had pools up to 2 ft deep. Watermarks and leaves deposited on nearby shrubs indicate that in some areas water levels may rise up to 3 feet higher after storm events, and suggest that flow is rapid during that time.

Channel characteristics of these streams varied from sharply winding to fairly regular, with widths ranging from approximately 2 to 10 feet, and channel depths were variable. The substrate of these streams ranged from rocky to sandy, and the banks were steeply hewn from the surrounding woodland.

The water within these streams was clear in most locations, although whitish foam was noted on the surface at a few locations. At eight sampling locations, most in the lower portion of the Area 18B stream, a reddish iron flocculent was apparent in the streambed. Water quality measurements (Appendices A and B) revealed no salinity (0 ppt) in any of the tributaries. In the Area 18B stream, the water was slightly acidic, with pH values ranging from 4 to 5 units, except at one location (SW-0104), where it was measured at 6.8 units. In the Area 18C stream, the surface water pH was closer to neutral (Appendix A).

The Area 18B and 18C streams converge at a cement box culvert located above the railroad tracks at the southern edge of Area 18. Flow is then channeled underground through a single pipe located between Buildings 425 and 426, and reappears aboveground in a drainage ditch lined with rip-rap located immediately north of Area 20 (Figure 3-3). It then flows through two 60-inch concrete pipes under Raritan Center Parkway, to reemerge aboveground at a point to the south of Campus Drive. The stream width there is approximately 15 feet, and its depth in December 1994 was approximately 2 inches. The stream is subsequently channeled through a

large headwall with four 48-inch culverts, which lie under the railroad tracks. Flow reemerges about 100 feet to the southeast, into a narrow open water area, approximately 2 feet deep, running parallel to the railroad tracks leading into Area 6 (Figure 3-3). It is then channeled through a side ditch running east under the railroad tracks through two 60-inch steel corrugated pipes, and empties into a wetland area associated with the upper reaches of Red Root Creek (Figure 3-3).

Area 20 Ditch

A 6-foot wide ditch in Area 20 was sampled during the August 1994 sampling event. Construction activity was in progress at that time, due to a new building project in the southwestern portion of Area 20. Surface water was present at a depth of 4 inches near SW-2001, but most of the ditch was dry and filled with a thin (3-inch) layer of erosional sand. A subsequent field visit in December 1994 revealed that this ditch had been completely filled.

Drainage from this area of the site is piped to the east under Raritan Center Parkway, and feeds into a shallow detention basin area located to the north of Olympic Drive. Under normal conditions, a portion of this drainage flows through a drainage ditch southward into the pond located immediately north of Olympic Drive. During flood conditions, flow would collect in the detention basin, and based on site topography, any excess flow would be expected to travel southward into Red Root Creek via sheet flow.

Area 8 Ponds

An approximate 2.25 acre pond exists to the north of Olympic Drive in Area 8 (the Area 8 pond). This pond is fed by the Area 20 drainage ditch described above, which runs parallel to Raritan Center Parkway; otherwise, this pond appears isolated. In August 1994, its depth ranged from approximately 2 inches to 3 feet. The water was clear at most locations, although significant algal growth was noted. The silty bottom also supported emergent vegetation. Water quality measurements taken at sampling location SW-0806 revealed that the salinity value was 0 ppt, and the pH was 5 units.

Another, larger pond exists immediately to the south of this pond, across Olympic Drive. This pond is hydrologically isolated from other features, and the lack of watermarks on vegetation surrounding it suggests it is not tidally influenced. A salinity measurement taken in January 1995 read 0 ppt. This pond was not sampled for surface water or sediment analysis.

Red Root Creek

While still a major surface water feature on site, Red Root Creek presently drains only a portion of its original drainage area. Surface flow in the Old Red Root Creek system no longer appears

to flow into Red Root Creek, due to the presence of fill material. Red Root Creek presently receives flow from Areas 1, 6, 8, 18, and 20.

Field observations during the August 1994 sampling event indicate that the creek itself is about 30 feet wide and exhibits tidal fluctuations ranging from 6 inches to about 4 feet, depending upon the location. Like most of the *Phragmites*-lined tidal creeks and ditches on the former Arsenal, its banks are steep, and the substrate is a black anoxic muck. Red Root Creek is turbid throughout its length, with water color ranging from greenish to reddish brown, depending on the location. At its lower end, where it crosses the road on its way to the Raritan River, flow was formerly regulated by a single tidal gate. During a field visit in January 1995, the gate was observed to be held open about 1 foot, by a stick which had been propped behind the cover.

Red Root Creek drains an extensive tidal marsh area, the upper portion of which is only slightly saline. The area within the vicinity of location SW-0601 (Figure 2-1) had salinity values of 8 ppt and 5 ppt at high and low tide, respectively during the August 1994 sampling event. Location SW-0602 exhibited freshwater conditions, with a salinity value of 0 ppt recorded at both high and low tide. No tidal fluctuation was apparent at either location.

Overall, the salinity of Red Root Creek ranged from 0 to 18.5 ppt at low tide and from 0 to 23 ppt at high tide, when measured during the August 1994 sampling event. Salinity was generally higher at sampling locations closer to the mouth of the creek. An opposing trend was observed with respect to acidity. While the surface water ranged from slightly acidic to neutral, more acidic conditions were noted toward the freshwater end of the watershed. Measured pH values ranged from 5 to 7 units.

Sulfur Plant Ponds (Area 6)

The sulfur plant ponds are located adjacent to the former LaPlace sulfuric acid plant, in the eastern portion of the site, near the Raritan River (Figure 3-3). Two inundated borrow pits (ponds) located adjacent to this plant were sampled during the August 1994 field event. These are freshwater according to the NJDEP regulatory definition, since the field salinity measurements were <3.5 ppt.

These ponds were shallow, with a maximum depth of about 2 feet. The water was clear; but like the sediment, it had a yellow-orange color. The water in these ponds was also highly acidic (pH 2-2.5), apparently as a consequence of sulfur compounds in the sediment. Sulfur mineral in a yellow crystalline form was apparent throughout the area both in piles and on the ground surface, and has probably been carried into the pits by runoff. The two ponds had similar water quality characteristics. They ranged in salinity from 1-2 ppt, which is probably an indication of the shallow, partially saline water table in this tidal marsh area.

A small, inundated (4 feet wide, and 1 foot deep) pit was also sampled for surface water and sediment in the vicinity of the sulfur plant. The water in this pit was also acidic (pH 2.5), but the sediment was anaerobic muck instead of sand. Salinity was measured at 1.5 ppt.

3.1.3.4 The Central Ditch Drainage

The Central Ditch Drainage includes the Central Ditch, located in the southeastern part of the former Arsenal, and associated ponded areas in Area 16. Some of these ponded areas are connected to the ditch, and others appear to be hydrologically isolated, except perhaps during major storm events.

Central Ditch

A 10-foot wide drainage ditch extends from Area 16 southward to the Raritan River in Area 11 (Figure 3-3), in the southeastern portion of the site. This ditch is referred to as the Central Ditch in this report, following terminology used in the Environmental Inventory[7]. Flow in this ditch may be influenced by a partially open tidal gate located near the southern terminus of this ditch, at the point where it runs under Dock Road. To the north of Dock Road, tidal fluctuations in this ditch were observed to vary little (< 1 foot) during the August 1994 sampling event; a fact which was confirmed by subsequent staff gauge readings[15] in 1995. South of the road, at location SW-1104, the tidal fluctuation in August 1994 was approximately 2 feet.

Surface water in the Central Ditch itself was fairly stagnant, especially in the upper reaches, and portions of the ditch were turbid. Depths ranged from 4 inches to about 3 feet. The pH of the water was neutral at all locations sampled. The salinity measurements taken at high tide were lower than at low tide. Values ranged from 12 to 14 ppt at low tide, and from 0 to 11 ppt at high tide. This may represent a sampling artifact due to salinity differences associated with vertical stratification. The ditch was sampled when the Raritan River was at mean high and low slack tide.

Ponded Areas

Several ponded areas with varying salinity exist in the eastern portion of Area 16. One large ponded area which is hydrologically connected to Central Ditch was sampled at locations SW-1621 and SW-1624 (Figure 2-1). This pond extends in a northwesterly direction, coming within 250 feet of Old Red Root Creek (Figure 3-3). However, no connection in the way of a pipe or ditch was found between this ditch and Old Red Root Creek, and flow appears to be minimal.

Other ponds in the vicinity appear to be shallow and isolated, even though they may exhibit some salinity. Salinity values in most of these ponds are less than the value used by NJDEP to define "estuarine" conditions of 3.5 ppt, therefore, freshwater regulatory criteria would apply.

These isolated ponded areas include ponds near sampling locations SW-1621, SW-1622, SW-1623 and SW-1626 (Figure 2-1).

One of these isolated ponds exhibited salinity values greater than 3.5 ppt, and would be regulated as SE-1 waters. This pond was a small, shallow (1 foot deep) stagnant pond, with red algal growth, sampled at location SW-1625 during both "high" and "low" tide periods. No fluctuation in water levels was observed in August 1994, a fact which was confirmed by the tidal influence study[15]. However, salinity measurements varied from 6 ppt at high tide to 8.7 ppt at low tide.

3.1.3.5 Area 12 Ditch Drainage

Area 12 - Tidal Ditches

Area 12 consists mostly of tidal *Phragmites* marsh. Two ditches carry flow from this area into the Raritan River. A narrow tidal ditch running in a southwesterly direction, carries flow into the Southwest Ditch (described below). Observations made during the preliminary reconnaissance indicate that this ditch is ill-defined, and has a muck substrate. Flow rates are slow. This area was not sampled due to ongoing UXO activities.

A second ditch along the eastern edge of Area 12 runs north to south, parallel to March Road. A portion of the flow apparently feeds into the above ditch, and eventually into the Southwest Ditch, but most empties directly into the Raritan River. At the time of the August 1994 sampling event, this ditch was 6 inches to 3 feet deep at its deepest point. Upstream portions of this ditch were only about 3 to 4 feet wide, and were barely discernible within the dense *Phragmites* cover. The substrate consisted of muck.

Salinity in this ditch varied tidally from 4.5 ppt at high tide to levels as high as 13 ppt at low tide. The reason for the higher salinity value at low tide is unclear, since water levels were lower at low tide. The pH ranged from 6.5 to 7.5 units.

3.1.3.6 Old Red Root Creek Drainage

The Old Red Root Creek Drainage encompasses much of the southwestern portion of the site. It includes wetland areas within Area 19, Old Red Root Creek itself, West Ditch, and associated ditches in the southwestern portion of Area 16, and the Southwest Ditch. Most of this drainage system drains into the Raritan River via the West Ditch, although a minor portion in the southern part of Area 16 may drain into the Southwest Ditch.

Dry Tributary - Area 18

This ditch runs in a north/south direction independently of the other tributaries in Area 18, and was dry during the August 1994 sampling event. Its channel was approximately 3 feet wide and 1 foot deep and lined with leaf litter and detritus. During the August 1994 sampling event no surface water samples were collected, since the ditch was dry. During a field visit in February 1995, this ditch contained about 2 inches of water in it at the point where it enters a culvert lying under the railroad tracks at the southern end of Area 18. Flow runs underground to the northeastern part of Area 19, where it emerges into a large wetland area. It eventually feeds into Old Red Root Creek, and into the Raritan River via drainage ditches on the western side of the site described below.

Area 19 Wetlands and Drainage Ditches

Much of Area 19 is covered by freshwater wetlands. Surface water gradually flows southward into Area 16. Much of this flow crosses under Magazine Road 11 in Area 19 about 425 feet southwest of sample location SW-1909 (Figure 2-1). During field visits in December 1994 and January 1995, water was seen rapidly upwelling from a submerged pipe on the south side of the road in this area. The water depth at this location was about 3 feet, and subsequent staff gauge readings revealed no tidal fluctuation at this point[15]. Flow from this point heads southward into Old Red Root Creek below the former railroad line near sample point SW-1910. It eventually flows into the Raritan River via the extensive network of drainage ditches in Area 16.

A 6-foot wide drainage ditch running north/south exists within the forested wetland north of Magazine Road 11. Sampling location SW-1903 was located in this ditch (Figure 2-1). This ditch was digitized onto Figure 2-1 from recent (April 1994) photography, since it did not appear on the photogrammetric base map derived from December 1992 aerial photography. The ditch may still carry some drainage under the Magazine Road 11 into Old Red Root Creek to the north of sample location SW-1610, although no pipe was found. South of the road this ditch is approximately 10-12 feet wide and 3 feet deep.

Salinity values recorded during the August 1994 sampling event at locations in this vicinity (SW-1903 to SW-1910) ranged from 0-0.5 ppt, indicating freshwater conditions. The water was slightly acidic (pH = 5). No tidal fluctuation was evident in this area[15]. Surface water appeared to be stagnant, reddish brown and turbid; and the substrate was silt overlain with organic material. Water depths at sampling locations varied from 3 inches to 3 feet.

A second ditch, approximately 8 feet wide (location SW-1905), carries runoff directly westward from Area 19 toward the West Ditch in Area 16. Flow in this ditch formerly passed under Magazine Road 11 near sampling location SW-1905. However, during the August 1994 sampling event and a subsequent field visit in January 1995, no pipe was found. Soil in this area was disturbed, and a 24-inch corrugated steel culvert was found on the ground surface, as

if it had been removed. Thus, it is unclear as to whether any significant flow continues to infiltrate through the soil below the tracks at this point. Any flow travelling under the tracks would eventually flow into the West Ditch and out into the Raritan River.

Water quality data and field observations of water levels suggest that Magazine Road 11 in Area 19 is close to the northern fringe of tidal influence in this area of the site. During the August 1994 sampling event, salinity values at location SW-1905 were recorded as high as 3 ppt. The pH value was 7 throughout this area. At location SW-1904, just north of Magazine Road 11 (Figures 2-1, 3-3), salinity was recorded at 1 ppt during the August 1994 sampling event. The pH value was not recorded. Watermarks on *Phragmites* vegetation observed at this location in August 1994 suggest the tidal fluctuation in this vicinity was no more than 10 inches.

Immediately south of Magazine Road 11 (location SW-1906), the tidal influence is much more pronounced, with estuarine conditions present. The salinity value recorded during the August 1994 sampling event was 11 ppt, and the pH was 8 units.

Old Red Root Creek

Old Red Root Creek exists as the western remnant of the former Red Root Creek drainage. Its watershed area includes much of Area 19 (described above) and part of Area 16. Field observations of water level fluctuations, as well as salinity measurements indicate the creek is still tidally influenced, although less so than the Red Root Creek watershed. Old Red Root Creek presently exists as a large ponded area, which does not fully drain with the tide.

Review of recent (April 1994) aerial photographs, and a field survey made in December 1994 revealed no connection between Old Red Root Creek and Red Root Creek. No functioning pipes or culverts were found connecting the eastern edge of Old Red Root Creek with any other nearby water body. Field observations suggest that surface flow between the two drainages is completely disconnected. In fact, the straight line distance between the existing channels of Old Red Root Creek and Red Root Creek is approximately 1450 feet, although a shallow, open water pond about 425 feet wide exists between the two drainages. Field observations suggest that the cutoff point between drainages is now located at March road, which separates Old Red Root Creek from a remaining fragment of the creek.

Evidence that Red Root Creek and Old Red Root Creek represent two tidal systems separated by a filled, non-tidal area is as follows: measurements taken at a staff gauge located on the eastern side of March Road indicated that water levels exhibit little discernible fluctuation at this point, and salinity measurements taken nearby at SW-1604 were 0 ppt during the August 1994 sampling event. This suggests that this area is not tidally influenced. In contrast, measurements taken in Old Red Root Creek and Red Root Creek suggest these bodies are tidally influenced[15].

Most of the flow leaving Old Red Root Creek apparently passes through a breach in the former railroad near location SW-1609 (Figure 2-1), into a series of canals running parallel to Old Red Root Creek along its western edge. Flow is in the direction of West Ditch, located in Area 16, and eventually into the Raritan River. Water quality measurements and field observations of water fluctuations made both during the August 1994 sampling event and during the tidal influence study[15] suggest that this area does not drain entirely within a tidal cycle. Water level fluctuations at SW-1609, the chief point of egress for surface flow, were only 6-10 inches during the August 1994 sampling event, and the tide appeared to drain very slowly in this area. Following low tide sampling, when the sampling team returned to sample location SW-1609 at high tide, the area was still found to be draining at a very slow rate. Moreover, the water level was actually 2 inches lower than the level at "low tide". Field measurements recorded during the tidal influence study in January 1995 revealed that tidal fluctuations were 3 inches or less at this location[15].

Salinity values in Old Red Root Creek ranged from 2 to 8 ppt. At location SW-1609, salinity values varied tidally between 5 and 6.5 ppt. Salinity measurements at sampling location SW-1610, immediately west of Old Red Root Creek, were generally closer to results obtained in the West Ditch (SW-1601). This suggests that location SW-1610 is more tidally influenced than Old Red Root Creek itself. Salinity at this location measured 11.5 ppt and the pH value was 6 units.

Immediately east of Old Red Root Creek, in the area where it formerly connected to Red Root Creek, are a number of freshwater ponds apparently formed from the remnants of Red Root Creek. One pond (location SW-1604) was sampled in this area. The depth of this pond is unknown, but staff gauge measurements revealed no tidal fluctuation[15]. This pond receives some flow from a culvert located at the edge of the Raritan Center Exposition Hall parking lot. At the time of the August 1994 sampling event, the water was brownish green and turbid. Salinity was 0 ppt, and the pH measured 5 units at this location.

West Ditch and Associated Ditches

Most of the western portion of Area 16 connects hydraulically with the West Ditch, which also receives drainage from Old Red Root Creek. The West Ditch originates in Area 19, carrying freshwater flow from the wetland there, southward along the southwestern site boundary. The ditch is located on the eastern side of the West Patrol Road.

South of Area 19, West Ditch collects flow from Old Red Root Creek, and a series of ditches running parallel to former railroad lines in Area 16 (Figure 3-3). Towards its lower end, West Ditch converges with the Southwest Ditch, and flows though a culvert with a tidal gate into the Raritan River under the West Patrol Road near the southern border of the site.

West Ditch consists of a 35 to 50-foot-wide channel over much of its length. Observations made during the August 1994 sampling event indicate that water depths at low tide range from about

1 inch to 2 feet, while high tide levels were estimated to be 3 to 4 feet higher (Appendix A). The tidal influence study[15] found that water levels at the edge of West Ditch fluctuated 2.5 feet in January 1995. The tide fluctuates quickly in West Ditch, as high tide levels toward its lower end were reached within 2 hours of the mean low tide levels.

The water in this ditch was turbid and brown when sampled. Salinity values recorded at low tide ranged from 5-10 ppt, and a single reading made at high tide at the upgradient location (SW-1601) read 12 ppt. The pH of this ditch ranged from 6-7 units.

Four ditches in Area 16 run parallel to the former railroad tracks and feed into the Western Ditch (Figure 3-3). These ditches were approximately 6 feet wide or less, without discernible banks, and surrounded by *Phragmites* vegetation. In some cases they connect with shallow (estimated 0 to 2 feet in depth) open water areas which appear to exhibit little tidal fluctuation. Water in the ditches themselves appeared to be stagnant, as evidenced by water lines on sampling stakes during the August 1994 sampling event. Turbidity and algal growth was noted at some locations, and the substrate was muck. Salinity readings recorded at sampling locations in this area (locations SW-1611 to SW-1618) ranged from 4-13 ppt, with higher salinity values generally recorded with increasing proximity to the West Ditch. The recorded pH values ranged from 6-7 units.

Southwest Ditch

The Southwest Ditch drains tidal wetlands in portions of Areas 12 and 16 (Figure 3-3). This ditch exhibits rapid tidal fluctuations, especially towards its confluence with the West Ditch near the Raritan River. A tidal gate at the base of this ditch, where it crosses the West Patrol Road, remains open. The channel of this ditch is approximately 30 feet wide, and during the August 1994 sampling event, water depths ranged from about 3 inches to 2 feet deep at low tide, and about 3 feet higher at high tide.

This ditch is surrounded by *Phragmites* marsh. At low tide, a brownish-gray muck substrate is apparent. During the August 1994 sampling event, water in the ditch had salinity values ranging from 10-11 ppt at low tide. High tide salinity measurements were not taken. The pH of the water in this ditch ranged from 5.5 to 6.5 units.

3.1.3.7 County Park Drainage

The County Park Drainage consists of a series of ditches constructed within the Thomas Edison County Park property in Area 10. These ditches carry runoff into the Raritan River via a large off-site ditch, running along the outer western boundary of the former Arsenal site.

Area 10 Ditches

Four ditches in Area 10 feed into an unnamed off-site drainage ditch, via a headwall structure with two 36-inch concrete pipes (Figure 3-3). This structure is located across the road from sampling location SW-1005 (Figure 2-1). The off-site ditch runs along the outer western boundary of the former Arsenal and into the Raritan River. For discussion purposes, these 4 ditches have been identified as follows, with sampling locations in parentheses from upgradient to downgradient:

- Western Boundary Ditch (SW-1001, SW-1002);
- Open Lawn Ditch (SD-1003, SW-1004, SW-1005);
- Maintenance Area Ditch (SD-1009, SD-1010, SD-1011, SD-1007, SD-1008);
- Area 10 Southern Border Ditch (SW-1902, SW-1006).

The above ditches had similar channel characteristics, ranging in width from approximately 3 to 6 feet wide. Their substrate was silty in forested wetland areas, and sandy with gravel in open lawn areas along the roadways. Surface water was fairly clear, and flowed slowly. Water depths ranged from 2-8 inches. Salinity was 0 ppt at the three locations measured. The water was slightly acidic, with pH measured at 5 units.

3.2 WETLANDS

3.2.1 Regulatory Framework

Wetlands in New Jersey are legally regulated as either freshwater or tidal wetlands. Both types of wetlands occur on the former Arsenal. Freshwater wetlands in New Jersey are regulated under the Freshwater Wetlands Protection Act of 1988 (NJSA 13:9B-1 et. seq.), making NJDEP the lead agency for wetlands regulation in the state. The Act defines "Freshwater wetland" as "an area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation; provided, however, that the Department, in designating a wetland, shall use the 3 parameter approach (i.e. hydrology, soils, and vegetation) enumerated in the April 1, 1987 interim-final draft "Wetland Identification and Delineation Manual" developed by the U.S. Environmental Protection Agency, and any subsequent amendments thereto;". The NJDEP presently uses the 1989 version of the EPA manual[16] to identify and delineate wetland areas[17].

Tidal wetlands are regulated by the NJ Wetlands Act of 1970 (NJSA 13:9A-1). The area mapped as NJDEP-regulated "tidal wetlands" includes a narrow fringe along the Raritan River, extending

approximately (2,000 feet) north along the East Ditch drainage[7]. However, the state also regulates all tidal waters, defining them as fresh or saline waters under tidal influence, up to the head of the tide (NJAC 7:7A-1.4). Thus, while most of the wetlands in the southern two thirds of the site are not mapped as tidal per se, they would nevertheless be regulated under the Freshwater Wetlands Act of 1970, since they undergo tidal fluctuations. These tidal wetlands in the southern portion of the site are also regulated by the USACE, under Section 404 of the Clean Water Act of 1977.

Under a memorandum of agreement signed between the USACE and NJDEP, USACE will honor decisions made by NJDEP regarding the determination of wetland boundaries and placement of fill in wetlands or open water areas normally regulated by US ACE under Section 404 of the Clean Water Act of 1975. However, certain permit applications (statewide general permits, open water discharges, and others) may be subject to review and comment by EPA.

3.2.2 Wetland Survey

As outlined in the Phase II RI Work Plan, this section refers to a review of the NWI maps for the site, additional pertinent site information, and observations made during the field investigation. Site vegetation and soil characteristics were reviewed in detail in the Environmental Inventory prepared in 1984[7]. The objective of this section is to update the summary of site wetlands given in the Environmental Inventory[7] to reflect present-day conditions. Any inferences or conclusions presented in this section are tentative. A field delineation of wetlands following the 3-parameter approach outlined by the EPA[16] was not undertaken, but may be necessary at a later date should remedial actions infringe upon wetland areas.

Wetlands mapped on site by the NWI program of the US Fish and Wildlife Service (FWS) under the NWI program were reviewed in the Environmental Inventory[7], and are shown in Figure 3-4. The NWI maps were used in this study only as a screening method to identify potential locations of wetlands on site for further investigation. The NWI maps are based on high altitude (1:80,000) aerial photography taken in 1976, and superimposed on 1:24,000 scale US Geological Survey topographic maps. Hence, their accuracy is limited.

Most of the southern two thirds of the site was mapped under the NWI program as estuarine wetlands, while portions of the upper third have been mapped as freshwater wetlands. Specific wetland types mapped on site are listed below:

E2EM - Estuarine Intertidal, Emergent;
E1OW - Estuarine Subtidal, Open Water;
PEM - Palustrine Emergent;
PSS1 - Palustrine Scrub-Shrub, Broad-Leaf Deciduous;
PFO1 - Palustrine Forested, Broad-Leaf Deciduous;

U - Upland areas, unclassified man-modified areas, non photo-identifiable areas, or unintentional omissions.

Estuarine wetlands are found along the U.S. coastline, and are associated with estuaries or brackish tidal waters. Estuarine emergent wetlands are dominated by grass or grass-like plants[18]. Much of the lower portion of the site is mapped as Estuarine Intertidal Emergent (E2EM) wetland (Figure 3-4), meaning emergent wetlands that may be subject to tidal inundation. At the former Arsenal, this refers to the tidal *Phragmites* marshes which dominate the southern area of the site, and to the narrow band of saltmarsh cordgrass *(Spartina alterniflora)* found along the Raritan River. These two communities were described in detail in the Environmental Inventory[6].

The Estuarine Subtidal, Open Water (E1OW) classification refers to the Raritan River, Red Root Creek, Old Red Root Creek and West Ditch areas of the site. Other estuarine open water areas of the site do not appear on the NWI map, but are extensive. These include ponded areas in Areas 12 and 16, as well as remaining tidal ditches.

Much of the area to the north of the Old Red Root Creek drainage has been mapped as palustrine wetlands under the NWI program. Palustrine wetlands largely consist of freshwater wetlands[18], and are represented by three types: palustrine emergent wetland, palustrine scrub-shrub wetland, and palustrine forested wetland[18]. Palustrine wetlands also include shallow open waterbodies such as ponds less than 6.6 feet deep, which are considered wetland by the FWS[18].

Palustrine emergent (PEM) wetlands are dominated by herbaceous vegetation such as grasses, cattails, rushes or sedges[18]. At the former Arsenal site, four PEM areas are shown within Area 14, near the eastern edge of the site (Figure 3-4). The largest of these areas consists of a *Phragmites* wetland associated with the East Ditch, which is freshwater over much of its length. This mapped area includes much of the area of the unnamed tributary in Area 14 near the eastern site boundary. A second PEM area appears on the map immediately to the north of this wetland, near the site boundary. This wetland was sampled at location SD-1401, and consists of a freshwater wetland dominated by woolgrass (*Scirpus cyperinus*). Another PEM wetland mapped on the eastern side of the UPS building no longer exists, as this area has been developed. The other PEM wetland is mapped in the upper portion of Area 14, and consists of an open water pond with *Phragmites* dominating its margins.

Palustrine Broad-leaved Scrub-Shrub (PSS1) Wetlands were mapped by the NWI in 3 areas located in the northern portion of the site (Figure 3-4). Palustrine scrub-shrub wetlands are defined as dominated by woody vegetation less than 20 feet tall[18]. The Broad-Leaf Deciduous designation refers to the growth characteristics of the dominant plant species in these areas. At the former Arsenal site, the first of these was mapped between the Black Ditch and East Ditch, toward the northern end of each, in Area 5. The other two areas were mapped as transitional between scrub-shrub and forested wetlands, and are represented by the notation PFO/SS1.

These are both located in Area 19, and represent early successional sweetgum (*Liquidambar styraciflua*) and red maple (*Acer rubrum*) woodlands.

Palustrine Broad-Leaf Deciduous Forested (PFO1) Wetlands were also mapped by the NWI in the northern portion of the site (Figure 3-4). Palustrine forested wetlands are dominated by trees taller than 20 feet, and are the most abundant wetland type in the eastern U.S.[18]. Preliminary field observations indicate that at the former Arsenal site, the Palustrine Forested, Broad-Leaf Deciduous classification refers to sweetgum and/or red maple wetlands.

The largest remaining PFO1 wetland area at the former Arsenal site is located within Area 19, to the north of Magazine Road 11. Sample location SW-1903 (Figure 2-1) is located within this wetland. This wetland encompasses approximately 30-35 acres, extending northward to the County Park maintenance area. It is dominated by a mature sweetgum forest, with some red maple in the overstory. The understory consists primarily of highbush blueberry (*Vaccinium corymbosum*), as well as red maple and sweetgum saplings. Sensitive fern (*Onoclea sensibilis*) and cinnamon fern (*Osmundea cinnamomea*) were noted in the herbaceous layer. During the January 1995 field visit, most of this area had been inundated, and was covered with about 1-2 inches of ice.

A total of 30 discrete PFO1 wetland areas were mapped by the NWI program in the northern portion of the site (Figure 3-4). Many of these appear to have been filled prior to completion of the Environmental Inventory[7], since Figure G-2 of that report shows several buildings placed in areas mapped as wetlands. Observations made during the August 1994 sampling event, and a subsequent field reconnaissance in January 1995 indicate that the PFO1 wetland areas mapped in the vicinity of Northfield Avenue apparently no longer exist. Moreover, the PFO1 wetlands mapped to the north of Newfield Avenue, and most of the wetlands north of Sunfield Avenue no longer exist. An exception is a single PFO1 wetland located between Newfield and Sunfield Avenues, close to Raritan Center Parkway. Most of the wetlands mapped immediately south of Clover Place also no longer exist. Fragments of PFO1 wetland which are also dominated by sweetgum trees still exist within Area 4 and Area 8.

Areas mapped as uplands (U) on the NWI map, include most of the northern portion of the site, as well as areas in the southern tidal marsh area along roadways, railroads, and other areas which have received fill material. The latter areas include the present Huber Ink Co., and the former LaPlace sulfuric-acid producing facility. During the August 1994 sampling event, it was noted that portions of the former sulfuric-acid plant area still support hydrophytic vegetation species, such as blue vervain (*Verbena histata*), and appear to exhibit wetland hydrology. Thus, filled areas within this vicinity may be in the process of reverting into wetland conditions.

In addition to the NWI mapping, the USACE produced a map in 1986[7] outlining the extent of wetlands at the former Arsenal site (Figure 3-5). The methodology used by USACE to identify the wetlands shown on the latter map was based upon the USACE three-parameter approach,

which states that all three parameters (hydrophytic vegetation, hydric soils, and surface hydrological indicators) must be present for an area to be classified as a wetland. In contrast, the approach used by the NJDEP is based upon procedures described in the 1989 EPA manual. This approach also relies on the same three parameters, but does not necessarily require that all three be present for an area to be classified as wetland.

The 1986 USACE map (Figure 3-5) taken from the Environmental Inventory report[7] shows significantly less wetlands than the NWI map. Field observations made in August 1994 and January 1995 suggest that the USACE map more closely approximates the existing extent of wetlands on the site. However, no field verification was undertaken other than a brief field reconnaissance. A detailed field delineation, including soil borings and vegetative analysis would be required to determine actual wetland boundaries.

Comparison of wetlands mapped under the NWI program with known fill areas described in the Archive report[8], reveals that some areas mapped by NWI as estuarine wetland have received large amounts of fill material through the years. Field observations indicate that some of these areas have regenerated a mixture of plant species indicative of disturbed conditions. For example, the tidal marsh on the northeastern side of Red Root Creek received fill material, and is still dominated by *Phragmites*, but other species were noted which may occur under drier conditions, such as gray birch (*Betula populifolia*), staghorn sumac (*Rhus typhina*), and blackberry (*Rubus sp.*). Detailed studies would be required to determine if this area is still functioning as a wetland.

SECTION 4.0

SURFACE WATER/SEDIMENT SAMPLING RESULTS REVIEW

4.1 RESULTS OF PREVIOUS SURFACE WATER/SEDIMENT INVESTIGATIONS

4.1.1 Prior Investigations at the Former Raritan Arsenal

O'Brien and Gere, Inc. collected a total of six surface water samples at the former Arsenal on 4 November 1988[4]. Dames and Moore, Inc. collected a total of nine surface water and nine sediment samples during the Phase I RI in 1992[4]. Results of these studies are summarized below and full analytical results of surface water and sediment samples collected during these investigations are given in Appendix B. All sample numbers given are the actual numbers listed in these prior reports.

Central Ditch Drainage

Dames and Moore, Inc. collected one surface water sample (SW-4) and one sediment sample (SS-4) within the Central Ditch Drainage. Samples SW-4 and SS-4 were collected from the Central Ditch. The samples were analyzed for VOCs, SVOCs, metals, and explosives. Sample SS-4 was also analyzed for pesticide and PCBs. Surface water sample SW-4 did not contain any compounds at concentrations exceeding the NJDEP surface water quality standards. The sediment sample SS-4 contained lead (52.6 mg/kg) at a concentration exceeding the NOAA Effects Range - Lower (ER-L) of 35 mg/kg, but below the NOAA Effects Range - Median (ER-M) of 110 mg/kg (see Section 4.3.2 for further explanation of the NOAA Effects Range). Sample SS-4 also contained phenanthrene (0.330 mg/kg) at a concentration exceeding the NOAA ER-L of 0.225 mg/kg, but below the NOAA ER-M of 1.38 mg/kg. All other compounds were either not detected or were present at concentrations below the NOAA ER-L. At sediment concentrattions below the NOAA ER-L, measurable effects are considered unlikely.

Black Ditch Drainage

Dames and Moore collected four surface water samples (SW-1, SW-2, SW-3, and SW-6) and four sediment samples (SS-1, SS-2, SS-3, and SF-6) within the Black Ditch Drainage. Samples SS-1 and SW-1 were collected within a small marshy portion of Area 3; samples SS-2, SW-2, SS-3, and SW-3 were collected within the Area 4 Ditch; and samples SF-6 and SW-6 were collected within Area 5 just east of MW-21. All samples collected were analyzed for VOCs, SVOCs, pesticides, metals, and explosives. In addition, samples SF-6 and SW-6 were also analyzed for cyanide, diathiane, oxathiane, and thiodiglycol.

Dames and Moore surface water samples SW-1 and SW-2 did not contain any compounds at concentrations exceeding the NJDEP surface water quality standards. Surface water samples SW-3 and SW-6 contained metals at concentrations exceeding the NJDEP surface water quality standards. Sample SW-6 also contained pesticides at concentrations exceeding the NJDEP surface water quality standards. Samples SW-3 (55 μg/L) and SW-6 (85.8 μg/L) contained arsenic at concentrations above the surface water standard of 50 μg/L. Samples SW-3 (434 μg/L) and SW-6 (606 μg/L) also contained lead at concentrations above the surface water standard of 50 μg/L. Sample SW-6 contained chromium at a concentration of 117 μg/L, exceeding the surface water standard of 50 μg/L. The pesticides 4,4'-DDD (0.132 μg/L) and 4,4'DDE (0.020 μg/L) were detected in sample SW-6 at concentrations exceeding the surface water quality standards of 0.001 μg/L each. Additional VOCs, SVOCs and explosives were also detected in samples SW-2, SW-3 and SW-6; however, surface water quality standards do not exist for the compounds detected.

Sediment samples collected by Dames and Moore, Inc. contained SVOCs, pesticides, and metals at concentrations exceeding the NOAA ER-L. Samples SS-1 and SS-2 contained benzo-(a)anthracene, benzo(a)pyrene, chyrsene, fluoranthrene, phenanthrene, and pyrene at concentrations exceeding the NOAA ER-L, but below the NOAA ER-M (Appendix B). In addition, sample SF-6 contained pyrene (0.370 mg/kg) at a concentration exceeding the NOAA ER-L (0.350 mg/kg), but below the ER-M (2.2 mg/kg). Sample SF-6 also contained dieldrin and endrin at concentrations above the NOAA ER-L, but below the NOAA ER-M. Sediment samples SS-1 (76.9 mg/kg), SS-2 (115 mg/kg), SS-3 (154 mg/kg) and SF-6 (193 mg/kg) contained lead at concentrations exceeding the NOAA ER-L of 35 mg/kg. Samples SS-2, SS-3 and SF-6 also contained lead at concentrations exceeding the NOAA ER-M of 110 mg/kg. Sediment samples SS-1 (0.248 mg/kg), SS-3 (0.277 mg/kg) and SF-6 (1.2 mg/kg) contained mercury at concentrations exceeding the NOAA ER-L of 0.15 mg/kg, but below the NOAA ER-M of 1.3 mg/kg. Sediment sample SF-6 contained arsenic (65 mg/kg) at a concentrations exceeding the NOAA ER-L of 33 mg/kg, but below the NOAA ER-M of 85 mg/kg. Sample SF-6 also contained 2.57 mg/kg of silver, exceeding both the NOAA ER-L (1.0 mg/kg) and ER-M (2.2 mg/kg).

OBG collected four surface water samples (SW-3, SW-4, SW-5, and SW-6) within the Black Ditch Drainage. Samples SW-3 and SW-5 were collected within the Area 4 Ditch; sample SW-4 was collected within the Area 5 Pond; and sample SW-6 was collected within Area 4 just south of Clover Place. All surface water samples were analyzed for VOCs, metals, petroleum hydrocarbons, explosives (with the exception of sample SW-3), and general indicator parameters.

Surface water samples collected during the OBG investigation contained VOCs, metals, and explosive compounds. Surface water sample SW-5 contained 5 μg/L of TCE. Lead was detected in samples SW-3 (14 μg/L), SW-4 (49 μg/L), SW-5 (8 μg/L) and SW-6 (109 μg/L). Cadmium (10 μg/L) and chromium (10 μg/L) were also detected in sample SW-5. The explosive compound 2,4,6-TNT was detected in samples SW-5 (2,960 μg/L) and SW-6 (413,000

μg/L). In addition, sample SW-6 also contained 4,540 μg/L of 2,4-DNT. All other compounds were either not detected or were present at concentrations below the NJDEP surface water quality standards.

Red Root Creek Drainage

Dames and Moore, Inc. collected four surface water samples (SW-5, SW-7, SW-8, and SW-9) and four sediment samples (SS-5, SS-7, SS-8, and SF-9) within the Red Root Creek Drainage. Samples SS-5 and SW-5 were collected within the Area 8 Pond and samples SS-7, SW-7, SS-8, SW-8, SS-9, and SW-9 were collected within the Sulfur Plant Ponds. All samples collected were analyzed for VOCs, SVOCs, pesticides, metals, and explosives.

Metals were detected at concentrations exceeding the NJDEP surface water quality standards in samples SW-5, SW-7, SW-8, and SW-9. Lead was detected at a concentration of 117 μg/L in sample SW-5, exceeding the surface water quality standard of 50 μg/L. Sample SW-7 contained 550 μg/L of arsenic, exceeding the surface water quality standard of 50 μg/L. Sample SW-7 also contained 13.4 μg/L of cadmium, exceeding the surface water quality standard of 10 μg/L. Samples SW-7, SW-8, and SW-9 contained barium (5,250 μg/L, 1,660 μg/L, and 2,340 μg/L), chromium (3,880 μg/L, 667 μg/L, and 243 μg/L), lead (1,280 μg/L, 452 μg/L, and 277 μg/L) and mercury (6.85 μg/L, 44.7 μg/L, and 2.52 μg/L) at concentrations exceeding the surface water standards of 1,000 μg/L, 50 μg/L, 50 μg/L, and 2 μg/L, respectively. Additional VOCs, SVOCs, and explosives were detected; however, NJDEP surface water quality standards do not exist for the compounds detected.

Metals (SS-5, SS-7 and SS-9) and pesticides (SS-7 and SS-9) were detected in sediment samples collected by Dames and Moore, Inc. at concentrations exceeding the NOAA ER-L. Sample SS-7 contained 4,4'-DDT at a concentration of 0.0184 mg/kg, exceeding both the NOAA ER-L (0.001 mg/kg) and ER-M (0.007 mg/kg). Sample SS-9 contained 4,4'-DDE (0.0096 mg/kg) and dieldrin (0.0063 mg/kg) at concentrations exceeding the NOAA ER-L of 0.002 mg/kg and 0.00002 mg/kg, respectively. The pesticides present in sample SS-9 did not exceed their respective NOAA ER-M concentrations. Samples SS-5 (38.7 mg/kg) and SS-7 (40.7 mg/kg) contained lead at concentrations exceeding the NOAA ER-L of 35 mg/kg, but below the ER-M of 110 mg/kg. Sample SS-7 also contained 101 mg/kg of chromium, exceeding the ER-L of 80 mg/kg, but below the ER-M of 145 mg/kg. In addition, sample SS-9 contained 0.204 mg/kg of mercury, exceeding the ER-L of 0.15 mg/kg, but below the ER-M of 1.3 mg/kg. All other compounds were either not detected or were present at concentrations below the NOAA ER-L.

OBG collected two surface water samples (SW-1 and SW-2) within the Red Root Creek Drainage. Sample SW-1 was collected upgradient of Area 1 within the Lower Area 18B Stream. Sample SW-2 was collected at an unknown location downgradient of Areas 1, 2, 3, and 7. Both surface water samples were analyzed for VOCs, metals, petroleum hydrocarbons, explosives, and general indicator parameters.

Samples SW-1 and SW-2 both contained VOCs, all other parameters analyzed were either not detected or were present at concentrations below the NJDEP surface water quality standards. Sample SW-1 contained 3 μg/L of 1,2-DCA and 22 μg/L of TCE. Sample SW-2 contained 2 μg/L of 1,1,1-TCA and 2 μg/L of TCE.

4.1.2 Background Concentrations of Metals in the Raritan River

Since reference area sampling could not be conducted concurrently with this investigation due to difficulties encountered in identifying a suitable location, the following information is being provided for the purposes of making rough comparisons of analytical results with other investigations in the area of the former Arsenal. It is not intended as a substitute for reference area sampling, nor even to allow for sound inferences to be drawn, since much of the data provided was collected several years before the Phase II RI investigation.

Evaluation of the significance of the above findings involve comparison of concentrations measured on site with appropriate background levels. Few data on background surface water concentrations of compounds in the Raritan River are available for comparison with results of the Phase II investigation. Sampling conducted for the Environmental Inventory[7] in 1985-1986 at 10 stations in the Raritan River near the site found arsenic levels ranging from 2 μg/L to 6 μg/L. Arsenic levels recorded in a study conducted within the vicinity of the site by NJDEP[19] in 1982-1983 ranged from 1 μg/L to 3.3 μg/L. An earlier Rutgers study in 1978 [20] reported arsenic levels in the vicinity of Crab Island, ranging from 6 μg/L to 39 μg/L. Crab Island is located within the Raritan River, directly across from the former Arsenal site.

Surface water lead levels reported from 1985-1986 in the Environmental Inventory ranged from 2 μg/L to 27 μg/L. The maximum lead level previously reported in the NJDEP study[19] was 2.5 μg/L, while the Rutgers study in 1978 reported values ranging from 2 μg/L to 54 μg/L.

Sediment was also collected during the 1985-1986 Environmental Inventory[7] study. Arsenic levels in the sediment ranged from 1.47 to 113 mg/kg. Lead levels in the sediment ranged from < 5 mg/kg to 274 mg/kg.

4.1.3 Lithologic Influences

McGlaughlin[21] investigated the concentration, speciation and biological availability of trace metals present in surface water, arising from lithologic units within the Raritan River Basin. Most of the northern portion of the site is underlain with Jurassic Brunswick Shales and sandstones, while the underlying strata in the southern portion consist of Cretaceous-Tertiary unconsolidated Coastal Plain sediments.

McGlaughlin measured trace metal concentrations in these lithologic units. These measurements do not include anthropogenic inputs, but represent values measured in the substrate itself. In

the Jurassic Brunswick shales and sandstones, the arsenic concentration was 16.2 mg/kg, the lead concentration was 57.1 mg/kg, and the zinc concentration was 88.5 mg/kg. In the Cretaceous-Tertiary unconsolidated Coastal Plain sediments, the arsenic concentration was 17.3 mg/kg, the lead concentration was 30.7 mg/kg, and the zinc concentration was 44.7 mg/kg. Comparison with NOAA ER-L values reveals that in the lower Raritan River Basin, the ER-L for lead (35 mg/kg) is close to the trace element level of lead measured in the Cretaceous-Tertiary sediments (30.7 mg/kg). The trace element level of lead measured in Jurassic Brunswick shales and sandstones (57.1 mg/kg) is actually higher than the NOAA ER-L level for lead in estuarine sediments.

Regarding trace element concentrations in surface water, McLaughlin[21] measured dissolved trace metal concentrations from the Lower Raritan River at median flow conditions. The arsenic concentration was 4.9 μg/L, while the lead concentration was 13 μg/L. These values apparently include anthropogenic as well as lithologic sources. Nevertheless, it is interesting to note that in this 1988 study, levels of arsenic in the Raritan River exceeded the present NJDEP SE-1 standard of 0.136 μg/L, and lead levels exceeded the EPA marine chronic criterion of 5.6 μg/L.

4.2 TDMS SUPPORT OF SAMPLING DATA EVALUATION

In order to establish a more efficient and powerful information infrastructure to support the storage, evaluation, and reporting of the results of the Phase II RI, the USACE has implemented a Technical Data Management System (TDMS) for the Raritan Arsenal investigation. All data utilized for analysis, presentation and reporting on the RI/RD project are stored in a central electronic database. Specialized application modules, outlined below, are utilized for automated data collection, data evaluation and data integration:

- **Geo Tracker** - Tracks analytical data through the entire project life-cycle.
- **Geo DE** - Reviews and evaluates analytical data against USACE, USEPA and NJDEP project-specific criteria (i.e, CDAP requirements and cleanup standards)
- **GEOLIS®** - Proprietary WESTON-designed module utilized for collection, analysis, management and QA/QC of lithology, well construction, well development and water level data (i.e., boring logs and well construction logs)
- **PROSPECTOR** - A Windows-based query tool utilized for easy access, scanning and integration of technical data from the centralized database.
- **GIS** - Mapping and visualization of analytical, geotechnical and geographical data.

The analytical data summary tables (Appendix C) discussed within this section of the report were generated by the TDMS. The TDMS automatically evaluates all laboratory data for conformance with the approved CDAP and Region II USEPA QA/QC guidelines for numerous analytical method requirements. Notes preceding data tables in Appendix C outlines specific TDMS data evaluation criteria and data qualifiers utilized for this report.

4.3 APPLICATION OF REGULATORY CRITERIA/GUIDELINES

Analytical results were compared to existing state and federal regulatory standards and guidelines as a screening method to identify potential areas of concern at the former Arsenal. The specific criteria or guidelines used for comparisons with each analyte are listed next to analytical results for each location in the results tables of this report. In cases where criteria or guidelines were calculated, values used in the calculations and procedures followed are summarized in Appendices D, E and F.

4.3.1 Surface Water Standards/Criteria

Surface water results were compared to NJDEP water quality standards (N.J.A.C. 7:9B) cited under 24 N.J.R. 3983(a), 24 N.J.R. 4471(a), 25 N.J.R. 404(a), 25 N.J.R. 405(a), 25 N.J.R. 3755(a), 25 N.J.R. 5569(a), 26 N.J.R. 1124(a), and 26 N.J.R. 1226(a). These standards are based on "total recoverable metals", which are unfiltered, and are thus comparable to the results of this investigation. Surface water standards are listed by NJDEP for two general categories of waters: freshwater (FW-2) and saltwater/estuarine (SE).

The "SE" surface water designation refers to saline waters in estuaries. "Saline" is defined by NJDEP as having salinities above 3.5 parts per thousand (ppt) at high tide. The number "1" in the SE-1 definition refers to regulated uses of those waters, such as recreation, etc. Under subchapter 7:9B-1.15, the main stem of the Raritan River and its associated saline tributaries from the Landing Lane bridge in New Brunswick, south to the Raritan Bay are all classified as SE-1 waters. This includes all estuarine portions of the former Arsenal study area.

The FW-2 surface water designation refers to those fresh waters which are not designated as FW-1 or Pinelands waters. The approximate extent of SE-1 and FW-2 waters at the former Arsenal site was determined on the basis of incidental salinity measurements taken during the August 1994 sampling event (Section 3.1.3).

For carcinogenic contaminants such as arsenic, the NJDEP standards are based on minimization of human health risks associated with ingestion of potable water, since state regulations specify that potable water is one of the potential uses of any surface water body in the state categorized as FW-2 or Pinelands waters (NJAC 7:9B-1.12B and C). For such contaminants, analytical results were also compared to EPA Ambient Water Quality Criteria as a second basis of comparison, since significant differences in the magnitude of the standards sometimes exist. Using arsenic as an example, the NJDEP FW-2 standard is 0.017 μg/L, as compared to the EPA acute freshwater criterion for protection of aquatic life of 360 μg/L and freshwater chronic criterion of 190 μg/L. The difference in these state and federal criteria affects the interpretation of the significance of the analytical results, as discussed in Section 4.0.

NJDEP has not yet promulgated water quality standards for all compounds. EPA Ambient Water Quality Criteria[22] were applied in such cases, as directed by NJDEP in correspondence to the USACE dated January 19, 1995[23]. For some parameters, such as copper and chromium, EPA freshwater standards were calculated using hardness data. Hardness was calculated from calcium and magnesium concentrations measured in surface water[24] from representative locations within each applicable water body, since calcium and magnesium were not analyzed in every sample. A table listing hardness data used in these calculations is presented in Appendix D, and also identifies which locations were used to extrapolate hardness data. For example, if only one location within the Area 5 Pond had surface water analyzed for calcium and magnesium, the resultant hardness value from this sampling location was used as a representative value for calculating criteria for the entire pond. In cases where hardness data varied within a water body, such as Black Ditch, the hardness value from the closest geographic sample where calcium and magnesium were measured was used for calculating criteria. Criteria were calculated in this manner for six metals (cadmium, copper, chromium, lead, nickel, and zinc) for which EPA lists hardness-dependent criteria[22].

4.3.2 Sediment Quality Guidelines

Uniform state and federal sediment quality criteria presently do not exist to compare with laboratory sampling results. To identify potential areas of concern, WESTON used existing published guidelines suggested by the NJDEP[23] and EPA[25] as screening levels to evaluate sediment quality. These included proposed EPA criteria for five organic compounds (fluoranthene, phenanthrene, acenapthene, dieldrin, endrin)[26-30], guidelines promulgated by the Province of Ontario[31] for protection of freshwater aquatic life, and National Oceanographic and Atmospheric Administration (NOAA) guidelines for the protection of marine and estuarine sediment quality[32]. In some cases[26-30] these screening guidelines are based on the contaminant concentration in micrograms per gram (ug/g) of organic carbon (C) in the sample. For these compounds, comparisons between results and screening guidelines were made by first multiplying the criterion for a given contaminant by the fraction of organic carbon in the sediment at each location. This resulted in an adjusted criterion based on ug/g C with which to compare results (Appendix E).

Analytical results for freshwater and estuarine sediments were compared to separate guidelines. Freshwater sediment locations were defined as locations where salinity in surface water was less than 3.5 ppt, as determined by field measurements at mean high tide. A list of sample locations by drainage area, with their freshwater or estuarine designation, is given in Table 3-1.

As suggested by EPA[25], freshwater sediment results were compared to guidelines promulgated by the Province of Ontario[31] for evaluating sediment quality. Results were compared to the Province of Ontario lowest effect level (LEL) and severe effects level (SEL) values[31]. The LEL value is described as a level of sediment contamination that can be tolerated by the majority of benthic organisms. The SEL value is described as the level at which pronounced disturbance

of the sediment-dwelling community can be expected, and is the sediment concentration of a compound that would be detrimental to the majority of benthic species[31].

Analytical results for estuarine sediments were compared to the NOAA Effects Range - Median (ER-M) values, and Effects Range - Lower (ER-L) values[32], as directed by NJDEP in a memo dated January 19, 1995[20]. The EPA concurred with this approach in a separate memo dated January 24, 1995[25].

The NOAA ER-M and ER-L values are described for a number of compounds. These are often used as screening guidelines for determining general levels of concern for a given contaminant. The ER-M value refers to the concentration above which contaminant effects were frequently or always observed among test species in studies reviewed by NOAA[32]. This value represents the 50th percentile point in available data screened on contaminant effects for a given chemical. The ER-L value refers to the lower 10th percentile of reviewed studies, and indicates the lower end of the range of concentrations for which effects were observed or predicted[32]. The ER-L value is thus more conservative, and was chosen to identify contaminants and sampling locations of potential ecological concern.

Sediment quality guidelines exist for polycyclic aromatic hydrocarbons (PAHs) in both freshwater (Ontario Provincial) and estuarine sediments (NOAA). The Ontario guidelines are based on the sum of 16 PAH compounds (Appendix F). In contrast, the NOAA guidelines are based on a variety of studies using differing numbers of individual PAH compounds (up to 21 compounds) to arrive at a total PAH value. The NOAA guideline document[32] concluded that a more consistent approach was necessary in deciding which compounds should be totalled. In the Phase II investigation, total PAHs in freshwater sediments were compared to the Ontario guidelines by summing the concentrations of the 16 PAH compounds on the Ontario list. However, for estuarine sediments, the concentrations of all 21 PAH compounds were summed (Appendix F) as a conservative estimate of total PAHs, for comparison with NOAA guidelines. As a result, any bias in the comparison would tend to overestimate, rather than underestimate potential ecological risk.

To evaluate the potential toxicity of compounds for which no NOAA or Ontario Provincial guidelines were listed, a brief literature review was conducted using the Superfund Chemical Data Matrix (SCDM)[33]. Any compounds for which LC_{50} values were found were also researched using the EPA AQUIRE database[34]. The LC_{50} value refers to the dose of a contaminant at which 50% mortality to the test population is observed. However, a detailed evaluation of ecological risk, or derivation of site specific criteria were beyond the scope of this investigation.

4.3.3 Soil Criteria

Results of soil samples collected in Area 10 were compared to NJDEP non-residential direct contact soil cleanup criteria (NRDCSCC). Area 10 (Thomas Edison County Park) is currently zoned for light industrial use. Approximately 75 percent of the park has been developed for recreational use, including ballfields, tennis courts, soccer fields, a running track and open grassy fields. The southeastern portion of the park which was sampled for surface soil during the August 1994 sampling event is undeveloped. Based upon the zoning and use of the park, the NRDCSCC is appropriate as a basis for evaluating the results of this investigation.

A Limited Health Risk Assessment (LHRA) conducted by Dames and Moore[35] in 1993 further supports use of the NRDCSCC. The report addressed potential health impacts, based upon extensive soil sampling conducted within the developed and undeveloped portions of Thomas Edison Park. Compounds of concern included arsenic, lead, carcinogenic PAHs represented by benzo(a)pyrene, and dioxin/furans. The results of the LHRA concluded that there were no unacceptable risks posed to the recreational or worker populations at the park as a result of exposure levels greater than the NRDCSCC for the compounds evaluated.

4.4 DATA ANALYSIS AND PRESENTATION

Analytical data were summarized for the seven major site drainages previously identified in Sections 2.1, 3.1.3, and Table 3-1. This site-wide approach was adopted since the drainages transcend the artificial "Area" boundaries previously delineated on the basis of past land use activities. Data were tabularized and plotted using the Technical Data Management System (TDMS) developed by WESTON, in order to identify contaminant distribution patterns and potential transport pathways. In addition, correlation analyses were conducted, and scatter plots generated between selected analytes to determine whether any compounds were collocated.

Analytical results were also evaluated in conjunction with physical characteristics of the sediment (grain size, organic content, pH, etc.). These parameters were recorded at each location in order to evaluate potential contaminant mobility and availability, and hence, toxicity to aquatic organisms. Physical parameters were compared to analytical results using correlation analysis and graphical plots by sampling location.

For presentation purposes, sampling locations have been grouped by surface water features within each of the seven major drainage areas identified for the former Arsenal (Table 3-1). Where applicable, sampling locations are listed from upstream to downstream. Analytical results for surface water are presented in Tables 4-1 through 4-6. Sediment results are presented by site drainage area in Tables 4-7 through 4-13. Soils results from Area 10 are in Table 4-14. These tables list compounds which were detected above their respective MDLs. Any exceedances of regulatory criteria, standards or guidelines are highlighted in bold and shaded. Tables listing all analytical results including "non-detects" and tentatively identified compounds

are presented in Appendix C. These results are organized by sample number, to facilitate cross-referencing. Appendix tables do not list values for VOCs or SVOCs which were not detected at any single location.

4.5 SURFACE WATER SAMPLING RESULTS

4.5.1 Volatile Organic Compounds

Analyses for VOCs in surface water detected 13 compounds present above their respective method detection limits (MDLs) on the former Raritan Arsenal site (Table 3-1). These compounds include 1,1,1-trichloroethane (1,1,1 TCA), 1,1-dichloroethane (1,1 DCA), 1,2-dichloroethane (1,2-DCA), acetone, carbon disulfide, chloroform, methyl chloride, methylene chloride, methyl ethyl ketone (MEK), toluene, total-1,2-dichloroethene (1,2-DCE), trichloroethylene (TCE), and 1,1-dichloroethene (1,1-DCE). Of these, acetone, methylene chloride, and MEK were also detected in laboratory blanks. Chloroform and methylene chloride were also present in field blanks.

Three VOC compounds (TCE, 1,1-DCE, and 1,2-DCA) were detected at concentrations exceeding either NJDEP or USEPA water quality standards. Of these, 1,1-DCE was detected exclusively in the Area 18C stream in the upper Red Root Creek Drainage, while 1,2-DCA was detected exclusively in the County Park Drainage. TCE had the most extensive distribution, being found primarily in three drainage areas (Red Root Creek, Black Ditch, and Old Red Root Creek). TCE was found at higher concentrations in the northern third of the site.

4.5.1.1 Extent of TCE Contamination

TCE was the most frequently detected VOC in surface water on site, occurring within the Black Ditch (Figure 4-1), Red Root Creek (Figure 4-2), Old Red Root Creek (Figure 4-3) and County Park Drainage (Figure 4-4) areas. TCE levels in surface water on site ranged from "non-detected" to a maximum value of 20 μg/L at locations SW-0101 and SW-1908.

The NJDEP FW-2 standard of 1.09 μg/L was exceeded at 17 sampling locations, including the northern portion of Black Ditch, wetlands within the Old Red Root Creek Drainage, and the northern portion of the Red Root Creek Drainage. The SE-1 standard of 81 μg/L was not exceeded at any of the estuarine locations on site (Figure 4-5).

Higher values of TCE were generally present in surface water in the northern portion of the site. The highest TCE values on site were found in the lower Area 18B and 18C streams toward the northern edge of the Red Root Creek Drainage (Table 4-1). Further downgradient within the Red Root Creek Drainage, TCE was not detected at all above its MDL.

A similar pattern was evident within the Black Ditch Drainage. In Black Ditch itself, TCE concentrations generally decreased from upstream (6.0 μg/L at SW-0407) to downstream (0.3J μg/L at SW-0618L). TCE concentrations exceeded the FW-2 standard in the northern portion of the ditch, from location SW-0407 to SW-0506.

Within the Old Red Root Creek Drainage, TCE concentrations at locations SW-1908, SW-1909 and SW-1910 in the Area 19 northeast wetlands exceeded the FW-2 standard for TCE; with concentrations ranging from 3.0 μg/L to 20 μg/L, respectively. These concentrations decreased moving downstream. In Old Red Root Creek itself, TCE detections ranged from 1.0 μg/L to 4.0 μg/L.

Although TCE was detected at 15 locations (0.3J to 9.0 μg/L) within the Black Ditch Drainage, exceedances of the FW-2 standard only occurred in the northern portion of Black Ditch, at locations SW-0407, SW-0408, and SW-0505. TCE was also detected at two locations in the County Park Drainage at concentrations below the FW-2 standard (0.1J-0.2J μg/L).

4.5.1.2 Other VOC Exceedances

1,1-DCE was detected at two locations in the Area 18C stream within the Red Root Creek Drainage. The concentration at SW-1815 (14 μg/L) exceeded the FW-2 standard of 4.81 μg/L, while the concentration at SW-1813 (2.0J μg/L) did not exceed the NJDEP standard.

1,2-DCA was detected at a single location (SW-1006) in the County Park Drainage at a concentration of 0.3J μg/L. This estimated value exceeded the NJDEP FW-2 standard of 0.291 μg/L.

4.5.1.3 Other VOCs Detected

The remaining VOCs detected in surface water at the former Arsenal did not exceed existing state or federal surface water standards.

1,2-DCE was detected at several locations within the Red Root Creek, Old Red Root Creek and Black Ditch Drainage (Table 4-2). However, values detected were well below the NJDEP FW-2 standard of 592 μg/L for trans-1,2 DCE.

1,1-DCA was detected at three sampling locations on site, including two locations in the Area 18C stream within the Red Root Creek Drainage. At the Area 18C stream locations (SW-1813, SW-1815) it was detected at concentrations of 3.0 and 6.0 μg/L, respectively. 1,1-DCA was also detected within the Old Red Root Creek Drainage in the upper portion of the East Ditch (SW-1907) at a concentration of 0.4 μg/L. There are no published NJDEP or EPA surface water standards for this compound, nor are any lethal concentration data listed in the Superfund Chemical Data Matrix (SCDM)[33].

1,1,1-TCA was detected mainly in the Area 18C stream, within the upper portion of the Red Root Creek Drainage. Concentrations were highest upstream (39 μg/L at SW-1815), and gradually decreased moving downstream (12 μg/L at SW-1813 and 2 μg/L at SW-1814). This compound was also detected at 0.4 μg/L (SW-1910) in the Old Red Root Creek drainage area.

Toluene was detected at six locations within the Old Red Root Creek Drainage at concentrations ranging from 0.1J to 2.0 μg/L (Table 4-1). Toluene was also detected at nine locations within the Red Root Creek Drainage, in the Area 8 Pond and in Red Root Creek itself. Concentrations of toluene were detected at 2.0 μg/L in the Area 8 pond (SW-0802, SW-0803, SW-0804) and ranged from 0.1J to 6.0 μg/L in Red Root Creek (SW-0602). The NJDEP surface water standards for this compound are 7,440 μg/L and 200,000 μg/L, for FW-2 and SE-1 waters, respectively.

Chloroform was detected at low concentrations (0.1J - 0.3J μg/L) in the Black Ditch and the Red Root Creek Drainage areas. The EPA freshwater chronic criterion of 1,240 μg/L was not exceeded, nor was the NJDEP FW-2 standard of 5.67 μg/L.

Methylene chloride was detected at location SW-1618L in Old Red Root Creek at a concentration of 4.0 μg/L. This concentration is well below the NJDEP SE-1 (estuarine) standard of 1600 μg/L for this compound.

No federal or state regulatory standards exist for the remaining VOC compounds detected in surface water at the former Arsenal site.

Acetone was detected at ten sampling locations on site (Table 4-1), at concentrations ranging from 3.0 to 38 μg/L (SW-0615, sulfur plant pond). These levels are considered low relative to the lowest LC_{50} value listed in EPA's AQUIRE Database for toxicity tests ranging from 1 to 4 days exposure. The lowest LC_{50} value listed[34] for freshwater organisms is a concentration of 1×10^4 μg/L based on 1 and 2-day toxicity tests using the water flea (*Daphnia magna*). The lowest LC_{50} value listed[34] for marine organisms is a concentration of 1.1×10^7 μg/L for a 4-day test using the bleak fish (*Alburnus alburnus*). Both of these LC_{50} values are several orders of magnitude higher than the acetone concentrations detected in surface water at the former Arsenal.

MEK (2-butanone) was detected within the Black Ditch, Red Root Creek, and Old Red Root Creek Drainages. In Black Ditch it was detected at SW-0618L at 2.0J μg/L, and in the Old Red Root Creek Drainage at location SW-1616 at high tide (5.0 μg/L) and low tide (4.0 μg/L). Within the Red Root Creek Drainage, MEK was detected in the Area 8 Pond (13 μg/L and 21J μg/L), in one of the sulfur plant ponds (3J μg/L), and in Red Root Creek itself (1.0J-4.0J μg/L). These concentrations are considered low based on the lowest freshwater LC_{50} value found in the AQUIRE Database[34] of 3.2×10^6 μg/L for the mosquitofish (*Gambusia affinis*), and the lowest

marine LC_{50} value of 4 x 10^5 μg/L for the sheepshead minnow (*Cyprinodon variegatus*), based on 1 to 4-day tests.

Carbon disulfide was detected at concentrations ranging from 1.0-3.0J μg/L in Old Red Root Creek and one location in the Central Ditch drainage area. These values are well below the lowest freshwater LC_{50} value listed in the AQUIRE database[34] for this compound (2,100 μg/L), based on a 2-day test on the water flea (*Daphnia magna*).

Methyl chloride was detected at one location in Red Root Creek (SW-0605L) at a concentration of 0.3J μg/L. No published USEPA or NJDEP water quality criteria are given for this compound. However, this concentration is also considered low based on the lowest listed LC_{50} value found in the AQUIRE database[34] for this compound of 2.7 x 10^5 μg/L determined from a 4-day test on the inland silverside (*Menidia beryllina*).

4.5.2 Semi-Volatile Organic Compounds

4.5.2.1 PAHs/Phthalates

Analyses for SVOCs in surface water detected seven compounds at levels exceeding state or federal water quality standards (Table 4-2). These compounds were chrysene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, indeno(1,2,3-C,D)pyrene, and bis(2-ethylhexyl)phthalate. Except for bis(2-ethylhexyl)phthalate, the compounds listed are all PAHs. These compounds were most frequently detected in the Red Root Creek (Figures 4-5, 4-5A) and Old Red Root Creek Drainage areas (Figures 4-7, 4-7A).

Exceedances of standards for individual PAH compounds in surface water were noted only at SW-1619, near the head of the Southwest Ditch (Figure 4-7, 4-7A). All six of the PAH compounds listed above, indeno(1,2,3-C,D)pyrene (1J μg/L), chrysene (2J μg/L), benzo(a) pyrene (1J μg/L), benzo(k)fluoranthrene (1J μg/L), benzo(b)fluoranthene (2J μg/L) and benzo(a)anthracene (2J μg/L) exceeded the NJDEP SE-1 standard of 0.031 μg/L for each respective compound.

Bis(2-ethylhexyl) phthalate was detected at locations SW-0614 (61 μg/L) and SW-1603H (9.0J μg/L) within the Old Red Root Creek Drainage, exceeding the NJDEP FW-2 standard (1.76 μg/L) and SE-1 standard (5.92 μg/L) respectively (Figures 4-7, 4-7A). Bis (2-ethylhexyl phthalate) was also detected in the Black Ditch, Old Red Root Creek, and Red Root Creek drainages at concentrations below regulatory standards, ranging from 1.0J to 4.0J μg/L.

4.5.2.2 Other SVOCs Detected

Eight additional SVOC compounds were detected in surface water at concentrations which exceeded their individual MDLs but for which standards presently do not exist (Table 4-2).

Benzyl butyl phthalate was detected at one location (SW-1912) at a concentration of 1.0J μg/L. Di-n-butyl phthalate was detected at two locations (SW-1902 and SW-2001) at concentrations of 2.0J μg/L and 3.0J μg/L, respectively. Diethyl phthalate was detected at four locations within the Black Ditch drainage, where concentrations ranged from 1.0J to 2.0J μg/L.

Phenol was detected at nine locations, including six locations in the Red Root Creek Drainage and three in the Black Ditch drainage. Phenol concentrations in surface water on site ranged from 1.0J to 3.0J μg/L. 4-Methylphenol was detected at SW-0602H at 20 μg/L.

Fluoranthene (5.0 μg/L), phenanthrene (3.0 μg/L), and pyrene (4.0J μg/L) were detected in surface water at location SW-1619.

4.5.2.3 Tentatively Identified Compounds (TICs)

Several TICs were detected in surface water collected from the former Arsenal (Appendix C). Some of these, such as hexadecanoic acid are naturally occurring hydrocarbons. Hexadecanoic acid and its isomers were found at several locations in the lower third of the site. Sulfur was detected in surface water within the Central Ditch, East Ditch, Old Red Root Creek, and Area 12 Ditch drainages.

4.5.3 Pesticides/Polychlorinated Biphenyls

Heptachlor epoxide was the only targeted pesticide compound detected above its MDL in surface water (Table 4-3 and Appendix C). This compound was detected at SW-1803 (0.03 μg/L) and SW-1804 (0.061 μg/L) in the Area 18B stream within the Red Root Creek Drainage area. Heptachlor epoxide concentrations at both of these locations exceeded the NJDEP FW-2 standard of 0.0038 μg/L.

4.5.4 Metals/Cyanide

Cyanide was detected above its MDL at SW-0104 in the lower Area 18B stream at a concentration of 10 μg/L, exceeding the NJDEP FW-2 standard of 5.2 μg/L. This was the only location sampled at the former Arsenal where cyanide was detected, although the MDL at several locations was higher than the NJDEP FW-2 standard.

PP and TAL metals analyses detected 23 metals in surface water at concentrations above their respective MDLs (Table 4-4). Metals were detected in surface water in the East Ditch Drainage (Figure 4-8), Black Ditch Drainage (Figure 4-9), Red Root Creek Drainage (Figures 4-10, 4-10A), Central Ditch Drainage (Figure 4-11), Area 12 Drainage Ditch (Figure 4-12), Old Red Root Creek Drainage (Figures 4-13, 4-13A) and County Park Drainage (Figure 4-14). Of these, 13 were detected at levels exceeding pertinent state or federal water quality standards. These were arsenic, lead, nickel, chromium, copper, zinc, thallium, mercury, iron, manganese, silver,

cadmium, and beryllium. The occurrence of these compounds is described below in order of the frequency of exceedances of criteria/standards on site.

4.5.4.1 Lead

Lead concentrations in surface water locations sampled at the former Arsenal site ranged from non-detected to 487J μg/L (location SW-1619). Lead levels exceeded state or federal regulatory standards at 57 of 114 locations sampled, with lead levels less than 20 μg/L at 47 of these locations. Exceedances were noted within all seven drainage areas. Lead levels exceeded the EPA freshwater chronic criterion in the upper portion of the Black Ditch Drainage, the Red Root Creek Drainage, the Old Red Root Creek, Central Ditch Drainage, and County Park Drainage areas. In the estuarine waters in the southern portion of the site, lead levels exceeded the EPA chronic marine criterion of 5.6 μg/L at 35 locations, but were well below the acute criterion of 140 μg/L in all but two locations sampled (SW-0602L, 460J μg/L, and SW-1619, 487J μg/L). No NJDEP standard presently exists for lead in SE (estuarine) waters.

In the Area 4 Ditch within the Black Ditch Drainage (Figure 4-9), the lead concentration at SW-0406 (22.7 μg/L) exceeded the EPA freshwater chronic criterion and NJDEP FW-2 standard. In the Area 5 pond, the lead concentrations exceeded the EPA and NJDEP FW-2 standards at all four locations sampled, with a maximum concentration of 35.8J μg/L at location SW-0501 (low tide). In Black Ditch, lead concentrations did not exceed the EPA freshwater chronic criterion. In the estuarine portion of Black Ditch south of SW-0506, lead concentrations exceeded the marine chronic criterion of 5.6 μg/L at SW-0616 (16.7J μg/L) in the low tide sample.

Lead levels did not exceed the EPA freshwater chronic criterion in the Area 18B and 18C streams within the upper Red Root Creek drainage (Figures 4-10, 4-10A). Further downgradient, a single water sample collected at SW-2001 within the Area 20 Ditch had a lead value of 25.3J μg/L, exceeding the EPA freshwater criterion. In the Area 8 pond north of Olympic Drive, lead levels exceeded the EPA freshwater chronic criterion at two of the six locations sampled. These two samples, SW-0801 (7.8 μg/L) and SW-0806 (8 μg/L), were collected on opposite ends of the pond. Further downgradient within the same drainage, three of four locations sampled within the sulfur plant ponds exceeded the EPA freshwater chronic criterion. In Red Root Creek itself, the NJDEP FW-2 standard was exceeded at low tide at SW-0601 (16.2J μg/L). The EPA chronic marine criterion (5.6 μg/L) was exceeded at locations SW-0602 and SW-0603, where lead levels at low tide were 460J μg/L, and 18.4J μg/L, respectively. Location SW-0602 also exceeded the EPA marine acute criterion of 140 μg/L at low tide. At high tide, lead concentrations did not exceed the EPA marine chronic criterion.

Within the Central Ditch Drainage, lead levels exceeded the EPA chronic marine criterion at four of six estuarine locations sampled (Figure 4-11). Three of these exceedances were located within the Central Ditch itself, where the maximum lead level detected was 9.3J μg/L at low tide

at location SW-1101. Lead also exceeded the EPA marine chronic criterion at SW-1625H (8.6 μg/L) and SW-1625L (6.1 μg/L). Samples from the isolated freshwater ponds (SW-1622, SW-1623, SW-1626) all had lead concentrations less than 10 μg/L, which exceeded the NJDEP FW-2 standard of 5.0 μg/L.

Within the Area 12 Drainage (Figure 4-12), the EPA chronic marine criterion (5.6 μg/L) was exceeded at location SW-1201 (8.8μg/L).

Lead levels exceeded the EPA marine chronic criterion of 5.6 μg/L at 20 of the 25 estuarine locations sampled within the Old Red Root Creek Drainage (Figures 4-13, 4-13A). Within Old Red Root Creek, three of the five estuarine locations sampled exceeded the EPA marine chronic criterion, with a maximum value of 10J μg/L at SW-1610. At SW-1609, the "high tide" water sample contained 5.4 μg/L lead, and the "low tide" sample had 8.5J μg/L lead. Lead exceedances of the EPA marine chronic criterion were also noted in all eight locations sampled within the Area 16 associated ditches, with concentrations ranging from 5.7 μg/L to 17.8 μg/L. Exceedances of the EPA freshwater chronic standard were noted in three sampling locations (SW-1604, SW-1605, SW-1614) with concentrations ranging from 3.6 μg/L to 11.2 μg/L.

Lead concentrations were slightly higher in the West Ditch and near the mouth of its associated ditches, than in Old Red Root Creek. West Ditch had high tide lead values ranging from 5.9J to 25.9J μg/L, and low tide values ranging from 7.8J to 37.4J μg/L, all of which exceeded the EPA chronic marine criterion. The maximum high tide lead concentration (25.9J μg/L) was at location SW-1602, while the maximum low tide concentration (37.4J μg/L) was detected at SW-1603. Lead levels were substantially lower at SW-1601, toward the upstream end of the ditch, where concentrations ranged from 5.9J to 7.8J μg/L (Table 4-4).

In the Southwest Ditch, lead concentrations decreased from the head of the ditch toward its confluence with the Raritan River. The EPA chronic marine criterion for lead was exceeded at all locations sampled. At SW-1619, the shallow water area near the head of the ditch, the lead concentration was 487J μg/L, which also exceeded the EPA acute marine criterion of 140 μg/L. Further downstream at SW-1620, the lead concentration was 22.5J μg/L. At locations SW-1215 and SW-1216, high tide lead concentrations were 7.2J and 10.6J μg/L, respectively; while at low tide the values were 13.8J μg/L, and 14.0J μg/L, respectively.

Lead was also detected in two samples within the County Park Drainage (Figure 4-14). The lead concentration at location SW-1006 (117J μg/L) exceeded the calculated EPA freshwater chronic criterion of 1.25 μg/L. At SW-2001 the lead concentration (2.4 J μg/L) also exceeded the calculated EPA freshwater chronic criterion (1.32 μg/L).

In summary, lead concentrations exceeded surface water quality standards throughout the former Arsenal (Figure 4-15), but concentrations were generally less than 30 μg/L throughout most of the site.

4.5.4.2 Arsenic

Arsenic levels in surface water exceeded NJDEP standards over much of the site, except for the northern portion of the Red Root Creek Drainages (Area 18B and 18C streams), the East Ditch, and the northern portion of the Black Ditch Drainage (including the Area 5 Pond, Area 4 ditch) (Figure 4-16).

Arsenic concentrations in surface water at the former Arsenal ranged from "non-detected", to a maximum concentration of 945 μg/L at SW-1903 (Table 4-4). However, at most locations, arsenic concentrations were below 20 μg/L. The highest arsenic concentrations were at locations SW-1903, SW-1619 (234 μg/L), and SW-1410 (148 μg/L). Arsenic levels in surface water were higher in estuarine areas than in freshwater areas of the site. Arsenic concentrations in estuarine areas were generally less than 30 μg/L, although the maximum concentration was 234 μg/L (SW-1619).

In freshwater areas, arsenic levels exceeded the FW-2 standard of 0.017 μg/L at 26 locations within the Black Ditch Drainage, the Red Root Creek Drainage, the Old Red Root Creek Drainage, the East Ditch Drainage (unnamed tributary) and within the Central Ditch Drainage (Figure 4-16).

Arsenic concentrations in the East Ditch Drainage (Figure 4-8) exceeded the FW-2 standard of 0.017 μg/L in the unnamed tributary at location SW-1410 (148 μg/L). Further downstream where the unnamed tributary becomes estuarine, arsenic levels exceeded the SE-1 standard of 0.136 μg/L at SW-1411 (15.3 μg/L) and SW-1412 (16 μg/L).

Within the Black Ditch Drainage, arsenic exceedances occurred mainly toward the upper portion of the drainage (Figure 4-9). Levels exceeded the FW-2 standard within the Area 4 Ditch, Area 5 Pond, and at one location in the upper portion of Black Ditch itself. At the one location (SW-0406) within the Area 4 ditch having sufficient surface water to sample, arsenic was detected at 5.1 μg/L. Within the Area 5 Pond, the FW-2 standard was exceeded at SW-0501 (2.6 μg/L), SW-0502 (3.4 μg/L) and SW-0503 (2.3 μg/L). In Black Ditch, the arsenic concentration at SW-0407 (13.7 μg/L) exceeded the FW-2 standard. Further downstream the SE-1 standard of 0.136 μg/L was exceeded at SW-0616 (4.0 μg/L) and SW-0618 (7.8 μg/L).

Within the Red Root Creek Drainage, surface water concentrations exceeded the FW-2 standard for arsenic at SW-1816 (2.3 μg/L) within the Area 18C stream (Figures 4-10, 4-10A). Arsenic concentrations also exceeded the FW-2 standard at all six locations sampled within the Area 8 Pond north of Olympic Drive, with arsenic values ranging from 2.0 to 8.2 μg/L. Additional arsenic exceedances were noted at SW-0601, near the upper reaches of Red Root Creek (8.2 μg/L at high tide; and 36 μg/L at low tide), and at location SW-2001 (4.3 μg/L), in the Area 20 Ditch. Arsenic was undetected at most locations sampled within Red Root Creek itself. However, detection limits (6.5-20 μg/L) significantly exceeded the SE-1 water quality standard

(0.136 μg/L) at seven locations. Near the upper reaches of Red Root Creek, the arsenic concentration exceeded the SE-1 standard at location SW-0602, where the high tide concentration was 17.5 μg/L, and the low tide concentration was 59 μg/L. Further downstream at location SW-0609 near the mouth of Red Root Creek, the high tide arsenic concentration was 12.5 μg/L, and at low tide arsenic was undetected at an MDL of 20 μg/L. Levels of arsenic in surface water collected from the sulfur plant ponds exceeded the FW-2 standard at locations SW-0610 (19.5 μg/L) and SW-0614 (15.5 μg/L). At sulfur plant pond locations SW-0613 and SW-0615 the MDL (10μg/L) was above the NJDEP FW-2 standard.

Arsenic concentrations exceeded the NJDEP SE-1 water quality standards at every location sampled within the Central Ditch Drainage (Figure 4-11). Levels of arsenic ranged from 4.9 to 62.4 μg/L. Concentrations of arsenic within the Central Ditch itself ranged from 6.7 μg/L at low tide to 29.8 μg/L, also at low tide. The highest arsenic concentrations within the drainage were detected at the isolated estuarine pond at location SW-1625, which had comparable values at high and low tide of 58.6 μg/L, and 62.4 μg/L, respectively (Figure 4-11).

Within the Area 12 Drainage, all three surface water samples collected contained arsenic at levels exceeding the SE-1 standard (Figure 4-12). The upstream sample (SW-1201) had an arsenic concentration of 16.4 μg/L. Two samples (SW-1202, SW-1203) measured at both high and low tide exceeded the standard at both sampling periods. These samples had low tide arsenic values ranging from 9.5 to 20.5 μg/L, and high tide values ranging from 11.7 to 34.2 μg/L.

Arsenic levels exceeded the FW-2 standard throughout the Old Red Root Creek Drainage (Figures 4-13, 4-13A). The single highest concentration of arsenic detected in surface water at the former Arsenal was 945 μg/L, detected at location SW-1903 in the Area 19 forested wetland. This sample was taken from a shallow ditch with a high level of suspended solids and organic material in the water column when sampled. In the Area 19 northeastern wetlands, arsenic exceeded the FW-2 standard at location SW-1910 (10.5 μg/L). In the Area 19 southwestern wetlands, arsenic levels exceeded the FW-2 standard at SW-1904 (16.0 μg/L), SW-1905 (3.7 μg/L), and SW-1906 (10.0 μg/L). In Old Red Root Creek itself, arsenic levels ranged from "non-detect" to 30.6 μg/L. The NJDEP surface water quality standards (FW-2 and SE-1; depending upon location) were exceeded at five locations. The highest arsenic concentration in Old Red Root Creek (30.6 μg/L) was recorded at high tide at location SW-1609, at the outlet of the creek. However, most arsenic values in Old Red Root Creek were within the 2 to 6 μg/L range (Figure 4-13A).

In the West Ditch, arsenic levels exceeded the SE-1 standard at locations SW-1603H (15.4 μg/L) and SW-1907 (38 μg/L) (Figures 4-13, 4-13A). Location SW-1603 was the furthest downstream of the four locations sampled. Several surface water samples collected from the associated ditches (SW-1611 through SW-1618, SW-1629, SW-1630) contained arsenic at levels above the SE-1 standard. Arsenic exceedances in these ditches ranged from 2.8 μg/L at location SW-1614

to 61.2 μg/L at location SW-1630. Location SW-1630 was a stagnant, shallow water location with a large amount of suspended organic material present.

In the Southwest Ditch, all four locations sampled exceeded the SE-1 standard (Figures 4-13 and 4-13A). Arsenic levels were higher at low tide than at high tide at the two locations where tidal differences were measured. At locations SW-1215 and SW-1216, low tide concentrations were 14.2 and 27.8 μg/L, respectively, while at high tide arsenic was undetected. Upstream, arsenic was detected at 1.8 μg/L at location SW-1620, and at 234 μg/L at location SW-1619 near the shallow headwaters of the ditch.

An exceedance of the arsenic FW-2 standard was also noted at location SW-1902 (2.5 μg/L) within the County Park Drainage (Figure 4-14). Arsenic was not detected at the remaining five locations, with the MDLs exceeding the FW-2 standard.

4.5.4.3 Zinc

No NJDEP standard presently exists for zinc in surface water, however, EPA Surface Water Quality Criteria exist for freshwater and marine chronic comparisons. "Freshwater acute criteria" were calculated based on hardness values (Appendix D). The EPA freshwater or marine criteria were exceeded at 26 locations sampled at the former Arsenal, including locations within every major drainage area except the Central Ditch and County Park Drainage areas (Table 4-4, and Figure 4-17).

Zinc exceeded EPA water quality criteria at nine of ten locations within the East Ditch Drainage (Figure 4-8). In the estuarine portion of the East Ditch, zinc levels at locations SW-1407 (115 μg/L) and SW-1408 (77.5 μg/L) exceeded the marine chronic criterion of 58 μg/L. In the freshwater portion of the East Ditch, the exceedances ranged from 121 μg/L to 134 μg/L. In the unnamed tributary, the calculated EPA freshwater chronic criterion of 47 μg/L was exceeded by a zinc concentration of 239 μg/L at SW-1410. No exceedances were noted in the estuarine portion of the unnamed tributary.

Within the Black Ditch Drainage (Figure 4-9), zinc concentrations exceeded the freshwater chronic criterion of 47 μg/L at locations SW-0406 (183 μg/L), SW-0501 (376 μg/L), SW-0407 (82.7 μg/L) and SW-0505 (55.1 μg/L). Location SW-0501 (376 μg/L), in the Area 5 Pond also exceeded the calculated EPA freshwater acute criterion of 239 μg/L.

In the Area 18C stream within the Red Root Creek Drainage, location SW-1817 was the only location exceeding the EPA freshwater chronic criterion of 47 μg/L for zinc (Figures 4-10, 4-10A). The zinc concentration at location SW-2001 (148 μg/L) in the Area 20 Drainage Ditch exceeded the calculated EPA freshwater acute (hardness-based) zinc criterion of 120.4 μg/L. In the sulfur plant ponds, zinc concentrations in surface water were the highest detected at the former Arsenal, exceeding calculated EPA acute criteria at all locations sampled. Here zinc

concentrations ranged from 2900 μg/L to 6940 μg/L. Within Red Root Creek itself, one location (SW-0602) exceeded the marine chronic criterion of 58 μg/L with a concentration of 170 μg/L at high tide, and 809 μg/L at low tide. These values were also equal to the marine acute criterion of 170 μg/L.

In the Area 12 Drainage area, the marine chronic criterion of 58 μg/L was exceeded at location SW-1201 (69 μg/L) as shown on Figure 4-12.

Within the Old Red Root Creek Drainage the highest zinc value (1,100 μg/L) was detected at the head of the Southwest Ditch at location SW-1619. Five other zinc exceedances within this area are shown on Figures 4-13 and 4-13A.

4.5.4.4 Nickel

Nickel concentrations exceeded calculated hardness-dependent EPA water quality criteria (Appendix D) at 35 locations at the former Arsenal. However, nickel exceedances of calculated EPA criteria were limited to the East Ditch, the northern portion of the Black Ditch Drainage, 13 locations within the upper Red Root Creek Drainage, two locations in the County Park Drainage, one location within the Area 12 Ditch, and one location within the Area 19 wetlands of the Old Red Root Creek Drainage (Figure 4-18). The NJDEP FW-2 and SE-1 standards were not exceeded in any samples (Table 4-4).

Within the East Ditch Drainage, nickel exceeded the EPA freshwater chronic criterion at five locations with concentrations ranging from 27.3 μg/L to 34.9 μg/L (Figure 4-8). The marine chronic criterion was also exceeded at SW-1407 (21.8 μg/L) in the East Ditch.

Nickel exceedances of EPA criteria were detected at every location sampled in the upper Black Ditch drainage, with concentrations highest in the northern portion of the Black Ditch, at SW-0407, gradually decreasing downstream to SW-0507 as shown in Figure 4-9. Nickel levels ranged from "non-detected" to 28.2 μg/L (SW-0507) at high tide, and from 11.6 μg/L (SW-0618) to 27.9 μg/L (SW-0507) at low tide. In the Area 4 Ditch, nickel exceeded the calculated hardness-based EPA criterion at location SW-0406 (14.1 μg/L). In the Area 5 Pond, nickel levels exceeded EPA water quality criteria at all four locations sampled (SW-0501 through SW-0505), ranging from 17.0 μg/L to 28.9 μg/L.

Nickel concentrations within the Red Root Creek Drainage exceeded calculated EPA criteria at one location in the lower portion of the Area 18B stream (SW-0101), and one location in the Area 18C stream (SW-1814), as shown in Figures 4-10 and 4-10A. The maximum nickel concentration in this area was 12.6 μg/L. In the Area 20 Ditch nickel was detected at 11.5 μg/L. Nickel concentrations in the sulfur plant ponds also exceeded EPA calculated criteria, ranging from 98.8 μg/L to 224 μg/L. In the Area 8 Pond, a duplicate sample (SW-0807, 14.9 μg/L) collected at SW-0801 exceeded the EPA freshwater chronic criterion. In Red Root Creek

itself, SW-0602 (28.8 μg/L) and SW-0603 (13 μg/L) exceeded the EPA marine chronic criterion at high tide. Low tide concentrations at these locations were 69.5 μg/L and 10.5 μg/L, respectively. A nickel exceedance was also noted at SW-0607 (12.1 μg/L).

Within the Area 12 ditch, the nickel concentration at low tide at SW-1203 (24.9 μg/L) exceeded the EPA marine chronic criterion (Figure 4-11).

The nickel concentration at location SW-1619 (101 μg/L) in the Southwest Ditch of the Old Red Root Creek Drainage exceeded the calculated EPA marine chronic criterion (Figures 4-13, 4-13A).

At locations SW-1004 (16.2 μg/L) and SW-1005 (51.7 μg/L) in the County Park Drainage, nickel exceeded calculated EPA criteria (Figure 4-14). The nickel concentration of sample SW-1012 (duplicate sample of SW-1005) also exceeded the EPA criterion with a concentration of 17.5J μg/L.

4.5.4.5 Copper

Copper concentrations ranged from "non-detected" to 817 μg/L in surface water collected at the former Arsenal. Copper concentrations exceeded the EPA chronic water criteria at 30 locations sampled (Figure 4-19). Fifteen exceedances were of calculated hardness-dependent freshwater criteria, and 15 were exceedances of the marine chronic criteria in estuarine areas. Exceedances were noted in all drainage areas, except for the Central Ditch (Table 4-4).

Within the East Ditch Drainage (Figure 4-8), the copper concentration exceeded the EPA hardness-based acute criterion of 289.5 μg/L at location SW-1410 (608 μg/L) as shown in Figure 4-8. Within the Black Ditch Drainage, copper concentrations exceeded the EPA hardness-dependent criteria (Appendix D) in the Area 5 Pond, and in the one location sampled for surface water in the Area 4 Ditch (Figure 4-9). Copper exceedances at all four locations in the Area 5 Pond ranged from 24.2 μg/L to 38.9 μg/L, compared to the EPA hardness-dependent acute criterion of 12.67 μg/L. At location SW-0406 in the Area 4 Ditch, the copper concentration (53.1 μg/L) also exceeded the calculated EPA acute freshwater criterion 17.67 μg/L.

Copper concentrations exceeded the EPA freshwater hardness-dependent criteria in the Red Root Creek Drainage at one location in the Area 18C stream (SW-1812), one location in the Area 20 Ditch (SW-2001), and at four locations within the sulfur plant ponds (Figures 4-10, 4-10A). In the Area 18C stream, copper concentrations ranged from 2.4 μg/L to 12.8 μg/L, while the copper concentration at SW-2001 in the Area 20 Ditch was 38.7 μg/L. In the sulfur plant ponds, levels of copper at locations SW-0610, SW-0613, SW-0614 and SW-0615 were 431 μg/L, 381 μg/L, 438 μg/L, and 671 μg/L, respectively. In Red Root Creek itself, copper exceeded the EPA marine chronic criterion of 2.9 μg/L at five locations, with values ranging from 4.4 μg/L (SW-0603, at high tide) to 253 μg/L (SW-0602, at low tide).

In the Area 12 Ditch Drainage, the copper concentration at SW-1203 (26.8 μg/L) exceeded the marine chronic criterion.

Within the Old Red Root Creek Drainage, location SW-1903 (28.4 μg/L) exceeded the calculated EPA freshwater acute criterion of 12.03 μg/L. In the Area 16 ditches associated with Old Red Root Creek and the West Ditch, four locations exceeded the EPA marine chronic criterion of 2.9 μg/L. These locations were SW-1616 (36.3J μg/L at high tide, ND at low tide), SW-1618 (25.1J μg/L), and SW-1603 (39.9 μg/L at high tide, ND at low tide) and SW-1612 (3.7J μg/L in the duplicate sample SW-1628) (Figure 4-13). Location SW-1906 in the Area 19 Southwest wetlands exceeded the marine chronic criterion with a copper concentration of 11.4 μg/L. Additional exceedances are shown in Figures 4-13 and 4-13A. Location SW-1619 (817 μg/L), in a shallow pond area near the head of the Southwest Ditch exceeded the EPA marine acute criterion of 2.9 μg/L.

Additional copper exceedances of EPA freshwater chronic criteria were detected at SW-1902 (12.8J) and SW-1001 (8.4 μg/L) in the County Park Drainage (Figure 4-14).

4.5.4.6 Cadmium

Cadmium levels in surface water exceeded the EPA hardness-based freshwater chronic criteria at six locations on site (Table 4-4). Three of these exceedances were within the Red Root Creek Drainage (Figures 4-10, 4-10A), two within the Black Ditch Drainage (Figure 4-9) and one was noted in the County Park Drainage (Figure 4-14). In the Area 18C stream, cadmium concentrations exceeded EPA hardness-based criteria at location SW-1813 (0.96 μg/L). Further downgradient in the sulfur plant ponds, cadmium concentrations exceeded the calculated criteria at two locations, SW-0613 and SW-0615 with concentrations of 8 μg/L and 18.1 μg/L respectively. These were the highest cadmium concentrations in surface water detected at the former Arsenal.

Cadmium exceeded the EPA freshwater chronic criterion at two locations in the Black Ditch drainage. Location SW-0501L (2.4 μg/L) exceeded the calculated EPA freshwater chronic criterion of 0.86 μg/L, and location SW-0407 (1.9 μg/L) exceeded the calculated EPA freshwater chronic criterion of 1.13 μg/L.

The cadmium concentration at location SW-1001 (3.7 μg/L) in the County Park Drainage exceeded the calculated EPA chronic freshwater cadmium criterion of 0.66 μg/L as well as the acute Freshwater criterion of 1.8 μg/L.

4.5.4.7 Chromium

Chromium exceeded calculated freshwater hardness-dependent EPA chronic criteria at 10 locations sampled at the former Arsenal (Table 4-4).

Within the Black Ditch Drainage, chromium exceeded the calculated criteria at two locations. In the Area 4 Ditch, chromium was detected at sample location SW-0406 at a concentration of 20.1 μg/L. In the Area 5 Pond, the chromium concentration at SW-0504 was 7.7 μg/L.

Within the Red Root Creek Drainage, the chromium concentration at SW-1808 (4 μg/L), in the Area 18B stream exceeded the calculated EPA freshwater chronic criterion of 3.63 μg/L (Figures 4-10, 4-10A). In the Area 20 Ditch, the chromium concentration of 27 μg/L at SW-2001 exceeded the calculated criterion of 3.46 μg/L. The highest levels of chromium detected at the former Arsenal were located further downgradient in the sulfur plant ponds. Chromium was detected at levels ranging 92.5 μg/L to 264 μg/L, exceeding the calculated EPA freshwater chronic criterion of 25.8 μg/L at the four sulfur plant pond locations (SW-0610 through SW-0614).

A chromium value of 225 μg/L was detected at location SW-1619 in the Old Red Root Creek Drainage. The value is significantly less than the EPA marine acute criterion of 10,300 μg/L. However, a marine chronic criterion is listed by EPA only for hexavalent chromium, a highly toxic species of chromium. Analytical results were not compared to this value, since hexavalent chromium is much rarer in nature than trivalent chromium[36], and it is unrealistic to assume in the absence of additional information that the majority of the chromium detected at the former Arsenal is in the hexavalent state.

The chromium concentration at two locations in the County Park Drainage area also exceeded calculated hardness-based EPA freshwater chronic criteria. Location SW-1902 (6.4J μg/L) and location SW-1005 (36.8 μg/L) exceeded the calculated EPA freshwater chronic criterion of 4.99 μg/L.

4.5.4.8 Mercury

Mercury was detected in surface water at levels exceeding state or federal regulatory standards at a total of 15 locations sampled at the former Arsenal, six of which were in freshwater portions of the site. Mercury concentrations on site ranged from "non-detected" to a maximum value of 5.4 μg/L at SW-1619. Regulatory exceedances were limited to the East Ditch Drainage, Black Ditch Drainage, the Old Red Root Creek Drainage, and one location (SW-2001) within the Red Root Creek Drainage (Table 4-4).

At SW-1410 near the head of the unnamed tributary in the East Ditch Drainage, the mercury level in surface water (0.22 μg/L) exceeded the NJDEP FW-2 standard of 0.144 μg/L (Figure 4-8).

Within the Black Ditch Drainage, mercury concentrations exceeded the EPA freshwater chronic criterion (0.012 μg/L) at all four locations sampled within the Area 5 pond (Figures 4-10, 4-10A). Mercury concentrations ranged from 0.12 to 0.15 μg/L in the Area 5 pond. In the Black Ditch itself, mercury exceeded the EPA freshwater chronic criterion at location SW-0506 (0.1 μg/L) in a sample collected at high tide. Further downstream the EPA marine chronic criterion (0.025 μg/L) was exceeded at locations SW-0617 and SW-0618, with mercury concentrations of 0.11 μg/L detected at both locations.

Mercury also exceeded the FW-2 standard as well as the EPA freshwater chronic criterion at SW-2001 (0.24 μg/L) in the Area 20 ditch within the Red Root Creek Drainage (Figures 4-10, 4-10A).

Within the Old Red Root Creek Drainage, mercury levels in surface water exceeded the EPA marine chronic criterion of 0.025 μg/L, as well as the NJDEP SE-1 standard of 0.146 μg/L at location SW-1618 (0.25 μg/L), and location SW-1911 (0.15 μg/L) (Figures 4-13, 4-13A). At the former Arsenal site, mercury reached its highest values in surface water within the Southwest Ditch, where at locations SW-1215 it was detected at low tide at 0.49 μg/L, and at the head of the ditch at SW-0619 it was detected at 5.4 μg/L. Mercury also exceeded both federal and state estuarine standards in the West Ditch at location SW-1603 (0.24 μg/L).

4.4.4.9 Silver

Silver concentrations in surface water exceeded EPA water quality criteria at 7 locations out of 114 locations sampled at the former Arsenal. Silver concentrations ranged from "non-detected" to a maximum value of 9.90J μg/L at location SW-0614. The sulfur plant ponds had the highest proportion of exceedances.

Within the Black Ditch Drainage, the silver concentration at location SW-0501 (3.7J μg/L) in the Area 5 pond exceeded the EPA freshwater hardness-dependent acute criterion of 2.20 μg/L. Within the Red Root Creek Drainage, silver concentrations exceeded regulatory criteria in Red Root Creek and the sulfur plant ponds. In Red Root Creek, the silver concentration at location SW-0606 (3.70J μg/L) at low tide exceeded the EPA marine acute criterion. In the sulfur plant ponds, silver concentrations exceeded EPA chronic criteria of 0.120 μg/L at three of four locations sampled, with concentrations ranging from 5.70J μg/L to 9.90J μg/L. The acute criterion calculated on the basis of hardness at this location (36.04 μg/L) was much higher than the acute criterion calculated for the Area 5 pond (2.20 μg/L).

Within the Old Red Root Creek Drainage, the silver concentration at location SW-1903 (4.10 μg/L) in the forested wetland exceeded the EPA freshwater chronic criterion (0.12 μg/L), as well as the calculated hardness-based EPA freshwater acute criterion (2.00 μg/L). The concentration at SW-1606 (2.40 μg/L) in Old Red Root Creek each exceeded the calculated EPA marine chronic criterion (2.30 μg/L).

4.4.4.10 Other Metals

Manganese

Although no NJDEP freshwater standard exists, manganese exceeded the NJDEP SE-1 standard of 100 μg/L at 20 estuarine locations at the former Arsenal site. EPA freshwater criteria do not exist for the protection of aquatic life from manganese. The highest freshwater Mn concentrations were 1,730 μg/L at location SW-0501 in the Area 5 Pond (Figure 4-9), 1,370 μg/L at location SW-0615 in the sulfur plant ponds (Figure 4-10), 905 μg/L at location SW-1908, in the Area 19 northeast wetlands (Figure 4-13), and 772 μg/L at SW-1403 in the unnamed tributary in the East Ditch Drainage (Figure 4-8). Manganese exceeded the SE-1 standard (100 μg/L) within all tidally-influenced drainages.

Within the East Ditch Drainage, manganese concentrations exceeded the SE-1 criterion at location SW-1407 (625 μg/L), downstream of the dam. In the unnamed tributary, manganese was detected at 510 μg/L at SW-1412.

Within the Black Ditch Drainage, manganese values exceeded the SE-1 standard at locations SW-0616 and SW-0619, at low tide. Concentrations in Black Ditch ranged from 376 μg/L to 1390 μg/L.

Manganese concentrations in the Red Root Creek Drainage exceeded the SE-1 criterion within Red Root Creek at SW-0607 (129 μg/L) and SW-0603 (256 μg/L).

Manganese concentrations exceeded the SE-1 standard at seven locations sampled within the Old Red Root Creek Drainage (Figure 4-13, 4-13A). In the Old Red Root Creek itself, manganese concentrations ranged from 161 μg/L to 298 μg/L. In the West Ditch, the only manganese exceedance of the NJDEP SE-1 standard was detected at location SW-1603 (129 μg/L at high tide, 471 μg/L at low tide). In the Area 19 Southwest wetlands, a manganese exceedance was detected at SW-1905 (315 μg/L). In the Area 19 Northeast wetland, the manganese concentration of 905 μg/L exceeded the SE-1 standard at location (SW-1908).

Scattered manganese exceedances in surface water were also noted within the Central Ditch Drainage (Figure 4-11), Area 12 Ditch Drainage (Figure 4-12), and County Park Drainages (Figure 4-14).

Iron

Iron levels in surface water exceeded regulatory criteria at ten locations at the former Arsenal site. Regulatory exceedances were limited to freshwater locations sampled (Table 4-4).

In the East Ditch Drainage, the iron concentration (2,020 μg/L) at location SW-1403 in the East Ditch exceeded the EPA freshwater acute criterion of 1,000 μg/L (Figure 4-8).

Within the Black Ditch Drainage, sample SW-0506 (1,330 μg/L) collected in the upper portion of Black Ditch exceeded the EPA acute freshwater criterion.

In the Area 8 Pond near Olympic Drive within the Red Root Creek Drainage, the iron concentration exceeded the EPA freshwater acute criterion at two of five locations sampled (Figures 4-10, 4-10A). Further downgradient within the same drainage, sample SW-0615 (55,900 μg/L) in the sulfur plant ponds exceeded the EPA acute freshwater criterion .

Within the Old Red Root Creek Drainage, the iron concentration at locations SW-1908 (17,800 μg/L) and SW-1905 (5,460 μg/L) significantly exceeded the EPA freshwater acute criterion (Figure 4-13, 4-13A).

Within the County Park Drainage, the iron concentration at sampling locations SW-1001 (1,410 μg/L) and SW-1006 (20,400 μg/L) also exceeded the EPA freshwater acute criterion (Figure 4-14).

Thallium

Thallium concentrations in surface water exceeded state or federal standards at six locations sampled at the former Arsenal. The distribution of thallium exceedances was limited to four locations within the Old Red Root Creek Drainage area, two locations in the Area 18B stream and one location in the sulfur plant ponds within the Red Root Creek Drainage (Table 4-4).

Levels of thallium in the Old Red Root Creek Drainage exceeded the NJDEP SE-1 standard (6.22 μg/L) at scattered locations, with a maximum concentration of 14 μg/L (Figures 4-13, 4-13A). Thallium exceedances were noted in Old Red Root Creek at SW-1609 (11.5 μg/L at low tide), in an associated ditch at SW-1611 (14 μg/L), in the West Ditch at SW-1602 (11 μg/L at high tide), and in the Southwest Ditch at SW-1216 (10.5 μg/L at high tide).

An exceedance of the thallium SE-1 standard was detected in the Area 12 Ditch, at SW-1203 (8 μg/L at low tide) as shown in Figure 4-12.

In addition, the FW-2 criterion (1.7 μg/L) was equalled at two locations within the Area 18B stream in the Red Root Creek Drainage (Figure 4-10, 4-10A). The FW-2 standard was exceeded at SW-0614 (6.4 μg/L) in the sulfur plant ponds.

Beryllium

Surface water beryllium concentrations exceeded the EPA freshwater chronic criterion of 5.3 μg/L at three locations on site, all within the sulfur plant ponds located in the lower Red Root Creek Drainage (Figure 4-10, 4-10A). The three locations had concentrations ranging from 8.5 μg/L to 12.4 μg/L.

An additional seven metals were detected in surface water, for which no New Jersey or federal water quality criteria presently exist. These include aluminum, calcium, cobalt, magnesium, sodium, vanadium, and potassium.

4.4.4.11 Data Analysis of Surface Water Metals

Correlation analyses of the most frequently occurring metals (arsenic, copper, chromium, mercury, lead, zinc) showed that several appear to be collocated (Appendix G). For example, lead was significantly ($p<0.0001$) correlated with arsenic, copper and mercury, with correlation coefficients ("r" values) of 0.68, 0.53 and 0.72, respectively. The "p" value refers to the probability that the observed relationship is due to chance alone. In addition to being correlated with lead, copper was highly correlated with zinc ($r=0.75$, $p<0.0001$) as well as arsenic ($r=0.68$, $p<0.0001$) and mercury ($r=0.54$, $p<0.0001$). In addition to lead and copper, arsenic was also significantly correlated with mercury ($r=0.77$, $p<0.0001$). Statistical analyses were conducted using SAS software[37].

Comparison between metals concentrations in surface water collected at high and low tide periods revealed few trends. Arsenic was detected in 17 of the 30 locations sampled at both low and high tide. Of those 17 locations, nine arsenic concentrations were higher at low tide; a number close to what would be expected by random chance (50%). A similar trend was apparent for lead. Of the 14 high and low tide locations where it was detected, nine locations contained a higher lead value at low tide (Table 4-5). These differences were not analyzed statistically since the two data sets (high and low tide) are not entirely independent.

Comparison of metals and pH data in surface water revealed few trends. Metals and pH values were not correlated, and plots of the data show no apparent relationship between sediment pH and the metals concentration in surface water.

4.5.5 Explosives/Thiodiglycol

Thiodiglycol, which was sampled for primarily within the Black Ditch Drainage and Area 8 Pond within the Red Root Creek Drainage, was not detected at any of the 28 locations where surface water was analyzed for this compound (Appendix C).

Analyses for explosives in surface water revealed little widespread evidence of contamination by these compounds within the areas investigated (Table 4-6).

Amino-DNT's were detected at 11 locations within the Black Ditch Drainage (Figure 4-20). Location SW-0501 (1.0 μg/L) was in the Area 5 Pond, and the remaining locations were in Black Ditch. Concentrations of these compounds within Black Ditch ranged from 0.25 μg/L to 0.85 μg/L. No federal or state water quality standard exists for this compound, and toxicity testing data were unavailable.

1,3,5-Trinitrobenzene was detected at SW-1804 in the Area 18B stream within the Red Root Creek Drainage at a concentration of 0.15 μg/L (Figure 4-21, 4-21A). 2,4,6-Trinitrotoluene (TNT) was detected in two water samples (SW-1803 and SW-1804) collected from the Area 18B stream at 0.140 μg/L and 2.8 μg/L, respectively. 2,4,6-Trinitrotoluene was also detected within the Black Ditch Drainage at one location within the Area 5 Pond (SW-0501, 0.410 μg/L), and at one location within Black Ditch itself (SW-0408, 0.650 μg/L).

The NJDEP lists a surface water quality standard of 16.0 μg/L for nitrobenzene in freshwater; however, there is no published NJDEP or USEPA standard for 1,3,5-trinitrobenzene. The AQUIRE Database[34] lists an LC_{50} value of 1.1×10^3 μg/L based on a 4-day test using the fathead minnow (*Pimephales promelas*). The 0.15 μg/L concentration detected in the one sample on site is substantially less than either of these values.

There are no published NJDEP or USEPA surface water quality criteria for 2,4,6-TNT; however, the SCDM provides a freshwater LC_{50} value of 1.2×10^3 μg/L for TNT also based on a 4-day test with fathead minnows (*Pimephales promelas*). All concentrations of 2,4,6-TNT detected on site were substantially less than this LC_{50} value.

Neither nitroglycerin nor PETN, which were sampled for only in Areas 11 and 12, were detected above their respective MDLs (Appendix C).

4.5.6 Dioxin Compounds

No dioxins/furan compounds were detected above their respective MDLs in any of the surface water samples analyzed (Appendix C).

4.6 SEDIMENT SAMPLING RESULTS

4.6.1 Volatile Organic Compounds

Overall, 13 VOCs from the targeted list were detected above their respective MDLs in sediment (Table 4-7). Eight of these compounds (1,1,1-TCA, acetone, carbon disulfide, methyl chloride, MEK, toluene, 1,2-DCE, and TCE) were also detected in surface water. Neither Ontario Provincial sediment guidelines nor NOAA ER-L and ER-M guidelines exist for any of the detected VOCs.

MEK was the most frequently detected VOC in sediment, being detected at 44 locations. This compound was recorded within every major drainage area on site. Concentrations on site ranged from "non-detected" to a maximum value of 0.58J milligrams per kilogram (mg/kg) at sampling location SW-0604. No proposed New Jersey or federal sediment guidelines presently exist for MEK.

MEK was recorded in sediment at four locations within the East Ditch Drainage, at concentrations ranging from 0.096J mg/kg to 0.44J mg/kg in the unnamed tributary, and from 0.015J mg/kg to 0.26J mg/kg in the East Ditch itself. It was also detected in sediment at 11 locations within the Red Root Creek Drainage (Table 4-7), including the Area 8 pond located north of Olympic Drive (0.036J to 0.15J mg/kg), the Sulfur Plant Ponds (0.009J mg/kg to 0.028J mg/kg), and Red Root Creek itself (0.021J to 0.58J mg/kg).

Within the Black Ditch Drainage, MEK was detected in the Area 5 Pond at four locations, with concentrations ranging from 0.031J mg/kg to 0.210J mg/kg in the sediment. It was also detected in the Area 4 Ditch at two locations, ranging from 0.029J mg/kg to 0.053J mg/kg. In the Black Ditch itself, MEK was detected in sediment at five locations, ranging from 0.028J to 0.15J mg/kg.

MEK was also detected at three locations in the Central Ditch Drainage area (Table 4-7) at concentrations ranging from 0.018J mg/kg to 0.160J mg/kg.

In the Area 12 ditch, MEK was detected at two locations, SW-1201 (0.059J mg/kg) and SW-1202 (0.027J mg/kg).

MEK was detected throughout the Old Red Root Creek Drainage area, being detected at 12 locations. It was detected at three locations (SW-1904, SW-1905, SW-1906 and SW-1911) in the Area 19 Southwest wetlands, at concentrations ranging from 0.01J to 0.33J mg/kg. It was detected at SW-1903 (0.029J mg/kg) in the Area 19 forested wetland, and also at locations SW-1908 (0.017J mg/kg) and SW-1909 (0.094J mg/kg) in the Area 19 northeast wetland. It was also detected in Old Red Root Creek at location SW-1608 (0.065J mg/kg) and location SW-1606 (0.085J mg/kg), the West Ditch at SW-1907 (0.087J mg/kg), in the associated ditches at SW-

1611 (0.053J mg/kg), and in the Southwest Ditch at SW-1620 (0.086J mg/kg) and SW-1216 (0.091J mg/kg).

Acetone was detected in 21 sediment samples collected on site. Concentrations on site ranged from "non-detect" to 2.9J mg/kg. Acetone was detected at 13 locations in the Red Root Creek Drainage, three locations in the Black Ditch Drainage, three locations in the Old Red Root Creek Drainage, and two locations in the East Ditch Drainage.

Within the East Ditch, acetone concentrations detected ranged from 0.51J mg/kg to 2.7J mg/kg at locations SW-1404 and SW-1405, respectively.

Within the Black Ditch Drainage, acetone was detected at SW-0503 (0.52J mg/kg), SW-0617 (0.79J mg/kg) and SW-0619 (0.047 mg/kg).

In the Red Root Creek Drainage, acetone was detected in sediment collected in the sulfur plant ponds (0.013J to 0.2J mg/kg), as well as seven locations in Red Root Creek itself (0.025J mg/kg to 2.9J mg/kg). It was also detected in the Southwest Ditch of the Old Red Root Creek Drainage at concentrations from 0.43J mg/kg to 0.45J mg/kg, and at SW-1606 (0.36J mg/kg) in Old Red Root Creek itself.

Toluene was the next most frequently detected VOC in sediment, being detected at 14 locations, of which 13 were in freshwater areas. Concentrations of toluene in site sediment (where detected) ranged from 0.003J mg/kg to 0.22J mg/kg. This compound was detected in every major drainage area except for the Area 12 Ditch.

Carbon disulfide was detected in sediment at 14 locations, at concentrations ranging from 0.001J mg/kg to 0.052J mg/kg. In sediment, this compound was detected in the East Ditch, Area 12 Ditch, Red Root Creek and Old Red Root Creek Drainages, and was primarily limited to the southern two thirds of the site.

TCE, 1,2-DCE and 1,1,1 TCA were detected at fewer locations in sediment than in surface water. In sediment, these compounds were detected nearly exclusively within the Red Root Creek Drainage area. TCE was detected at seven locations in sediment, three of which were in the sulfur plant ponds (0.001J mg/kg to 0.003J mg/kg). The remaining four locations were in the Area 18B stream, where concentrations ranged from 0.002 mg/kg to 0.015 mg/kg. 1,2-DCE was detected at location SW-1908 (0.003J mg/kg) in the Area 19 Northeast wetlands within the Old Red Root Creek Drainage. Within the Red Root Creek Drainage it was detected in the Area 20 Drainage ditch at SW-2002 (0.002J mg/kg), and within the Area 18B stream (0.002J mg/kg to 0.008J mg/kg).

Other VOCs detected in sediment included 2-hexanone, ethyl benzene, methyl chloride, PCE, and xylenes, each of which occurred at five (or fewer) locations. Levels of each of these

compounds were less than 0.1J mg/kg at all locations sampled (Table 4-7). A variety of TICs were detected as well (Appendix C).

4.6.2 Semi-Volatile Organic Compounds

A total of 28 SVOC compounds were detected in sediment above their respective MDL values at the former Arsenal site. Of these, 12 compounds detected in freshwater areas of the site exceeded the Ontario Provincial Sediment Quality LEL guideline. A total of 12 compounds which were detected at estuarine locations exceeded the NOAA ER-L values for sediment (Table 4-8).

4.6.2.1 Total PAHs

The SVOC compounds detected exceeding regulatory guidelines in on-site sediments are all PAH compounds. PAHs were detected in the sediment in every major drainage area of the site. Data are presented in the form of total PAHs (Figure 4-22) since plots of the distribution of individual PAH compounds on site suggest they are highly collocated (Figures 4-22A through 4-22C). Total PAH values on site were highest in the Area 18B and 18C streams within the upper portion of the Red Root Creek Drainage, ranging from "non-detected" to a maximum value of 4,909 mg/kg at location SW-1804 (Table 4-8).

Total PAHs in sediment exceeded sediment quality guidelines at 36 locations sampled at the former Arsenal (Figure 4-22). The Ontario LEL guideline of 4 mg/kg total PAHs was exceeded at 18 freshwater locations sampled, and the NOAA ER-L guideline of 4 mg/kg was exceeded at 18 estuarine locations sampled (Table 4-8). In freshwater areas of the site, the Ontario SEL guidelines for total PAHs were exceeded at nine locations, all located within the lower Area 18B and 18C streams. At estuarine locations, total PAHs exceeded the NOAA ER-M guideline at SW-1103 (62.03 mg/kg) and SW-1619 (102.5 mg/kg).

Total PAHs in the East Ditch Drainage (Figure 4-23) exceeded Ontario LEL guidelines at SW-1410 (2.48 mg/kg) and SD-1401 (3.85 mg/kg). Total PAHs within the Black Ditch Drainage exceeded the Ontario guidelines at SW-0403 (14.83 mg/kg) in the Area 4 Ditch (Figure 4-24). In the estuarine portion of the Black Ditch the total PAH concentration exceeded the NOAA ER-L value at five of the seven locations sampled. Total PAH concentrations ranged from 10.35 mg/kg at location SW-0619 (duplicate of SW-0620) to 28.19 mg/kg (SW-0617). Total PAH levels were noticeably lower in the upper portion of the ditch (locations SW-0407 to SW-0507).

Total PAH concentrations detected in sediment at the former Arsenal were highest in the upper portion of the Red Root Creek Drainage (Figures 4-25 and 4-25A). Locations SW-1803 and SW-1804 at the head of the Area 18B stream had total PAH values of 4,510 mg/kg and 4,909 mg/kg, respectively. Concentrations gradually decreased downstream. At location SW-1805, about 175 feet further downstream, total PAHs measured 201.3 mg/kg, while at SW-1806 the

concentration was 20.71 mg/kg. At SW-1808 the total PAH concentration was below the Ontario LEL criterion.

A similar trend was evident in the Area 18C stream. Three locations near the head of individual stream tributaries, SW-1810 (50.84 mg/kg), SW-1812 (14.17 mg/kg) and SW-1815 (44.69 mg/kg) had the highest concentrations of total PAHs in the Area 18C stream (Figures 4-26, 4-26A). Location SW-1810 (50.84 mg/kg) had a higher sediment concentration than location SW-1811 (28.97 mg/kg), which was downstream. Location SW-1812 (14.17 mg/kg) also had a higher concentration than location SW-1816, about 500 feet downstream, where PAHs were not detected. Location SW-1815 had a total PAH concentration of 44.69 mg/kg, while the total PAH concentration downstream at location SW-1813 was 33.07 mg/kg. Ontario Provincial SEL guidelines (in ug/g C) were exceeded at nine locations sampled in the Area 18B and 18C streams (Figure 4-25, 4-25A).

In the Area 8 Pond, total PAH levels in sediment exceeded the Ontario LEL guideline of 4 mg/kg at locations SW-0801 (31.68 mg/kg from duplicate sample SW-0807) and SW-0802 (8.98 mg/kg), respectively. In the freshwater marsh in the upper reaches of Red Root Creek (SW-0601), total PAHs (5.18 mg/kg) exceeded the Ontario LEL guideline. Within Red Root Creek itself, levels of total PAHs exceeded the NOAA ER-L value of 4 mg/kg from locations SW-0603 southward to SW-0607, except location SW-0605, with concentrations ranging from 5.66 mg/kg to 18.55 mg/kg. In the sulfur plant ponds, total PAHs exceeded the Ontario LEL guideline at SW-0615 (5.90 mg/kg).

Within the Central Ditch Drainage (Figure 4-26), the Ontario LEL guideline for total PAHs was not exceeded. Total PAHs exceeded the NOAA ER-L guideline at locations SW-1103 (62.03 mg/kg) and SW-1104 (8.37 mg/kg) in the Central Ditch.

PAH concentrations at SW-1202 (5.1 mg/kg) and SW-1203 (19.36 mg/kg) within the Area 12 Ditch exceeded the NOAA ER-L guideline (Figure 4-27).

Total PAH concentrations in sediments collected within the Old Red Root Creek Drainage (Figures 4-27, 4-27A) exceeded sediment quality guidelines at seven locations (SW-1615, SW-1618, SW-1905, SW-1619, SW-1620, SW-1630, SD-1801) (Figure 4-28). The highest concentration within the drainage was noted at SW-1619 (102.5 mg/kg), which exceeded the NOAA ER-M guideline. In the associate drainage ditches, total PAH concentrations at SW-1615 (5.27 mg/kg), SW-1618 (4.00 mg/kg), and SW-1630 (5.08 mg/kg) equalled or exceeded the NOAA ER-L guideline of 4 mg/kg. At location SW-1905 (34.33 mg/kg), and SW-1906 (34.27 mg/kg) in the Area 19 SW wetlands, the Ontario LEL guideline was exceeded. In the dry tributary in Area 18, sampling location SW-1801 (7.85 mg/kg) exceeded the Ontario LEL guideline.

Within the County Park Drainage, location SD-1003 (10.93 mg/kg) exceeded the Ontario LEL guideline (Figure 4-29).

4.6.2.2 Individual PAHs

Several individual PAH compounds in sediment collected at the former Arsenal exceeded sediment quality guidelines (Table 4-28). These compounds included: acenapthene, anthracene, benzo(a)anthracene, benzo(k)fluoranthrene, benzo(a)pyrene, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, fluoranthrene, fluorene, 2-methylnapthalene, naphthalene, indeno(1,2,3-C,D)pyrene, pyrene, and phenanthrene. Plotting the concentration of the most frequently detected PAHs on site by sampling location revealed that they are highly collocated (Figures 4-22A through 4-22C). These plots are shown with and without the maximum concentrations noted at SW-1803 and SW-1804 in order to illustrate trends. The distribution of individual PAH compounds closely reflected total PAH results (Tables 4-28, and Figures 4-22 through 4-29).

The PAH compounds most frequently exceeding sediment quality guidelines were pyrene, chrysene, and phenanthrene (Table 4-28). Pyrene concentrations exceeded sediment quality guidelines more frequently than any other PAH compound; exceedances were noted at 72 locations at the former Arsenal. Chrysene exceeded sediment quality standards at 45 locations, while phenanthrene exceedances were noted at 36 locations. The greatest exceedances for these compounds (Table 4-28) were noted in the Area 18B stream (SW-1803, SW-1804, SW-1805), at the head of the Southwest Ditch (SW-1619), in the lower Central Ditch (SW-1103), in the Area 8 Pond, and in the lower portion of Black Ditch.

4.6.3 Pesticides/Polychlorinated Biphenyls

Eleven of the 28 pesticide compounds for which sediment was analyzed were detected above their respective MDLs. Seven compounds (4,4-DDD, 4,4'-DDE, 4,4'-DDT, heptachlor epoxide, aldrin, dieldrin and beta-BHC) were present at levels above sediment quality guidelines (Table 4-9). Pesticide compounds were detected in the East Ditch Drainage (Figure 4-23), Black Ditch Drainage (Figure 4-30), Red Root Creek Drainage (Figure 4-31), Central Ditch Drainage (Figure 4-32), Area 12 Drainage (Figure 4-27), Old Red Root Creek Drainage (Figures 4-33, 4-33A), and County Park Drainage (Figure 4-34).

DDT compounds were the most frequently detected pesticides on site. These compounds were most frequently detected in the Old Red Root Creek, Red Root Creek and Black Ditch Drainages, although at least one of these compounds was detected in every major drainage area (Appendix C). Concentrations of 4,4' DDT ranged from 0.002J mg/kg to 1.3J mg/kg in sediment, equaling or exceeding the Ontario LEL guideline of 0.007 mg/kg at 11 freshwater locations, and the NOAA ER-L guideline of 0.001 mg/kg at seven locations. Levels of 4,4' DDE ranged from 0.002J mg/kg to 0.16 mg/kg, and met or exceeded the Ontario LEL guideline of 0.005 mg/kg at ten freshwater locations, and the NOAA ER-L guideline of 0.002 mg/kg at

14 estuarine locations. Concentrations of 4,4' DDD ranged from 0.006J mg/kg to 0.62J mg/kg (Figure 4-29A), exceeding the Ontario LEL guideline (0.008 mg/kg) at 27 locations sampled on site (Figure 4-36). Exceedances were primarily located in the upper Black Ditch Drainage, the sulfur plant ponds, and the Area 18B and 18C streams in the Red Root Creek Drainage, one location in the East Ditch Drainage (SW-1410), four locations in Red Root Creek and in the Old Red Root Creek Drainage, and one location in the County Park Drainage (SW-1008). Exceedances of the Ontario SEL guideline were noted at SW-1810 (0.32 mg/kg) and SW-1811 (0.086 mg/kg) in the Area 18C stream, and at location SW-1903 (0.310J mg/kg) in the forested wetland within the Old Red Root Creek Drainage (Table 4-9).

Heptachlor epoxide exceeded the Ontario LEL guideline of 0.005 mg/kg at 13 locations sampled on site, 11 of which were located in the Area 18B and 18C streams (Figure 4-31, 4-31A). Six of these locations also exceeded the Ontario SEL guideline. Overall, heptachlor epoxide was detected at 19 locations, at concentrations ranging from 0.001 mg/kg to 3.6 mg/kg.

Aldrin equaled or exceeded the Ontario freshwater LEL guideline of 0.002 mg/kg at seven locations on site, with concentrations ranging from 0.0021 mg/kg to 0.69 mg/kg. These exceedances were limited to three locations in the Central Ditch Drainage (SW-1622, SW-1623, SW-1626), one location in the East Ditch Drainage (SD-1401), and three locations in the Area 18B stream within the Red Root Creek Drainage. Locations SW-1803 (0.690J mg/kg), SW-1804 (0.350J mg/kg), and SW-1805 (0.320J mg/kg) all exceeded the Ontario SEL guideline as well, calculated by location on the basis of TOC content in the sediment.

Dieldrin exceeded the NOAA ER-M guideline (0.008 mg/kg) in freshwater sediments at one location, SW-1906 (0.23J mg/kg) and its duplicate sample SW-1911 (0.49J mg/kg) in the Area 19 NE wetlands (Table 4-9).

Beta BHC exceeded the Ontario LEL guideline of 0.006 at SW-1403 (0.027 mg/kg) in the East Ditch. Other pesticides detected on site, but not exceeding existing sediment quality guidelines include beta endosulfan (five locations, from 0.021 mg/kg to 0.18 mg/kg) and methoxychlor (three locations, 0.61 mg/kg to 0.67 mg/kg). Endrin ketone and dieldrin were both detected in sediment above their MDLs at less than four locations each. Regarding the distribution of pesticides in on-site sediments, the Area 18B and 18C streams had the highest total number of pesticide compounds (eight) detected above their MDLs. Four compounds were detected almost exclusively within these streams, or within these streams and downgradient in the Red Root Creek Drainage. These compounds were beta endosulfan, endrin ketone, heptachlor epoxide, and methoxychlor.

Aroclor 1260 was the only PCB compound detected above its MDL value in sediment collected at the former Arsenal. This compound was detected at SW-0603 (4.2 mg/kg) and SW-0604 (3.8J mg/kg) in Red Root Creek (Figures 4-31 and 4-31A), exceeding both NOAA ER-L and

ER-M guidelines. The Aroclor 1260 concentration at location SW-2001 in the Area 20 Ditch (0.13 mg/kg) exceeded the NOAA ER-L guideline of 0.05 mg/kg.

4.6.4 Metals

All 23 metals for which sediments were analyzed were detected at levels exceeding their respective MDLs (Table 4-10). Of these, 11 were present at levels exceeding either Ontario Provincial guidelines in freshwater sediments, or NOAA guidelines in estuarine sediments. These compounds were: arsenic, lead, copper, silver, mercury, zinc, cadmium, chromium, nickel, iron and antimony. Metals were detected in the East Ditch Drainage (Figure 4-35), Black Ditch Drainage (Figure 4-36), Red Root Creek Drainage (Figures 4-37, 4-37B), Central Ditch Drainage (Figure 4-38), Old Red Root Creek Drainage (Figure 4-39, 4-39B), and County Park Drainage (Figure 4-40).

4.6.4.1 Lead

Lead concentrations exceeded sediment quality guidelines at 87 locations sampled at the former Arsenal, distributed over all major drainage areas (Figure 4-41). The Ontario LEL guideline of 31 mg/kg was exceeded at 45 freshwater locations, and the NOAA ER-L guideline of 35 mg/kg was exceeded at 42 estuarine sampling locations (Figure 4-41, Table 4-10). In contrast, the Ontario SEL guideline (250 mg/kg) was exceeded at only six locations (SD-0402, SD-0403, SD-1009, SD-1801, SD-1401, SW-0602). The NOAA ER-M guideline of 110 mg/kg was exceeded at 17 locations (Table 4-10), seven of which were located in Red Root Creek.

Within the East Ditch Drainage, the maximum lead concentration measured in sediment was at SD-1401 (316 mg/kg) in the upgradient *Scirpus* marsh. This value exceeded the Ontario SEL guideline of 250 mg/kg. In the unnamed tributary, lead concentrations exceeded sediment quality guidelines at SW-1410 (203J mg/kg), SW-1411 (111J mg/kg) and SW-1412 (44.1J mg/kg). Concentrations decreased from upstream to downstream (Figure 4-35). Lead levels in the East Ditch exceeded the Ontario LEL guideline (31 mg/kg) at locations from SW-1403 southward to SW-1406 (44.7 mg/kg to 50.9 mg/kg). The lead concentration at SW-1407 (57.3J mg/kg) exceeded the NOAA ER-L guideline.

Lead concentrations exceeded sediment quality guidelines over much of the Black Ditch Drainage (Figure 4-36). Locations SW-0501 through SW-0504 in the Area 5 pond (95.2J mg/kg to 205J mg/kg) were greater than the Ontario LEL guideline. Lead concentrations at locations SW-0401 through SW-0406 in the Area 4 drainage ditch (72.7J mg/kg to 327J mg/kg) were greater than the Ontario LEL guideline. The Ontario SEL guideline was exceeded at locations SW-0402 (309J mg/kg) and SW-0403 (327J mg/kg), near the head of the ditch.

Lead concentrations at locations SW-0616 through SW-0619 (96.3J mg/kg to 120J mg/kg) in the lower portion of Black Ditch were above the NOAA ER-L guideline. The highest value detected

in the ditch was at SW-0619 (120J mg/kg), which was greater than the NOAA ER-M guideline of 110 mg/kg.

Within the upper portion of the Red Root Creek Drainage (Figures 4-37, 4-37A), lead concentrations in sediment exceeded the Ontario LEL guideline at locations SW-1803 (127 mg/kg), SW-1804 (88.9 mg/kg), SW-1805 (63.2 mg/kg), and SW-1807 (40.9J mg/kg) within the Area 18B stream. This represents a steady decreasing trend from upstream to downstream. A similar trend was seen in the Area 18C stream. The lead concentration at location SW-1810 (111 mg/kg) at the head of a tributary was greater than the concentration downstream at SW-1811 (39.6 mg/kg). Both values exceeded the Ontario LEL guideline. Similarly, the lead concentration at SW-1812 (52.6 mg/kg) near the head of a fork of the Area 18C stream was greater than concentrations downstream at locations SW-1816 (2.3 mg/kg) and SW-1817 (2.9 mg/kg).

Downgradient within the Red Root Creek Drainage, locations SW-0801 (193J mg/kg), SW-0802 (148J mg/kg), SW-0807 (135J mg/kg), SW-0803 (59.3J mg/kg) and SW-0806 (32.7J mg/kg) in the Area 8 pond north of Olympic Drive exceeded the Ontario LEL guideline.

Lead concentrations at locations SW-0608 through SW-0602 in Red Root Creek (114J mg/kg to 339J mg/kg) exceeded the NOAA ER-L as well as the ER-M guideline and SW-0609 (70.9J) exceeded the NOAA ER-L guideline. Lead concentrations in the sulfur plant ponds at SW-0610 through SW-0615 (36.9J mg/kg to 182J mg/kg) exceeded the Ontario LEL guideline.

Within the Central Ditch Drainage, lead levels at locations SW-1622 (47.6J mg/kg), SW-1625 (200J mg/kg), SW-1104 (88.5 mg/kg), SW-1102 (87.4 mg/kg) and SW-1101 (42.5 mg/kg) exceeded the guideline. The NOAA ER-M guideline was also exceeded at location SW-1625 (200J mg/kg).

Within the Area 12 Drainage, lead levels exceeded the NOAA ER-L guideline at locations SW-1201 (61.1 mg/kg) and SW-1203 (333 mg/kg). The lead concentration at SW-1203 also exceeded the NOAA ER-M guideline.

Lead levels exceeded the Ontario LEL guideline throughout freshwater portions of the Old Red Root Creek Drainage, and the NOAA ER-L guideline was similarly exceeded throughout the estuarine portion. In the dry tributary in Area 18 (Figures 4-13, 4-13A), the highest concentration was at SD-1801 (586 mg/kg), which exceeded the Ontario SEL guideline of 250 mg/kg.

The Ontario LEL guideline was exceeded at scattered locations in the Area 19 wetlands. In Old Red Root Creek, lead concentrations (69.3J mg/kg to 101J mg/kg) exceeding the NOAA ER-L guideline at locations SW-1007 through SW-1610.

Downgradient of Old Red Root Creek, in the associated drainage ditches, lead concentrations ranged from 12.2 mg/kg to 176 mg/kg. The lead concentration at location SW-1612 (176J mg/kg), SW-1611 (133J mg/kg) and SW-1616 (1145 mg/kg) exceeded the NOAA ER-M guideline. In the Southwest Ditch, lead concentrations at locations SW-1216 (103J mg/kg), SW-1620 (123J mg/kg), SW-1215 (158J mg/kg), and SW-1619 (223J mg/kg) exceeded the NOAA ER-L value. At three of these locations (SW-1619, SW-1215, and SW-1620, the ER-M guideline was also exceeded. Lead concentrations at locations SW-1602 (42.6J mg/kg), SW-1907 (76.3J mg/kg) and SW-1601 (98.3J mg/kg) in the West Ditch, exceeded the NOAA ER-L value.

Within the County Park Drainage, lead concentrations exceeded the Ontario LEL guideline of 31 mg/kg at locations SW-1005 (46.1J mg/kg), SW-1003 (65.1J mg/kg), SW-1008 (97.8J mg/kg) and SD-1009 (272 mg/kg). SD-1009 also exceeded the TOC based Ontario SEL guidance value of 250 mg/kg (Figure 4-40).

4.6.4.2 Arsenic

Arsenic exceeded sediment quality guidelines at 60 locations sampled, of which 36 were exceedances of the Ontario freshwater LEL of 6 mg/kg, and 24 were exceedances of the NOAA ER-L guideline of 33 mg/kg (Figure 4-42). At seven locations, detection limits were higher than regulatory guidelines. The Ontario SEL guideline (33 mg/kg) was exceeded at four freshwater locations (SW-1410, SW-1903, SW-0601, SD-1401), and the NOAA ER-M guideline of 85 mg/kg was exceeded at three estuarine locations (SW-1617, SW-1619, and SW-0607). Arsenic exceedances in sediment were most frequent within the East Ditch Drainage, Old Red Root Creek, and Red Root Creek Drainage, although other scattered exceedances were noted throughout the site (Figure 4-42).

Within the East Ditch Drainage (Figure 4-35), arsenic exceeded sediment quality guidelines at 8 of 11 locations sampled. The arsenic concentration at location SD-1401 (186 mg/kg) in the upgradient *Scirpus* marsh exceeded the Ontario Provincial SEL guideline of 33 mg/kg. In the unnamed tributary, a gradual decrease in arsenic concentrations was observed from upstream to downstream. Sampling location SW-1410 (176J mg/kg) also exceeded the Ontario SEL guideline. The arsenic concentration at SW-1411 (54.8J mg/kg), downgradient from SW-1410 in the estuarine portion of the tributary, exceeded the NOAA ER-L guideline, but not the ER-M guideline. Further downstream, the arsenic concentration at SW-1412 (19.6J mg/kg) was lower.

In the East Ditch itself, arsenic concentrations exceeded sediment guidelines at five locations (SW-1403, SW-1404, SW-1405, SW-1406, and SW-1407) with concentrations ranging from 6.1J mg/kg to 59.6J mg/kg. The Ontario LEL guideline of 6 mg/kg was exceeded in the freshwater portion of the ditch at locations SW-1403 downstream to SW-1406. The arsenic concentration was highest at SW-1407 (59.6J mg/kg), in the estuarine portion of the ditch, decreasing downstream at SW-1408 (14.1J mg/kg).

Within the Black Ditch Drainage, arsenic levels in the Area 4 Ditch sediment (3.9 mg/kg to 13 mg/kg) exceeded the Ontario LEL guideline of 6 mg/kg at SW-0406 (6.3J mg/kg), SW-0401 (9.4J mg/kg), SW-0402 (13J mg/kg), and SW-0404 (6.8J mg/kg) (Figure 4-36). In the Area 5 Pond, the Ontario LEL was exceeded at SW-0501 (15.9J mg/kg). Within Black Ditch itself, arsenic levels were higher in sediments toward the downstream portion of the drainage, with the highest value recorded at location SW-0619 (29.5J mg/kg). Arsenic levels in the Black Ditch did not exceed either Ontario Provincial or NOAA guidelines.

Arsenic was detected throughout the Red Root Creek Drainage at levels exceeding sediment quality guidelines (Figures 4-37, 4-37A). In the Area 18B stream in the upper portion of the drainage, the arsenic concentrations at SW-1804 (6.3J mg/kg), and SW-1807 (7.4J mg/kg) barely exceeded the Ontario LEL guideline of 6 mg/kg. The Ontario LEL guideline was also exceeded at SW-1810 (32.9J mg/kg) in the Area 18C stream. This concentration was just below the SEL value of 33 mg/kg.

Further downgradient in the Area 8 Pond, arsenic levels ranged from 1.5 mg/kg to 14.8 mg/kg, exceeding the Ontario LEL guideline at four locations, SW-0806 (6.1 mg/kg), SW-0801 (14.8J mg/kg), SW-0802 (11.5J mg/kg) and SW-0803 (11.1J mg/kg). In marshes near the head of Red Root Creek, location SW-0601 (38.3 mg/kg) exceeded the Ontario SEL guideline. The arsenic concentration at location SW-0602 (43.3J mg/kg), an estuarine location within the same marsh area, exceeded the NOAA ER-L guideline.

In Red Root Creek itself (Figures 4-37 and 4-37A), arsenic concentrations ranged from 15.1 mg/kg to 105J mg/kg, and exceeded the NOAA ER-L guideline of 33 mg/kg at locations SW-0604 through SW-0609 and SW-0602. Arsenic concentrations exceeded the NOAA ER-M guideline of 85 mg/kg at location SW-0607 (105J mg/kg). In sediment collected from the sulfur plant ponds, arsenic was detected at levels ranging from 3.2J mg/kg to 22.8J mg/kg. The Ontario LEL guideline of 6 mg/kg was exceeded at locations SW-0610 (22.8J mg/kg), SW-0612 (7.6J mg/kg), SW-0614 (13.9J mg/kg), SW-0611 (15.6J mg/kg) and SW-0613 (16.5J mg/kg).

Regarding the Central Ditch Drainage, the only sediment quality guideline exceedances were noted at the freshwater locations SW-1621 (15.2J mg/kg) and SW-1626 (9.2J mg/kg in the duplicate sample SD-1627) (Figure 4-38). Arsenic concentrations in the Central Ditch itself ranged from 3 mg/kg to 29.4 mg/kg in the sediment. These values did not exceed the NOAA ER-L guideline.

No arsenic exceedances were noted in sediment collected from the Area 12 Drainage, but within the Old Red Root Creek Drainage, scattered exceedances were noted. In the dry tributary in Area 18, arsenic barely exceeded the Ontario LEL at location SD-1802 (6.9J mg/kg). Further downgradient in the wetlands within Area 19, the arsenic concentration was greatest at SW-1903 (78.1J mg/kg) (Figures 4-39, 4-39A), exceeding the Ontario SEL guideline. The arsenic level at SW-1901 (25.9J mg/kg) and SW-1905 (6.1 mg/kg) exceeded the Ontario LEL guideline.

Old Red Root Creek had arsenic concentrations ranging from 1.7J mg/kg to 50J mg/kg. The arsenic concentration at SW-1610 (50 mg/kg) exceeded the NOAA ER-L guideline. A slight gradient is observable in the data from Old Red Root Creek (Figures 4-39, 4-39A), with arsenic concentrations in sediment appearing to decrease from location SW-1606 (43.0J mg/kg) to location SW-1609 (29.5J mg/kg). All of these values are in excess of the NOAA ER-L guideline of 33 mg/kg, with the exception of location SW-1609.

The maximum arsenic concentration detected in the associated drainage ditches and wetlands south of Old Red Root Creek, was at sampling location SW-1617 (152J mg/kg). This was the only location in the vicinity where the arsenic concentration exceeded the NOAA ER-M guideline of 85 mg/kg. Arsenic concentrations exceeded the ER-L guideline at locations SW-1611 (44.4J mg/kg), SW-1612 (46.8J mg/kg), SW-1630 (42.3J mg/kg), SW-1616 (36.1J mg/kg), and SW-1618 (40.1J mg/kg).

In West and Southwest Ditches, the arsenic results from the sediment samples collected suggest contamination gradients from upstream to downstream. In the West Ditch, arsenic concentrations decreased from SW-1601 (41.1J mg/kg) near the upstream end to SW-1603 (24.7 mg/kg) near the mouth of the ditch. Arsenic concentrations exceeded the ER-L guideline only at location SW-1601 (41.1J mg/kg). In the Southwest Ditch, arsenic concentrations decreased from SW-1619 (95.6J mg/kg) near the head of the ditch, to SW-1215 (26.4J mg/kg) near the mouth of it. The NOAA ER-L value of 33 was exceeded at locations SW-1216 (34.6J mg/kg), SW-1620 (44.7J mg/kg) and SW-1619 (95.60 mg/kg). At sample location SW-1619 (95.6 mg/kg) the ER-M value of 85 mg/kg was exceeded as well.

Arsenic values in sediment in the County Park Drainage (Figure 4-40) exceeded the Ontario LEL guidelines at SD-1008 (18.4J mg/kg), SD-1009 (32.4J mg/kg), SD-1010 (14.3 mg/kg), SD-1003 (7.4 mg/kg) and SD-1005 (8.2J mg/kg in duplicate sample SD-1012).

4.6.4.3 Copper

Copper concentrations in sediment exceeded sediment quality guidelines over much of the former Arsenal (85 of 132 locations sampled) (Figure 4-43). Levels in sediment ranged from 1.9 mg/kg to a maximum value of 2,850J mg/kg (location SW-1410). Copper concentrations were highest in the East Ditch Drainage.

Within the East Ditch Drainage (Figure 4-35), the copper concentration at location SD-1401 (294 mg/kg) exceeded the Ontario SEL of 110 mg/kg. In the unnamed tributary, copper concentrations decreased from location SW-1410 (2,850J mg/kg) upstream to SW-1412 (166J mg/kg), located downstream. Location SW-1410 (freshwater) exceeded the Ontario SEL guideline, while location SW-1411 (estuarine) exceeded the NOAA ER-M guideline (390 mg/kg) for copper with a concentration of 712J. In the East Ditch itself, copper levels in sediment ranged from 8 mg/kg to 148 mg/kg, exceeding the Ontario LEL value of 16 mg/kg at locations

SW-1403 through SW-1406. The NOAA ER-L value of 70 mg/kg was exceeded at location SW-1407 (148J mg/kg).

Copper concentrations within the Area 4 Ditch of the Black Ditch Drainage exceeded the Ontario SEL value at five of six locations sampled; at the remaining location (SW-0406), the LEL guideline was exceeded (Figure 4-36). Copper levels in the Area 4 ditch sediment ranged from 76.9J mg/kg to 207J mg/kg. In the Area 5 Pond, copper concentrations in the sediment ranged from 58.7J mg/kg to 107J mg/kg at locations SW-0501 through SW-0504, and exceeded the Ontario LEL guideline of 16 mg/kg. In the Black Ditch itself, copper concentrations did not exceed the Ontario guideline in the upper freshwater portion, but exceeded the NOAA ER-L guideline at estuarine locations from SW-0616 southward with concentrations ranging from 75.7J to 150J mg/kg.

In the Red Root Creek Drainage, copper concentrations exceeded the Ontario LEL guideline of 16 mg/kg at ten locations in the Area 18B and 18C streams, with exceedance concentrations ranging from 18.2J mg/kg to 84.1 mg/kg (Figures 4-37, 4-37A). Again, a trend was apparent in this area with greater concentrations (and most of the exceedances) located toward the upstream portion of the tributaries. Further downgradient within the Area 8 Pond north of Olympic Drive, copper concentrations exceeded the Ontario LEL guideline at locations SW-0806 (35.8J mg/kg), SW-0803 (51.3J mg/kg), SW-0801 (138J mg/kg), and SW-0802 (125J mg/kg), and the SEL guideline of 110 mg/kg at locations SW-0802 and SW-0801.

In Red Root Creek itself, copper concentrations in the sediment ranged from 61.9 to 238 mg/kg, and exceeded sediment quality guidelines at several locations (Figure 4-37, 4-37A). The copper concentration at location SW-0601 (61.9J mg/kg) exceeded the Ontario LEL guideline. Sediment concentrations in the remainder of Red Root Creek exceeded the NOAA ER-L guideline. In the sulfur plant ponds, the copper concentration at location SD-0611 (144J mg/kg) exceeded the Ontario SEL guideline, while the LEL guideline was exceeded at the other locations sampled. Sediment concentrations ranged from 17.2J mg/kg to 144J mg/kg.

Copper concentrations in the Central Ditch Drainage (Figure 4-38) exceeded sediment quality guidelines at locations SW-1621 (18.8J mg/kg), SW-1623 (18.2 mg/kg) and SW-1625 (236J mg/kg). The copper concentration at SW-1625, an estuarine location, exceeded the NOAA ER-L guideline. Copper concentrations at the other two locations exceeded the freshwater Ontario LEL.

In the Area 12 Ditch, the copper concentration at SW-1203 (187J mg/kg) exceeded the NOAA ER-L guideline. This sampling location is near the mouth of the ditch (Figure 4-27).

Copper concentrations exceeded sediment quality guidelines throughout the Old Red Root Creek Drainage. In the dry tributary at the head of the drainage, locations SD-1801 (48.3 mg/kg) and SD-1802 (48.3 mg/kg) exceeded the Ontario LEL guideline of 16 mg/kg. The copper

concentration within the forested wetland at locations SW-1903 (108 mg/kg) and SW-1901 (39.8 mg/kg) also exceeded the Ontario LEL guideline. Other exceedances of this guideline were noted at locations SW-1904, SW-1905, SW-1909, SW-1910 and SW-1614 (Figures 4-39, 4-39A).

Exceedances of the NOAA ER-L guideline were noted in Old Red Root Creek, with concentrations ranging from 72.7 mg/kg to 131J mg/kg. Copper concentrations in the Southwest Ditch ranged from 132J mg/kg to 437J mg/kg, exceeding the NOAA ER-L guideline at locations SW-1215, SW-1216, SW-1619, and SW-1620. The copper concentration at SW-1619 (437J mg/kg) exceeded the ER-M guideline as well. Concentrations in the West Ditch exceeded the NOAA ER-L guideline at SW-1601 (107 mg/kg) and SW-1907 (92.1J mg/kg).

Copper levels within the associated ditches within the Old Root Creek Drainage exceeded sediment quality guidelines at six locations sampled (Figure 4-39A). Five of the nine estuarine locations had copper levels exceeding NOAA ER-L guidelines, with exceedance concentrations ranging from 116J mg/kg to 171J mg/kg, respectively. The copper concentration at SW-1614 (24.8J mg/kg) exceeded the Ontario LEL guideline.

Within the County Park Drainage, copper concentrations exceeded the Ontario LEL guideline at locations SW-1001 (29.7J mg/kg), SW-1008 (84.7J mg/kg), SW-1010 (20.3J mg/kg), SW-1009 (77J mg/kg) and SD-1003 (324J mg/kg). Location SD-1003 also exceeded the Ontario SEL guideline.

4.6.4.4 Zinc

Zinc concentrations exceeded sediment quality guidelines at 48 locations spread over much of the former Arsenal site (Figure 4-45). The highest zinc concentrations in sediment were detected in the East Ditch Drainage at locations SW-1410 (1,120J mg/kg) and SW-1411 (1,110J mg/kg) in the unnamed tributary (Figure 4-35). Location SW-1410, in the freshwater portion, exceeded the Ontario SEL guideline of 820 mg/kg, while SW-1411 in the estuarine portion, exceeded the NOAA ER-M guideline of 270 mg/kg. The Zn concentration at location SW-1412 (273 mg/kg) also exceeded the ER-M guideline of 270 mg/kg.

In the upgradient *Scirpus* marsh, the Zn concentration at location SD-1401 (127J mg/kg) exceeded the Ontario LEL value of 120 mg/kg. In the East Ditch itself, zinc concentrations at SW-1404 (238J mg/kg) and SW-1405 (156J mg/kg) exceeded the Ontario LEL guideline of 120 mg/kg. The NOAA ER-M guideline was exceeded at SW-1407 (271J mg/kg).

Within the Black Ditch Drainage, zinc concentrations exceeded sediment quality guidelines in the Black Ditch and in the Area 4 Ditch (Figure 4-36). The NOAA ER-L guideline of 120 mg/kg was exceeded at locations SW-0618 (334J mg/kg), SW-0617 (274J mg/kg), SW-0616 (225.8J mg/kg) and SW-0619 (247J mg/kg) in the lower portion of Black Ditch. Locations SW-

0617 and SW-0618 exceeded the ER-M value. Exceedances of the Ontario LEL guidelines were noted in the Area 4 Ditch at SW-0401 (507J mg/kg) and SW-0403 (197J mg/kg) respectively.

Zinc concentrations exceeded sediment guidelines throughout the Red Root Creek Drainage. The Ontario LEL guideline was exceeded at locations SW-1803 (244 mg/kg), SW-1804 (151J mg/kg), SW-1805 (194J mg/kg) in the Area 18B stream, and at location SW-1810 (121 mg/kg) in the Area 18C stream (Figure 4-37, 4-37A). Further downgradient in the Area 8 Pond, zinc exceeded the Ontario LEL guideline at locations SW-1801 (480J mg/kg), SW-1802 (408J mg/kg) and SW-1803 (171J mg/kg) in the western part of the pond. Locations SW-0602 (224J mg/kg), SW-0603 (169J mg/kg), SW-0604 (435J mg/kg), SW-0605 (239J mg/kg) in the upper half of Red Root Creek exceeded the NOAA ER-L guideline. The ER-M guideline was also exceeded at location SW-0604 (435J mg/kg).

Levels of zinc in sediment exceeded the NOAA ER-L guideline at one location each in the Central Drainage at SW-1104 (190 mg/kg), and location SW-1203 (280J mg/kg) in the Area 12 Ditch. The Zn concentration at SW-1203 also exceeded the NOAA ER-M guideline (Figure 4-38).

Zinc concentrations exceeded sediment quality guidelines over much of the Old Red Root Creek Drainage (Figure 4-39, 4-39A). The NOAA ER-L guideline of 120 mg/kg was exceeded at 16 locations. Four of these also exceeded the ER-M guideline of 270 mg/kg. In Old Red Root Creek, the maximum sediment zinc concentration was at SW-1607 (624J mg/kg). Locations SW-1606 (525J mg/kg), SW-1607 (624J mg/kg), and SW-1608 (591J mg/kg) exceeded the NOAA ER-M guideline. Location SW-1629 (279 mg/kg), in a ponded wetland area south of Old Red Root Creek also exceeded the NOAA ER-M guideline.

Within the County Park Drainage, the Ontario LEL guideline was exceeded at SW-1008 (280J mg/kg), in the Open Lawn Area Ditch (Figure 4-40).

4.6.4.5 Nickel

Nickel concentrations exceeded sediment quality guidelines primarily in the East Ditch Drainage, the Area 8 Pond of the Red Root Creek Drainage, and scattered locations in the Old Red Root Creek Drainage (Figure 4-45).

Within the East Ditch Drainage (Figure 4-35), nickel concentrations exceeded the Ontario LEL guideline (16 mg/kg) at SD-1401 (28 mg/kg) in the upgradient *Scirpus* marsh, and in the upper portion of the unnamed tributary at SW-1410 (43J mg/kg). Location SW-1411 (42.7 mg/kg), and exceeded the NOAA ER-L guideline of 30 mg/kg. In the East Ditch itself, nickel exceeded the Ontario LEL guideline at SW-1404 (44.3J mg/kg) and SW-1405 (19.5 mg/kg). The nickel concentration at location SW-1408 (31.8J mg/kg), below the confluence with Black Ditch, slightly exceeding the NOAA ER-L guideline.

Within the Black Ditch Drainage (Figure 4-36), exceedances of the Ontario LEL guideline were noted in the Area 4 Ditch at locations SD-0402 (20.4J mg/kg) and SD-0403 (20.1J mg/kg).

In the Area 8 Pond within the Red Root Creek Drainage (Figures 4-37, 4-37A, nickel concentrations exceeded the Ontario LEL guideline of 16 mg/kg at SW-0802 (40.9J mg/kg), SW-0801 (30.2J mg/kg) and SW-0803 (18.1J mg/kg). The Ontario LEL guideline was also exceeded at locations SW-0601 (21.7J mg/kg) and SW-0611 (163J mg/kg). In Red Root Creek itself the NOAA ER-L guideline was exceeded at SW-0604 (31.5 mg/kg).

Within the Old Red Root Creek Drainage, nickel concentrations exceeded sediment quality guidelines in Old Red Root Creek, associated ditches in Area 16, the Area 19 wetland areas, as well as the Southwest Ditch (Figure 4-39, 4-39A). The highest nickel concentration was in Old Red Root Creek itself, at SW-1607 (52.3 mg/kg). The Ontario LEL guideline was also exceeded at location SW-1008 (24.9J mg/kg) in the County Park Drainage.

4.6.4.6 Other Metals

Other metals exceeding existing sediment quality guidelines were mercury, chromium, cadmium and antimony (Table 4-10). Mercury concentrations greater than sediment quality guidelines were noted within several individual water features throughout the former Arsenal, although most of the upper Red Root Creek Drainage and County Park Drainages had lower values.

Mercury concentrations in sediment sampled at the former Arsenal ranged from "non-detect" to 5.5 mg/kg at SD-1401. Mercury concentrations in sediment were greater than the Ontario LEL guideline of 0.2 mg/kg at 18 locations. These locations were primarily in the unnamed tributary in the East Ditch Drainage, the Area 5 Pond and Area 4 Ditch in the Black Ditch Drainage, the Area 8 Pond and upper portion of Red Root Creek, the sulfur plant ponds, and the Area 19 forested wetlands (Table 4-10). Mercury concentrations in sediment exceeded the Ontario SEL guideline of 2 mg/kg at SD-1008 (5.13J mg/kg), in the County Park Drainage, and at SW-1410 (3.2J mg/kg) in the unnamed tributary and SW-1401 (5.5 mg/kg) in the upgradient *Scirpus* marsh within the East Ditch Drainage.

Mercury concentrations in sediment were greater than the NOAA ER-L guideline of 0.15 mg/kg at 37 estuarine locations. At five of these locations, the NOAA ER-M guideline of 1.5J mg/kg was also exceeded. Within the East Ditch Drainage, locations SW-1407 (1.3J mg/kg) and SW-1411 (1.3 mg/kg) both exceeded the ER-M guideline (Figure 4-35). In Red Root Creek the mercury concentrations at SW-0606 (2.64J mg/kg), SW-0607 (2.10J mg/kg) and SW-0608 (2.0J mg/kg) also exceeded the NOAA ER-M guideline.

Chromium was detected above sediment quality guidelines at 19 locations at the former Arsenal (Table 4-10). Seventeen of these locations exceeded the freshwater Ontario LEL guideline of 26 mg/kg. Chromium concentrations in sediment exceeded this guideline throughout the East

Ditch Drainage, as well as in the Area 4 Ditch within the Black Ditch Drainage, the Area 8 Pond, Red Root Creek and sulfur plant ponds in the Red Root Creek Drainage, and scattered locations in the Area 19 wetlands within the Old Red Root Creek Drainage. Concentrations exceeding the guideline ranged from 28.5J mg/kg to 1,110J mg/kg. The SEL guideline of 110 mg/kg was exceeded at three locations SW-1410 (155J mg/kg), SD-1401 (209 mg/kg), in the East Ditch Drainage (Figure 4-35) and SD-0611 (1,110J mg/kg) in the sulfur plant ponds in the Red Root Creek. Chromium concentrations in sediment were greater than the NOAA ER-L guideline of 80 mg/kg at locations SW-0604 (82.8J mg/kg) and SW-0606 (113J mg/kg) in Red Root Creek (Table 4-10).

Silver concentrations in sediment exceeded sediment quality guidelines at 26 locations sampled at the former Arsenal. All of these locations exceeded the NOAA ER-L guideline of 1 mg/kg. Fourteen of the 26 exceedances also exceeded the NOAA ER-M guideline (2.2 mg/kg). These locations were limited to the East Ditch Drainage, Red Root Creek, and to the southern portion of the Old Red Root Creek Drainage (Table 4-10). Silver levels in site sediments ranged from "non-detect" to 21.9J mg/kg (location SD-1008 in the County Park Drainage).

Cadmium exceeded sediment quality guidelines at 19 locations on site. All but two of these were exceedances of the Ontario LEL guideline of 0.6 mg/kg. No SEL exceedances were noted. Locations with concentrations greater than the Ontario LEL guideline were limited in distribution to the East Ditch Drainage, Area 4 Ditch and Black Ditch in the Black Ditch Drainage, the Area 8 Pond, sulfur plant ponds, and SW-1803 (0.61 mg/kg)in the Red Root Creek Drainage, location SW-1909 (2.2J), SD-1901 (0.78 mg/kg) in the Old Red Root Creek Drainage and SD-1008 (2.5J mg/kg) in the County Park Drainage. Cadmium concentrations exceeding the Ontario LEL guideline at the former Arsenal ranged from 0.61 mg/kg to 10.2 mg/kg. The exceedances of NOAA ER-L were noted at locations SW-1407 (5.3J mg/kg) and SW-1411 (10.2 mg/kg) in the East Ditch Drainage.

Antimony concentrations in sediment exceeded the NOAA ER-L guideline of 2 mg/kg at five locations sampled at the former Arsenal. Antimony concentrations in sediment which exceeded the NOAA ER-L guideline ranged from 2.2J mg/kg to 9.8J mg/kg. Most exceedances were located within the East Ditch Drainage (Figure 4-35), although other exceedances were noted in the Black Ditch (SW-0619, 4.8J mg/kg), Area 12 Ditch (SW-1203, 3.4J mg/kg), and Old Red Root Creek (SW-1609, 2.9J mg/kg).

Iron levels in sediment exceeded the Ontario LEL guideline of 20,000 at two locations sampled at the former Arsenal. At location SW-0801 in the Area 8 Pond, within the Red Root Creek Drainage, the concentration was 30,100J mg/kg, and at SW-1001 in the County Park drainage, the concentration was 23,500J mg/kg.

4.6.4.7 Data Analysis of Sediment Metals

Correlation analyses between metals most frequently exceeding sediment quality guidelines in sediment (lead, arsenic, copper, zinc, nickel, chromium and mercury) showed several of these metals to be significantly positively correlated (Appendix H). Lead was significantly correlated with all of these metals ($p<0.05$), however correlation coefficients ("r" values) were below 0.5 for all correlations except copper, indicating significant variability in the data set. Lead was positively correlated with copper, as indicated by an "r" value of 0.68. A plot of lead, copper and zinc concentrations by sampling location (Figure 4-46) suggests these compounds are highly collocated.

Arsenic was positively correlated with all of the above metals ($p<0.05$), although correlation coefficients were less than 0.5 for zinc, lead, chromium, and nickel, indicating a weak correlation. Arsenic was highly correlated with mercury ($r=0.64$) and copper ($r=0.58$). The correlation between arsenic and lead was low ($r=0.39$), but significant ($p<0.0001$). A graph of the arsenic and lead data by sampling location (Figure 4-47) shows that arsenic was not detected at as many locations as lead. However, where arsenic was detected, lead tended to occur as well.

Although significant correlations existed between several of the above metals, "r" values were often less than 0.5, indicating a large amount of variability in the data. Nickel and chromium were among the few metals showing a high degree of correlation ($r=0.82$).

Levels of several metals (zinc, lead, arsenic, mercury, copper, nickel) in sediment were significantly correlated with the TOC level in the sediment. However, "r" values were poor, ranging from 0.03 to 0.39 (for lead) (Appendix H). Plots of the distribution of selected metals (Figures 4-48 through 4-50) show that despite the poor degree of correlation, TOC concentrations appear to follow a similar distribution to several metals.

Similarly, several metals were poorly correlated with grain size (Appendix H). Most of the metals investigated (zinc, lead, arsenic, mercury, copper, nickel) were negatively correlated with percent sand and gravel, and positively correlated with silt and clay. However, "r" values were low (<0.5) in all cases.

4.6.5 Explosives/Thiodiglycol

Although 59 locations screened positive for TNT using the Jenkins method (Table 4-11), no explosives were detected in any of the 32 sediment samples which were also analyzed using Method 8330. These included 17 samples which screened positive for TNT using the Jenkins method. In addition, no explosives were detected in the seven samples analyzed by Method 8330 alone. Thiodiglycol was also undetected in sediment at all locations sampled (Appendix D).

4.6.6 Dioxin Compounds

Of the 12 dioxin/furan compounds for which sediments were screened, four were detected above their respective MDLs (Table 12). These were Total HPCDD, Total HPCDF, OCDF, and OCDD. Octachlorinated dibenzo-p-dioxins (OCDD) were detected at seven locations on site, within the Black Ditch and Red Root Creek Drainages. Concentrations of individual dioxin compounds ranged from 0.0003 mg/kg to 0.0022 mg/kg. No regulatory guideline presently exist for OCDD compounds in sediment.

The remaining three compounds were detected primarily at location SW-0616 in the Black Ditch (Table 4-12). At this location the concentration of Total HPCDD was 0.0001 mg/kg, while the concentrations of HPCDF and OCDF were 0.00004 mg/kg and 0.00003 mg/kg. Total HPCDD was also detected at location SW-0620, near the base of Black Ditch (0.0001 mg/kg), OCDF was also detected at location SW-0603 in Red Root Creek (0.0001 mg/kg).

No sediment quality guidelines presently exist for dioxin compounds. However, use of the EPA's toxicity equivalency factors (TEFs)[47] in conjunction with present agency guidance allows an interim evaluation of these concentrations in sediment. Since little data are available regarding toxicity of dioxin compounds, with the exception of 2,3,7,8 TCDD, the TEF values are an interim measure devised by EPA to determine the "toxicity equivalence" of other dioxin compounds. The concentration of a given dioxin compound is multiplied by the appropriate TEF value listed in the EPA guidance document[47]; values are then summed for each of the compounds detected at a given location to calculate 2,3,7,8 toxicity equivalences (TEQs) for comparison with known dioxin effects in the literature, or current EPA policy guidelines. Results of toxicity equivalence calculations for dioxin concentrations detected in sediment at the former Arsenal revealed that dioxin TEQs ranged from 0.001 μg/kg to 0.002 μg/kg. These values are well below the current interim EPA guidance of 0.1 μg/kg for dioxin (2,3,7,8 TCDD equivalent) in soil.

4.6.7 Physical Characteristics (pH, TOC, Grain Size)

4.6.7.1 Sediment pH

The pH of sediments sampled at the former Arsenal ranged from acidic to slightly basic, varying from 3.4 to 7.7 (Table 4-13). Sampling locations having a sediment pH value less than 6 were generally limited to freshwater areas of the site, while sediments with a pH over 7 were generally limited to estuarine areas in the southern two thirds of the site.

In the East Ditch drainage, a single sample collected in the upgradient *Scirpus* marsh had a pH value of 4.4. The average pH of sediment sampled in the unnamed tributary was significantly higher, at 6.97. The sediment pH in the East Ditch averaged 6.3 units.

In the Black Ditch Drainage, the pH of the sediment was lower in areas which were not tidally influenced. In the Area 4 Ditch the pH averaged 4.85, and in the Area 5 Pond it averaged 5.63. In contrast, the average pH of Black Ditch itself was 6.53.

Sediments collected within the Red Root Creek Drainage had a highly variable pH (Table 4-13). The pH values in the Area 18B and 18C streams indicated sediment was generally acidic. The average pH was 5.63 in the Area 18B stream tributaries, and 4.83 in the lower portion of the main Area 18B stream. In the Area 18C stream tributaries, the pH averaged 6.13. The ditch located in Area 20 had an average pH of 6.4. Nearby, within the Area 8 pond located north of Olympic Drive, the average pH was 6.59.

In Red Root Creek itself, the average pH was 6.62. Two samples collected in the wetlands near the upper reaches of the creek itself (SW-0601, SW-0602) had sediment pH values of 5.7 and 5.8, respectively. Samples collected downgradient had higher values, with most closer to 7, or in some cases greater. The sulfur plant ponds had an average pH value of 4.43. This acidic pH is probably due to the influence of sulfuric acid from the facility.

Sediment collected from the Central Ditch Drainage ranged from near neutral to slightly basic (Table 4-13). The Central Ditch itself had an average pH value of 7.6 at the four locations sampled, while samples collected from the upgradient contiguous ponded area had an average pH of 7.15. Isolated freshwater ponds in the vicinity had an average pH of 6.9. Sample location SW-1625, within an isolated estuarine pond, had a pH of 7.2.

The three samples collected in the Area 12 Drainage had an average pH of 7.2.

The Old Red Root Creek Drainage exhibited sediment pH values close to neutral over much of the area. A slight trend was seen, as sediment was slightly acidic in upgradient areas. For example, the "dry" tributary in Area 18 had an average pH of 5.8. Samples collected from the northeastern wetlands portion of Area 19 (SW-1908, SW-1909, SW-1910) had an average pH value of 6.47. The Area 19 forested wetland area also had slightly acidic sediment. The two samples from this area (SD-1901 and SW-1903) had an average pH of 5.65. Samples in the southwestern portion of the wetlands in Area 19 (SW-1904, SW-1905, SW-1906) had an average pH of 6.6.

In Old Red Root Creek itself, the average pH of the sediment was 6.7. In the West Ditch, and associated ditches located south of Old Red Root Creek, the pH of the sediment averaged 6.85 and 7.04, respectively. The average pH in the Southwest Ditch was 7.03.

In the County Park Drainage, sediment was slightly acidic throughout (Table 4-13). Two samples collected in the Western Boundary Ditch had an average pH of 6.15. Sediment collected from the Maintenance Area Ditch had an average pH of 5.44, while sediment from the

Open Lawn Ditch had an average pH of 5.53. The Area 10 Southern Border Ditch had an average sediment pH of 5.75.

4.6.7.2 Total Organic Carbon

Total organic carbon values varied widely in site sediments, both within and between drainage areas. Across the former Arsenal, TOC values ranged from 119 mg/kg to 218,000 mg/kg (Table 4-13).

In the East Ditch Drainage, sediment in the upgradient *Scirpus* marsh sediment had a TOC value of 27,700 mg/kg. Values in the East Ditch itself ranged from 2,450 mg/kg to 87,100 mg/kg, and averaged 2,949 mg/kg. In the unnamed tributary, TOC of the sediment averaged 49,500 mg/kg.

Areas sampled within the Black Ditch Drainage varied highly with respect to TOC content in the sediment. Samples collected from two small freshwater areas, the Area 4 Ditch and Area 5 Pond, had TOC values averaging 92,733 mg/kg and 109,025 mg/kg, respectively. Values in Black Ditch were much lower, ranging from 188 mg/kg to 43,800 mg/kg, and averaging 17,031 mg/kg. In Black Ditch there was a noticeable gradient in TOC contamination, with much higher values detected at sampling location SW-0616, and further downstream (Table 4-13).

TOC in the Red Root Creek Drainage was lowest in the Area 18B and 18C streams within Areas 1 and 18, and highest in Red Root Creek itself. The TOC in sediment collected from the Area 18C stream tributaries averaged 1,975 mg/kg. Sediment from the Area 18B stream tributaries averaged 17,955 mg/kg, but the lower segment of the main tributary averaged 365 mg/kg.

In the Area 8 pond north of Olympic Drive, TOC in the sediment averaged 25,217 mg/kg, while in the Area 20 Ditch it averaged 5,290 mg/kg. Sediment collected from Red Root Creek itself ranged from 23,200 to 96,700 mg/kg TOC, and averaged 55,422 mg/kg. The TOC content of the sulfur plant pond sediment averaged 15,717 mg/kg.

In the Central Ditch Drainage, the TOC in sediment collected from the upgradient contiguous and nearby freshwater ponded areas averaged less than that of the ditch itself. In the isolated freshwater ponded areas, the TOC content averaged 8,926 mg/kg. In ponded areas contiguous with Central Ditch, the TOC averaged 10,960 mg/kg. In the Central Ditch itself, the TOC averaged 22,045 mg/kg. However, one sample location, SW-1625, collected in a small isolated estuarine pond, had a TOC value of 147,000 mg/kg.

In the Area 12 Drainage, three samples collected from the Area 12 Ditch had an average TOC value of 56,167 mg/kg.

In the Old Red Root Creek Drainage, average TOC values generally increased downgradient toward the Raritan River, with the exception of the Southwest Ditch. The TOC of sediment collected from the "dry tributary" in Area 18 averaged 20,250 mg/kg. Wetlands in Area 19 had TOC values ranging from 5,770 to 65,300 mg/kg (Table 4-13). In Old Red Root Creek itself, the TOC in sediment averaged 53,180 mg/kg. TOC values in the West Ditch and its associated ditches to the south averaged 60,428 mg/kg, and 69,344 mg/kg, respectively. In the Southwest Ditch, TOC averaged 26,975 mg/kg.

In the County Park Drainage, the Western Boundary Ditch had an average sediment TOC value of 8,400 mg/kg. The Area 10 Southern Border Ditch, the TOC value averaged 25,300 mg/kg. In the Maintenance Area Ditch, the average TOC value was 31,408 mg/kg, while in the Open Lawn Ditch the average value was 11,523 mg/kg.

4.6.7.3 Grain Size

The grain size distribution of the sediments on site also varied geographically within and between drainages. Most of the ditches and streams in the northern part of the site (Areas 1, 10, and 18) had sediment with a relatively high sand and gravel content relative to other areas of the former Arsenal (Table 4-13). In contrast, relatively slow-moving tidal ditches and creeks in the southern portion of the site (e.g. Red Root Creek, West Ditch) had comparatively higher amounts of silt and clay in the sediment.

Within the East Ditch Drainage, a sample from the upgradient *Scirpus* marsh had a sand and gravel content of 51.2%, and silt and clay fractions of 37.1 and 11.7%, respectively. In the unnamed tributary, the average grain size distribution was similar, with a combined sand and gravel content of 58.3%, and silt and clay content of 41.7% and 7.8%, respectively. The East Ditch itself had an average sand and gravel content of 41.8%, while the average silt and clay fractions were 39.3% and 19%, respectively.

The grain size distribution of sediments sampled within the Black Ditch Drainage varied highly between water bodies sampled. The two upgradient features, the Area 4 Ditch and Area 5 pond, had sediments with a comparable grain size distribution. Both had an average sand and gravel content close to 45%, with silt and clay fractions near 40% and 15%, respectively.

Samples collected from Black Ditch itself had a much higher average sand and gravel content (70.7%) than the Area 4 ditch or Area 5 Pond. Silt and clay components for Black Ditch averaged 23.7%, and 5.6%, respectively. However, a clear gradient is observable in the data from Black Ditch. Samples collected from location SW-0616 and further downstream had a combined sand and gravel percentage much less than the upgradient locations. The average sand and gravel content downstream of SW-0616 was 44.5%, while upgradient of this point it averaged 91.7%.

Within the Red Root Creek Drainage, the water bodies in the northern portion of the drainage again differed with respect to grain size distribution from those in the southern portion. But unlike the Black Ditch Drainage, the upgradient water bodies had a higher average sand content. The average sand and gravel content of the sediment within the Area 18B and 18C streams was greater than 90%, while in Red Root Creek it was only 47%. The average grain size distribution of sediments collected in the Area 20 ditch and Area 8 pond was similar to that of average in Red Root Creek.

The Central Ditch Drainage exhibited minor grain size differences between the different water bodies sampled (Table 4-13). For example, the average sand and gravel content in the Central Ditch itself was 68.7%, as opposed to 79.6% in the contiguous upgradient ponded area, and 73.4% in the isolated freshwater ponded areas. The silt and clay fractions were accordingly similar.

The single sample collected from the isolated estuarine pond at location SW-1625 had a combined sand and gravel content of 40.1%, silt content of 40% and a clay content of 19.9%.

The sand and gravel content of the ditch within the Area 12 Drainage averaged 56.7%, and the silt and clay fractions were 31.9% and 11.4%, respectively.

Within the Old Red Root Creek Drainage, the average grain size distribution of sediment was similar in several of the individual water bodies sampled, such as the West Ditch, Old Red Root Creek and associated ditches (Table 4-13). When calculated for each of these individual features, the average combined sand and gravel content ranged between 50% and 60% over much of the drainage area. However, the dry tributary at the head of the drainage in Area 18, and the Southwest Ditch both had lower average sand and gravel percentages (47.5%, and 44.7%, respectively). The sediments collected in the southwestern portion of the Area 19 wetlands (locations SW-1904, SW-1905, and SW-1906) had a somewhat higher average sand and gravel content (68.2%). Average silt percentages for individual water bodies sampled within the drainage were similar, ranging from 25.3% to 41.9%, while average clay content ranged from 6.5% to 14.2%.

In the County Park Drainage, the combined sand and gravel content of the sediments averaged approximately 80% or higher in the four ditches sampled. The average silt fraction of these ditches varied from 0.7% to 19.7%, and the average clay fraction was fairly constant, varying from 1.2% to 3.6%.

4.7 AREA 10 SOIL SAMPLING RESULTS

Analytical results for the seven soil samples collected within Area 10 (County Park Drainage) are presented in Table 4-14 and Figure 4-51. Only compounds for which exceedances of the

NRDSCC were noted are listed in the table and figure; complete results are listed in Appendix C.

4.7.1 Volatile Organic Compounds

No VOCs were detected in surface soil at levels above NJDEP non-residential soil criteria (Appendix C).

4.7.2 Semi-Volatile Organic Compounds

Only benzo(a)pyrene was detected above NJDEP non-residential criteria in soils collected from the seven locations investigated in Area 10 (Table 4-14). Levels of this compound exceeded the non-residential criteria of 0.66 mg/kg at two locations (SS-1056A and SS-1060A) with levels ranging from 1.3 to 1.7 mg/kg.

4.7.3 Pesticide/PCB Compounds

No pesticide/PCB compounds were detected above NJDEP non-residential criteria (Appendix C).

4.7.4 Metals

Only arsenic was detected above the NJDEP non-residential criteria (Table 4-14). Arsenic exceeded the criterion of 20 mg/kg at location SS-1061A with a concentration of 56.6 mg/kg.

4.7.5 Explosives

No explosive compounds were detected in soil at the seven locations sampled within Area 10 as part of this investigation.

4.8 QA/QC REVIEW OF LABORATORY RESULTS

A QC summary for site-wide Phase II RI surface water and sediment data is presented in Appendix I. The QC review summarizes data versus CDAP compliance. A discussion of sample practical quantitation limits (PQLs) exceeding the applicable surface water and sediment quality guidelines is also provided in Appendix I.

All analytical holding times were met as defined in Tables 4-2 and 4-3 of the December 1993 CDAP, with the following exceptions:

- Lloyd Kahn Method: TOC analyses for 78 samples were performed past the EPA 14-day holding time requirement specified in the CDAP; however, 50 out of 78 samples were analyzed within the method-specified 28-day holding time.

- Method 8080: The re-extraction of sample SW-0602L was performed one day past the holding time specified in the CDAP; the original extract was lost in the extraction process. The extraction for sample FB-0610 was performed five days past the holding time specified in the CDAP.

- Method 8240: Analysis for SD-1803 were performed 12 days past the holding time of 10 days specified in the CDAP.

- Method 8270: Extractions for FB-0610 was performed five days past the holding time specified in the CDAP.

- Method 8330: Extractions for SD-1631 and SD-1614 were performed one day past the holding time specified in the CDAP, and extraction for sample SW-0408 was performed 13 days past the holding time specified in the CDAP.

- Method 9010: Analyses for SD-0403, SD-0407, and FB-0407 were performed one day past the holding time specified in the CDAP, and analyses for SD-0619L and SD-0620 were performed three days past the holding time specified in the CDAP.

All samples were analyzed for the correct analyte lists and met PQL's as defined in Tables 2-2 through 2-6 of the CDAP with the following exceptions:

- Method 6010/7000: Due to matrix interferences, several sediment samples were analyzed at various dilutions for antimony, arsenic, lead, selenium, and/or thallium. Quantitation limits were increased accordingly.

- Method 8080: Due to matrix interferences, several surface water and sediment samples were analyzed at various dilutions for pesticide/PCBs. Quantitation limits were increased accordingly. Samples SD-0604L, SD-1903 and sample SD-0603L were analyzed at various dilutions due to high concentrations of analytes. Sample SD-1902 was analyzed at 1:2 dilution due to the color of its extract. Quantitation limits were increased accordingly.

- Method 8240: Samples SW-1908, SD-0617L, and SD-0503 were analyzed at various dilutions due to high concentrations of target compounds. Due to matrix interferences, sample SD-1411 required 1:5 dilution. The quantitation limits were increased accordingly.

- Method 8260: Several surface water samples were analyzed at various dilutions due to sample foaming during the purging step and matrix interferences. Quantitation limits were increased accordingly.

- Method 8270: Sediment samples SD-0616L, SD-0617L, and SD-1908 were analyzed at various dilutions due to high concentrations of non-target compounds and matrix interferences. Quantitation limits were increased accordingly.

- Due to (1) sample dilutions, (2) less than optimum volume used for sample extraction, and (3) the CDAP-specified PQLs exceeding the applicable surface water quality criteria, various compounds and analytes were not detected in surface water samples at PQLs exceeding EPA Ambient Water Quality acute criteria established for freshwater and estuarine locations.

- Due to (1) sample dilutions, (2) the adjustment for sample moisture content required by analytical methods, and (3) the CDAP-specified PQLs exceeding the applicable sediment quality criteria, several semi-volatile compounds, pesticides, and PCBs were not detected in 54 estuarine sediment samples at PQLs exceeding NOAA ER-M values.

All laboratory blanks and field blanks were free from target compound and analyte contamination above the PQL's defined in the CDAP with the following exceptions:

- Some method blanks contained the common volatile contaminants acetone, methylene chloride, and 2-butanone (methyl ethyl ketone) at levels less than 5 times the CRQLs. These blanks were considered in control by the laboratory.

- Some method blanks contained the common phthalate contaminants at levels less than 3 times the CRQLs. These blanks were considered in control by the laboratory.

- A non-target contaminant was observed in the HxCDD window of the dioxin/furan method blank, 94LS0070-MB1. This compound did not resemble a dioxin, and was not observed in the associated sample.

- One metals preparation blank, 94L1348-MB1, contained aluminum at a concentration greater than the CRQL. However, all associated samples were found to contain aluminum at concentrations greater than 20 times the concentration found in the blank. As a result, data quality was not affected.

- The metals laboratory preparation blank, 94L1380-MB1, contained zinc at a concentration greater than the CRQL. Since the associated samples contained zinc at concentrations less than 20 times the concentration detected in the preparation blank, the samples were redigested (within their holding times) and reanalyzed. The metals laboratory preparation blank, 94L1394-MB1, contained zinc at a concentration greater than the CRQL. An associated

sample (SD-0407) contained zinc at a level less than 20 times the concentration found in the blank. The sample was redigested in preparation batch 94L1452 and reanalyzed.

- Field blank FB-0407 was found to contain methylene chloride at a concentration of 6 times the CRQL. Field blanks FB-1412 and FB-0505L contained chloroform at 2 times and 5 times the CRQL, respectively. Field blanks FB-0505L, FB-0610, and FB-1005 contained zinc at levels less than 2 times, 2 times, and 4 times the CRQL, respectively.

- Trip blanks collected in association with the surface water samples generally contained methylene chloride at concentrations less than 4 times the CRQL. TB-1601L contained methylene chloride at a concentration greater than 5 times the CRQL; however, since methylene chloride was not detected in the associated samples, the data quality was not affected.

The overall percent completeness for sediment samples (95.9%) for all methods exceeded the completeness goal of 95%. While the overall completeness for surface water and field blank samples (94.6%) did not meet the completeness goal, the total percent completeness for both the sediment and surface water field effort was 95.2% for all methods, which exceeded the project completeness goal of 95%. The calculations of completeness evaluated the laboratory-generated data and were independent of the data evaluation performed by TDMs.

All data generated by the laboratory were subjected to data evaluation performed by TDMS. Some surface water and sediment sample results were qualified as estimated (J) as a result of not meeting specific QC requirements. These results can be used "as is", as per NJDEP guidelines.

Due to low spike recoveries, the nondetections of tetryl in 23 surface water and 7 sediment samples; thallium in 28 surface water and 1 sediment samples; and selenium in 29 surface water samples were rejected. The non-rejected site-wide data indicate that in surface water, thallium and selenium were not detected at concentrations above the EPA Ambient Water Quality criteria. Therefore, thallium and selenium are not contaminants of concern in surface water. Sediment quality criteria are not available for tetryl, selenium and thallium. A surface water quality criterion for tetryl is also not available.

Due to blank contaminants, the detections of lead in 11 surface water samples and the detections of zinc in 7 estuarine sediment samples were rejected. The non-rejected results indicate that lead is not a site-wide contaminant of concern in surface water. Zinc was detected in 11 estuarine sediment samples at concentrations exceeding the NOAA ER-M values. The non-rejected estuarine sediment results are sufficient to evaluate the presence of zinc in this matrix. The non-detections of semi-volatile acid compounds in SW-1610 were rejected due to low surrogate recovery. The site-wide historical data indicate that they are not contaminants of concern.

Various compounds and analytes were not detected in surface water and sediment samples at PQLs exceeding the EPA Ambient Water Quality acute criteria and the applicable Ontario and NOAA sediment quality criteria, respectively. These PQL/standard exceedances were mainly due to the fact that those surface water quality criteria and sediment quality criteria were established in toxicity studies designed for evaluating ecological risk. Concentrations of contaminants predicted to cause potential environmental risk are often below achievable PQLs using methods designed for chemical analyses of environmental samples. The site-wide historical data indicate that the majority of the PQL/standard exceedances summarized in Tables 2, 3, and 4 of Appendix I are not contaminants of concern with the exceptions of PAHs in the estuarine sediment samples. Dibenzo(a,h)anthracene, anthracene, acenaphthene, fluorene, and 2-methylnaphthalene are the PAHs that were not detected in the majority of the sediment samples summarized in Table 4 of Appendix I. Although their PQLs exceeded the NOAA ER-M values; since the NOAA sediment quality criteria are based on a variety of studies using up to 21 PAHs to arrive at a total PAH value, other PAH results were used to evaluate whether or not PAHs in general were contaminants of concern.

In summary, overall data generated during the Phase II RI are sufficient to evaluate the extent of the site-wide surface water and sediment contamination.

SECTION 5.0

NATURE AND EXTENT OF CONTAMINATION

While several compounds were detected in sediment and surface water at the former Arsenal at concentrations exceeding regulatory criteria or guidelines, the following discussion focuses on "major" contaminants occurring with the greatest frequency and magnitude, and contaminants which have a discernible distribution pattern at the former Arsenal. A low frequency of "detects" or exceedances of regulatory guidelines in itself may not warrant exclusion of a contaminant from further investigation of potential ecological effects, especially if concentrations detected were clearly elevated, or the contaminant was detected in an area where other contaminants were present at elevated concentrations. For this reason, some compounds are described here in the context of specific areas of concern, such as the sulfur plant ponds, where the combined effects of multiple contaminants may warrant additional concern.

The following discussion is *not* intended as a determination of contaminants of potential concern at the former Arsenal, as this would require toxicological evaluation of each contaminant, which was outside the scope of the Phase II investigation. Rather, it is intended as a means of focusing discussion on contaminants which, based on exceedances of water quality standards or sediment quality guidelines, are likely to be of greatest ecological concern. Other compounds for which regulatory criteria or guidelines do not exist; or which do not demonstrate clear contamination patterns at the former Arsenal, will still be carried into a preliminary ecological screening assessment to determine their potential risk. The following discussion also focuses on potential contaminant source areas and specific locations at the former Arsenal which may warrant future investigation.

In some cases, the compounds discussed below (e.g. TCE, arsenic) were found at levels exceeding conservative, human-health based water quality criteria promulgated by the State of New Jersey, but were seldom present at levels exceeding the US EPA water quality standards for protection of aquatic life. For evaluating ecological risks, the US EPA water quality standards are more relevant.

5.1 TCE CONTAMINATION IN SURFACE WATER

TCE was the most frequently detected VOC which exceeded state or federal regulatory standards/criteria in surface water, being found on site at levels ranging from "non-detect" to a maximum value of 20 μg/L at locations SW-0101 and SW-1908. Regulatory exceedances for 1,2-DCE and 1,2-DCA were also noted, but only at locations SW-1815 and SW-1006, respectively. These compounds have a similar chemical structure, and may be considered degradation products of TCE.

The distribution pattern of TCE in surface water suggests multiple sources of contamination at the former Arsenal, since several of the areas in which it was detected are apparently not hydrologically contiguous. Three primary areas of potential concern regarding TCE contamination in surface water have been identified as a result of the Phase II investigation: Area 18B and 18C streams, Area 19 northwestern wetlands, and Black Ditch.

5.1.1 Area 18B and 18C Streams

The highest number of TCE exceedances of the NJDEP water quality standard occurred within the lower Area 18B and 18C streams, which also had some of the highest TCE concentrations of the surface water locations sampled at the former Arsenal. Exceedances of the NJDEP criterion were noted at seven of 12 locations sampled within the Area 18B stream (most within the lower portion), and at three of eight locations sampled within the Area 18C stream. TCE concentrations in these streams ranged from "non-detect" to 20 μg/L. These results are consistent with the OBG investigation[1] which detected surface water TCE concentrations of up to 22 μg/L (OBG location SW-1) in this area of the site. However, comparisons of these data to the interim US EPA water quality criterion, which are ecologically based, would result in no exceedances.

A former liquid disposal pond, referred to in prior reports[2] as a "tar pit" located in Area 18A represents a potential source area for TCE contamination within the Area 18B stream. This pond was reportedly a disposal site for tar, waste solvents, degreasers, and cosmoline (a vaseline-like grease). TCE has several uses, the most common of which is as a degreaser in metal degreasing plants[39]. Despite the fact that oily residues, sludge and grossly contaminated soils were removed from this area by the USACE in 1992-1993, residual TCE levels in soil were reported in the remedial report. Subsequent soil sampling conducted by WESTON in Area 18A detected TCE at low levels in surficial and subsurface soils located close to the groundwater level. In addition to the potential former pond source, this area formerly contained a vehicle maintenance garages operated by both the Army and the GSA, where TCE may have been used. Stormwater runoff into the Area 18B stream from non-point sources represents another potential source of TCE contamination.

Concentrations of TCE exceeding the NJDEP standard were also found in the Area 18C stream, but only at three of eight locations sampled. The TCE present in the Area 18C stream may have originated from a different source or sources from those contributing to the Area 18B stream contamination. Area 18C was historically used for landfilling, and is the former location of an underground storage tank which reportedly stored paint thinner/spirits. Runoff from non-point sources may have also contributed to TCE contamination in this stream. For example, location SW-1815 was the only location where the NJDEP standard was exceeded in the central tributary of the Area 18C stream, and was located just below a culvert leading from the nearby railroad tracks. The source of drainage flowing into this culvert is presently unknown.

5.1.2 Area 19 Northeastern Wetlands

TCE also exceeded the NJDEP surface water standard within the Old Red Root Creek Drainage, at all three locations sampled within the Area 19 northeastern wetlands. Surface water in this area is fed by runoff flowing through a ditch which originates from the western portion of Area 18. While TCE was not detected in sediment near the head of this ditch at SD-1801 or SD-1802, Area 18 cannot be ruled out as a potential source area, since surface water was not present at SD-1801 or SD-1802 during the August 1994 sampling event. It is possible that the TCE present in Area 19 has migrated from Area 18 during runoff periods. An alternative explanation is that the TCE detected in the Area 19 wetlands originated from a groundwater source, especially since surface water and groundwater in wetlands are often in direct communication. TCE was found in shallow groundwater in this vicinity[15]. Again, if TCE levels are compared to the interim US EPA chronic freshwater water quality criteria, no exceedances would result.

5.1.3 Black Ditch

TCE was also found in the upper portion of the Black Ditch at all four freshwater locations sampled at levels exceeding the NJDEP surface water standard. The levels found do not exceed the US EPA chronic freshwater water quality criterion. Potential sources for this contamination include stormwater runoff, and a TCE groundwater plume noted near the intersection of Fieldcrest Avenue and Raritan Center Parkway at monitoring well MW-40. Surface water runoff from off-site areas could also contribute to the TCE contamination present.

5.1.4 Natural Fate of TCE Contamination

The low levels of TCE detected in sediment (0.001 mg/kg to 0.015 mg/kg) and soil collected during the Phase II RI (0.005 mg/kg to 0.031 mg/kg) reflect the fact that TCE exhibits little adsorption to soil or sediment particles. TCE could thus be expected to quickly migrate into groundwater, or be transferred via surface water runoff into streams and wetland areas at the former Arsenal. In the case of Area 18, where the water table is close to the surface (10 feet or less), an interchange between these two migration routes is possible. TCE was detected in groundwater in Areas 18A, 18C, 18G, 1, 3, 8 and 10.

Once present in surface water, TCE can be expected to volatilize quickly due to its high vapor pressure[39]. In aquatic systems the half-life of TCE ranges from minutes to hours, depending upon the degree of turbulence[40]. This could explain the distribution pattern of TCE observed on site; with TCE concentrations elevated near source areas, but decreasing with increased distance downstream. The TCE exceedances observed at the former Arsenal were all in the northern third of the site, although TCE was detected elsewhere at lower levels.

Channel characteristics of streams such as the Area 18B and 18C streams, and the northern portion of Black Ditch are conducive to volatilization. These streams have steep banks, a coarse

sand and gravel bottom, and relatively straight channels. Field observations of channel characteristics and vegetation driftlines suggest that these are "flashy" streams with high velocity and sharply increased volume during major storm events, which tend to further increase volatilization rates. This may explain the lower TCE concentrations found at downstream locations such as in Red Root Creek.

TCE levels present at the former Arsenal are less than US EPA water quality criteria. Hence, adverse impacts to aquatic biota in the Area 18B and 18C streams, the upper Black Ditch, and the Area 19 northeastern wetlands as a result of TCE contamination are unlikely.

5.2 PAH CONTAMINATION IN SEDIMENT

Of the SVOCs detected in surface water, only phthalates and PAH compounds were detected at levels exceeding regulatory standards. Bis(2-ethylhexyl)phthalate exceeded water quality criteria at only two of 114 locations sampled (SW-0614, SW-1603). Individual PAH concentrations exceeded NJDEP surface water standards at only one of the 114 locations sampled (SW-1619).

PAH compounds occurred in sediment at levels greater than regulatory guidelines. Although sediment quality guidelines do not exist for a number of SVOC compounds, few other compounds were detected above their MDLs in sediment.

PAH compounds exceeded regulatory guidelines far more often in sediment than in surface water, a pattern which may be explained by their poor water solubility[41]. PAHs were detected in the sediment at concentrations greater than regulatory guidelines in every major drainage area of the site. At some locations, individual PAHs were detected at levels exceeding regulatory guidelines in sediment, but total PAH levels were not greater than the "total" guideline. In general, PAH compounds were collocated; therefore, their distribution pattern at the former Arsenal can be addressed collectively. Total PAHs in sediment exceeded sediment quality guidelines at 37 of 132 locations sampled at the former Arsenal, split almost evenly between freshwater and estuarine locations. In freshwater areas of the site, the Ontario SEL guidelines for total PAHs were exceeded at nine locations, all located within the lower Area 18B and 18C streams. At estuarine locations, total PAHs exceeded the NOAA ER-M guideline at locations SW-1103 (62.03 mg/kg) and SW-1619 (102.5 mg/kg). The areas with the greatest frequency and magnitude of sediment PAH contamination at the former Arsenal are the Black Ditch Drainage, Red Root Creek Drainage, and portions of the Old Red Root Creek Drainage.

5.2.1 Lower Black Ditch Drainage

In the upper portion of the Black Ditch Drainage (Area 4 Ditch, Area 5 Pond, freshwater portion of Black Ditch) total PAH concentrations exceeded the Ontario LEL guideline at one out of 15 locations sampled (SW-0403, 24.83 mg/kg). While concentrations of individual PAHs exceeded the Ontario LEL at eight locations, total PAH concentrations throughout the northern portion of

the drainage ranged from "non-detected" to 3.65 mg/kg, with the exception of location SW-0403.

Concentrations of total PAHs in the estuarine portion of Black Ditch ranged from 7.36 mg/kg to 28.19 mg/kg and were greater than the NOAA ER-L at all five locations sampled. The source of this contamination is unknown, but stormwater runoff from impervious surfaces such as parking lots, roadways and railroads in this area could contribute to these concentrations. According to prior studies[1,4] PAHs were not present at elevated levels in soil samples collected from this vicinity; however, PAHs were detected in soils at location SS-06B06 in the Phase II RI. This lower section of the drainage, with its higher TOC content and finer grain size, is apparently acting as a sediment sink for PAH compounds.

5.2.2 Red Root Creek Drainage

PAH contamination was found in both the upper portion of the Red Root Creek Drainage (Area 18B and 18C streams) as well as downgradient in the Area 8 Pond north of Olympic Avenue, in Red Root Creek itself, and in the sulfur plant ponds. PAH contamination was highest in the upper portion of the drainage.

5.2.2.1 Area 18B and 18C Streams

Total PAH concentrations in sediment collected at the former Arsenal were highest in the Area 18B and 18C streams within the upper portion of the Red Root Creek Drainage. All nine exceedances of the Ontario SEL guideline were in this area of the site, and total PAH concentrations exceeded the Ontario LEL quality guideline at 11 of 20 locations sampled in this area.

Total PAH concentrations in the Area 18B stream ranged from "non-detected" to a maximum value of 4,909 mg/kg at location SW-1804. The two highest concentrations were noted at SW-1803 and SW-1804, which are adjacent to the former disposal pond area in Area 18A. The Area 18B stream is also in the vicinity of Area 18D, where several fuel oil storage tanks (both above and below ground)[6] exist which could represent additional sources of PAH contamination. Also, the EPA underground storage tank research and development leak testing facility and a former maintenance garage, operated by both the Army and the GSA, are present in this area.

Concentrations of total PAHs in the 18C stream ranged from "non-detected" to 50.84 mg/kg. Potential sources of PAH contamination in this stream include stormwater runoff from both roadways and railroads in the area, and improper storage or disposal practices. Many of the surface locations within Areas 18D, 18E and 18G were apparently backfilled using crushed asphalt material, which could also be contributing to PAH levels in the 18C stream. PAHs were previously detected in soil in Areas 18D, 18E and 18G.

5.2.2.2 Lower Red Root Creek Drainage

PAHs exceeded the Ontario LEL at two of six locations in the Area 8 Pond (SW-0801 and SW-0802), with a maximum concentration of 31.68 mg/kg (duplicate sample SW-0807). These locations are toward the western end of the pond, which accepts stormwater runoff from Area 20, and a ditch located along Raritan Center Parkway which connects hydraulically with the northwestern corner of the pond. A sandy bank, apparently eroded from road runoff from Olympic Avenue, was observed in the southwestern corner of this pond, providing further evidence that runoff may contribute to the observed PAH levels. Olympic Avenue is used as an overflow parking area for events at the Raritan Center Exposition Hall. While this pond appears relatively undisturbed, some industrial debris (scrap iron) was noted as having been discarded into the pond.

Total PAH concentrations ranged from "non-detected" to 18.55 mg/kg, and exceeded sediment quality guidelines at 5 of 9 locations sampled in Red Root Creek. However, over most of the creek concentrations ranged from "non-detected" to 9.55 mg/kg. Red Root Creek is actively used as part of the stormwater management system of the Raritan Center Office Park. Other potential sources of PAH contamination are migration of contaminants from upstream areas such as the Area 18B and 18C streams, and the former landfill area near location SW-0601.

PAH contamination was also present in the sulfur plant ponds, but to a lesser extent. Total PAH concentrations exceeded the Ontario LEL guideline at only one (SW-0615) of six locations sampled, with a maximum concentration of 5.9 mg/kg.

5.2.3 Old Red Root Creek and Other Drainages

Total PAH concentrations ranged from "non-detected" to 102.5 mg/kg, and exceeded sediment quality guidelines at seven of the 39 locations sampled in this drainage. With the exception of locations SW-1619 and SW-1905, concentrations ranged from "non-detect" to 7.85 mg/kg.

Apart from the Area 18B and 18C streams, location SW-1619 (102.5 mg/kg) at the head of the Southwest Ditch had the highest total PAH concentrations detected in sediment at the former Arsenal. Total PAHs exceeded the NOAA ER-M guideline at this location, and the ER-L was slightly exceeded downstream at SW-1620 (4.14 mg/kg).

The source of PAH contamination at location SW-1905 (34.33 mg/kg) is uncertain. Scattered exceedances of individual PAH compounds were noted in Area 19, and part of this contamination (such as that detected at SW-1908) may have originated in Area 18. The total PAH concentration at SD-1802 (7.85 mg/kg) in the dry tributary exceeded the Ontario LEL guideline. This contamination may have originated from the former Area 18A disposal pond, Area 18 maintenance garages, or runoff.

Three locations in the associated ditches in Area 16 exceeded the NOAA ER-L guideline with concentrations ranging from 4.0 mg/kg to 5.27 mg/kg PAHs. This contamination may have originated from the railroad tracks running parallel to these ditches, or the fill material used to construct the railroad ballast.

Two locations in the eastern portion of the East Ditch Drainage had total PAH concentrations greater than regulatory guidelines. Total PAH concentrations at SD-1401 (3.85 mg/kg) and SW-1410 (2.48 mg/kg) exceeded the Ontario LEL guideline. This contamination could be due to deposition of dredge spoils in the vicinity, or off-site influences, since several industrial complexes are present in this area of the former Arsenal.

Total PAHs also were detected at concentrations greater than sediment quality guidelines at locations SW-1103 (62.03 mg/kg) and SW-1104 (8.37 mg/kg) in the lower portion of the Central Ditch. The source of these concentrations is unknown, but these locations are each within 15 feet of Dock Road. Individual PAHs at locations SW-1622 and SW-1623 within the Central Ditch Drainage exceeded the Ontario LEL, but total values were below the LEL guideline of 4 mg/kg.

Total PAH concentrations in the Area 12 ditch exceeded the NOAA ER-L guideline at SW-1202 (5.1 mg/kg) and SW-1203 (19.36 mg/kg). The source of this contamination may be due to runoff, as former railroad tracks and roadways are present in this area.

In the County Park Drainage, location SD-1003 (10.93 mg/kg) in the Open Lawn Ditch was the only location where total PAHs exceeded the Ontario LEL guideline, although individual PAH compounds exceeded guidelines at SD-1008.

5.2.4 Natural Fate of PAHs

The widespread extent of PAH compounds in sediment at the former Arsenal reflects their ubiquitous nature in the environment. In addition to being produced naturally as a consequence of forest fires, volcanoes, microbial synthesis, etc., man-made sources add a large portion of PAHs present in the environment[44]. PAHs are emitted from the iron, steel, coal and petroleum industries, as well as from manufacture of asphalt and coal tar, heating and power production, and internal combustion engines[44]. Since they may be transported aerially by adherence to soot particles, and are constituents of fuel oils and automobile exhaust, they are commonly encountered in industrialized areas such as the vicinity of the former Arsenal.

Unlike TCE, PAHs can be transported via adsorption to soil and sediment particles, since they are nearly insoluble in water. As a result, the major mechanism of transport of PAHs is expected to be surface water runoff, which could transport particulates, as well as oils, etc. on the water surface. This trend was observed in the analytical results from the Phase II RI, since

PAHs were found in soil and sediment, but at few locations in surface water and ground water.

Once present in surface water, PAHs in aquatic environments tend to bind to humic material largely because of their hydrophobic nature, as opposed to ionization, as in the case of metals[44]. This characteristic can be seen in the analytical results from the Black Ditch, where PAH concentrations closely follow TOC concentrations in the sediment. However, the overall pattern of PAH contamination at the former Arsenal suggests that TOC concentrations themselves are a poor indicator of PAH concentrations at the former Arsenal, since the proximity to potential point sources is the most important factor influencing contaminant distribution. For example, the highest concentrations of PAHs in the Red Root Creek Drainage were in the Area 18B and 18C streams, where TOC concentrations were lowest. However, in areas where PAHs are known to occur, TOC concentrations can be used as a preliminary means of identifying potential areas of ecological concern. Higher TOC concentrations should result in PAHs being less biologically available. In contrast, areas having high PAH concentrations and low TOC concentrations can be expected to present a greater potential ecological risk. This trend is reflected in the Ontario SEL guidelines, which are based on organic carbon in the sediment. All nine SEL exceedances were in the Area 18B and 18C streams, which reflects the relatively high PAH concentrations coupled with low TOC concentrations.

Of the individual PAH compounds found at levels greater than sediment quality guidelines in sediment collected at the former Arsenal, many are lower-molecular weight compounds which are known or suspected carcinogens. Biological effects of PAHs in aquatic environments are well documented[44], ranging from organismic effects (such as tissue lesions, etc.) to community-level effects. Due to their lipophilic nature[44], PAHs could be absorbed directly from the water column or sediment, or absorbed via ingestion of sediment. However, PAHs are not known to biomagnify.

5.3 PESTICIDE CONTAMINATION IN SEDIMENT

At the former Arsenal, heptachlor epoxide was the only pesticide/PCB compound detected in surface water at concentrations exceeding water quality standards. Seven compounds (heptachlor epoxide, 4,4-DDD, 4,4'-DDE, 4,4'-DDT, aldrin, dieldrin, and beta BHC) were present at levels above sediment quality guidelines.

5.3.1 DDT Compounds in Sediment

DDT compounds (4,4'-DDT, 4,4'-DDD and 4,4'-DDE) were detected in sediment, soil and surface water throughout the former Arsenal site. None of these compounds exceeded surface water standards, but all three were detected at levels exceeding sediment quality guidelines at scattered locations.

4,4'-DDD was detected at levels exceeding the Ontario LEL guideline (0.008 mg/kg) at 27 locations sampled on site with concentrations ranging from 0.006J mg/kg to 0.62J mg/kg. Levels of 4,4' DDE ranged from 0.002J mg/kg to 0.16 mg/kg. 4,4'-DDE met or exceeded and the Ontario LEL guideline of 0.005 mg/kg at ten freshwater locations, and the NOAA ER-L guideline of 0.002J mg/kg at 14 estuarine locations. Concentrations of 4,4' DDT ranged from 0.002J mg/kg to 1.3J mg/kg in sediment. 4,4'-DDT equaled or exceeded the Ontario LEL guideline of 0.007 mg/kg at 11 freshwater locations, and the NOAA ER-L guideline of 0.001 mg/kg at seven locations. DDT compounds were most frequently detected in the Red Root Creek and Old Red Root Creek Drainages, although concentrations of these compounds were greater than sediment quality guidelines at scattered locations throughout the site. Contamination by these compounds is possibly a result of past pesticide application, both on and off-site, as DDT was widely used in the 1950's and 1960's.

5.3.1.1 Red Root Creek Drainage

DDD, DDE and DDT were all exceeding the Ontario LEL at two locations (SW-1810 and SW-1811) in the area 18C stream. DDT also exceeded the Ontario LEL guideline at one additional location (SW-1813) in the 18C stream. 4,4 DDE also exceeded the LEL guideline at two of 11 locations sampled in the Area 18B stream. 4,4'-DDD concentrations in sediment exceeded the Ontario LEL guideline at two of 11 locations sampled in the Area 18B stream. Where detected, concentrations of all these compounds were less than 0.5 mg/kg.

DDD and DDE compounds were also detected in sediment within Red Root Creek itself, at concentrations greater than the NOAA ER-L and ER-M guidelines. 4,4'-DDD exceeded the NOAA ER-L guideline of 0.002 mg/kg at 5 locations, 2 of which also NOAA ER-M guideline of 0.02 mg/kg. 4,4'-DDE exceeded the NOAA ER-L guideline of 0.002 mg/kg at 4 locations, 2 of which also exceed the NOAA ER-M guideline of 0.015 mg/kg. 4,4'-DDD also exceeded the Ontario LEL guideline of 0.008 μg/L at one location.

In the sulfur plant ponds, 4,4'-DDT and 4,4-DDE concentrations exceeded the Ontario LEL guideline at two of six locations sampled, while 4,4'-DDD concentrations were greater than the LEL guideline at three of the six locations.

5.3.1.2 Old Red Root Creek Drainage

DDT compounds were detected in sediment at levels above sediment quality guidelines at several locations within the Old Red Root Creek Drainage, but no pattern of contamination was apparent. Again, concentrations of these compounds at all but two locations were less than 0.5 mg/kg. 4,4'-DDE exceeded sediment quality guidelines at seven of the 38 locations sampled, while 4,4-DDT exceeded the guideline at 6 locations and 4,4'-DDD exceeded the guidelines at nine locations. All three compounds (4,4'-DDT, 4,4'-DDE and 4,4'-DDD) exceeded sediment quality guidelines at location SD-1802, in the dry tributary within Area 18, location SW-1619

at the head of the Southwest Ditch, and at location SW-1906 in the Area 19 southwestern wetlands.

5.3.1.3 Natural Fate of DDT Compounds

The fact that DDT compounds were detected in sediment but not surface water or groundwater at the former Arsenal is consistent with the tendency of DDT to adsorb efficiently to detritus and humic colloidal material, primarily by hydrogen bonding[43]. Thus, the primary means of transport for DDT compounds at the former Arsenal is probably via runoff, which transports soil and organic particles. Once entering surface water bodies and shallow wetlands, particulates tend to settle out into finer sediments, especially those with a higher organic content. DDT, DDD and DDE are all insoluble and can persist for a long time in soils and sediments. The toxicological properties of DDT compounds, and their tendency to biomagnify in food chains are well documented[43].

5.3.2 Heptachlor Epoxide and its Natural Fate in the Area 18B and 18C Streams

Heptachlor epoxide concentrations exceeded water quality standards at two locations (SW-1803, SW-1804) in the Area 18B stream, near the former disposal pond within Area 18A. At the former Arsenal, heptachlor epoxide was detected in sediment at 19 locations, at concentrations ranging from 0.001 mg/kg to 3.6 mg/kg. Eleven of the 13 locations where sediment concentrations were greater than the Ontario Provincial guideline were located in the Area 18B and 18C streams. Six of these locations were greater than the "severe effect" level.

The highest concentrations of hepatchlor epoxide in sediment were also located at SW-1803 and SW-1804 near the former disposal pond. However, heptachlor epoxide concentrations also exceeded sediment guidelines at six of eight locations sampled in the 18C stream, and the source of this contamination is unknown. Once introduced into surface water, heptachlor can be transported via runoff, or adhere to sediment particles. Although it has a relatively low vapor pressure[32], its half-life in river systems has been reported as 3.3 days[32]. A freshwater bioconcentration factor of 2.3 was reported in the SCDM[33], indicating this compound has potential to bioaccumulate in freshwater organisms.

5.3.3 Aldrin Contamination and Natural Fate in Sediment

Aldrin concentrations detected in sediment collected at the former Arsenal ranged from 0.0021 mg/kg to 0.69J mg/kg. Aldrin concentrations in sediment were greater than sediment quality guidelines at seven of 132 locations. These included three locations in the Area 18B stream, near the former Area 18A disposal pond (locations SD-1803, SD-1804, SD-1805), where aldrin concentrations were greater than the Ontario "severe effect" guidelines. Aldrin was also detected at concentrations greater than sediment quality guidelines at one location within the East Ditch Drainage (SD-1401) and three locations within the freshwater ponds in the Central Ditch

Drainage, suggesting more than one source of this compound may exist. There are no known potential point sources for the aldrin contamination in the Central Ditch Drainage and East Ditch Drainage locations; suggesting that the aldrin detected may have been a consequence of past pesticide application. Aldrin was not detected in surface water, and its principal mode of transport at the former Arsenal is likely via adherence to soil particles transported by stormwater runoff.

Aldrin is highly toxic, and can easily bioaccumulate if available. BCF values of up to $1x10^5$ have been reported in the literature for freshwater organisms[32].

The fact that aldrin was detected in sediment from the freshwater ponds within the Central Ditch Drainage, but was not detected within the tidal ditches in this area may be related to its chemical characteristics. The half-life of aldrin in river systems has been reported as short as two days due to volatilization, however, in lake systems this figure was reported as 170 days[32]. Aldrin present in sediment within regularly flowing tidal ditches should volatilize faster than sediment in a static system such as the freshwater ponds in the Central Ditch Drainage.

5.4 METALS CONTAMINATION

5.4.1 General Distribution and Potential Sources of Individual Metals

Based on their frequency and magnitude of contamination at the former Arsenal, the following metals are discussed below in detail: lead, arsenic, copper, nickel, zinc, mercury, chromium, cadmium, and silver. Of these, lead, arsenic, chromium and cadmium were detected in prior investigations at levels exceeding NOAA sediment guidelines (Section 1.2.3). Other metals which exceeded regulatory criteria or guidelines at fewer locations will still be carried into a screening-level ecological risk assessment to evaluate their potential risk.

Lead, copper, arsenic, zinc and nickel were the most widespread metals, although other compounds such as mercury and chromium may also pose an ecological concern, especially at locations where several of these metals may co-occur. All of these metals exceeded regulatory criteria or guidelines more often in sediment than in surface water.

Several metals (lead, arsenic, copper, zinc) at the former Arsenal were collocated in both surface water and sediment, suggesting common sources or pathways of contamination. Potential site sources of metals contamination include disposal of dredge spoils (particularly within the East Ditch Drainage); Army training activities, such as the rifle range in Area 18 (Upper Red Root Creek Drainage); disposal of and potential deterioration of unexploded ordnance; and industrial activities at the former Arsenal site after the U.S. Army sold the property. The lower, tidal portion of the site has received stormwater runoff from non-DOD activities in the northern portion of the former Arsenal since at least 1963[8], with the amount of runoff steadily increasing with development of the Raritan Center Industrial Park.

In addition, several potential off-site sources of contamination exist within the immediate vicinity of the site which could influence metals levels in water and sediment. These include the Kin-Buc, Edison, and ILR landfills, and adjacent industrial facilities (past and present) involved in the manufacturing of steel, paint, and pesticides.

Iron and manganese exceeded surface water quality criteria at 10 and 20 locations, respectively, out of 35 locations at which these compounds were analyzed. Iron and manganese are not considered to be compounds of concern, since both of these metals occur at naturally high levels in wetland systems[42], and have been detected at high natural levels in soil and groundwater at the former Arsenal. Iron is also an essential nutrient for plant growth. The extent and distribution of metals are summarized below, followed by a discussion of physical areas of concern.

Lead

Lead was the most widely distributed metal occurring at levels greater than water quality criteria or sediment quality guidelines at the former Arsenal. Surface water lead concentrations at locations sampled ranged from non-detected to 487J μg/L. Lead concentrations exceeded state or federal regulatory standards at 57 of 114 locations, with lead levels less than 20 μg/L at 47 of these locations. Exceedances were noted within all seven drainage areas, but the most exceedances were at locations in the Old Red Root Creek, Central Ditch and Black Ditch Drainage.

In sediment, lead concentrations ranged from "non-detected" to 586 mg/kg at the former Arsenal, exceeding sediment quality guidelines at 87 locations of the 132 locations sampled for sediment, within all major drainages. At over two-thirds of the locations sampled on site, lead concentrations in sediment were less than 100 mg/kg. For comparison, the Ontario LEL and SEL guidelines are 35 mg/kg and 250 mg/kg, respectively, and the NOAA ER-L and ER-M guidelines are 35 mg/kg and 110 mg/kg, respectively.

Potential sources of lead contamination at the former Arsenal include ordnance handling areas, vehicle maintenance locations, dredge spoils in Area 14, railway areas, particulate fallout and stormwater runoff from developed areas. Since lead is a ubiquitous contaminant in industrialized areas, it is difficult to trace precise contamination pathways or to ascribe any single point source to observed contamination.

Arsenic

Arsenic concentrations in surface water at the former Arsenal ranged from "non-detected", to a maximum concentration of 945 μg/L at SW-1903, exceeding NJDEP human health-based water quality standards at 60 of 114 locations sampled. At most locations, arsenic concentrations were

below 20 μg/L. And hence are well below the US EPA chronic freshwater criterion of 190 μg/L, or marine chronic criterion of 36 μg/L.

Arsenic concentrations in on-site sediment ranged from "non-detected" to 186 mg/kg. Arsenic exceeded sediment quality guidelines at 60 of 132 locations sampled; of which 36 were exceedances of the Ontario freshwater LEL of 6 mg/kg, and 24 were exceedances of the NOAA ER-L guideline of 33 mg/kg. Most locations where arsenic concentrations exceeded quality guidelines were within the East Ditch Drainage, Area 4 Ditch in the Black Ditch Drainage, lower Red Root Creek Drainage (Area 8 pond, Red Root Creek, sulfur plant ponds), and Old Red Root Creek Drainage.

Arsenic, formerly used in the manufacture of pesticides[45], was detected throughout the Arsenal at several locations in surface water and sediment. At least some of the arsenic present on site is probably a consequence of past herbicide application by the Army to control vegetation growth at the former Arsenal. However, other industrial facilities formerly involved in the manufacture of arsenic pesticides are present within the vicinity of the site, so it is conceivable that the arsenic present is from multiple sources.

Copper

Copper concentrations ranged from "non-detected" to 817 μg/L in surface water collected at the former Arsenal. Copper concentrations exceeded the EPA chronic water criteria at 30 locations sampled. Fifteen exceedances were of calculated hardness-dependent freshwater criteria, and 15 were exceedances of the marine chronic criteria in estuarine areas. Exceedances were noted in all drainage areas, except for the Central Ditch.

Copper concentrations exceeded surface water criteria at fewer locations than arsenic or lead. Most copper exceedances in surface water were limited to the upper Black Ditch Drainage (Area 5 Pond, Area 4 Ditch), Red Root Creek Drainage (Red Root Creek, sulfur plant ponds) and Old Red Root Creek drainages.

In sediment, copper concentrations exceeded sediment quality guidelines at 85 locations, distributed over much of the former Arsenal. The pattern of locations where concentrations exceeded sediment quality guidelines was similar to that of lead, in that copper was found in sediments throughout the site. In fact, lead, copper and zinc concentrations in sediment were highly correlated. Site-wide copper concentrations in sediment ranged from "non-detected" to a maximum value of 2,850J mg/kg (location SW-1410), with the highest concentrations in the East Ditch Drainage.

The source of copper contamination at the former Arsenal is uncertain; although dredge spoils, stormwater runoff, and ordnance renovation activities (containing brass components) are potential contributing factors.

Nickel

Nickel concentrations exceeded calculated hardness-dependent EPA water quality criteria at 35 of 114 locations sampled at the former Arsenal. However, nickel exceedances of calculated EPA criteria were limited to the East Ditch, the northern portion of the Black Ditch Drainage, 13 locations within the upper Red Root Creek Drainage, two locations in the County Park Drainage, one location within the Area 12 Ditch, and one location within the Area 19 wetlands of the Old Red Root Creek Drainage.

Nickel concentrations in sediment ranged from "non-detected" to 163J mg/kg, exceeding sediment quality guidelines primarily in the East Ditch Drainage, the Area 8 Pond of the Red Root Creek Drainage, and scattered locations in the Old Red Root Creek Drainage. Nickel contamination within the East Ditch Drainage is likely a consequence of dredge spoil deposition, while the source of nickel contamination in these other areas is unknown.

Zinc

The EPA freshwater and marine criteria for zinc in surface water were exceeded at 26 locations sampled at the former Arsenal, including locations within every major drainage area except the Central Ditch and County Park Drainage areas. However, most exceedances were within the East Ditch, sulfur plant ponds, and scattered throughout the Old Red Root Creek Drainage area. Zinc concentrations exceeding criteria ranged from 5.2 μg/L to 6,940 μg/L.

Zinc concentrations exceeded sediment quality guidelines at 48 of 132 locations sampled, distributed over much of the former Arsenal site. The highest zinc concentrations in sediment were detected in the East Ditch Drainage at locations SW-1410 (1,120J mg/kg) and SW-1411 (1,110J mg/kg) in the unnamed tributary. Potential sources of zinc contamination at the former Arsenal include dredge spoils, surface water runoff, and ordnance renovation activities (brass components containing zinc).

Mercury

Mercury was detected in surface water at levels exceeding state or federal regulatory standards at 15 of 114 locations sampled at the former Arsenal, six of which were in freshwater portions of the site. Mercury concentrations on site ranged from "non-detected" to a maximum value of 5.4 μg/L at SW-1619. Regulatory exceedances were limited to the East Ditch Drainage, Black Ditch Drainage, the Old Red Root Creek Drainage, and one location (SW-2001) within the Red Root Creek Drainage.

Mercury concentrations in sediment sampled at the former Arsenal ranged from "non-detected" to 5.5 mg/kg at SD-1401. Mercury concentrations in sediment were greater than the Ontario LEL guideline of 0.2 mg/kg at 18 locations. These were primarily in the unnamed tributary in

the East Ditch Drainage, the Area 5 Pond and Area 4 Ditch in the Black Ditch Drainage, the Area 8 Pond and upper portion of Red Root Creek, the sulfur plant ponds, and the Area 19 forested wetlands.

Chromium

Chromium exceeded calculated freshwater hardness-dependent EPA chronic criteria at 10 locations sampled on the former Arsenal, with exceedance concentrations ranging from 4 μg/L to 264 μg/L.

Chromium was detected above sediment quality guidelines at 19 locations on the former Arsenal. Seventeen of these locations exceeded the freshwater Ontario LEL guideline of 26 mg/kg. Chromium concentrations in sediment exceeded this guideline throughout the East Ditch Drainage, as well as in the Area 4 Ditch within the Black Ditch Drainage, the Area 8 Pond, Red Root Creek and sulfur plant ponds in the Red Root Creek Drainage, and scattered locations in the Area 19 wetlands within the Old Red Root Creek Drainage. Concentrations exceeding the guideline ranged from 28.5J mg/kg to 1,110J mg/kg.

Cadmium

Cadmium levels in surface water collected at the former Arsenal ranged from "non-detected" to 18.1 μg/L, and exceeded the EPA hardness-based freshwater chronic criteria at seven of 114 locations sampled. Three of these exceedances were within the Red Root Creek Drainage, one within the Black Ditch Drainage and one was noted in the County Park Drainage.

Cadmium exceeded sediment quality guidelines at 19 locations on site. All but two of these were exceedances of the Ontario LEL guideline of 0.6 mg/kg. No SEL exceedances were noted. Locations with cadmium concentrations greater than the Ontario LEL guideline were limited in distribution to the East Ditch Drainage, Area 4 Ditch and Black Ditch in the Black Ditch Drainage, the Area 8 Pond, sulfur plant ponds, and SW-1803 (0.61 mg/kg) in the Red Root Creek Drainage, location SW-1909 (2.2J), SD-1901 (0.78 mg/kg) in the Old Red Root Creek Drainage and SD-1008 (2.5J mg/kg) in the County Park Drainage. Cadmium concentrations exceeding the Ontario LEL guideline at the former Arsenal ranged from 0.61 mg/kg to 10.2 mg/kg.

Silver

Silver exceeded EPA surface water quality criteria at seven of 114 locations sampled, with concentrations ranging from "non-detected" to 9.9J μg/L.

Silver concentrations in sediment exceeded sediment quality guidelines at 26 locations sampled on the former Arsenal. All of these locations exceeded the NOAA ER-L guideline of 1 mg/kg.

Fourteen of the 26 exceedances also exceeded the NOAA ER-M guideline (2.2 mg/kg). These locations were limited to the East Ditch Drainage, Red Root Creek, and to the southern portion of the Old Red Root Creek Drainage. Silver levels in site sediments ranged from "non-detect" to 21.9J mg/kg (location SD-1008) in the County Park Drainage.

5.4.2 East Ditch Drainage Metals Contamination

While metals such as arsenic, copper and lead were detected throughout the former Arsenal, the number of metals detected above water quality criteria or sediment guidelines can be used as an indication of potential physical areas of concern at the former Arsenal. Of the major drainage areas considered, more metals exceeded regulatory criteria or guidelines in the East Ditch drainage than any other drainage. This is likely due to the historical deposition of dredge spoils in this area from the Raritan River. Dredge spoils could be expected to contain a variety of contaminants resulting from past and present historical industrial activities upstream along the Raritan River. The following metals were detected in sediment above regulatory guidelines in this area: lead, arsenic, copper, nickel, zinc, and silver; as well as occasional exceedance concentrations of chromium, mercury, silver, cadmium and antimony. Although concentrations of these metals were variable, the collective metals burden in sediments sampled from within this area may be ecologically significant.

5.4.3 Black Ditch Drainage Metals Contamination

Several metals were detected at concentrations greater than sediment quality guidelines throughout the Black Ditch Drainage including lead, arsenic, copper, nickel, mercury, silver and zinc. While sediment contamination was apparent in Black Ditch, surface water exceedances were primarily within the Area 5 pond, and the one location sampled (SW-0406) in the Area 4 ditch. In the Area 5 pond, arsenic, copper, lead, mercury, nickel and zinc exceeding water quality criteria. In the Area 4 Ditch, the one location sampled containing water during the August 1994 sampling event had concentrations of arsenic, lead, copper, nickel, chromium, thallium and zinc which were greater than water quality criteria. Relatively few water quality exceedances were noted in the Black Ditch itself; although mercury, lead, nickel and zinc were the most common metals exceeding criteria.

The source of metals in the above areas could be related to past deposition of dredge spoils and surface water runoff. Surface water runoff is a likely influence on metals contamination in the Area 4 Ditch, since several industries are located nearby and the ditch itself is close to roadways and railroad tracks.

5.4.4 Lower Red Root Creek Drainage Metals Contamination

The Area 8 Pond contained concentrations of several metals in sediment exceeding regulatory criteria. These included lead, arsenic, copper, zinc, nickel, copper, chromium, and mercury. Of these, lead, nickel and arsenic were detected at exceedance levels in surface water.

Concentrations of several metals (lead, arsenic, copper, nickel, zinc, chromium, mercury and silver) exceeded sediment criteria throughout Red Root Creek. Potential sources of this contamination include stormwater runoff and the stockpiled soil and railroad areas near locations SW-0601 and SW-0602. Lead, arsenic, copper, zinc and silver were found at exceedance concentrations in surface water, but a much smaller number of exceedances were noted in surface water than sediment. The relatively high TOC concentrations and grain size distribution of close to 50% fine particles suggests contaminants in this area may be less available for bioaccumulation, at least from the water column.

In contrast, several metals detected at levels exceeding sediment quality guidelines in the sulfur plant ponds (lead, arsenic, copper, nickel, mercury, zinc, chromium and cadmium) were present at higher concentrations. Several of these metals (arsenic, cadmium, chromium, copper, lead, nickel, silver and zinc) occurred in surface water at exceedance levels as well. Some, such as zinc (3,280J μg/L to 6,940 μg/L), occurred in surface water at their highest concentrations on site. Given the low pH, low TOC and high sand content of the sediments in these ponds, metals would be expected to be available, and hence potentially more toxic to aquatic biota.

5.4.5 Old Red Root Creek Drainage Metals Contamination

Concentrations of several metals (lead, arsenic, copper, nickel, mercury, zinc, silver, cadmium chromium, and antimony) were detected at levels exceeding sediment quality guidelines in the Old Red Root Creek Drainage. However, the most contaminated sediment (based on the number of metals exceeding guidelines) was located in Old Red Root Creek itself, and the Southwest Ditch, and SW-1903 and SW-1909 in the wetlands north of Old Red Root Creek.

There were far fewer exceedances of water quality standards than sediment guidelines, with lead and arsenic being the most consistently detected metals at exceedance levels. Arsenic levels in surface water were less than 30 μg/L in most of the area. Although these levels exceed the FW-2 and SE-1 criteria, they are well under the EPA chronic fresh and marine criteria of 36 and 69 μg/L. Lead concentrations in contrast, exceed the EPA water quality criteria throughout the drainage.

The source or sources of metals contamination in the Old Red Root Creek drainage are unknown, but this area accepts stormwater runoff from the northern portion of the site. Also, the area of the "associated ditches" is crossed by a series of parallel railroad tracks. Both runoff

from the tracks, as well as fill material used for the ballast may contribute to metals concentrations in the sediment.

5.4.6 Natural Fate of Metals in Surface Water and Sediment

While properties of individual metals can affect their mobility and uptake, metals transport from soil and the land surface at the former Arsenal can be expected to be via surface water runoff, erosion, and percolation into groundwater. Once present in aquatic systems, the chemical fate of metals is affected by a complex interaction of chemical variables such as surface water and sediment pH, hardness, salinity, sulfides, organic content, physical variables such as grain size of the sediment and biological processes such as microbial transformation and degradation[21,35,44,45,46]. Metals present in aquatic systems can be present as part of the total solids fraction, dissolved in the water column, bound to sediment, and may be transported via tidal action, erosion of tidal ditches, and stormwater flow. They may also be accumulated by plants and their subsequent animal consumers.

Data from the Phase II RI investigation showed little relationship between sediment pH, sediment TOC or sediment metals concentrations and the metals concentrations in surface water. However, these results are not unexpected, given the complexity of metal chemistry in aquatic systems, and the fact that surface water in the southern, tidal portion of the site is constantly changing and mixing with surface water from areas beyond the immediate sample vicinity.

Focusing on the sediment data alone, concentrations of several metals were clearly related to the TOC concentrations in the sediment. While correlation coefficients were often weak, graphs showing the relationship between sediment metals concentrations and TOC show that where metals concentrations were high, TOC concentrations were also high. These results suggest that at several locations the metals present in the sediment are bound to organic carbon.

Grain size can also affect availability, and hence toxicity of metals in the sediment. While concentrations of several metals in sediment were positively correlated with the percentage silt and clay in the sediment, and negatively correlated with the sand content, correlation coefficients were again low, indicating variability in the relationship.

TOC and grain size data can be used in conjunction with metals concentrations in sediment to identify potential physical areas of concern. Much of the northern portion of the site had a higher sand and gravel content, which would tend to bind contaminants to a much lesser extent than the fine silts and clays in wetland areas of the site. In this area, metals would be expected to be exported downstream more quickly from the system. For example, in the County Park Drainage the sand and gravel content was 80% or higher in the four ditches sampled. Comparable results were noted for sediments collected in the northern portion of the Black Ditch Drainage, and in the Area 18B and 18C streams. Less metals contamination was noted in these areas.

In contrast, areas on site with finer-grained sediments could potentially act as contaminant sinks, with the degree of ecological risk difficult to predict, since availability is affected by a number of variables. Wetland areas, especially stagnant, shallow inundated areas, allow contaminants in surface water to settle out and adhere to the fine sediments and organic material which are often present in these systems. Some of the most contaminated locations on site were located within relatively stagnant wetland areas. These included location SW-1903, in a shallow drainage ditch in the forested wetland within Area 19, location SW-1619, located in the shallow ponded area at SW-1619 near the head of the Southwest Ditch, location SW-1410, in a Phragmites stand at the upper portion of the unnamed tributary in the East Ditch Drainage, and location SW-1602, located in a marsh near the base of a soil stockpile and railroad yard near the upper portion of Red Root Creek. While contaminant concentrations are higher in these areas, they are not necessarily available for uptake, since finer-grained sediments with high amounts of organic material tend to make contaminants less available.

Areas which are more likely to pose a risk to ecological systems have high metals concentrations (probably due to their proximity to source areas), coarse grain size and low TOC concentrations. Examples at the former Arsenal site are the sulfur plant ponds, and most sediments within the Central Ditch Drainage, where the average sand and gravel content was close to 70% throughout. Metals detected in these areas would theoretically be highly mobile and available.

5.5 EXPLOSIVES IN SURFACE WATER

Explosives compounds were detected only in surface water, and at low levels. Levels of amino DNT ranged from 0.25 to 1.4 ug/L, and were limited to the Black Ditch Drainage. No federal or state water quality standard exists for this compound, and toxicity testing data were unavailable.

1,3,5-Trinitrobenzene was detected near the former disposal pond in Area 18A (location SW-1804, 0.15 ug/L). 2,4,6-Trinitrotoluene (TNT) was detected in two water samples from the same area (SW-1803 and SW-1804) collected from the Area 18B stream at 0.140 μg/L and 2.8 μg/L, respectively. This compound was also detected within the Black Ditch Drainage at Area 5 Pond (SW-0501, 0.410 μg/L), and at one location within Black Ditch (SW-0408, 0.650 μg/L).

Levels of explosives found in surface water in the Phase II RI are much lower than previous concentrations reported in previous investigations (Section 1.2.3). While toxicological data were not found for many of these compounds, 2,4,6-TNT and 1,3,5-trinitrobenzene concentrations were well below the lowest LC_{50} values of 1.1×10^3 μg/L and 1.2×10^3 μg/L respectively, noted for these compounds in freshwater.

5.6 SPECIFIC SAMPLING LOCATIONS OF POTENTIAL CONCERN

A review of analytical results identified the following individual sampling locations as having a higher level of contamination than other locations sampled at the former Arsenal, as measured by the frequency and magnitude of contaminants detected:

- Location SW-1410 near the head of the unnamed tributary within the East Ditch Drainage had elevated levels of metals and PAH compounds in sediment and surface water. Location SW-1407 in the East Ditch also had elevated levels of these compounds. Samples collected at both of these locations were from slowly flowing ditches within Phragmites stands, and having sediments with high silt and organic content. In the case of SW-1407, an oily sheen was observed emanating from the sediment when it was collected with the auger from below the water surface, and a noxious odor (not hydrogen sulfide) was evident.

- Location SW-1203, near the base of the Area 12 Ditch, had elevated levels of metals and PAH compounds, primarily in sediment. Although there is no flood gate regulating tidal flow into the Raritan River below this location, this portion of the ditch appeared fairly stagnant, with algal mat evident on the surface of the water.

- Locations SD-1803 and SD-1804 in the Area 18B stream (upper Red Root Creek Drainage) had elevated levels of organics, particularly VOCs such as TCE, PAH compounds and pesticides (4,4' DDD, heptachlor epoxide, and others), primarily in surface water. These two locations were adjacent to the former Area 18A liquid disposal pond.

- Location SW-0602, near the filled area within the marsh toward the upper end of Red Root Creek had concentrations of metals and several other compounds which were higher than those further downstream in Red Root Creek. The source of the fill material used in this vicinity is presently unknown.

- Locations SW-0610 to SW-0615 in the sulfur plant ponds had levels of metals in surface water and sediment which in some cases were higher than any other location at the former Arsenal. High concentrations of zinc, chromium and other metals were found in surface water, and the pH was recorded at 2 during the August sampling event.

- Location SW-1619, in a shallow wetland area near the head of the Southwest Ditch, was one of the most contaminated locations identified on site. This location was located toward the end of a railroad spur, and had elevated levels of several metals and PAH compounds in both surface water and sediment.

- Location SW-1903, in a stagnant ditch in the forested wetland within Area 19, had the highest arsenic concentration on site in surface water. Elevated levels of metals and PAHs were also detected in sediment at this location.

SECTION 6.0

CONCLUSIONS AND RECOMMENDATIONS

6.1 PHYSICAL SITE CHARACTERIZATION

The results of the Phase II RI surface water and sediment investigation indicate that most of the southern two thirds of the former Arsenal consists of tidal estuarine wetlands dominated by common reed-grass (*Phragmites communis*), while most portions of the northern third of the site which have not been developed consist primarily of palustrine (freshwater) forested and emergent wetlands. Site drainage is in a southerly direction toward the Raritan River. Surface waters on site are classified by NJDEP as freshwater (FW-2) or estuarine (SE-1). The dividing line between freshwater and estuarine areas of the site corresponds approximately with the 100-year floodplain, except that past activities in the eastern portion of Area 16 and in Area 14 have altered surface hydrology so that waters over much of these areas are no longer estuarine.

On the basis of field reconnaissance and review of aerial photography, seven major drainage areas were identified according to present surface flow patterns. These are the East Ditch Drainage, Black Ditch Drainage, Red Root Creek Drainage, Central Ditch Drainage, Area 12 Ditch Drainage, Old Red Root Creek Drainage and County Park Drainage. All site drainage discharges to the Raritan River. The East Ditch Drainage encompasses the northeastern portion of the site near Area 14. Runoff flows through the East Ditch, and a parallel unnamed tributary near the eastern boundary of the site southward into the Raritan River. The Black Ditch Drainage includes the area immediately upgradient of Black Ditch, including the Area 4 Ditch, Area 5 pond and Black Ditch itself. The Red Root Creek Drainage encompasses the streams within Area 18, the pond in Area 8, and Red Root Creek. The Central Ditch Drainage is located in the south central portion of the site in Areas 11 and 16, consisting of the Central Ditch and a number of freshwater and estuarine ponds in the vicinity. The Area 12 Ditch Drainage consists of the small "Area 12 Ditch" running into the Raritan River along the eastern edge of Area 12, and a second ditch flowing east to west within Area 12 into the Southwest Ditch. The Old Red Root Creek Drainage accepts runoff from the north central portion of the site. Old Red Root Creek flows outward to the Raritan River via the West Ditch, and a number of parallel, associated ditches in the southwestern portion of the site. The County Park Drainage accepts runoff from a network of ditches within Thomas Edison County Park and the Middlesex County College. This runoff is channeled off-site through an unnamed ditch running along the outer western site boundary. While the boundaries of these major drainages are not discrete, they indicate general surface water pathways for the potential flow of contaminants.

6.2 SURFACE WATER CONTAMINATION

The results of the previous Phase I investigation and the site-wide Phase II surface water/sediment investigation indicated that TCE, PAHs, heptachlor epoxide, and metals (arsenic, lead, copper, nickel, zinc, cadmium, chromium, mercury) were the compounds most frequently detected above surface water quality standards in areas sampled at the former Arsenal. Concentrations of the compounds exceeded NJDEP surface water quality standards, EPA surface water quality criteria, or both. Other compounds were detected which exceeded water quality criteria at fewer locations, or which do not have published water quality standards. These compounds may still potentially pose an ecological risk and will be evaluated along with the above compounds in a Tier 1 screening-level ecological risk assessment.

Analytical concentrations of contaminants were compared to NJDEP surface water quality standards or EPA water quality criteria, whichever value was less for a given compound. While the EPA criteria are based on chronic and acute effects to freshwater and marine life, the NJDEP standards for some compounds, such as arsenic, are based on conservative human-health based criteria intended to minimize cancer risk from ingestion of potable water. In these cases (e.g. arsenic, TCE) the US EPA water quality criteria are more relevant indicators of potential ecological risk.

While concentrations of several metals exceeded surface water quality criteria, these values represent total recoverable metals, which do not provide an accurate indication of the actual fraction of metals available for biological uptake. The potential for metals uptake is more accurately measured by the dissolved metals in the water column.

6.3 SEDIMENT CONTAMINATION

In sediment, concentrations of PAHs, DDT compounds, heptachlor epoxide, aldrin, and metals (arsenic, lead, copper, nickel, zinc, cadmium, chromium, mercury, silver) may be of potential concern in selected areas of the site. Sediment concentrations of these contaminants exceeded sediment quality guidelines. Other compounds exceeding sediment quality guidelines at fewer locations, such as Aroclor 1260, or for which sediment quality guidelines do not exist, will still be evaluated for ecological risk during a screening-level risk assessment.

Analytical results from freshwater areas were compared to Ontario Provincial sediment quality guidelines and results from estuarine areas were compared to NOAA sediment guidelines. These guidelines are not enforceable regulatory standards, but are based on the current limited body of evidence of sediment contaminant effects on ecological systems. Hence, exceedances of these guidelines merely represent *potential* areas of concern, and should be interpreted with caution.

Physical characteristics of sediment affecting contaminant mobility, such as total organic content, grain size, and pH, varied widely across the former Arsenal. Most of the streams located in the

northern third of the site are characterized by sand and gravel bottoms, steep channels and water levels less than one foot deep. Wetland areas in the northern portion of the site generally have a higher silt and organic content, and may act as contaminant sinks. Estuarine locations on site also have high amounts of silt, clay and organic matter which would tend to bind contaminants.

6.4 RECOMMENDATIONS FOR FURTHER INVESTIGATIONS

The surface waters which were sampled during the Phase II investigation accept stormwater runoff from on-site and off-site locations. The former Raritan Arsenal site and adjacent areas have also experienced 32 years of extensive construction, development and industrial/commercial and other uses since the Raritan Arsenal was closed in 1963; extending the potential sources of contamination substantially beyond historical DOD source areas. In addition, several of the compounds which have been identified as exceeding water quality criteria or sediment quality guidelines as a result of the Phase II investigation (TCE, PAHs, pesticides, metals) are common contaminants found within many industrialized and developed areas of New Jersey. No previous studies have been conducted to evaluate *Raritan River* contaminant concentrations for comparison to the contaminant concentrations detected on site, or to the regulatory screening criteria/standards referenced in this report.

Contaminants present at concentrations exceeding either surface water standards/criteria or sediment quality guidelines do not immediately warrant remediation or ecological concern. In many cases the criteria were adopted with other intentions (e.g. effluent regulation or drinking water criteria), or were developed on the basis of incomplete information or using data from a variety of studies unrelated to the Raritan Arsenal investigation. The intent of comparing analytical results to these published criteria/guidelines is to help focus the future ecological risk assessment toward specific contaminants and potential areas of concern at the former Arsenal. It is recommended that the following general investigations be carried out to further evaluate potential ecological risks posed by sediment and surface water contamination at the former Arsenal. The purpose of these proposed activities will be to determine whether the compounds detected pose an unacceptable environmental risk and to what extent they are attributable to past DOD activities at the site.

- A tiered ecological risk assessment should be initiated in order to further evaluate the potential toxicity of compounds detected in surface water and sediment at the former Arsenal. The first tier or phase of this risk assessment (Tier 1) would be a "screening-level" assessment aimed at conservatively estimating potential ecological risks posed by contaminants which are present at levels exceeding surface water quality criteria or sediment quality guidelines, or contaminants for which no such criteria or guidelines exist, yet were detected above their respective MDLs.

- Any compounds detected at levels not exceeding current ecologically-based criteria or guidelines would be dropped from the screening level assessment. The most up-to-date

water quality and sediment criteria will be used in this assessment, including metals criteria based on dissolved metals levels promulgated by US EPA in 1995.

- The screening level assessment will be conducted by drainage area for each of the seven drainage areas identified at the former Arsenal (see Section 2.1) to determine which contaminants present are of ecological significance. In addition to the calculation of screening hazard quotients on a per drainage basis, additional information on the frequency, extent, distribution pattern (or lack thereof), potential sources, and levels of contaminants within the Raritan River watershed measured in prior unrelated studies conducted by others (US EPA, NJDEP, Rutgers University) will contribute to evaluation of whether any compounds should be excluded from further consideration as potential contaminants of ecological concern.

- The screening level assessment will be used to identify a list of contaminants of potential concern and contamination "hot-spots", which will be further evaluated to determine whether or not they may be related to DOD or non-DOD activities. Due to 32 years of non-DOD activity at the former Arsenal and the potential for off-site sources to contribute to the observed contaminant levels in surface water and sediment, further evaluation of contaminant source areas is required. A records search/review, interviews, and site inspections of potential non-DOD contamination will be conducted. A more detailed identification of the stormwater collection and distribution system layout for the developed portions of the former Arsenal is also recommended, as very limited information has been provided by landowners or Edison Township officials. As recommended in the draft ROI for the Area 14 soil investigation, additional research is required to determine the exact nature and circumstances related to the historical dredging/filling operations which have impacted Areas 11, 12, and 14. The results of this research will determine whether dredge areas qualify under DERP guidelines for DOD-lead remediations. Existing studies conducted within the Raritan River watershed will be reviewed to determine levels of contaminants recorded elsewhere within the watershed in order to evaluate whether compounds recorded at the Raritan Arsenal are actually linkable to the site.

- If the conservative Tier 1 "screening level" results were inconclusive or predicted adverse effects from DOD-related contaminants, then the objective of a second tier ecological risk assessment would be to conduct appropriate site-specific studies to test or further resolve the extent of ecological effects posed by DOD-related contaminants, and to ultimately establish site-specific cleanup levels for contaminants of concern. Tier 2 studies might include toxicity testing or other field studies directed at ascertaining site-specific risk levels.

- Raritan River sampling should be undertaken to facilitate interpretation of the site-specific sampling results. This should be done over a complete tidal cycle. This

information will be used in the future to evaluate the feasibility of cleanup of different contaminants. If necessary, it would also be used to develop potential cleanup criteria for potential remedial activities within tidally affected areas, since the Raritan River may be a continuing source of contamination at these locations. Results of a 1988 study by McLaughlin suggest that background levels of contaminants such as lead in the Raritan River may potentially contribute to surface water concentrations of these metals in tidally-influenced areas of the former Arsenal.

- Development activities and plans for the Raritan Center Industrial Park and other areas within the former Arsenal should be identified. Decisions related to future investigation and potential remediation at the former Arsenal should take these plans into consideration, as construction activities undertaken during and following the completion of the sediment and water investigation have resulted in further alteration of site hydrology and have potentially affected contaminant migration and transport. Examples of such activities include filling the Area 20 Ditch, wetland creation/mitigation activities in the northeastern portion of Red Root Creek and ongoing fill activities in Area 14.

6.4.1 Specific Areas of Potential Concern

Specific potential areas of concern for surface water and sediment and conclusions and recommendations regarding them are described below. Except for additional investigations related to the Work Plan Addendum or unfinished Area 12 sampling, further investigation of areas of concern will be contingent upon the results of the general investigations proposed in Section 6.4.

- It is recommended that the ecologically-based EPA criteria be used in evaluating potential risks posed by surface water contamination in cases where the only NJDEP standards available are based on conservative human-health assumptions. This includes compounds such as TCE, arsenic, and others.

- TCE concentrations in surface water exceeded the NJDEP FW-2 surface water quality standard of 1.09 μg/L at 17 of 114 locations sampled, all of which were freshwater locations. This standard is a conservative human-health based value, designed to minimize the likelihood of cancer from ingestion of potable water. If analytical results were compared to the more realistic EPA surface water quality criteria for protection of aquatic life (45,000 μg/L acute freshwater and 2,000 μg/L acute marine), then none of the 114 locations sampled on site would exceed the criteria. While EPA chronic criteria do not yet exist for TCE, use of the interim value of 21,900 μg/L for freshwater chronic effects would still greatly exceed any TCE concentration detected in surface water on site. TCE concentrations in surface water ranged from "non-detected" to 20 μg/L, far less than the interim US EPA ecologically-based water quality criterion. Potential areas of concern where TCE concentrations exceeded the NJDEP

water quality standard include the Area 18B stream (7 of 12 locations sampled), the Area 18C stream (3 of 8 locations sampled), the Area 19 northeastern wetlands (3 of 3 locations sampled), and the freshwater portion of Black Ditch (4 of 4 locations sampled).

- The highest TCE concentrations on site were noted in the Area 18B stream near a former liquid waste disposal pond in Area 18A. The pond was remediated by the Omaha District of the USACE in 1992-1993. Phase II RI soil sampling conducted by WESTON in Area 18A detected TCE at low levels in surficial and subsurface soils located close to the groundwater level, indicating that significant soil sources appear to have been removed by the Omaha District or that nearly all TCE in the Area 18A has volatilized or moved into groundwater. TCE levels were lower in sediment than in surface water, reflecting its poor adsorption to sediment and soil. The presence of this compound at scattered surface water locations with little hydraulic connection, and near apparently separate groundwater contamination plumes, suggests its presence may be due to multiple sources. Further investigation of the influence of groundwater TCE contamination on the Area 18B and 18C streams may be warranted, as is additional investigation of potential point sources and surface runoff sources, both on and off-site, for each area of concern.

- PAHs were present in sediment at levels exceeding Ontario Provincial and NOAA sediment quality guidelines. These compounds were generally collocated in sediment samples collected on site. Total PAH concentrations were greater than sediment quality guidelines (total PAH guidelines) at 36 of 132 locations sampled at the former Arsenal, with concentrations of total PAHs ranging from "non-detected" to 4,909 mg/kg. However, at 27 of the 36 locations of potential concern, concentrations of total PAHs were less than 30 mg/kg. PAH levels in the lower Black Ditch Drainage, Area 18B and 18C Streams and lower Red Root Creek Drainage, Old Red Root Creek Drainage, and scattered locations within the East Ditch, Central Ditch, Area 12 Ditch and County Park Drainages may be of concern. Sources of PAH contamination on site include the former disposal pond in Area 18A, dredge spoils, construction activities, and runoff from railroad tracks, roadways and impervious surfaces. Further evaluation of potential point-sources should be conducted.

- Several metals, including lead, arsenic, copper, nickel, zinc, chromium, mercury, silver, cadmium and others exceeded regulatory standards or criteria in surface water. Of these, arsenic, lead and copper had the widest distribution of exceedances at the former Arsenal. Fewer regulatory exceedances were noted for surface water than for sediment. Metals from dredge spoils in the vicinity of the unnamed tributary in the East Ditch Drainage have apparently affected surface water metals levels, as arsenic levels exceed the NJDEP FW-2 water quality standard in this area.

- Lead, arsenic, copper, nickel, zinc, chromium, cadmium, and mercury also exceeded sediment quality guidelines at several locations sampled. Several metals, such as lead, copper and zinc are highly collocated in sediment, suggesting common sources of contamination, such as dredge spoils and stormwater runoff. The areas of metals contamination at the former Arsenal which are of the greatest concern are the East Ditch Drainage, Black Ditch, lower Red Root Creek Drainage, and Old Red Root Creek. Concentrations of most of the metals detected were between the Ontario LEL value and SEL values at most freshwater locations, and between the NOAA ER-L and NOAA ER-M guidelines at most estuarine locations. Sediments within surface water features around Areas 11, 12 and 14 dredge spoil depositional areas appear to be more highly contaminated with metals, both in terms of concentrations as well as the number of metals compounds detected.

- Arsenic concentrations in sediment and surface water may be partly related to application of herbicides at the former Arsenal for vegetation control. The degree of risk from arsenic contamination at the former Arsenal from surface water contamination has been assessed extremely conservatively, due to the use of the only available NJDEP surface water standards of 0.017 μg/L for FW-2 and 0.136 μg/L for SE-1 waters respectively. These represent human health derived standards based on minimization of cancer risk from drinking water. The surface waters at the site could not be reasonably utilized for drinking water, and the saline, tidal portions of the Raritan River are not subject to drinking water use. Comparison of surface water arsenic results with more realistic EPA criteria (190 μg/L and 360 μg/L freshwater chronic and acute, respectively, and 36 μg/L and 69 μg/L marine acute and chronic, respectively) instead of the NJDEP FW-2 and SE-1 standards would result in a far fewer number of exceedances. Exceedances of the EPA marine chronic criteria are limited to 6 locations, while no exceedances exist of the EPA freshwater criteria. Furthermore, only one of these locations, SW-1903 (945 μg/L) would exceed the EPA acute freshwater criterion of 360 μg/L. Thus, it is recommended that the more realistic, ecologically-based US EPA water quality criteria be used for determination of potential effects.

- Heptachlor epoxide was the only pesticide compound detected above its MDL in surface water. It was detected at levels exceeding the NJDEP FW-2 water quality standard (0.0038 μg/L) at SW-1803 (0.03 μg/L) and SW-1804 (0.061 μg/L) in the Area 18B stream. These two locations are adjacent to the former liquid disposal pond in Area 18A. Heptachlor epoxide was also detected in sediment at 13 of 132 locations sampled at levels exceeding the Ontario Provincial sediment quality guideline. Eleven of these locations were within the Area 18B and 18C streams, and concentrations at six of these 11 locations exceeded the Ontario Provincial "severe effects" level. The potential sources and ecological effects of heptachlor epoxide contamination in this area may require further investigation, pending results of the Tier 1 screening-level assessment.

- DDT compounds (4,4'-DDD, 4,4'-DDE, 4,4'-DDT) were the most frequently detected pesticides in sediment collected at the former Arsenal. Concentrations of these compounds exceeded sediment quality guidelines at scattered locations, primarily in the Old Red Root Creek, Red Root Creek and Black Ditch Drainages. At 49 of the 132 locations sampled for sediment at least one of these compounds exceeded applicable sediment quality guidelines. 4,4'-DDT concentrations were the highest among these compounds, ranging from 0.002J mg/kg to 1.3J mg/kg, as compared to the NOAA ER-L guideline of 0.001 mg/kg in estuarine sediments, and the Ontario LEL guideline of 0.007 mg/kg in freshwater sediments. The source and potential ecological effects of these contaminant concentrations may require further investigation, pending results of the Tier 1 screening level assessment.

- Aldrin exceeded the Ontario LEL guideline (0.002 mg/kg) at three sediment locations in the Central Ditch, one location in the East Ditch and three locations in the Area 18B stream. Aldrin concentrations in sediment ranged from "non-detect" to a maximum of 0.69 mg/kg. At SW-1803 (0.690 mg/kg), SW-1804 (0.350 mg/kg), SW-1805 (0.320 mg/kg) in the Area 18B stream, concentrations exceeded the Ontario "severe effect level". Since other compounds were detected at levels of potential concern, further investigation of potential sources and effects of aldrin may be warranted, pending results of the Tier 1 screening level assessment.

- Although few consistent differences were detected between contaminant concentrations in surface water collected between low and high tide; when differences were observed, several metals were detected at much higher concentrations at low tide. The significance of this trend is as yet uncertain and requires further evaluation following proposed sampling of surface water and sediment in the Raritan River.

- As proposed in the Work Plan Addendum, additional sampling near the Dames and Moore Phase I RI sampling location in Area 3 will be conducted during early 1996.

- Sediment and water sampling within the Area 12 Southwest Ditch tributary area, originally intended to be sampled during the August 1994 sampling event, will be sampled during early 1996.

SECTION 7.0

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TABLE 2-1
SUMMARY OF SURFACE WATER AND SEDIMENT SAMPLING PROGRAM
SAMPLES CONDUCTED 8/1/94 - 8/16/94
FORMER RARITAN ARSENAL
EDISON, NEW JERSEY

MATRIX	SAMPLE ID	SAMPLE DATE	ANALYTICAL PARAMETERS															DUPLICATE OF
			VOCs	SVOCs	PEST	PCBs	TAL METALS	PP METALS	Hg	CN	PH	EXP (J)	EXP 8330	TOC	GRAIN SIZE	THIODI-GLYCOL	DIOXIN FURANS	
SD	SD-0101	8/1/94	X	X	X	X		X			X	X		X	X			
SD	SD-0102	8/1/94	X	X	X	X		X			X	X		X	X			
SD	SD-0103	8/1/94	X	X	X	X		X			X	X		X	X			
SD	SD-0104	8/1/94	X	X	X	X	X			X	X	X		X	X			
SD	SD-0401	8/9/94	X	X	X	X		X			X	X		X	X			
SD	SD-0402	8/9/94	X	X	X	X		X			X	X		X	X			
SD	SD-0403	8/9/94	X	X	X	X	X			X	X	X		X	X			
SD	SD-0404	8/9/94	X	X	X	X		X			X	X	X	X	X			
SD	SD-0405	8/9/94	X	X	X	X		X			X	X		X	X			
SD	SD-0406	8/9/94	X	X	X	X		X			X	X		X	X			
SD	SD-0407	8/9/94	X	X	X	X	X			X	X	X		X	X	X		
SD	SD-0408	8/4/94	X	X	X	X		X			X	X		X	X	X		
SD	SD-0501	8/4/94	X	X	X	X	X			X	X	X		X	X	X		
SD	SD-0502	8/4/94	X	X	X	X		X			X	X		X	X	X		
SD	SD-0503	8/4/94	X	X	X	X		X			X	X		X	X	X		
SD	SD-0504	8/4/94	X	X	X	X		X			X	X		X	X	X		
SD	SD-0505L	8/4/94	X	X	X	X	X			X	X	X		X	X	X		
SD	SD-0506L	8/4/94	X	X	X	X		X			X	X		X	X	X		
SD	SD-0507L	8/4/94	X	X	X	X		X			X	X		X	X	X		
SD	SD-0601L	8/9/94	X	X	X	X		X			X	X		X	X			
SD	SD-0602L	8/9/94	X	X	X	X		X			X	X		X	X			
SD	SD-0603L	8/10/94	X	X	X	X	X			X	X	X		X	X		X	
SD	SD-0604L	8/10/94	X	X	X	X		X			X	X		X	X			
SD	SD-0605L	8/10/94	X	X	X	X		X			X	X		X	X			
SD	SD-0606L	8/10/94	X	X	X	X		X			X	X		X	X			
SD	SD-0607	8/10/94	X	X	X	X	X			X	X	X		X	X			
SD	SD-0608L	8/10/94	X	X	X	X		X			X	X		X	X			
SD	SD-0609L	8/10/94	X	X	X	X		X			X	X		X	X		X	
SD	SD-0610	8/10/94	X	X	X	X		X			X	X		X	X			
SD	SD-0611	8/10/94	X	X	X	X		X			X	X		X	X			
SD	SD-0612	8/10/94	X	X	X	X		X			X	X		X	X			
SD	SD-0613	8/10/94	X	X	X	X		X			X	X		X	X		X	
SD	SD-0614	8/10/94	X	X	X	X		X			X	X		X	X			
SD	SD-0615	8/10/94	X	X	X	X	X			X	X	X	X	X	X		X	
SD	SD-0616L	8/4/94	X	X	X	X		X			X	X		X	X	X	X	
SD	SD-0617L	8/4/94	X	X	X	X		X			X	X		X	X	X		
SD	SD-0618L	8/4/94	X	X	X	X		X			X	X		X	X	X		
SD	SD-0619L	8/4/94	X	X	X	X	X			X	X	X	X	X	X	X	X	
SD	SD-0801	8/9/94	X	X	X	X	X			X	X		X	X	X	X		
SD	SD-0802	8/9/94	X	X	X	X		X			X	X	X	X	X	X		
SD	SD-0803	8/9/94	X	X	X	X		X			X	X		X	X	X		
SD	SD-0804	8/9/94	X	X	X	X	X			X	X	X		X	X	X		
SD	SD-0805	8/9/94	X	X	X	X		X			X	X		X	X	X		
SD	SD-0806	8/16/94	X	X	X	X		X			X	X		X	X	X		
SD	SD-1001L	8/16/94	X	X	X	X	X			X	X	X		X	X			
SD	SD-1002	8/16/94	X	X	X	X		X			X	X		X	X			
SD	SD-1003	8/16/94	X	X	X	X		X			X	X	X	X	X			
SD	SD-1004	8/16/94	X	X	X	X		X			X	X		X	X			

TABLE 2-1 (continued)
SUMMARY OF SURFACE WATER AND SEDIMENT SAMPLING PROGRAM
SAMPLES CONDUCTED 8/1/94 - 8/16/94
FORMER RARITAN ARSENAL
EDISON, NEW JERSEY

MATRIX	SAMPLE ID	SAMPLE DATE	ANALYTICAL PARAMETERS															DUPLICATE OF
			VOCs	SVOCs	PEST	PCBs	TAL METALS	PP METALS	Hg	CN	PH	EXP (J)	EXP 8330	TOC	GRAIN SIZE	THIODI-GLYCOL	DIOXIN FURANS	
SD	SD-1005	8/16/94	X	X	X	X		X			X		X	X	X			
SD	SD-1006	8/16/94	X	X	X	X	X			X	X	X		X	X			
SD	SD-1007	8/16/94	X	X	X	X		X			X	X	X	X	X			
SD	SD-1008	8/16/94	X	X	X	X		X			X	X	X	X	X			
SD	SD-1009	8/16/94	X	X	X	X		X			X	X	X	X	X			
SD	SD-1010	8/16/94	X	X	X	X		X			X	X		X	X			
SD	SD-1011	8/16/94	X	X	X	X	X			X	X	X		X	X			
SD	SD-1101	8/8/94	X	X	X	X		X			X	X		X	X			
SD	SD-1102L	8/8/94	X	X	X	X		X			X	X		X	X			
SD	SD-1103L	8/8/94	X	X	X	X		X			X	X		X	X			
SD	SD-1104L	8/8/94	X	X	X	X	X			X	X	X		X	X			
SD	SD-1201	8/8/94	X	X	X	X		X			X	X	X	X	X			
SD	SD-1202L	8/8/94	X	X	X	X		X			X	X		X	X			
SD	SD-1203L	8/8/94	X	X	X	X	X			X	X	X		X	X			
SD	SD-1215L	8/12/94	X	X	X	X		X			X	X		X	X			
SD	SD-1216L	8/12/94	X	X	X	X	X			X	X	X		X	X			
SD	SD-1401	8/3/94	X	X	X	X		X			X	X		X	X			
SD	SD-1402	8/3/94	X	X	X	X		X			X	X	X	X	X			
SD	SD-1403	8/3/94	X	X	X	X	X			X	X	X	X	X	X			
SD	SD-1404	8/3/94	X	X	X	X		X			X	X		X	X			
SD	SD-1405	8/3/94	X	X	X	X		X			X	X	X	X	X			
SD	SD-1406	8/3/94	X	X	X	X		X			X	X		X	X			
SD	SD-1407	8/3/94	X	X	X	X	X			X	X	X		X	X			
SD	SD-1408L	8/3/94	X	X	X	X		X			X	X		X	X			
SD	SD-1410	8/3/94	X	X	X	X		X			X	X	X	X	X			
SD	SD-1411	8/3/94	X	X	X	X		X			X	X		X	X			
SD	SD-1412	8/3/94	X	X	X	X	X			X	X	X		X	X			
SD	SD-1601L	8/11/94	X	X	X	X		X			X	X		X	X			
SD	SD-1602L	8/12/94	X	X	X	X		X			X	X		X	X			
SD	SD-1603L	8/12/94	X	X	X	X	X			X	X	X		X	X			
SD	SD-1604	8/11/94	X	X	X	X		X			X	X		X	X			
SD	SD-1605	8/15/94	X	X	X	X		X			X	X		X	X			
SD	SD-1606	8/11/94	X	X	X	X		X			X	X		X	X			
SD	SD-1607	8/11/94	X	X	X	X	X			X	X	X		X	X			
SD	SD-1608	8/11/94	X	X	X	X	X			X	X	X		X	X			
SD	SD-1609L	8/15/94	X	X	X	X	X			X	X		X	X	X			
SD	SD-1610	8/11/94	X	X	X	X		X			X	X		X	X			
SD	SD-1611	8/12/94	X	X	X	X		X			X	X		X	X			
SD	SD-1612	8/15/94	X	X	X	X		X			X		X	X	X			
SD	SD-1613	8/12/94	X	X	X	X		X			X	X		X	X			
SD	SD-1614	8/15/94	X	X	X	X		X			X	X	X	X	X			
SD	SD-1615	8/15/94	X	X	X	X		X			X	X		X	X			
SD	SD-1616L	8/15/94	X	X	X	X		X			X	X		X	X			
SD	SD-1617	8/15/94	X	X	X	X	X			X	X	X		X	X			
SD	SD-1618	8/15/94	X	X	X	X		X			X	X		X	X			
SD	SD-1619	8/12/94	X	X	X	X		X			X	X		X	X			
SD	SD-1620	8/12/94	X	X	X	X		X			X	X		X	X			
SD	SD-1621	8/8/94	X	X	X	X		X			X	X		X	X			

TABLE 2-1 (continued)
SUMMARY OF SURFACE WATER AND SEDIMENT SAMPLING PROGRAM
SAMPLES CONDUCTED 8/1/94 - 8/16/94
FORMER RARITAN ARSENAL
EDISON, NEW JERSEY

MATRIX	SAMPLE ID	SAMPLE DATE	ANALYTICAL PARAMETERS															DUPLICATE OF
			VOCs	SVOCs	PEST	PCBs	TAL METALS	PP METALS	Hg	CN	PH	EXP (J)	EXP 8330	TOC	GRAIN SIZE	THIODI-GLYCOL	DIOXIN FURANS	
SD	SD-1622	8/8/94	X	X	X	X		X			X	X		X	X			
SD	SD-1623	8/8/94	X	X	X	X		X			X	X		X	X			
SD	SD-1624	8/8/94	X	X	X	X	X			X	X	X		X	X			
SD	SD-1625L	8/8/94	X	X	X	X		X			X	X		X	X			
SD	SD-1626	8/8/94	X	X	X	X		X			X		X	X	X			
SD	SD-1629	8/12/94	X	X	X	X		X			X	X		X	X			
SD	SD-1630	8/12/94	X	X	X	X		X			X	X		X	X			
SD	SD-1801	8/2/94	X	X	X	X		X			X	X		X	X			
SD	SD-1802	8/2/94	X	X	X	X		X			X	X		X	X			
SD	SD-1803	8/2/94	X	X	X	X	X			X	X	X	X	X	X			
SD	SD-1804	8/2/94	X	X	X	X		X			X	X		X	X			
SD	SD-1805	8/2/94	X	X	X	X		X			X	X		X	X			
SD	SD-1806	8/2/94	X	X	X	X	X			X	X	X		X	X			
SD	SD-1807	8/2/94	X	X	X	X		X			X	X	X	X	X			
SD	SD-1808	8/2/94	X	X	X	X		X			X	X		X	X			
SD	SD-1809	8/2/94	X	X	X	X		X			X		X	X	X			
SD	SD-1810	8/1/94	X	X	X	X		X			X	X		X	X			
SD	SD-1811	8/1/94	X	X	X	X		X			X	X		X	X			
SD	SD-1812	8/1/94	X	X	X	X	X			X	X	X		X	X			
SD	SD-1813	8/1/94	X	X	X	X		X			X	X		X	X			
SD	SD-1814	8/1/94	X	X	X	X	X			X	X	X		X	X			
SD	SD-1815	8/1/94	X	X	X	X		X			X	X		X	X			
SD	SD-1816	8/1/94	X	X	X	X		X			X	X		X	X			
SD	SD-1817	8/1/94	X	X	X	X		X			X	X		X	X			
SD	SD-1901	8/16/94	X	X	X	X		X			X	X		X	X			
SD	SD-1902	8/16/94	X	X	X	X					X	X	X	X	X			
SD	SD-1903	8/11/94	X	X	X	X		X			X	X		X	X			
SD	SD-1904	8/11/94	X	X	X	X		X			X	X		X	X			
SD	SD-1905	8/11/94	X	X	X	X	X			X	X	X		X	X			
SD	SD-1906	8/11/94	X	X	X	X		X			X		X	X	X			
SD	SD-1907	8/11/94	X	X	X	X		X			X	X		X	X			
SD	SD-1908	8/11/94	X	X	X	X	X			X	X	X		X	X			
SD	SD-1909	8/11/94	X	X	X	X		X			X	X		X	X			
SD	SD-1910	8/11/94	X	X	X	X		X			X	X		X	X			
SD	SD-2001	8/15/94	X	X	X	X	X			X	X	X		X	X			
SD	SD-2002	8/15/94	X	X	X	X		X			X	X		X	X			
SS	SS-1054A	8/16/94	X	X	X	X	X			X	X	X						
SS	SS-1055A	8/16/94	X	X	X	X		X			X	X						
SS	SS-1056A	8/16/94	X	X	X	X		X			X	X						
SS	SS-1057A	8/16/94	X	X	X	X		X			X	X						
SS	SS-1058A	8/16/94	X	X	X	X		X			X	X						
SS	SS-1059A	8/16/94	X	X	X	X		X			X	X						
SS	SS-1060A	8/16/94	X	X	X	X		X			X	X						
SS	SS-1061A	8/16/94	X	X	X	X	X			X	X	X						
SW	SW-0101	8/1/94	X	X	X	X		X	X				X					
SW	SW-0102	8/1/94	X	X	X	X		X	X				X					
SW	SW-0103	8/1/94	X	X	X	X		X	X				X					
SW	SW-0104	8/1/94	X	X	X	X	X		X	X			X					

TABLE 2-1 (continued)
SUMMARY OF SURFACE WATER AND SEDIMENT SAMPLING PROGRAM
SAMPLES CONDUCTED 8/1/94 - 8/16/94
FORMER RARITAN ARSENAL
EDISON, NEW JERSEY

MATRIX	SAMPLE ID	SAMPLE DATE	ANALYTICAL PARAMETERS															DUPLICATE OF
			VOCs	SVOCs	PEST	PCBs	TAL METALS	PP METALS	Hg	CN	PH	EXP (J)	EXP 8330	TOC	GRAIN SIZE	THIODI-GLYCOL	DIOXIN FURANS	
SW	SW-0406	8/9/94	X	X	X	X		X	X				X					
SW	SW-0407	8/9/94	X	X	X	X	X		X	X			X			X		
SW	SW-0408	8/4/94	X	X	X	X		X	X				X			X		
SW	SW-0501	8/4/94	X	X	X	X	X		X	X			X			X		
SW	SW-0502	8/4/94	X	X	X	X		X	X				X			X		
SW	SW-0503	8/4/94	X	X	X	X		X	X				X			X		
SW	SW-0504	8/4/94	X	X	X	X		X	X				X			X		
SW	SW-0505H	8/4/94	X	X	X	X		X	X				X			X		
SW	SW-0505L	8/4/94	X	X	X	X	X		X	X			X			X		
SW	SW-0506H	8/4/94	X	X	X	X		X	X				X			X		
SW	SW-0506L	8/4/94	X	X	X	X		X	X				X			X		
SW	SW-0507H	8/4/94	X	X	X	X		X	X				X			X		
SW	SW-0507L	8/4/94	X	X	X	X		X	X				X			X		
SW	SW-0601H	8/9/94	X	X	X	X		X	X				X					
SW	SW-0601L	8/9/94	X	X	X	X		X	X				X					
SW	SW-0602H	8/9/94	X	X	X	X		X	X				X					
SW	SW-0602L	8/9/94	X	X	X	X		X	X				X					
SW	SW-0603H	8/10/94	X	X	X	X	X		X	X			X				X	
SW	SW-0603L	8/10/94	X	X	X	X	X		X	X			X				X	
SW	SW-0604H	8/10/94	X	X	X	X		X	X				X					
SW	SW-0604L	8/10/94	X	X	X	X		X	X				X					
SW	SW-0605H	8/10/94	X	X	X	X		X	X				X					
SW	SW-0605L	8/10/94	X	X	X	X		X	X				X					
SW	SW-0606H	8/10/94	X	X	X	X		X	X				X					
SW	SW-0606L	8/10/94	X	X	X	X		X	X				X					
SW	SW-0607	8/10/94	X	X	X	X	X		X	X			X					
SW	SW-0608H	8/10/94	X	X	X	X		X	X				X					
SW	SW-0608L	8/10/94	X	X	X	X		X	X				X					
SW	SW-0609H	8/10/94	X	X	X	X		X	X				X				X	
SW	SW-0609L	8/10/94	X	X	X	X		X	X				X				X	
SW	SW-0610	8/10/94	X	X	X	X		X	X				X					
SW	SW-0613	8/10/94	X	X	X	X		X	X				X				X	
SW	SW-0614	8/10/94	X	X	X	X		X	X				X					
SW	SW-0615	8/10/94	X	X	X	X	X		X	X			X				X	
SW	SW-0616H	8/4/94	X	X	X	X		X	X				X			X	X	
SW	SW-0616L	8/4/94	X	X	X	X	X		X	X			X			X	X	
SW	SW-0617H	8/4/94	X	X	X	X		X	X				X			X		
SW	SW-0617L	8/4/94	X	X	X	X		X	X				X			X		
SW	SW-0618H	8/4/94	X	X	X	X		X	X				X			X		
SW	SW-0618L	8/4/94	X	X	X	X		X	X				X			X		
SW	SW-0619H	8/4/94	X	X	X	X		X	X				X			X	X	
SW	SW-0619L	8/4/94	X	X	X	X	X		X	X			X			X	X	
SW	SW-0801	8/9/94	X	X	X	X	X		X	X			X			X		
SW	SW-0802	8/9/94	X	X	X	X		X	X				X			X		
SW	SW-0803	8/9/94	X	X	X	X		X	X				X			X		
SW	SW-0804	8/9/94	X	X	X	X	X		X	X			X			X		
SW	SW-0805	8/9/94	X	X	X	X		X	X				X			X		
SW	SW-0806	8/9/94	X	X	X	X		X	X				X			X		

TABLE 2-1 (continued)
SUMMARY OF SURFACE WATER AND SEDIMENT SAMPLING PROGRAM
SAMPLES CONDUCTED 8/1/94 - 8/16/94
FORMER RARITAN ARSENAL
EDISON, NEW JERSEY

MATRIX	SAMPLE ID	SAMPLE DATE	ANALYTICAL PARAMETERS															DUPLICATE OF
			VOCs	SVOCs	PEST	PCBs	TAL METALS	PP METALS	Hg	CN	PH	EXP (J)	EXP 8330	TOC	GRAIN SIZE	THIODI-GLYCOL	DIOXIN FURANS	
SW	SW-1001	8/16/94	X	X	X	X	X		X				X					
SW	SW-1002	8/16/94	X	X	X	X		X	X				X					
SW	SW-1004	8/16/94	X	X	X	X		X	X				X					
SW	SW-1005	8/16/94	X	X	X	X		X	X				X					
SW	SW-1006	8/16/94	X	X	X	X	X		X	X			X					
SW	SW-1101H	8/8/94	X	X	X	X		X	X				X					
SW	SW-1101L	8/8/94	X	X	X	X		X	X				X					
SW	SW-1102H	8/8/94	X	X	X	X		X	X				X					
SW	SW-1102L	8/8/94	X	X	X	X		X	X				X					
SW	SW-1103H	8/8/94	X	X	X	X		X	X				X					
SW	SW-1103L	8/8/94	X	X	X	X		X	X				X					
SW	SW-1104H	8/8/94	X	X	X	X	X		X	X			X					
SW	SW-1104L	8/8/94	X	X	X	X	X		X	X			X					
SW	SW-1201	8/8/94	X	X	X	X		X	X				X					
SW	SW-1202H	8/8/94	X	X	X	X		X	X				X					
SW	SW-1202L	8/8/94	X	X	X	X		X	X				X					
SW	SW-1203H	8/8/94	X	X	X	X	X		X	X			X					
SW	SW-1203L	8/8/94	X	X	X	X	X		X	X			X					
SW	SW-1215H	8/12/94	X	X	X	X		X	X				X					
SW	SW-1215L	8/12/94	X	X	X	X		X	X				X					
SW	SW-1216H	8/12/94	X	X	X	X	X		X	X			X					
SW	SW-1216L	8/12/94	X	X	X	X	X		X	X			X					
SW	SW-1402	8/3/94	X	X	X	X		X	X				X					
SW	SW-1403	8/3/94	X	X	X	X	X		X	X			X					
SW	SW-1404	8/3/94	X	X	X	X		X	X				X					
SW	SW-1405	8/3/94	X	X	X	X		X	X				X					
SW	SW-1406	8/3/94	X	X	X	X		X	X				X					
SW	SW-1407	8/3/94	X	X	X	X	X		X	X			X					
SW	SW-1408H	8/3/94	X	X	X	X		X	X				X					
SW	SW-1408L	8/3/94	X	X	X	X		X	X				X					
SW	SW-1410	8/3/94	X	X	X	X		X					X					
SW	SW-1411	8/3/94	X	X	X	X		X	X				X					
SW	SW-1412	8/3/94	X	X	X	X	X		X	X			X					
SW	SW-1601H	8/11/94	X	X	X	X		X	X				X					
SW	SW-1601L	8/11/94	X	X	X	X		X	X				X					
SW	SW-1602H	8/12/94	X	X	X	X		X	X				X					
SW	SW-1602L	8/12/94	X	X	X	X		X	X				X					
SW	SW-1603H	8/12/94	X	X	X	X	X		X	X			X					
SW	SW-1603L	8/12/94	X	X	X	X	X		X	X			X					
SW	SW-1604	8/11/94	X	X	X	X		X	X				X					
SW	SW-1605	8/15/94	X	X	X	X		X	X				X					
SW	SW-1606	8/11/94	X	X	X	X		X	X				X					
SW	SW-1607	8/11/94	X	X	X	X	X		X	X			X					
SW	SW-1608	8/11/94	X	X	X	X	X		X	X			X					
SW	SW-1609H	8/15/94	X	X	X	X	X		X	X			X					
SW	SW-1609L	8/15/94	X	X	X	X	X		X	X			X					
SW	SW-1610	8/11/94	X	X	X	X		X	X				X					
SW	SW-1611	8/12/94	X	X	X	X		X	X				X					

TABLE 2-1 (continued)
SUMMARY OF SURFACE WATER AND SEDIMENT SAMPLING PROGRAM
SAMPLES CONDUCTED 8/1/94 - 8/16/94
FORMER RARITAN ARSENAL
EDISON, NEW JERSEY

MATRIX	SAMPLE ID	SAMPLE DATE	ANALYTICAL PARAMETERS															DUPLICATE OF
			VOCs	SVOCs	PEST	PCBs	TAL METALS	PP METALS	Hg	CN	PH	EXP (J)	EXP 8330	TOC	GRAIN SIZE	THIODI-GLYCOL	DIOXIN FURANS	
SW	SW-1612	8/15/94	X	X	X	X		X	X				X					
SW	SW-1613	8/12/94	X	X	X	X		X	X				X					
SW	SW-1614	8/15/94	X	X	X	X		X	X				X					
SW	SW-1615	8/15/94	X	X	X	X		X	X				X					
SW	SW-1616H	8/15/94	X	X	X	X		X	X				X					
SW	SW-1616L	8/15/94	X	X	X	X		X	X				X					
SW	SW-1617	8/15/94	X	X	X	X	X		X	X			X					
SW	SW-1618	8/15/94	X	X	X	X		X	X				X					
SW	SW-1619	8/12/94	X	X	X	X		X	X				X					
SW	SW-1620	8/12/94	X	X	X	X		X	X				X					
SW	SW-1621	8/8/94	X	X	X	X		X	X				X					
SW	SW-1622	8/8/94	X	X	X	X		X	X				X					
SW	SW-1623	8/8/94	X	X	X	X		X	X				X					
SW	SW-1624	8/8/94	X	X	X	X	X		X	X			X					
SW	SW-1625H	8/8/94	X	X	X	X		X	X				X					
SW	SW-1625L	8/8/94	X	X	X	X		X	X				X					
SW	SW-1626	8/8/94	X	X	X	X		X	X				X					
SW	SW-1629	8/12/94	X	X	X	X		X	X				X					
SW	SW-1629	8/15/94	X	X	X	X		X	X				X					
SW	SW-1630	8/12/94	X	X	X	X		X	X				X					
SW	SW-1803	8/2/94	X	X	X	X	X		X	X			X					
SW	SW-1804	8/2/94	X	X	X	X		X	X				X					
SW	SW-1805	8/2/94	X	X	X	X		X	X				X					
SW	SW-1806	8/2/94	X	X	X	X	X		X	X			X					
SW	SW-1807	8/2/94	X	X	X	X		X	X				X					
SW	SW-1808	8/2/94	X	X	X	X		X	X				X					
SW	SW-1809	8/2/94	X	X	X	X		X	X				X					
SW	SW-1810	8/1/94	X	X	X	X		X	X				X					
SW	SW-1811	8/1/94	X	X	X	X		X	X				X					
SW	SW-1812	8/1/94	X	X	X	X	X		X	X			X					
SW	SW-1813	8/1/94	X	X	X	X		X	X				X					
SW	SW-1814	8/1/94	X	X	X	X	X		X	X			X					
SW	SW-1815	8/1/94	X	X	X	X		X	X				X					
SW	SW-1816	8/1/94	X	X	X	X		X	X				X					
SW	SW-1817	8/1/94	X	X	X	X		X	X				X					
SW	SW-1902	8/16/94	X	X	X	X		X	X				X					
SW	SW-1903	8/11/94	X	X	X	X		X	X				X					
SW	SW-1904	8/11/94	X	X	X	X		X	X				X					
SW	SW-1905	8/11/94	X	X	X	X	X		X	X			X					
SW	SW-1906	8/11/94	X	X	X	X		X	X				X					
SW	SW-1907	8/11/94	X	X	X	X		X	X				X					
SW	SW-1908	8/11/94	X	X	X	X	X		X	X			X					
SW	SW-1909	8/11/94	X	X	X	X		X	X				X					
SW	SW-1910	8/11/94	X	X	X	X		X	X				X					
SW	SW-2001	8/15/94	X	X	X	X		X	X				X					
SW	SW-2002	8/15/94	X	X	X	X		X	X				X					

TABLE 2-1 (continued)
SUMMARY OF SURFACE WATER AND SEDIMENT SAMPLING PROGRAM
SAMPLES CONDUCTED 8/1/94 - 8/16/94
FORMER RARITAN ARSENAL
EDISON, NEW JERSEY

MATRIX	SAMPLE ID	SAMPLE DATE	ANALYTICAL PARAMETERS															DUPLICATE OF
			VOCs	SVOCs	PEST	PCBs	TAL METALS	PP METALS	Hg	CN	PH	EXP (J)	EXP 8330	TOC	GRAIN SIZE	THIODI-GLYCOL	DIOXIN FURANS	
SD	SD-0620	8/4/94	X	X	X	X	X			X	X		X			X	X	SD-0619
SD	SD-0807	8/9/94	X	X	X	X		X			X		X			X		SD-0801
SD	SD-1012	8/16/94	X	X	X	X		X			X		X					SD-1005
SD	SD-1627	8/8/94	X	X	X	X		X			X		X					SD-1626
SD	SD-1628	8/15/94	X	X	X	X		X			X		X					SD-1612
SD	SD-1631	8/15/94	X	X	X	X	X			X	X		X					SD-1609
SD	SD-1818	8/2/94	X	X	X	X		X			X		X					SD-1809
SD	SD-1911	8/11/94	X	X	X	X		X			X		X					SW-1906
SW	SW-0620	8/4/94	X	X	X	X	X		X	X			X			X	X	SW-0619
SW	SW-0807	8/9/94	X	X	X	X		X	X	X			X			X		SW-0801
SW	SW-1012	8/16/94	X	X	X	X		X	X				X					SW-1005
SW	SW-1627	8/8/94	X	X	X	X		X	X				X					SW-1626
SW	SW-1628	8/15/94	X	X	X	X		X	X				X					SW-1612
SW	SW-1631	8/15/94	X	X	X	X	X		X	X			X					SW-1609
SW	SW-1818	8/2/94	X	X	X	X		X	X				X					SW-1809
SW	SW-1911	8/11/94	X	X	X	X		X	X				X					SD-1906
SW	SW-1912	8/11/94	X	X	X	X		X	X				X					SW-1904

NOTES: SW = Surface Water SD = Sediment HT = High Tide LT = Low Tide
Explosives (J) = Jenkins Method TNT Screening
Explosives (8330) = Full lab analysis (10% of Jenkins samples at field/lab discretion). If 8330 is selected on this table, choose 10% of remaining Jenkins samples for 8330.
All VOCs sampled first and not homogenized. SW VOC via Method 8260. SC VOC via Method 8240.
MS/MSD samples, QC duplicates and QA duplicates taken once every 20 samples per parameter per matrix.
MS/MSDs and QC duplicates not needed for Jenkins Explosives (TNT), TOC, and grain size.
QA duplicates not needed for Jenkins Explosives (TNT), TOC, and grain size.
Field Blanks 1 per day per parameter per sampling technique. (No FB needed for Jenkins Explosives, TOC, grain size). FB for sediment only.
PPM = Priority Pollutant Metals plus Barium
One trip blank per water VOC cooler shipment.

TABLE 2-2
SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL SAMPLING PROGRAM
FORMER RARITAN ARSENAL
EDISON, NEW JERSEY

QA/QC SAMPLE TYPE	MATRIX	SAMPLE LOCATION	SAMPLE ID	DATE COLLECTED	STANDARD WITH TAL METALS	STANDARD WITH PP METALS	VOC ONLY	CN	EXP. 8330	EXP. (J)	THIODI-GLYCOL	DIOXINS/ FURANS
DUPLICATE SAMPLES	SD	SW-0619	SD-0620	8/4/94	X				X		X	X
	SD	SW-0801	SD-0807	8/9/94		X			X		X	
(TOTAL NO. SD = 8)	SD	SW-1005	SD-1012	8/16/94		X			X			
	SD	SW-1626	SD-1627	8/8/94		X			X			
(TOTAL NO. SW = 9)	SD	SW-1612	SD-1628	8/15/94		X			X			
	SD	SW-1609	SD-1631	8/15/94	X			X	X			
	SD	SW-1809	SD-1818	8/2/94		X			X			
	SD	SW-1906	SD-1911	8/11/94		X			X			
	SW	SW-0619	SW-0619L	8/4/94	X			X	X			
	SW	SW-0801	SW-0807	8/9/94	X			X	X		X	
	SW	SW-1005	SW-1012	8/16/94		X			X			
	SW	SW-1626	SW-1627	8/8/94		X			X			
	SW	SW-1612	SW-1628	8/15/94		X			X			
	SW	SW-1609	SW-1631	8/15/94	X			X	X			
	SW	SW-1809	SW-1818	8/2/94		X			X			
	SW	SW-1906	SW-1911	8/11/94		X			X			
	SW	SW-1904	SW-1912	8/11/94		X			X			
FIELD BLANKS	FB	SW-0104	FB-0104	8/2/94	X			X	X			
	FB	SW-0407	FB-0407	8/9/94	X			X	X		X	
(TOTAL NO. = 11)	FB	SW-0505L	FB-0505L	8/4/94	X			X	X		X	X
	FB	SW-0610	FB-0610	8/10/94	X			X	X			X
	FB	SW-1005	FB-1005	8/16/94	X			X	X			
	FB	SW-1412	FB-1412	8/3/94	X			X	X			
	FB	SW-1605	FB-1605	8/15/94	X			X	X			
	FB	SW-1611	FB-1611	8/12/94	X			X	X			
	FB	SW-1624	FB-1624	8/8/94	X			X	X			
	FB	SW-1811	FB-1811	8/1/94	X			X	X			
	FB	SW-1910	FB-1910	8/11/94	X			X	X			
TRIP BLANKS	TB	SW-0104	TB-0104	8/2/94			X		X			
	TB	SW-0407	TB-0407	8/9/94			X					
(TOTAL NO. = 16)	TB	SW-0506H	TB-0506H	8/4/94			X					
	TB	SW-0603L	TB-0603L	8/10/94			X					
	TB	SW-0801	TB-0801	8/9/94			X					

TABLE 2-2 (continued)
SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL SAMPLING PROGRAM
FORMER RARITAN ARSENAL
EDISON, NEW JERSEY

QA/QC SAMPLE TYPE	MATRIX	SAMPLE LOCATION	SAMPLE ID	DATE COLLECTED	STANDARD WITH TAL METALS	STANDARD WITH PP METALS	VOC ONLY	CN	EXP. 8330	EXP. (J)	THIODI-GLYCOL	DIOXINS/ FURANS
	TB	SW-1005	TB-1005	8/16/94			X					
	TB	SW-1002L	TB-1102L	8/8/94			X					
	TB	SW-1215H	TB-1215H	8/12/94			X					
	TB	SW-1412	TB-1412	8/3/94			X					
	TB	SW-1601L	TB-1601L	8/11/94			X					
	TB	SW-1605	TB-1605	8/15/94			X					
	TB	SW-1809	TB-1809	8/2/94			X					
	TB	SW-1811	TB-1811	8/1/94			X					
	TB	SW-1905	TB-1905	8/11/94			X					
	TB	SW-1907	TB-1907	8/12/94			X					
	TB	SW-2001	TB-2001	8/15/94			X					
MS/MSD (1)	SD	SW-0619	SD-0619L	8/4/94	X			X	X		X	X
	SD	SW-0801	SD-0801	8/9/94	X			X	X		X	
(TOTAL NO. = 19)	SD	SW-1005	SD-1005	8/16/94		X			X			
	SD	SW-1201	SD-1201	8/8/94		X			X			
	SD	SW-1609	SD-1609L	8/15/94	X			X	X			
	SD	SW-1612	SD-1612	8/15/94		X			X			
	SD	SW-1626	SD-1626	8/8/94		X			X			
	SD	SW-1809	SD-1809	8/2/94		X			X			
	SD	SW-1906	SD-1906	8/11/94		X			X			
	SW	SW-0619	SW-0620	8/4/94	X			X	X			
	SW	SW-0801	SW-0801	8/9/94	X			X	X			
	SW	SW-1005	SW-1005	8/16/94		X			X			
	SW	SW-1201	SW-1201	8/8/94		X			X	X		
	SW	SW-1609	SW-1609L	8/15/94	X				X			
	SW	SW-1612	SW-1612	8/15/94		X			X			
	SW	SW-1626	SW-1626	8/8/94		X			X			
	SW	SW-1809	SW-1809	8/2/94		X			X			
	SW	SW-1904	SW-1904	8/11/94		X			X			
	SW	SW-1906	SW-1906	8/11/94		X			X			

TABLE 2-2 (continued)
SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL SAMPLING PROGRAM
FORMER RARITAN ARSENAL
EDISON, NEW JERSEY

QA/QC SAMPLE TYPE	MATRIX	SAMPLE LOCATION	SAMPLE ID	DATE COLLECTED	STANDARD WITH TAL METALS	STANDARD WITH PP METALS	VOC ONLY	CN	EXP. 8330	EXP. (J)	THIODI-GLYCOL	DIOXINS/ FURANS
MRD SAMPLES	SD	SW-0619	2742-SD-0619L	8/4/94	X			X	X			
	SD	SW-0801	2742-SD-0801	8/9/94	X			X	X		X	
(TOTAL NO. = 17)	SD	SW-1005	2742-SD-1005	8/16/94		X			X			
	SD	SW-1609	2742-SD-1609L	8/15/94	X			X	X			
	SD	SW-1612	2742-SD-1612	8/15/94		X			X			
	SD	SW-1626	2742-SD-1626	8/8/94		X				X		
	SD	SW-1809	2742-SD-1809	8/2/94		X			X			
	SD	SW-1906	2742-SD-1906	8/11/94		X			X			
	SW	SW-0619	2742-SW-0619L	8/4/94	X			X	X			
	SW	SW-0801	2742-SW-0801	8/9/94	X			X	X		X	
	SW	SW-1005	2742-SW-1005	8/16/94		X			X			
	SW	SW-1609	2742-SW-1609L	8/15/94	X			X	X			
	SW	SW-1612	2742-SW-1612	8/15/94		X			X			
	SW	SW-1626	2742-SW-1626	8/8/94		X			X			
	SW	SW-1809	2742-SW-1809	8/2/94		X			X			
	SW	SW-1904	2742-SW-1904	8/11/94		X			X			
	SW	SW-1906	2742-SW-1906	8/11/94		X			X			

NOTES:

1. Standard analyses for Sediment included: VOCs, SVOCs, Pesticides, PCBs, pH, TOC, Grain Size, Explosives by Jenkins Method, and Metals.
2. If explosives for sediment were collected for Method 8330, they were not collected for the standard Jenkins method.
3. Standard analyses for Surface Water included: VOCs, SVOCs, Pesticides, PCBs, Explosives by Method 8330, Mercury, and Metals.
4. If explosives for surface water were collected for Jenkins Method, they were not collected for the standard Method 8330.
5. Trip blanks were analyzed for VOCs only.
6. PP = Priority Pollutant Metals, TAL = Target Analyte List Metals.

(1) Additional volume for MS/MSD collected for surface water only.

TABLE 3-1

SUMMARY OF SAMPLING LOCATIONS BY DRAINAGE AREA
FORMER RARITAN ARSENAL
EDISON, NEW JERSEY

DRAINAGE AREA	DRAINAGE SUBAREA	LOCATION	FIELD SAMPLE ID	FRESH WATER (F) OR ESTUARINE (E)
EAST DITCH DRAINAGE	Upgradient Scirpus Marsh	SD-1401	SD-1401	F
	Unnamed Tributary	SW-1410	SW-1410	F
			SD-1410	F
		SW-1411	SW-1411	E
			SD-1411	E
		SW-1412	SW-1412	E
			SD-1412	E
	East Ditch	SW-1402	SW-1402	F
			SD-1402	F
		SW-1403	SW-1403	F
			SD-1403	F
		SW-1404	SD-1404	F
			SD-1404	F
		SW-1405	SW-1405	F
			SD-1405	F
		SW-1406	SW-1406	F
			SD-1406	F
		SW-1407	SW-1407	E
			SD-1407	E
		SW-1408	SW-1408H	E
			SW-1408L	E
			SD-1408	E
BLACK DITCH DRAINAGE	Area 4 Ditch	SD-0401	SD-0401	F
		SD-0402	SD-0402	F
		SD-0403	SD-0403	F
		SD-0404	SD-0404	F
		SD-0405	SD-0405	F
		SW-0406	SW-0406	F
			SD-0406	F
	Area 5 Pond	SW-0501	SW-0501	F
			SD-0501	F
		SW-0502	SW-0502	F
			SD-0502	F
		SW-0503	SW-0503	F
			SD-0503	F
		SW-0504	SW-0504	F
			SD-0504	F
	Black Ditch	SW-0407	SW-0407	F
			SD-0407	F
		SW-0408	SW-0408	F
			SD-0406	F
		SW-0505	SW-0505H	F
			SW-0505L	F
			SD-0505	F
		SW-0506	SW-0506H	E
			SW-0506L	E
			SD-0506	E
		SW-0507	SW-0507H	E
			SW-0507L	E
			SD-0507	E
		SW-0616	SW-0616H	E
			SW-0616L	E
			SD-0616	E
		SW-0617	SW-0617H	E

NOTE:

Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with an "SD" prefix were dry during the August sampling event, and hence were sampled only for sediment.

TABLE 3-1 (continued)

SUMMARY OF SAMPLING LOCATIONS BY DRAINAGE AREA
FORMER RARITAN ARSENAL
EDISON, NEW JERSEY

DRAINAGE AREA	DRAINAGE SUBAREA	LOCATION	FIELD SAMPLE ID	FRESH WATER (F) OR ESTUARINE (E)
BLACK DITCH DRAINAGE	Black Ditch		SW-0617L	E
			SD-0617	E
		SW-0618	SW-0618H	E
			SW-0618L	E
			SD-0618	E
		SW-0619	SW-0619H	E
			SW-0619L	E
			SD-0619	E
RED ROOT CREEK DRAINAGE	18C Stream	SW-1812	SW-1812	F
			SD-1812	F
		SW-1816	SW-1816	F
			SD-1816	F
		SW-1817	SW-1817	F
			SD-1817	F
		SW-1815	SW-1815	F
			SD-1815	F
		SW-1813	SW-1813	F
			SD-1813	F
		SW-1814	SW-1814	F
			SD-1814	F
		SW-1810	SW-1810	F
			SD-1810	F
		SW-1811	SW-1811	F
			SD-1811	F
	18B Stream	SW-1803	SW-1803	F
			SD-1803	F
		SW-1804	SW-1804	F
			SD-1804	F
		SW-1805	SW-1805	F
			SD-1805	F
		SW-1806	SW-1806	F
			SD-1806	F
		SW-1807	SW-1807	F
			SD-1807	F
		SW-1808	SW-1808	F
			SD-1808	F
		SW-1809	SW-1809	F
			SD-1809	F
	Lower 18B Stream	SW-0101	SW-0101	F
			SD-0101	F
		SW-0102	SW-0102	F
			SD-0102	F
		SW-0103	SW-0103	F
			SD-0103	F
		SW-0104	SW-0104	F
			SD-0104	F
	Area 20 Ditch	SW-2001	SW-2001	F
			SD-2001	F
		SW-2002	SW-2002	F
			SD-2002	F
	Area 8 Pond	SW-0801	SW-0801	F
			SD-0801	F
		SW-0802	SW-0802	F
			SD-0802	F
		SW-0803	SW-0803	F

NOTE:

Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with an "SD" prefix were dry during the August sampling event, and hence were sampled only for sediment.

TABLE 3-1 (continued)

SUMMARY OF SAMPLING LOCATIONS BY DRAINAGE AREA
FORMER RARITAN ARSENAL
EDISON, NEW JERSEY

DRAINAGE AREA	DRAINAGE SUBAREA	LOCATION	FIELD SAMPLE ID	FRESH WATER (F) OR ESTUARINE (E)
RED ROOT CREEK DRAINAGE	Area 8 Pond		SD-0803	F
		SW-0804	SW-0804	F
			SD-0804	F
		SW-0805	SW-0805	F
			SD-0805	F
		SW-0806	SW-0806	F
			SD-0806	F
	Red Root Creek	SW-0601	SW-0601H	E
			SW-0601L	E
			SD-0601	E
		SW-0602	SW-0602H	F
			SW-0602L	F
			SD-0602	F
		SW-0603	SW-0603H	E
			SW-0603L	E
			SD-0603	E
		SW-0604	SW-0604H	E
			SW-0604L	E
			SD-0604	E
		SW-0605	SW-0605H	E
			SW-0605L	E
			SD-0605	E
		SW-0606	SW-0606H	E
			SW-0606L	E
			SD-0606	E
		SW-0607	SW-0607	E
			SD-0607	E
		SW-0608	SW-0608H	E
			SW-0608L	E
			SD-0608	E
		SW-0609	SW-0609H	E
			SW-0609L	E
			SD-0609	E
	Sulfur Plant Ponds	SD-0611	SD-0611	F
		SD-0612	SD-0612	F
		SW-0613	SW-0613	F
			SD-0613	F
		SW-0614	SW-0614	F
			SD-0614	F
		SW-0610	SW-0610	F
			SD-0610	F
		SW-0615	SW-0615	F
			SD-0615	F
CENTRAL DITCH DRAINAGE	Central Ditch	SW-1101	SW-1101H	E
			SW-1101L	E
			SD-1101	E
		SW-1102	SW-1102H	E
			SW-1102L	E
			SD-1102	E
		SW-1103	SW-1103H	E
			SW-1103L	E
			SD-1103	E
		SW-1104	SW-1104H	E
			SW-1104L	E
			SD-1104	E

NOTE:

Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with an "SD" prefix were dry during the August sampling event, and hence were sampled only for sediment.

TABLE 3-1 (continued)

SUMMARY OF SAMPLING LOCATIONS BY DRAINAGE AREA
FORMER RARITAN ARSENAL
EDISON, NEW JERSEY

DRAINAGE AREA	DRAINAGE SUBAREA	LOCATION	FIELD SAMPLE ID	FRESH WATER (F) OR ESTUARINE (E)
CENTRAL DITCH DRAINAGE	Upgradient Contiguous Ponded Area	SW-1621	SW-1621	F
			SD-1621	F
		SW-1624	SW-1624	E
			SD-1624	E
	Isolated Freshwater Pond	SW-1622	SW-1622	F
			SD-1622	F
		SW-1626	SW-1626	F
			SD-1626	F
		SW-1623	SW-1623	F
			SD-1623	F
	Isolated Estuarine Ponds	SW-1625	SW-1625H	E
			SW-1625L	E
			SD-1625	E
AREA 12 DRAINAGE	Area 12 Ditch	SW-1201	SW-1201	E
			SD-1201	E
		SW-1202	SW-1202H	E
			SW-1202L	E
			SD-1202	E
		SW-1203	SW-1203H	E
			SW-1203L	E
			SD-1203	E
OLD RED ROOT CREEK DRAINAGE	Dry Tributary - Area 18	SD-1801	SD-1801	F
		SD-1802	SD-1802	F
	Area 19 NE Wetlands	SW-1908	SW-1908	F
			SD-1908	F
		SW-1909	SW-1909	F
			SD-1909	F
		SW-1910	SW-1910	F
			SD-1910	F
	Area 19 Forested Wetlands	SD-1901	SD-1901	F
		SW-1903	SW-1903	F
			SD-1903	F
	Area 19 SW Wetlands	SW-1904	SW-1904	F
			SD-1904	F
		SW-1905	SW-1905	F
			SD-1905	F
		SW-1906	SW-1906	E
			SD-1906	E
	Old Red Root Creek	SW-1604	SW-1604	F
			SD-1604	F
		SW-1605	SW-1605	F
			SD-1605	F
		SW-1606	SW-1606	E
			SD-1606	E
		SW-1607	SW-1607	E
			SD-1607	E
		SW-1608	SW-1608	E
			SD-1608	E
		SW-1609	SW-1609H	E
			SW-1609L	E

NOTE:

Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with an "SD" prefix were dry during the August sampling event, and hence were sampled only for sediment.

TABLE 3-1 (continued)

SUMMARY OF SAMPLING LOCATIONS BY DRAINAGE AREA
FORMER RARITAN ARSENAL
EDISON, NEW JERSEY

DRAINAGE AREA	DRAINAGE SUBAREA	LOCATION	FIELD SAMPLE ID	FRESH WATER (F) OR ESTUARINE (E)
OLD RED ROOT CREEK DRAINAGE	Old Red Root Creek		SD-1609	E
		SW-1610	SW-1610	E
			SD-1610	E
	West Ditch	SW-1907	SW-1907	E
			SD-1907	E
		SW-1601	SW-1601H	E
			SW-1601L	E
			SD-1601	E
		SW-1602	SW-1602H	E
			SW-1602L	E
			SD-1602	E
		SW-1603	SW-1603H	E
			SW-1603L	E
			SD-1603	E
	Associated Ditches - Area 16	SW-1611	SW-1611	E
			SD-1611	E
		SW-1612	SW-1612	E
			SD-1612	E
		SW-1629	SW-1629	E
			SD-1629	E
		SW-1613	SW-1613	E
			SD-1613	E
		SW-1630	SW-1630	E
			SD-1630	E
		SW-1614	SW-1614	F
			SD-1614	F
		SW-1615	SW-1615	E
			SD-1615	E
		SW-1616	SW-1616H	E
			SW-1616L	E
			SD-1616	E
		SW-1617	SW-1617	E
			SD-1617	E
		SW-1618	SW-1618	E
			SD-1618	E
	Southwest Ditch	SW-1619	SW-1619	E
			SD-1619	E
		SW-1620	SW-1620	E
			SD-1620	E
		SW-1215	SW-1215H	E
			SW-1215L	E
			SD-1215	E
		SW-1216	SW-1216H	E
			SW-1216L	E
			SD-1216	E
COUNTY PARK DRAINAGE AREA	Western Boundary Ditch	SW-1001	SW-1001	F
			SD-1001	F
		SW-1002	SW-1002	F
			SD-1002	F
	Maintenance Area Ditch	SD-1009	SD-1009	F
		SD-1010	SD-1010	F
		SD-1011	SD-1011	F
		SD-1007	SD-1007	F
		SD-1008	SD-1008	F

NOTE:

Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with an "SD" prefix were dry during the August sampling event, and hence were sampled only for sediment.

TABLE 3-1 (continued)

SUMMARY OF SAMPLING LOCATIONS BY DRAINAGE AREA
FORMER RARITAN ARSENAL
EDISON, NEW JERSEY

DRAINAGE AREA	DRAINAGE SUBAREA	LOCATION	FIELD SAMPLE ID	FRESH WATER (F) OR ESTUARINE (E)
COUNTY PARK DRAINAGE AREA	Open Lawn Ditch	SD-1003	SD-1003	F
		SW-1004	SW-1004	F
			SD-1004	F
		SW-1005	SW-1005	F
			SD-1005	F
	Area 10 Southern Border Ditch	SW-1902	SW-1902	F
			SD-1902	F
		SW-1006	SW-1006	F
			SD-1006	F

NOTE:

Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with an "SD" prefix were dry during the August sampling event, and hence were sampled only for sediment.

TABLE 4-1
VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

EAST DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	EAST DITCH			UNNAMED TRIBUTARY		WATER QUALITY CRITERIA		
	SW-1407	SW-1408H	SW-1408L	SW-1411	SW-1412	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,1,1-TRICHLOROETHANE	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	NCA	31200	NCA
1,1-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	NCA	NCA	NCA
1,1-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	NCA	NCA	NCA
1,2-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	99	113000	NCA
ACETONE	2.00 U	2.00 U	2.00 U	4.00 U	6.00 U	NCA	NCA	NCA
CARBON DISULFIDE	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	NCA	NCA	NCA
CHLOROFORM	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	470	NCA	NCA
METHYL CHLORIDE	2.00 U	2.00 U	2.00 U	4.00 U	2.00 U	NCA	NCA	NCA
METHYL ETHYL KETONE	2.00 U	2.00 U	2.00 U	4.00 U	2.00 U	NCA	NCA	NCA
METHYLENE CHLORIDE	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1600	NCA	NCA
TOLUENE	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	200000	6300	5000
TOTAL-1,2-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	NCA	224000	NCA
TRICHLOROETHYLENE (TCE)	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	81	2000	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-1
VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

EAST DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	EAST DITCH					UNNAMED TRIBUTARY	WATER QUALITY CRITERIA		
	SW-1402	SW-1403	SW-1404	SW-1405	SW-1406	SW-1410	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
1,1,1-TRICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	127	NCA	NCA
1,1-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
1,1-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	4.81	NCA	NCA
1,2-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	0.291	118000	20000
ACETONE	2.00 U	49.00 U	11.00	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
CARBON DISULFIDE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
CHLOROFORM	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	5.67	28900	1240
METHYL CHLORIDE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
METHYL ETHYL KETONE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
METHYLENE CHLORIDE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.49	NCA	NCA
TOLUENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	7440	NCA	NCA
TOTAL-1,2-DICHLOROETHENE*	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	592.00	NCA	NCA
TRICHLOROETHYLENE (TCE)	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.09	45000	21900

NOTES:
* NJDEP FW-2 Standard based on Trans-1,2-Dichloroethene.
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-1
VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	BLACK DITCH					WATER QUALITY CRITERIA		
	SW-0618H	SW-0618L	SW-0619H	SW-0619L	SW-0620 (Duplicate of SW-0619)	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,1,1-TRICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	31200	NCA
1,1-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
1,1-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
1,2-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	99	113000	NCA
ACETONE	5.00 U	14.00 U	5.00 U	5.00 U	6.00 U	NCA	NCA	NCA
CARBON DISULFIDE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
CHLOROFORM	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	470	NCA	NCA
METHYL CHLORIDE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
METHYL ETHYL KETONE	5.00 U	2.00 J	5.00 U	5.00 U	5.00 U	NCA	NCA	NCA
METHYLENE CHLORIDE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1600	NCA	NCA
TOLUENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	200000	6300	5000
TOTAL-1,2-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	224000	NCA
TRICHLOROETHYLENE (TCE)	1.00 U	0.30 J	1.00 U	0.40 J	0.50 J	81	2000	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-1
VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	BLACK DITCH								WATER QUALITY CRITERIA		
	SW-0506H	SW-0506L	SW-0507H	SW-0507L	SW-0616H	SW-0616L	SW-0617H	SW-0617L	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,1,1-TRICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	31200	NCA
1,1-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
1,1-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
1,2-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	99	113000	NCA
ACETONE	5.00 U	7.00 U	5.00 U	5.00 U	5.00 U	6.00 U	5.00 U	8.00 U	NCA	NCA	NCA
CARBON DISULFIDE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
CHLOROFORM	0.30 J	1.00 U	0.20 J	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	470	NCA	NCA
METHYL CHLORIDE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
METHYL ETHYL KETONE	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	NCA	NCA	NCA
METHYLENE CHLORIDE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1600	NCA	NCA
TOLUENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	200000	6300	5000
TOTAL-1,2-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	224000	NCA
TRICHLOROETHYLENE (TCE)	1.00	2.00	0.90 J	0.70 J	0.90 J	0.50 J	0.30 J	0.50 J	81	2000	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-1
VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	RED ROOT CREEK								WATER QUALITY CRITERIA		
	SW-0601H	SW-0601L	SW-0603H	SW-0603L	SW-0604H	SW-0604L	SW-0605H	SW-0605L	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,1,1-TRICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	31200	NCA
1,1-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
1,1-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
1,2-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	99	113000	NCA
ACETONE	5.00 U	15.00 U	7.00 U	5.00 U	7.00 U	7.00 U	5.00 U	10.00 U	NCA	NCA	NCA
CARBON DISULFIDE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
CHLOROFORM	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	470	NCA	NCA
METHYL CHLORIDE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	0.30 J	NCA	NCA	NCA
METHYL ETHYL KETONE (2-BUTANONE)	5.00 U	1.00 J	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	1.00 J	NCA	NCA	NCA
METHYLENE CHLORIDE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1600	NCA	NCA
TOLUENE	0.20 J	0.70 J	1.00 U	0.10 J	1.00 U	1.00 U	1.00 U	1.00 U	200000	6300	5000
TOTAL-1,2-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	224000	NCA
TRICHLOROETHYLENE (TCE)	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	81	2000	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-1
VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 4 DITCH	AREA 5 POND				BLACK DITCH				WATER QUALITY CRITERIA		
	SW-0406	SW-0501	SW-0502	SW-0503	SW-0504	SW-0407	SW-0408	SW-0505H	SW-0505L	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
1,1,1-TRICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	127	NCA	NCA
1,1-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
1,1-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	4.81	NCA	NCA
1,2-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	0.291	118000	20000
ACETONE	5.00 U	6.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	6.00 U	NCA	NCA	NCA
CARBON DISULFIDE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
CHLOROFORM	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	0.20 J	1.00 U	5.67	28900	1240
METHYL CHLORIDE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
METHYL ETHYL KETONE	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	NCA	NCA	NCA
METHYLENE CHLORIDE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.49	NCA	NCA
TOLUENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	7440	NCA	NCA
TOTAL-1,2-DICHLOROETHENE*	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	0.60 J	0.60 J	0.40 J	1.00 U	592.00	NCA	NCA
TRICHLOROETHYLENE (TCE)	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	6.00	4.00	9.00	2.00	1.09	45000	21900

NOTES:
* NJDEP FW-2 Standard based on Trans-1,2-Dichloroethene.
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-1
VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 20 DITCH	AREA 18B STREAM								WATER QUALITY CRITERIA		
	SW-2001	SW-1803	SW-1804	SW-1805	SW-1806	SW-1807	SW-1808	SW-1809	SW-1818 (Duplicate of SW-1809)	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
1,1,1-TRICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	127	NCA	NCA
1,1-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
1,1-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	4.81	NCA	NCA
1,2-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	0.291	118000	20000
ACETONE	6.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
CARBON DISULFIDE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
CHLOROFORM	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	5.67	28900	1240
METHYL CHLORIDE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
METHYL ETHYL KETONE	5.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
METHYLENE CHLORIDE	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.49	NCA	NCA
TOLUENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	7440	NCA	NCA
TOTAL-1,2-DICHLOROETHENE*	1.00 U	1.00 U	1.00 U	1.00 U	3.00	1.00 U	12.00	1.00 U	1.00 U	592.00	NCA	NCA
TRICHLOROETHYLENE (TCE)	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	16.00	14.00 J-	12.00	1.09	45000	21900

NOTES:
* NJDEP FW-2 Standard based on Trans-1,2-Dichloroethene.
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-1
VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	RED ROOT CREEK							WATER QUALITY CRITERIA		
	SW-0606H	SW-0606L	SW-0607	SW-0608H	SW-0608L	SW-0609H	SW-0609L	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,1,1-TRICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	31200	NCA
1,1-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
1,1-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
1,2-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	99	113000	NCA
ACETONE	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	NCA	NCA	NCA
CARBON DISULFIDE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
CHLOROFORM	1.00 U	1.00 U	1.00 U	1.00 U	0.20 J	1.00 U	0.10 J	470	NCA	NCA
METHYL CHLORIDE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
METHYL ETHYL KETONE (2-BUTANONE)	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	NCA	NCA	NCA
METHYLENE CHLORIDE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1600	NCA	NCA
TOLUENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	200000	6300	5000
TOTAL-1,2-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	224000	NCA
TRICHLOROETHYLENE (TCE)	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	81	2000	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-1
VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 18B LOWER STREAM			AREA 8 POND						WATER QUALITY CRITERIA		
	SW-0102	SW-0103	SW-0104	SW-0801	SW-0802	SW-0803	SW-0804	SW-0805	SW-0806	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
1,1,1-TRICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	127	NCA	NCA
1,1-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	NCA	NCA	NCA
1,1-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	4.81	NCA	NCA
1,2-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	0.291	118000	20000
ACETONE	5.00 U	5.00 U	5.00 U	14.00 U	7.00 U	6.00 U	2.00 U	4.00 U	19.00 U	NCA	NCA	NCA
CARBON DISULFIDE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	NCA	NCA	NCA
CHLOROFORM	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	5.67	28900	1240
METHYL CHLORIDE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	4.00 U	2.00 U	NCA	NCA	NCA
METHYL ETHYL KETONE	5.00 U	5.00 U	5.00 U	21.00 J	2.00 U	2.00 U	2.00 U	4.00 U	2.00 U	NCA	NCA	NCA
METHYLENE CHLORIDE	2.00 U	2.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	2.49	NCA	NCA
TOLUENE	1.00 U	1.00 U	1.00 U	1.00 U	2.00	2.00	2.00	2.00 U	1.00 U	7440	NCA	NCA
TOTAL-1,2-DICHLOROETHENE*	5.00	4.00	3.00	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	592.00	NCA	NCA
TRICHLOROETHYLENE (TCE)	15.00	16.00	13.00	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00	45000	21900

NOTES:
* NJDEP FW-2 Standard based on Trans-1,2-Dichloroethene.
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-1
VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 18C STREAM								LOWER 18B STREAM	WATER QUALITY CRITERIA		
	SW-1810	SW-1811	SW-1812	SW-1813	SW-1814	SW-1815	SW-1816	SW-1817	SW-0101	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
1,1,1-TRICHLOROETHANE	1.00 U	1.00 U	1.00 U	12.00	2.00 J	39.00	1.00 U	1.00 U	1.00 U	127	NCA	NCA
1,1-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	3.00	1.00 U	6.00	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
1,1-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	2.00 J	1.00 U	14.00 J	1.00 U	1.00 U	1.00 U	4.81	NCA	NCA
1,2-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	0.291	118000	20000
ACETONE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	5.00 U	NCA	NCA	NCA
CARBON DISULFIDE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
CHLOROFORM	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	5.67	28900	1240
METHYL CHLORIDE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
METHYL ETHYL KETONE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	5.00 U	NCA	NCA	NCA
METHYLENE CHLORIDE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	2.49	NCA	NCA
TOLUENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	7440	NCA	NCA
TOTAL-1,2-DICHLOROETHENE*	4.00	3.00	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	5.00	592.00	NCA	NCA
TRICHLOROETHYLENE (TCE)	8.00	4.00	1.00 U	1.00 U	1.00 U	5.00	1.00 U	1.00 U	20.00	1.09	45000	21900

NOTES:
* NJDEP FW-2 Standard based on Trans-1,2-Dichloroethene.
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-1
VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

CENTRAL DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	CENTRAL DITCH								WATER QUALITY CRITERIA		
	SW-1101H	SW-1101L	SW-1102H	SW-1102L	SW-1103H	SW-1103L	SW-1104H	SW-1104L	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,1,1-TRICHLOROETHANE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	31200	NCA
1,1-DICHLOROETHANE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
1,1-DICHLOROETHENE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
1,2-DICHLOROETHANE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	99	113000	NCA
ACETONE	4.00 U	4.00 U	4.00 U	9.00 U	6.00 U	4.00 U	4.00 U	4.00 U	NCA	NCA	NCA
CARBON DISULFIDE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
CHLOROFORM	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	470	NCA	NCA
METHYL CHLORIDE	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	NCA	NCA	NCA
METHYL ETHYL KETONE	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	NCA	NCA	NCA
METHYLENE CHLORIDE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	1600	NCA	NCA
TOLUENE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	200000	6300	5000
TOTAL-1,2-DICHLOROETHENE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	224000	NCA
TRICHLOROETHYLENE (TCE)	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	81	2000	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-1
VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 8 POND	RED ROOT CREEK		SULFUR PLANT PONDS				WATER QUALITY CRITERIA		
	SW-0807 (Duplicate of SW-0801)	SW-0602H	SW-0602L	SW-0610	SW-0613	SW-0614	SW-0615	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
1,1,1-TRICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	127	NCA	NCA
1,1-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
1,1-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	4.81	NCA	NCA
1,2-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	0.291	118000	20000
ACETONE	8.00 U	26.00 U	9.00 U	11.00 U	5.00 U	10.00 U	38.00	NCA	NCA	NCA
CARBON DISULFIDE	1.00 U	2.00	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
CHLOROFORM	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	5.67	28900	1240
METHYL CHLORIDE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
METHYL ETHYL KETONE	13.00	4.00 J	5.00 U	5.00 U	5.00 U	5.00 U	3.00 J	NCA	NCA	NCA
METHYLENE CHLORIDE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.49	NCA	NCA
TOLUENE	2.00	1.00	6.00	1.00 U	1.00 U	1.00 U	1.00 U	7440	NCA	NCA
TOTAL-1,2-DICHLOROETHENE*	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	592.00	NCA	NCA
TRICHLOROETHYLENE (TCE)	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.09	45000	21900

NOTES:
* NJDEP FW-2 Standard based on Trans-1,2-Dichloroethene.
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-1
VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

CENTRAL DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	ISOLATED FRESHWATER PONDS			UPGRADIENT PONDED AREA	WATER QUALITY CRITERIA		
	SW-1623	SW-1626	SW-1627 (Duplicate of SW-1626)	SW-1621	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
1,1,1-TRICHLOROETHANE	1.00 U	2.00 U	2.00 U	1.00 U	127	NCA	NCA
1,1-DICHLOROETHANE	1.00 U	2.00 U	2.00 U	1.00 U	NCA	NCA	NCA
1,1-DICHLOROETHENE	1.00 U	2.00 U	2.00 U	1.00 U	4.81	NCA	NCA
1,2-DICHLOROETHANE	1.00 U	2.00 U	2.00 U	1.00 U	0.291	118000	20000
ACETONE	5.00 U	26.00 U	21.00 U	10.00 U	NCA	NCA	NCA
CARBON DISULFIDE	1.00 U	2.00 U	2.00 U	1.00 U	NCA	NCA	NCA
CHLOROFORM	1.00 U	2.00 U	2.00 U	1.00 U	5.67	28900	1240
METHYL CHLORIDE	2.00 U	4.00 U	4.00 U	2.00 U	NCA	NCA	NCA
METHYL ETHYL KETONE	2.00 U	4.00 U	4.00 U	2.00 U	NCA	NCA	NCA
METHYLENE CHLORIDE	1.00 U	2.00 U	2.00 U	1.00 U	2.49	NCA	NCA
TOLUENE	1.00 U	2.00 U	2.00 U	1.00 U	7440	NCA	NCA
TOTAL-1,2-DICHLOROETHENE*	1.00 U	2.00 U	2.00 U	1.00 U	592.00	NCA	NCA
TRICHLOROETHYLENE (TCE)	1.00 U	2.00 U	2.00 U	1.00 U	1.09	45000	21900

NOTES:
* NJDEP FW-2 Standard based on Trans-1,2-Dichloroethene.
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-1
VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

CENTRAL DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	ISOLATED ESTUARINE PONDS			UPGRADIENT PONDED AREA	WATER QUALITY CRITERIA		
	SW-1622	SW-1625H	SW-1625L	SW-1624	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,1,1-TRICHLOROETHANE	1 U	10.00 U	1.00 U	2.00 U	NCA	31200	NCA
1,1-DICHLOROETHANE	1 U	10.00 U	1.00 U	2.00 U	NCA	NCA	NCA
1,1-DICHLOROETHENE	1 U	10.00 U	1.00 U	2.00 U	NCA	NCA	NCA
1,2-DICHLOROETHANE	1 U	10.00 U	1.00 U	2.00 U	99	113000	NCA
ACETONE	2 U	20.00 U	9.00 U	4.00 U	NCA	NCA	NCA
CARBON DISULFIDE	1 U	10.00 U	4.00	2.00 U	NCA	NCA	NCA
CHLOROFORM	1 U	10.00 U	1.00 U	2.00 U	470	NCA	NCA
METHYL CHLORIDE	2 U	20.00 U	2.00 U	4.00 U	NCA	NCA	NCA
METHYL ETHYL KETONE	2 U	20.00 U	2.00 U	4.00 U	NCA	NCA	NCA
METHYLENE CHLORIDE	1 U	10.00 U	1.00 U	2.00 U	1600	NCA	NCA
TOLUENE	1 U	10.00 U	1.00 U	2.00 U	200000	6300	5000
TOTAL-1,2-DICHLOROETHENE	1 U	10.00 U	1.00 U	2.00 U	NCA	224000	NCA
TRICHLOROETHYLENE (TCE)	1 U	10.00 U	1.00 U	2.00 U	81	2000	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-1
VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 16 ASSOCIATED DITCHES									WATER QUALITY CRITERIA		
	SW-1611	SW-1612	SW-1613	SW-1615	SW-1616H	SW-1616L	SW-1617	SW-1618	SW-1628 (Duplicate of SW-1612)	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,1,1-TRICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	31200	NCA
1,1-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
1,1-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
1,2-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	99	113000	NCA
ACETONE	3.00 U	6.00	2.00 U	3.00	4.00	2.00 U	2.00 U	4.00	6.00	NCA	NCA	NCA
CARBON DISULFIDE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
CHLOROFORM	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	470	NCA	NCA
METHYL CHLORIDE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
METHYL ETHYL KETONE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	4.00	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
METHYLENE CHLORIDE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	4.00	1.00 U	1600	NCA	NCA
TOLUENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	200000	6300	5000
TOTAL-1,2-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	224000	NCA
TRICHLOROETHYLENE (TCE)	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	81	2000	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
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TABLE 4-1
VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

AREA 12 DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 12 DITCH					WATER QUALITY CRITERIA		
	SW-1201	SW-1202H	SW-1202L	SW-1203H	SW-1203L	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,1,1-TRICHLOROETHANE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	31200	NCA
1,1-DICHLOROETHANE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
1,1-DICHLOROETHENE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
1,2-DICHLOROETHANE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	99	113000	NCA
ACETONE	4.00 U	14.00 J	13.00	4.00 U	4.00 U	NCA	NCA	NCA
CARBON DISULFIDE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
CHLOROFORM	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	470	NCA	NCA
METHYL CHLORIDE	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	NCA	NCA	NCA
METHYL ETHYL KETONE	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	NCA	NCA	NCA
METHYLENE CHLORIDE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	1600	NCA	NCA
TOLUENE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	200000	6300	5000
TOTAL-1,2-DICHLOROETHENE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	224000	NCA
TRICHLOROETHYLENE (TCE)	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	81	2000	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-1
VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	WESTERN BOUNDARY DITCH							WATER QUALITY CRITERIA		
	SW-1601H	SW-1601L	SW-1602H	SW-1602L	SW-1603H	SW-1603L	SW-1907	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,1,1-TRICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	31200	NCA
1,1-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	0.40 J	NCA	NCA	NCA
1,1-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
1,2-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	99	113000	NCA
ACETONE	2.00 U	2.00 U	2.00 U	4.00 U	2.00 U	4.00 U	11.00 U	NCA	NCA	NCA
CARBON DISULFIDE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
CHLOROFORM	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	470	NCA	NCA
METHYL CHLORIDE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
METHYL ETHYL KETONE	2.00 U	2.00 U	2.00 U	2.00 U	5.00	2.00 U	5.00 U	NCA	NCA	NCA
METHYLENE CHLORIDE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1600	NCA	NCA
TOLUENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	0.10 J	200000	6300	5000
TOTAL-1,2-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	0.20 J	NCA	224000	NCA
TRICHLOROETHYLENE (TCE)	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	81	2000	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-1
VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)
ESTUARINE

COMPOUND	ASSOCIATED DITCHES		OLD RED ROOT CREEK							WATER QUALITY CRITERIA		
	SW-1629	SW-1630	SW-1606	SW-1607	SW-1608	SW-1609H	SW-1609L	SW-1610	SW-1631 (Duplicate of SW-1609)	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,1,1-TRICHLOROETHANE	2.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	31200	NCA
1,1-DICHLOROETHANE	2.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
1,1-DICHLOROETHENE	2.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
1,2-DICHLOROETHANE	2.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	99	113000	NCA
ACETONE	12.00 U	13.00 U	2.00 U	3.00 U	2.00 U	4.00 U	5.00 U	6.00 U	4.00 U	NCA	NCA	NCA
CARBON DISULFIDE	2.00	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	3.00 J	1.00 U	1.00 U	NCA	NCA	NCA
CHLOROFORM	2.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	470	NCA	NCA
METHYL CHLORIDE	4.00 U	4.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
METHYL ETHYL KETONE	4.00 U	4.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
METHYLENE CHLORIDE	2.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1600	NCA	NCA
TOLUENE	2.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	200000	6300	5000
TOTAL-1,2-DICHLOROETHENE	2.00 U	2.00 U	8.00	3.00	1.00	1.00 U	2.00	1.00 U	2.00	NCA	224000	NCA
TRICHLOROETHYLENE (TCE)	2.00 U	2.00 U	4.00	2.00	1.00	1.00 U	1.00	1.00 U	1.00	81	2000	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-1
VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 16 DITCHES	AREA 19 FOREST. WETLAND	AREA 19 NE WETLANDS			OLD RED ROOT CREEK		WATER QUALITY CRITERIA		
	SW-1614	SW-1903	SW-1908	SW-1909	SW-1910	SW-1604	SW-1605	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
1,1,1-TRICHLOROETHANE	1.00 U	1.00 U	2.00 U	1.00 U	0.40 J	1.00 U	1.00 U	127	NCA	NCA
1,1-DICHLOROETHANE	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
1,1-DICHLOROETHENE	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	4.81	NCA	NCA
1,2-DICHLOROETHANE	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	0.291	118000	20000
ACETONE	8.00	8.00 U	17.00 U	5.00 U	6.00 U	3.00 U	4.00	NCA	NCA	NCA
CARBON DISULFIDE	1.00 U	1.00	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
CHLOROFORM	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	5.67	28900	1240
METHYL CHLORIDE	2.00 U	2.00 U	5.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
METHYL ETHYL KETONE	2.00 U	5.00 U	12.00 U	5.00 U	5.00 U	2.00 U	2.00 U	NCA	NCA	NCA
METHYLENE CHLORIDE	1.00 U	2.00 U	9.00 U	4.00 U	6.00 U	1.00 U	1.00 U	2.49	NCA	NCA
TOLUENE	2.00	0.10 J	2.00 U	1.00 U	0.10 J	1.00 U	1.00 U	7440	NCA	NCA
TOTAL-1,2-DICHLOROETHENE*	1.00 U	1.00 U	70.00	1.00	10.00	1.00 U	1.00	592.00	NCA	NCA
TRICHLOROETHYLENE (TCE)	1.00 U	1.00 U	20.00	3.00	7.00	1.00 U	1.00 U	1.09	45000	21900

NOTES:
* NJDEP FW-2 Standard based on Trans-1,2-Dichloroethene.
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-1
VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 19 SOUTHWEST WETLANDS		SOUTHWEST DITCH						WATER QUALITY CRITERIA		
	SW-1906	SW-1911 (Duplicate of SW-1906)	SW-1215H	SW-1215L	SW-1216H	SW-1216L	SW-1619	SW-1620	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,1,1-TRICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	NCA	31200	NCA
1,1-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	NCA	NCA	NCA
1,1-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	NCA	NCA	NCA
1,2-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	99	113000	NCA
ACETONE	11.00 U	10.00 U	2.00 U	2.00 U	2.00 U	5.00 U	15.00 U	2.00 U	NCA	NCA	NCA
CARBON DISULFIDE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00	NCA	NCA	NCA
CHLOROFORM	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	470	NCA	NCA
METHYL CHLORIDE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	4.00 U	2.00 U	NCA	NCA	NCA
METHYL ETHYL KETONE	5.00 U	5.00 U	2.00 U	2.00 U	2.00 U	2.00 U	4.00 U	2.00 U	NCA	NCA	NCA
METHYLENE CHLORIDE	5.00 U	3.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1600	NCA	NCA
TOLUENE	1.00 U	0.10 J	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	200000	6300	5000
TOTAL-1,2-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	NCA	224000	NCA
TRICHLOROETHYLENE (TCE)	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	81	2000	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-1
VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

COUNTY PARK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 10 SOUTHERN BORDER DITCH		OPEN LAWN DITCH			WESTERN BOUNDARY DITCH		WATER QUALITY CRITERIA		
	SW-1006	SW-1902	SW-1004	SW-1005	SW-1012 (Duplicate of SW-1005)	SW-1001	SW-1002	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
1,1,1-TRICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	127	NCA	NCA
1,1-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
1,1-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	4.81	NCA	NCA
1,2-DICHLOROETHANE	0.30 J	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	0.291	118000	20000
ACETONE	5.00 U	9.00 U	5.00 U	6.00 U	5.00 U	5.00 U	5.00 U	NCA	NCA	NCA
CARBON DISULFIDE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
CHLOROFORM	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	5.67	28900	1240
METHYL CHLORIDE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
METHYL ETHYL KETONE	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	NCA	NCA	NCA
METHYLENE CHLORIDE	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.49	NCA	NCA
TOLUENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	7440	NCA	NCA
TOTAL-1,2-DICHLOROETHENE*	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	592.00	NCA	NCA
TRICHLOROETHYLENE (TCE)	0.20 J	1.00 U	1.00 U	1.00 U	1.00 U	0.10 J	1.00 U	1.09	45000	21900

NOTES:
* NJDEP FW-2 Standard based on Trans-1,2-Dichloroethene.
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-1
VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 19 SOUTHWESTERN WETLANDS			WATER QUALITY CRITERIA		
	SW-1904	SW-1905	SW-1912 (Duplicate of SW-1904)	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
1,1,1-TRICHLOROETHANE	1.00 U	1.00 U	1.00 U	127	NCA	NCA
1,1-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
1,1-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	4.81	NCA	NCA
1,2-DICHLOROETHANE	1.00 U	1.00 U	1.00 U	0.291	118000	20000
ACETONE	5.00 U	11.00 U	14.00 U	NCA	NCA	NCA
CARBON DISULFIDE	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
CHLOROFORM	1.00 U	1.00 U	1.00 U	5.67	28900	1240
METHYL CHLORIDE	2.00 U	2.00 U	2.00 U	NCA	NCA	NCA
METHYL ETHYL KETONE	5.00 U	5.00 U	5.00 U	NCA	NCA	NCA
METHYLENE CHLORIDE	3.00 U	6.00 U	2.00 U	2.49	NCA	NCA
TOLUENE	1.00 U	1.00 U	0.10 J	7440	NCA	NCA
TOTAL-1,2-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	NCA	NCA	NCA
TRICHLOROETHYLENE (TCE)	1.00 U	1.00 U	1.00 U	1.09	45000	21900

NOTES:

(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-2
SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

EAST DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	EAST DITCH					UNNAMED TRIBUTARY	WATER QUALITY CRITERIA		
	SW-1402	SW-1403	SW-1404	SW-1405	SW-1406	SW-1410	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
4-METHYLPHENOL	10 U	11 U	10 U	10 U	10 U	10 U	NCA	NCA	NCA
BENZO(A)ANTHRACENE	10 U	11 U	10 U	10 U	10 U	10 U	0.0028	NCA	NCA
BENZO(A)PYRENE	10 U	11 U	10 U	10 U	10 U	10 U	0.0028	NCA	NCA
BENZO(B)FLUORANTHENE	10 U	11 U	10 U	10 U	10 U	10 U	0.0028	NCA	NCA
BENZO(K)FLUORANTHENE	10 U	11 U	10 U	10 U	10 U	10 U	0.0028	NCA	NCA
BENZYL BUTYL PHTHALATE	10 U	11 U	10 U	10 U	10 U	10 U	239	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	10 U	11 U	10 U	34 U	10 U	10 U	1.76	NCA	NCA
CHRYSENE	10 U	11 U	10 U	10 U	10 U	10 U	0.0028	NCA	NCA
DI-N-BUTYL PHTHALATE	10 U	11 U	10 U	10 U	10 U	10 U	3530	NCA	NCA
DIETHYL PHTHALATE	10 U	11 U	10 U	10 U	10 U	10 U	21200	NCA	NCA
FLUORANTHRENE	10 U	11 U	10 U	10 U	10 U	10 U	310	3980	NCA
INDENO(1,2,3-C,D)PYRENE	10 U	11 U	10 U	10 U	10 U	10 U	0.0028	NCA	NCA
PHENANTHRENE	10 U	11 U	10 U	10 U	10 U	10 U	NCA	NCA	NCA
PHENOL	10 U	11 U	10 U	10 U	10 U	10 U	20900	10200	2560
PYRENE	10 U	11 U	10 U	10 U	10 U	10 U	797	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-2
SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

EAST DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	EAST DITCH			UNNAMED TRIBUTARY		WATER QUALITY CRITERIA		
	SW-1407	SW-1408H	SW-1408L	SW-1411	SW-1412	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
4-METHYLPHENOL	10 U	10 UJ	10 U	10 U	11 U	NCA	NCA	NCA
BENZO(A)ANTHRACENE	10 U	10 U	10 U	10 U	11 U	0.031	NCA	NCA
BENZO(A)PYRENE	10 U	10 U	10 U	10 U	11 U	0.031	NCA	NCA
BENZO(B)FLUORANTHENE	10 U	10 U	10 U	10 U	11 U	0.031	NCA	NCA
BENZO(K)FLUORANTHENE	10 U	10 U	10 U	10 U	11 U	0.031	NCA	NCA
BENZYL BUTYL PHTHALATE	10 U	10 U	10 U	10 U	11 U	416	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	10 U	10 U	10 U	10 U	11 U	5.92	NCA	NCA
CHRYSENE	10 U	10 U	10 U	10 U	11 U	0.031	NCA	NCA
DI-N-BUTYL PHTHALATE	10 U	10 U	10 U	10 U	11 U	15700	NCA	NCA
DIETHYL PHTHALATE	10 U	10 U	10 U	10 U	11 U	111000	NCA	NCA
FLUORANTHRENE	10 U	10 U	10 U	10 U	11 U	393	40	16
INDENO(1,2,3-C,D)PYRENE	10 U	10 U	10 U	10 U	11 U	0.031	NCA	NCA
PHENANTHRENE	10 U	10 U	10 U	10 U	11 U	NCA	NCA	NCA
PHENOL	10 U	10 UJ	10 U	10 U	11 U	4600000	5800	NCA
PYRENE	10 U	10 U	10 U	10 U	11 U	8970	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-2
SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	BLACK DITCH						WATER QUALITY CRITERIA		
	SW-0617L	SW-0618H	SW-0618L	SW-0619H	SW-0619L	SW-0620 (Duplicate of SW-0619)	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
4-METHYLPHENOL	10 U	10 U	10 U	10 U	10 U	10 U	NCA	NCA	NCA
BENZO(A)ANTHRACENE	10 U	10 U	10 U	10 UJ	10 U	10 U	0.031	NCA	NCA
BENZO(A)PYRENE	10 U	10 U	10 U	10 UJ	10 U	10 U	0.031	NCA	NCA
BENZO(B)FLUORANTHENE	10 U	10 U	10 U	10 UJ	10 U	10 U	0.031	NCA	NCA
BENZO(K)FLUORANTHENE	10 U	10 U	10 U	10 UJ	10 U	10 U	0.031	NCA	NCA
BENZYL BUTYL PHTHALATE	10 U	10 U	10 U	10 UJ	10 U	10 U	416	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	10 U	10 U	10 U	10 UJ	10 U	10 U	5.92	NCA	NCA
CHRYSENE	10 U	10 U	10 U	10 UJ	10 U	10 U	0.031	NCA	NCA
DI-N-BUTYL PHTHALATE	10 U	10 U	10 U	10 UJ	10 U	10 U	15700	NCA	NCA
DIETHYL PHTHALATE	1 J	10 U	10 U	10 UJ	10 U	10 U	111000	NCA	NCA
FLUORANTHRENE	10 U	10 U	10 U	10 UJ	10 U	10 U	393	40	16
INDENO(1,2,3-C,D)PYRENE	10 U	10 U	10 U	10 UJ	10 U	10 U	0.031	NCA	NCA
PHENANTHRENE	10 U	10 U	10 U	10 UJ	10 U	10 U	NCA	NCA	NCA
PHENOL	10 U	10 U	10 U	10 U	10 U	10 U	4600000	5800	NCA
PYRENE	10 U	10 U	10 U	10 UJ	10 U	10 U	8970	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-2
SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	BLACK DITCH							WATER QUALITY CRITERIA		
	SW-0506H	SW-0506L	SW-0507H	SW-0507L	SW-0616H	SW-0616L	SW-0617H	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
4-METHYLPHENOL	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NCA	NCA	NCA
BENZO(A)ANTHRACENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZO(A)PYRENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZO(B)FLUORANTHENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZO(K)FLUORANTHENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZYL BUTYL PHTHALATE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	416	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	10 U	10 U	10 U	1 J	10 U	10 U	10 U	5.92	NCA	NCA
CHRYSENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
DI-N-BUTYL PHTHALATE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	15700	NCA	NCA
DIETHYL PHTHALATE	10 U	10 U	10 U	10 U	2 J	10 U	1 J	111000	NCA	NCA
FLUORANTHRENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	393	40	16
INDENO(1,2,3-C,D)PYRENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
PHENANTHRENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NCA	NCA	NCA
PHENOL	10 U	1 J	10 U	10 U	10 U	10 U	10 U	4600000	5800	NCA
PYRENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	8970	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-2
SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 18 B STREAM								WATER QUALITY CRITERIA		
	SW-1803	SW-1804	SW-1805	SW-1806	SW-1807	SW-1808	SW-1809	SW-1818 (Duplicate of SW-1809)	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
4-METHYLPHENOL	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	NCA	NCA	NCA
BENZO(A)ANTHRACENE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	0.0028	NCA	NCA
BENZO(A)PYRENE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	0.0028	NCA	NCA
BENZO(B)FLUORANTHENE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	0.0028	NCA	NCA
BENZO(K)FLUORANTHENE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	0.0028	NCA	NCA
BENZYL BUTYL PHTHALATE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	239	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	1.76	NCA	NCA
CHRYSENE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	0.0028	NCA	NCA
DI-N-BUTYL PHTHALATE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	3530	NCA	NCA
DIETHYL PHTHALATE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	21200	NCA	NCA
FLUORANTHRENE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	310	3980	NCA
INDENO(1,2,3-C,D)PYRENE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	0.0028	NCA	NCA
PHENANTHRENE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	NCA	NCA	NCA
PHENOL	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	20900	10200	2560
PYRENE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	797	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
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TABLE 4-2
SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 4 DITCH	AREA 5 POND				BLACK DITCH				WATER QUALITY CRITERIA		
	SW-0406	SW-0501	SW-0502	SW-0503	SW-0504	SW-0407	SW-0408	SW-0505H	SW-0505L	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
4-METHYLPHENOL	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NCA	NCA	NCA
BENZO(A)ANTHRACENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.0028	NCA	NCA
BENZO(A)PYRENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.0028	NCA	NCA
BENZO(B)FLUORANTHENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.0028	NCA	NCA
BENZO(K)FLUORANTHENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.0028	NCA	NCA
BENZYL BUTYL PHTHALATE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	239	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	10 U	10 U	10 U	10 U	1 J	10 U	10 U	1 J	1 J	1.76	NCA	NCA
CHRYSENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.0028	NCA	NCA
DI-N-BUTYL PHTHALATE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	3530	NCA	NCA
DIETHYL PHTHALATE	10 U	10 U	10 U	10 U	1 J	10 U	10 U	10 U	10 U	21200	NCA	NCA
FLUORANTHRENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	310	3980	NCA
INDENO(1,2,3-C,D)PYRENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.0028	NCA	NCA
PHENANTHRENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NCA	NCA	NCA
PHENOL	10 U	10 U	10 U	10 U	2 J	10 U	10 U	10 U	1 J	20900	10200	2560
PYRENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	797	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
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TABLE 4-2
SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 8 POND							AREA 20	WATER QUALITY CRITERIA		
	SW-0801	SW-0802	SW-0803	SW-0804	SW-0805	SW-0806	SW-0807 (Duplicate of SW-0801)	SW-2001	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
4-METHYLPHENOL	10 U	10 U	10 U	11 U	11 U	10 U	11 U	10 U	NCA	NCA	NCA
BENZO(A)ANTHRACENE	10 U	10 U	10 U	11 U	11 U	10 U	11 U	10 U	0.0028	NCA	NCA
BENZO(A)PYRENE	10 U	10 U	10 U	11 U	11 U	10 U	11 U	10 U	0.0028	NCA	NCA
BENZO(B)FLUORANTHENE	10 U	10 U	10 U	11 U	11 U	10 U	11 U	10 U	0.0028	NCA	NCA
BENZO(K)FLUORANTHENE	10 U	10 U	10 U	11 U	11 U	10 U	11 U	10 U	0.0028	NCA	NCA
BENZYL BUTYL PHTHALATE	10 U	10 U	10 U	11 U	11 U	10 U	11 U	10 U	239	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	10 U	10 U	10 U	11 U	11 U	10 U	11 U	10 U	1.76	NCA	NCA
CHRYSENE	10 U	10 U	10 U	11 U	11 U	10 U	11 U	10 U	0.0028	NCA	NCA
DI-N-BUTYL PHTHALATE	10 U	10 U	10 U	11 U	11 U	10 U	11 U	3 J	3530	NCA	NCA
DIETHYL PHTHALATE	10 U	10 U	10 U	11 U	11 U	10 U	11 U	10 U	21200	NCA	NCA
FLUORANTHRENE	10 U	10 U	10 U	11 U	11 U	10 U	11 U	10 U	310	3980	NCA
INDENO(1,2,3-C,D)PYRENE	10 U	10 U	10 U	11 U	11 U	10 U	11 U	10 U	0.0028	NCA	NCA
PHENANTHRENE	10 U	10 U	10 U	11 U	11 U	10 U	11 U	10 U	NCA	NCA	NCA
PHENOL	10 U	10 U	10 U	11 U	11 U	10 U	11 U	1 J	20900	10200	2560
PYRENE	10 U	10 U	10 U	11 U	11 U	10 U	11 U	10 U	797	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
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TABLE 4-2
SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 18C STREAM								WATER QUALITY CRITERIA		
	SW-1810	SW-1811	SW-1812	SW-1813	SW-1814	SW-1815	SW-1816	SW-1817	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
4-METHYLPHENOL	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	NCA	NCA	NCA
BENZO(A)ANTHRACENE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	0.0028	NCA	NCA
BENZO(A)PYRENE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	0.0028	NCA	NCA
BENZO(B)FLUORANTHENE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	0.0028	NCA	NCA
BENZO(K)FLUORANTHENE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	0.0028	NCA	NCA
BENZYL BUTYL PHTHALATE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	239	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	1.76	NCA	NCA
CHRYSENE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	0.0028	NCA	NCA
DI-N-BUTYL PHTHALATE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	3530	NCA	NCA
DIETHYL PHTHALATE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	21200	NCA	NCA
FLUORANTHRENE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	310	3980	NCA
INDENO(1,2,3-C,D)PYRENE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	0.0028	NCA	NCA
PHENANTHRENE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	NCA	NCA	NCA
PHENOL	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	20900	10200	2560
PYRENE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U	797	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
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(3) From NJAC 7:9B Surface Water Quality Standards.
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TABLE 4-2
SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	RED ROOT CREEK							WATER QUALITY CRITERIA		
	SW-0606H	SW-0606L	SW-0607	SW-0608H	SW-0608L	SW-0609H	SW-0609L	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
4-METHYLPHENOL	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NCA	NCA	NCA
BENZO(A)ANTHRACENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZO(A)PYRENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZO(B)FLUORANTHENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZO(K)FLUORANTHENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZYL BUTYL PHTHALATE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	416	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.92	NCA	NCA
CHRYSENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
DI-N-BUTYL PHTHALATE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	15700	NCA	NCA
DIETHYL PHTHALATE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	111000	NCA	NCA
FLUORANTHRENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	393	40	16
INDENO(1,2,3-C,D)PYRENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
PHENANTHRENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NCA	NCA	NCA
PHENOL	3 J	2 J	10 U	10 U	10 U	10 U	10 U	4600000	5800	NCA
PYRENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	8970	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
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TABLE 4-2
SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	RED ROOT CREEK								WATER QUALITY CRITERIA		
	SW-0601H	SW-0601L	SW-0603H	SW-0603L	SW-0604H	SW-0604L	SW-0605H	SW-0605L	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
4-METHYLPHENOL	11 U	11 U	10 U	11 U	10 U	10 U	11 U	10 U	NCA	NCA	NCA
BENZO(A)ANTHRACENE	11 U	11 U	10 U	11 U	10 U	10 U	11 U	10 U	0.031	NCA	NCA
BENZO(A)PYRENE	11 U	11 U	10 U	11 U	10 U	10 U	11 U	10 U	0.031	NCA	NCA
BENZO(B)FLUORANTHENE	11 U	11 U	10 U	11 U	10 U	10 U	11 U	10 U	0.031	NCA	NCA
BENZO(K)FLUORANTHENE	11 U	11 U	10 U	11 U	10 U	10 U	11 U	10 U	0.031	NCA	NCA
BENZYL BUTYL PHTHALATE	11 U	11 U	10 U	11 U	10 U	10 U	11 U	10 U	416	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	1 J	11 U	10 U	11 U	10 U	10 U	11 U	10 U	5.92	NCA	NCA
CHRYSENE	11 U	11 U	10 U	11 U	10 U	10 U	11 U	10 U	0.031	NCA	NCA
DI-N-BUTYL PHTHALATE	11 U	11 U	10 U	11 U	10 U	10 U	11 U	10 U	15700	NCA	NCA
DIETHYL PHTHALATE	11 U	11 U	10 U	11 U	10 U	10 U	11 U	10 U	111000	NCA	NCA
FLUORANTHRENE	11 U	11 U	10 U	11 U	10 U	10 U	11 U	10 U	393	40	16
INDENO(1,2,3-C,D)PYRENE	11 U	11 U	10 U	11 U	10 U	10 U	11 U	10 U	0.031	NCA	NCA
PHENANTHRENE	11 U	11 U	10 U	11 U	10 U	10 U	11 U	10 U	NCA	NCA	NCA
PHENOL	11 U	11 U	10 U	2 J	10 U	10 U	11 U	10 U	4600000	5800	NCA
PYRENE	11 U	11 U	10 U	11 U	10 U	10 U	11 U	10 U	8970	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
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TABLE 4-2
SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	SULFUR PLANT PONDS		WATER QUALITY CRITERIA		
	SW-0614	SW-0615	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
4-METHYLPHENOL	10 U	10 U	NCA	NCA	NCA
BENZO(A)ANTHRACENE	10 U	10 U	0.0028	NCA	NCA
BENZO(A)PYRENE	10 U	10 U	0.0028	NCA	NCA
BENZO(B)FLUORANTHENE	10 U	10 U	0.0028	NCA	NCA
BENZO(K)FLUORANTHENE	10 U	10 U	0.0028	NCA	NCA
BENZYL BUTYL PHTHALATE	10 U	10 U	239	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	61	10 U	1.76	NCA	NCA
CHRYSENE	10 U	10 U	0.0028	NCA	NCA
DI-N-BUTYL PHTHALATE	10 U	10 U	3530	NCA	NCA
DIETHYL PHTHALATE	10 U	10 U	21200	NCA	NCA
FLUORANTHRENE	10 U	10 U	310	3980	NCA
INDENO(1,2,3-C,D)PYRENE	10 U	10 U	0.0028	NCA	NCA
PHENANTHRENE	10 U	10 U	NCA	NCA	NCA
PHENOL	1 J	10 U	20900	10200	2560
PYRENE	10 U	10 U	797	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
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TABLE 4-2
SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	LOWER AREA 18B STREAM				RED ROOT CREEK		SULFUR PLANT PONDS		WATER QUALITY CRITERIA		
	SW-0101	SW-0102	SW-0103	SW-0104	SW-0602H	SW-0602L	SW-0610	SW-0613	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
4-METHYLPHENOL	10 U	11 U	10 U	12 U	20	11 U	10 U	10 U	NCA	NCA	NCA
BENZO(A)ANTHRACENE	10 U	11 U	10 U	12 U	11 U	11 U	10 U	10 U	0.0028	NCA	NCA
BENZO(A)PYRENE	10 U	11 U	10 U	12 U	11 U	11 U	10 U	10 U	0.0028	NCA	NCA
BENZO(B)FLUORANTHENE	10 U	11 U	10 U	12 U	11 U	11 U	10 U	10 U	0.0028	NCA	NCA
BENZO(K)FLUORANTHENE	10 U	11 U	10 U	12 U	11 U	11 U	10 U	10 U	0.0028	NCA	NCA
BENZYL BUTYL PHTHALATE	10 U	11 U	10 U	12 U	11 U	11 U	10 U	10 U	239	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	10 U	11 U	10 U	12 U	11 U	4 J	10 U	10 U	1.76	NCA	NCA
CHRYSENE	10 U	11 U	10 U	12 U	11 U	11 U	10 U	10 U	0.0028	NCA	NCA
DI-N-BUTYL PHTHALATE	10 U	11 U	10 U	12 U	11 U	11 U	10 U	10 U	3530	NCA	NCA
DIETHYL PHTHALATE	10 U	11 U	10 U	12 U	11 U	11 U	10 U	10 U	21200	NCA	NCA
FLUORANTHRENE	10 U	11 U	10 U	12 U	11 U	11 U	10 U	10 U	310	3980	NCA
INDENO(1,2,3-C,D)PYRENE	10 U	11 U	10 U	12 U	11 U	11 U	10 U	10 U	0.0028	NCA	NCA
PHENANTHRENE	10 U	11 U	10 U	12 U	11 U	11 U	10 U	10 U	NCA	NCA	NCA
PHENOL	10 U	11 U	10 U	12 U	11 U	11 U	2 J	10 U	20900	10200	2560
PYRENE	10 U	11 U	10 U	12 U	11 U	11 U	10 U	10 U	797	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
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TABLE 4-2
SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

CENTRAL DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	UPGRADIENT POND	ISOLATED ESTUARINE POND			WATER QUALITY CRITERIA		
	SW-1624	SW-1622	SW-1625H	SW-1625L	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
4-METHYLPHENOL	10 U	10 U	10 U	10 U	NCA	NCA	NCA
BENZO(A)ANTHRACENE	10 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZO(A)PYRENE	10 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZO(B)FLUORANTHENE	10 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZO(K)FLUORANTHENE	10 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZYL BUTYL PHTHALATE	10 U	10 U	10 U	10 U	416	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	10 U	10 U	10 U	10 U	5.92	NCA	NCA
CHRYSENE	10 U	10 U	10 U	10 U	0.031	NCA	NCA
DI-N-BUTYL PHTHALATE	10 U	10 U	10 U	10 U	15700	NCA	NCA
DIETHYL PHTHALATE	10 U	10 U	10 U	10 U	111000	NCA	NCA
FLUORANTHRENE	10 U	10 U	10 U	10 U	393	40	16
INDENO(1,2,3-C,D)PYRENE	10 U	10 U	10 U	10 U	0.031	NCA	NCA
PHENANTHRENE	10 U	10 U	10 U	10 U	NCA	NCA	NCA
PHENOL	10 U	10 U	10 U	10 U	4600000	5800	NCA
PYRENE	10 U	10 U	10 U	10 U	8970	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-2
SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

CENTRAL DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	CENTRAL DITCH								WATER QUALITY CRITERIA		
	SW-1101H	SW-1101L	SW-1102H	SW-1102L	SW-1103H	SW-1103L	SW-1104H	SW-1104L	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
4-METHYLPHENOL	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NCA	NCA	NCA
BENZO(A)ANTHRACENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZO(A)PYRENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZO(B)FLUORANTHENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZO(K)FLUORANTHENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZYL BUTYL PHTHALATE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	416	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	10 U	10 U	18 U	10 U	10 U	10 U	10 U	10 U	5.92	NCA	NCA
CHRYSENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
DI-N-BUTYL PHTHALATE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	15700	NCA	NCA
DIETHYL PHTHALATE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	111000	NCA	NCA
FLUORANTHRENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	393	40	16
INDENO(1,2,3-C,D)PYRENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
PHENANTHRENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NCA	NCA	NCA
PHENOL	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	4600000	5800	NCA
PYRENE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	8970	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
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TABLE 4-2
SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

AREA 12 DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 12 DITCH					WATER QUALITY CRITERIA		
	SW-1201	SW-1202H	SW-1202L	SW-1203H	SW-1203L	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
4-METHYLPHENOL	11 U	10 U	10 U	10 U	10 U	NCA	NCA	NCA
BENZO(A)ANTHRACENE	11 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZO(A)PYRENE	11 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZO(B)FLUORANTHENE	11 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZO(K)FLUORANTHENE	11 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZYL BUTYL PHTHALATE	11 U	10 U	10 U	10 U	10 U	416	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	11 U	10 U	10 U	10 U	10 U	5.92	NCA	NCA
CHRYSENE	11 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
DI-N-BUTYL PHTHALATE	11 U	10 U	10 U	10 U	10 U	15700	NCA	NCA
DIETHYL PHTHALATE	11 U	10 U	10 U	10 U	10 U	111000	NCA	NCA
FLUORANTHRENE	11 U	10 U	10 U	10 U	10 U	393	40	16
INDENO(1,2,3-C,D)PYRENE	11 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
PHENANTHRENE	11 U	10 U	10 U	10 U	10 U	NCA	NCA	NCA
PHENOL	11 U	10 U	10 U	10 U	10 U	4600000	5800	NCA
PYRENE	11 U	10 U	10 U	10 U	10 U	8970	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
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TABLE 4-2
SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

CENTRAL DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	ISOLATED FRESHWATER PONDS			UPGRADIENT PONDED AREA	WATER QUALITY CRITERIA		
	SW-1623	SW-1626	SW-1627 (Duplicate of SW-1626)	SW-1621	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
4-METHYLPHENOL	10 U	10 U	11 U	10 U	NCA	NCA	NCA
BENZO(A)ANTHRACENE	10 U	10 U	11 U	10 U	0.0028	NCA	NCA
BENZO(A)PYRENE	10 U	10 U	11 U	10 U	0.0028	NCA	NCA
BENZO(B)FLUORANTHENE	10 U	10 U	11 U	10 U	0.0028	NCA	NCA
BENZO(K)FLUORANTHENE	10 U	10 U	11 U	10 U	0.0028	NCA	NCA
BENZYL BUTYL PHTHALATE	10 U	10 U	11 U	10 U	239	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	10 U	10 U	11 U	30 U	1.76	NCA	NCA
CHRYSENE	10 U	10 U	11 U	10 U	0.0028	NCA	NCA
DI-N-BUTYL PHTHALATE	10 U	10 U	11 U	10 U	3530	NCA	NCA
DIETHYL PHTHALATE	10 U	10 U	11 U	10 U	21200	NCA	NCA
FLUORANTHRENE	10 U	10 U	11 U	10 U	310	3980	NCA
INDENO(1,2,3-C,D)PYRENE	10 U	10 U	11 U	10 U	0.0028	NCA	NCA
PHENANTHRENE	10 U	10 U	11 U	10 U	NCA	NCA	NCA
PHENOL	10 U	10 U	11 U	10 U	20900	10200	2560
PYRENE	10 U	10 U	11 U	10 U	797	NCA	NCA

NOTES:
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TABLE 4-2
SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	OLD RED ROOT CREEK	WEST DITCH							WATER QUALITY CRITERIA		
	SW-1631 (Duplicate of SW-1609)	SW-1601H	SW-1601L	SW-1602H	SW-1602L	SW-1603H	SW-1603L	SW-1907	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
4-METHYLPHENOL	11 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U	NCA	NCA	NCA
BENZO(A)ANTHRACENE	11 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZO(A)PYRENE	11 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZO(B)FLUORANTHENE	11 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZO(K)FLUORANTHENE	11 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZYL BUTYL PHTHALATE	11 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U	416	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	2 J	10 U	11 U	10 U	10 U	9 J	2 J	10 U	5.92	NCA	NCA
CHRYSENE	11 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
DI-N-BUTYL PHTHALATE	11 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U	15700	NCA	NCA
DIETHYL PHTHALATE	11 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U	111000	NCA	NCA
FLUORANTHRENE	11 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U	393	40	16
INDENO(1,2,3-C,D)PYRENE	11 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U	0.031	NCA	NCA
PHENANTHRENE	11 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U	NCA	NCA	NCA
PHENOL	11 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U	4600000	5800	NCA
PYRENE	11 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U	8970	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
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TABLE 4-2
SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 16 ASSOCIATED DITCHES		OLD RED ROOT CREEK						WATER QUALITY CRITERIA		
	SW-1629	SW-1630	SW-1606	SW-1607	SW-1608	SW-1609H	SW-1609L	SW-1610	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
4-METHYLPHENOL	10 U	11 U	10 U	10 U	10 U	11 U	11 U	10 R	NCA	NCA	NCA
BENZO(A)ANTHRACENE	10 U	11 U	10 U	10 U	10 U	11 U	11 U	10 UJ	0.031	NCA	NCA
BENZO(A)PYRENE	10 U	11 U	10 U	10 U	10 U	11 U	11 U	10 UJ	0.031	NCA	NCA
BENZO(B)FLUORANTHENE	10 U	11 U	10 U	10 U	10 U	11 U	11 U	10 UJ	0.031	NCA	NCA
BENZO(K)FLUORANTHENE	10 U	11 U	10 U	10 U	10 U	11 U	11 U	10 UJ	0.031	NCA	NCA
BENZYL BUTYL PHTHALATE	10 U	11 U	10 U	10 U	10 U	11 U	11 U	10 UJ	416	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	10 U	11 U	10 U	1 J	1 J	11 U	11 U	10 UJ	5.92	NCA	NCA
CHRYSENE	10 U	11 U	10 U	10 U	10 U	11 U	11 U	10 UJ	0.031	NCA	NCA
DI-N-BUTYL PHTHALATE	10 U	11 U	10 U	10 U	10 U	11 U	11 U	10 UJ	15700	NCA	NCA
DIETHYL PHTHALATE	10 U	11 U	10 U	10 U	10 U	11 U	11 U	10 UJ	111000	NCA	NCA
FLUORANTHRENE	10 U	11 U	10 U	10 U	10 U	11 U	11 U	10 UJ	393	40	16
INDENO(1,2,3-C,D)PYRENE	10 U	11 U	10 U	10 U	10 U	11 U	11 U	10 UJ	0.031	NCA	NCA
PHENANTHRENE	10 U	11 U	10 U	10 U	10 U	11 U	11 U	10 UJ	NCA	NCA	NCA
PHENOL	10 U	11 U	10 U	10 U	10 U	11 U	11 U	10 R	4600000	5800	NCA
PYRENE	10 U	11 U	10 U	10 U	10 U	11 U	11 U	10 UJ	8970	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
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TABLE 4-2
SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 19 SOUTHWESTERN WETLANDS		SOUTHWEST DITCH						WATER QUALITY CRITERIA		
	SW-1906	SW-1911 (Duplicate of SW-1906)	SW-1215H	SW-1215L	SW-1216H	SW-1216L	SW-1619	SW-1620	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
4-METHYLPHENOL	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NCA	NCA	NCA
BENZO(A)ANTHRACENE	10 U	10 U	10 U	10 U	10 U	10 U	2 J	10 U	0.031	NCA	NCA
BENZO(A)PYRENE	10 U	10 U	10 U	10 U	10 U	10 U	1 J	10 U	0.031	NCA	NCA
BENZO(B)FLUORANTHENE	10 U	10 U	10 U	10 U	10 U	10 U	2 J	10 U	0.031	NCA	NCA
BENZO(K)FLUORANTHENE	10 U	10 U	10 U	10 U	10 U	10 U	1 J	10 U	0.031	NCA	NCA
BENZYL BUTYL PHTHALATE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	416	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	10 U	10 U	3 J	10 U	1 J	10 U	10 U	10 U	5.92	NCA	NCA
CHRYSENE	10 U	10 U	10 U	10 U	10 U	10 U	2 J	10 U	0.031	NCA	NCA
DI-N-BUTYL PHTHALATE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	15700	NCA	NCA
DIETHYL PHTHALATE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	111000	NCA	NCA
FLUORANTHRENE	10 U	10 U	10 U	10 U	10 U	10 U	5 J	10 U	393	40	16
INDENO(1,2,3-C,D)PYRENE	10 U	10 U	10 U	10 U	10 U	10 U	1 J	10 U	0.031	NCA	NCA
PHENANTHRENE	10 U	10 U	10 U	10 U	10 U	10 U	3 J	10 U	NCA	NCA	NCA
PHENOL	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	4600000	5800	NCA
PYRENE	10 U	10 U	10 U	10 U	10 U	10 U	4 J	10 U	8970	NCA	NCA

NOTES:
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TABLE 4-2
SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	ASSOCIATED DITCHES - AREA 16									WATER QUALITY CRITERIA		
	SW-1611	SW-1612	SW-1613	SW-1615	SW-1616H	SW-1616L	SW-1617	SW-1618	SW-1628 (Duplicate of SW-1612)	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
4-METHYLPHENOL	10 U	10 U	10 U	10 U	11 U	12 U	10 U	10 U	10 U	NCA	NCA	NCA
BENZO(A)ANTHRACENE	10 U	10 U	10 U	10 U	11 U	12 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZO(A)PYRENE	10 U	10 U	10 U	10 U	11 U	12 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZO(B)FLUORANTHENE	10 U	10 U	10 U	10 U	11 U	12 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZO(K)FLUORANTHENE	10 U	10 U	10 U	10 U	11 U	12 U	10 U	10 U	10 U	0.031	NCA	NCA
BENZYL BUTYL PHTHALATE	10 U	10 U	10 U	10 U	11 U	12 U	10 U	10 U	10 U	416	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	2 J	10 U	10 U	10 U	11 U	12 U	2 J	10 U	10 U	5.92	NCA	NCA
CHRYSENE	10 U	10 U	10 U	10 U	11 U	12 U	10 U	10 U	10 U	0.031	NCA	NCA
DI-N-BUTYL PHTHALATE	10 U	10 U	10 U	10 U	11 U	12 U	10 U	10 U	10 U	15700	NCA	NCA
DIETHYL PHTHALATE	10 U	10 U	10 U	10 U	11 U	12 U	10 U	10 U	10 U	111000	NCA	NCA
FLUORANTHRENE	10 U	10 U	10 U	10 U	11 U	12 U	10 U	10 U	10 U	393	40	16
INDENO(1,2,3-C,D)PYRENE	10 U	10 U	10 U	10 U	11 U	12 U	10 U	10 U	10 U	0.031	NCA	NCA
PHENANTHRENE	10 U	10 U	10 U	10 U	11 U	12 U	10 U	10 U	10 U	NCA	NCA	NCA
PHENOL	10 U	10 U	10 U	10 U	11 U	12 U	10 U	10 U	10 U	4600000	5800	NCA
PYRENE	10 U	10 U	10 U	10 U	11 U	12 U	10 U	10 U	10 U	8970	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
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TABLE 4-2
SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	OLD RED ROOT CREEK		AREA 19 SOUTHWESTERN WETLANDS			WATER QUALITY CRITERIA		
	SW-1604	SW-1605	SW-1904	SW-1905	SW-1912 (Duplicate of SW-1904)	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
4-METHYLPHENOL	10 U	11 U	10 U	10 U	10 U	NCA	NCA	NCA
BENZO(A)ANTHRACENE	10 U	11 U	10 U	10 U	10 U	0.0028	NCA	NCA
BENZO(A)PYRENE	10 U	11 U	10 U	10 U	10 U	0.0028	NCA	NCA
BENZO(B)FLUORANTHENE	10 U	11 U	10 U	10 U	10 U	0.0028	NCA	NCA
BENZO(K)FLUORANTHENE	10 U	11 U	10 U	10 U	10 U	0.0028	NCA	NCA
BENZYL BUTYL PHTHALATE	10 U	11 U	10 U	10 U	1 J	239	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	10 U	11 U	10 U	10 U	10 U	1.76	NCA	NCA
CHRYSENE	10 U	11 U	10 U	10 U	10 U	0.0028	NCA	NCA
DI-N-BUTYL PHTHALATE	10 U	11 U	10 U	10 U	10 U	3530	NCA	NCA
DIETHYL PHTHALATE	10 U	11 U	10 U	10 U	10 U	21200	NCA	NCA
FLUORANTHRENE	10 U	11 U	10 U	10 U	10 U	310	3980	NCA
INDENO(1,2,3-C,D)PYRENE	10 U	11 U	10 U	10 U	10 U	0.0028	NCA	NCA
PHENANTHRENE	10 U	11 U	10 U	10 U	10 U	NCA	NCA	NCA
PHENOL	10 U	11 U	10 U	10 U	10 U	20900	10200	2560
PYRENE	10 U	11 U	10 U	10 U	10 U	797	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
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TABLE 4-2
SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	ASSOCIATED DITCHES	AREA 19 FOR. WTLDS	AREA 19 NE WETLANDS			WATER QUALITY CRITERIA		
	SW-1614	SW-1903	SW-1908	SW-1909	SW-1910	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
4-METHYLPHENOL	10 U	10 U	10 U	10 U	10 U	NCA	NCA	NCA
BENZO(A)ANTHRACENE	10 U	10 U	10 U	10 U	10 U	0.0028	NCA	NCA
BENZO(A)PYRENE	10 U	10 U	10 U	10 U	10 U	0.0028	NCA	NCA
BENZO(B)FLUORANTHENE	10 U	10 U	10 U	10 U	10 U	0.0028	NCA	NCA
BENZO(K)FLUORANTHENE	10 U	10 U	10 U	10 U	10 U	0.0028	NCA	NCA
BENZYL BUTYL PHTHALATE	10 U	10 U	10 U	10 U	10 U	239	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	10 U	10 U	10 U	10 U	10 U	1.76	NCA	NCA
CHRYSENE	10 U	10 U	10 U	10 U	10 U	0.0028	NCA	NCA
DI-N-BUTYL PHTHALATE	10 U	10 U	10 U	10 U	10 U	3530	NCA	NCA
DIETHYL PHTHALATE	10 U	10 U	10 U	10 U	10 U	21200	NCA	NCA
FLUORANTHRENE	10 U	10 U	10 U	10 U	10 U	310	3980	NCA
INDENO(1,2,3-C,D)PYRENE	10 U	10 U	10 U	10 U	10 U	0.0028	NCA	NCA
PHENANTHRENE	10 U	10 U	10 U	10 U	10 U	NCA	NCA	NCA
PHENOL	10 U	10 U	10 U	10 U	10 U	20900	10200	2560
PYRENE	10 U	10 U	10 U	10 U	10 U	797	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-2
SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

COUNTY PARK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 10 SOUTHERN BORDER DITCH		OPEN LAWN DITCH			WESTERN BOUNDARY DITCH		WATER QUALITY CRITERIA		
	SW-1006	SW-1902	SW-1004	SW-1005	SW-1012 (Duplicate of SW-1005)	SW-1001	SW-1002	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
4-METHYLPHENOL	10 U	10 U	11 U	11 U	11 U	10 U	10 U	NCA	NCA	NCA
BENZO(A)ANTHRACENE	10 U	10 U	11 U	11 U	11 U	10 U	10 U	0.0028	NCA	NCA
BENZO(A)PYRENE	10 U	10 U	11 U	11 U	11 U	10 U	10 U	0.0028	NCA	NCA
BENZO(B)FLUORANTHENE	10 U	10 U	11 U	11 U	11 U	10 U	10 U	0.0028	NCA	NCA
BENZO(K)FLUORANTHENE	10 U	10 U	11 U	11 U	11 U	10 U	10 U	0.0028	NCA	NCA
BENZYL BUTYL PHTHALATE	10 U	10 U	11 U	11 U	11 U	10 U	10 U	239	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	10 U	10 U	11 U	11 U	11 U	10 U	10 U	1.76	NCA	NCA
CHRYSENE	10 U	10 U	11 U	11 U	11 U	10 U	10 U	0.0028	NCA	NCA
DI-N-BUTYL PHTHALATE	10 U	2 J	11 U	11 U	11 U	10 U	10 U	3530	NCA	NCA
DIETHYL PHTHALATE	10 U	10 U	11 U	11 U	11 U	10 U	10 U	21200	NCA	NCA
FLUORANTHRENE	10 U	10 U	11 U	11 U	11 U	10 U	10 U	310	3980	NCA
INDENO(1,2,3-C,D)PYRENE	10 U	10 U	11 U	11 U	11 U	10 U	10 U	0.0028	NCA	NCA
PHENANTHRENE	10 U	10 U	11 U	11 U	11 U	10 U	10 U	NCA	NCA	NCA
PHENOL	10 U	10 U	11 U	11 U	11 U	10 U	10 U	20900	10200	2560
PYRENE	10 U	10 U	11 U	11 U	11 U	10 U	10 U	797	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-3
SUMMARY OF PESTICIDE/PCB COMPOUNDS DETECTED IN SURFACE WATER (ug/l)
FORMER RARITAN ARSENAL EDISON, NEW JERSEY

DRAINAGES	SAMPLE ID	WATER FEATURE	FRESHWATER/ ESTUARINE	HEPTACHLOR EPOXIDE	NJDEP SURFACE WATER CRITERIA	
					FW-2	SE-1
Old Red Root Creek Drainage Area	SW-1611	Assoicated Ditches - Area 16	Estuarine	0.051 U	NA	0.0036 (c)
	SW-1612		Estuarine	0.054 U	NA	0.0036 (c)
	SW-1613		Estuarine	0.052 U	NA	0.0036 (c)
	SW-1614		Freshwater	0.25 U	0.0036 (c)	NA
	SW-1615		Estuarine	0.25 U	NA	0.0036 (c)
	SW-1616H		Estuarine	0.052 U	NA	0.0036 (c)
	SW-1616L		Estuarine	0.05 U	NA	0.0036 (c)
	SW-1617		Estuarine	0.05 U	NA	0.0036 (c)
	SW-1618		Estuarine	0.05 U	NA	0.0036 (c)
	SW-1628 (4)		Estuarine	0.052 U	NA	0.0036 (c)
	SW-1629		Estuarine	0.051 U	NA	0.0036 (c)
	SW-1630		Estuarine	2.8 U	NA	0.0036 (c)
	SW-1903	Area 19 Forested Wetlands	Freshwater	0.05 UJ	0.0038 (c)	NA
	SW-1908	Area 19 NE Wetlands	Freshwater	0.05 U	0.0038 (c)	NA
	SW-1909		Freshwater	0.05 U	0.0038 (c)	NA
	SW-1910		Freshwater	0.052 U	0.0038 (c)	NA
	SW-1604	Old Red Root Creek	Freshwater	0.051 U	0.0038 (c)	NA
	SW-1605		Freshwater	0.052 U	0.0038 (c)	NA
	SW-1606		Estuarine	0.052 U	NA	0.0036 (c)
	SW-1607		Estuarine	0.053 U	NA	0.0036 (c)
	SW-1608		Estuarine	0.052 U	NA	0.0036 (c)
	SW-1609H		Estuarine	0.052 U	NA	0.0036 (c)
	SW-1609L		Estuarine	0.051 U	NA	0.0036 (c)
	SW-1610		Estuarine	0.52 U	NA	0.0036 (c)
	SW-1631 (5)		Estuarine	0.05 U	NA	0.0036 (c)
	SW-1904	Area 19 SW Wetlands	Freshwater	0.05 U	0.0038 (c)	NA
	SW-1905		Freshwater	0.05 U	0.0038 (c)	NA
	SW-1906		Estuarine	0.051 UJ	NA	0.0038 (c)
	SW-1911 (6)		Estuarine	0.052 U	NA	0.0038 (c)
	SW-1912 (7)		Freshwater	0.05 U	0.0038 (c)	NA
	SW-1215H	Southwest Ditch	Estuarine	0.05 U	NA	0.0036 (c)
	SW-1215L		Estuarine	0.051 U	NA	0.0036 (c)
	SW-1216H		Estuarine	0.051 U	NA	0.0036 (c)
	SW-1216L		Estuarine	0.05 U	NA	0.0038 (c)
	SW-1619		Estuarine	0.54 U	NA	0.0036 (c)
	SW-1620		Estuarine	0.051 U	NA	0.0036 (c)
	SW-1601H	West Ditch	Estuarine	0.26 U	NA	0.0036 (c)
	SW-1601L		Estuarine	0.052 U	NA	0.0036 (c)
	SW-1602H		Estuarine	0.05 U	NA	0.0036 (c)
	SW-1602L		Estuarine	0.052 U	NA	0.0036 (c)
	SW-1603H		Estuarine	0.051 U	NA	0.0036 (c)
	SW-1603L		Estuarine	0.05 U	NA	0.0036 (c)
	SW-1907		Estuarine	0.052 U	NA	0.0036 (c)
Red Root Creek Drainage Area	SW-2001	Area 20 Ditch	Freshwater	0.05 U	0.0038 (c)	NA
	SW-1803	Area 18B Stream	Freshwater	0.031	0.0038 (c)	NA
	SW-1804		Freshwater	0.061	0.0038 (c)	NA
	SW-1805		Freshwater	0.05 U	0.0038 (c)	NA
	SW-1806		Freshwater	0.05 U	0.0038 (c)	NA
	SW-1807		Freshwater	0.05 U	0.0038 (c)	NA
	SW-1808		Freshwater	0.056 U	0.0038 (c)	NA
	SW-1809		Freshwater	0.051 U	0.0038 (c)	NA
	SW-1818 (8)		Freshwater	0.05 U	0.0038 (c)	NA
	SW-1810	Area 18C Stream	Freshwater	0.05 U	0.0038 (c)	NA
	SW-1811		Freshwater	0.05 U	0.0038 (c)	NA
	SW-1812		Freshwater	0.05 U	0.0038 (c)	NA
	SW-1813		Freshwater	0.05 U	0.0036 (c)	NA
	SW-1814		Freshwater	0.05 U	0.0038 (c)	NA
	SW-1815		Freshwater	0.05 U	0.0038 (c)	NA
	SW-1816		Freshwater	0.054 U	0.0038 (c)	NA
	SW-1817		Freshwater	0.05 U	0.0038 (c)	NA
	SW-0101	Lower Area 18B Stream	Freshwater	0.05 U	0.0038 (c)	NA
	SW-0102		Freshwater	0.054 U	0.0038 (c)	NA
	SW-0103		Freshwater	0.05 U	0.0038 (c)	NA
	SW-0104		Freshwater	0.058 U	0.0038 (c)	NA
	SW-0801	Area 8 Pond	Freshwater	0.05 U	0.0038 (c)	NA
	SW-0802		Freshwater	0.052 U	0.0038 (c)	NA
	SW-0803		Freshwater	0.051 U	0.0038 (c)	NA

TABLE 4-3
SUMMARY OF PESTICIDE/PCB COMPOUNDS DETECTED IN SURFACE WATER (ug/l)
FORMER RARITAN ARSENAL EDISON, NEW JERSEY

DRAINAGES	SAMPLE ID	WATER FEATURE	FRESHWATER/ ESTUARINE	HEPTACHLOR EPOXIDE	NJDEP SURFACE WATER CRITERIA	
					FW-2	SE-1
Area 12 Drainage Area	SW-1201	Area 12 Ditch	Estuarine	2.7 U	NA	0.0036 (c)
	SW-1202H		Estuarine	0.5 U	NA	0.0036 (c)
	SW-1202L		Estuarine	0.25 U	NA	0.0036 (c)
	SW-1203H		Estuarine	0.26 U	NA	0.0036 (c)
	SW-1203L		Estuarine	0.25 U	NA	0.0036 (c)
Black Ditch Drainage Area	SW-0406	Area 4 Ditch	Freshwater	0.05 U	0.0038 (c)	NA
	SW-0501	Area 5 Pond	Freshwater	0.052 U	0.0038 (c)	NA
	SW-0502		Freshwater	0.05 U	0.0038 (c)	NA
	SW-0503		Freshwater	0.052 U	0.0038 (c)	NA
	SW-0504		Freshwater	0.052 U	0.0038 (c)	NA
	SW-0407	Black Ditch	Freshwater	0.05 U	0.0038 (c)	NA
	SW-0408		Freshwater	0.052 UJ	0.0038 (c)	NA
	SW-0505H		Freshwater	0.05 U	0.0038 (c)	NA
	SW-0505L		Freshwater	0.05 U	0.0038 (c)	NA
	SW-0506H		Estuarine	0.05 U	NA	0.0036 (c)
	SW-0506L		Estuarine	0.05 U	NA	0.0036 (c)
	SW-0507H		Estuarine	0.05 U	NA	0.0036 (c)
	SW-0507L		Estuarine	0.052 U	NA	0.0036 (c)
	SW-0616H		Estuarine	0.05 U	NA	0.0036 (c)
	SW-0616L		Estuarine	0.05 U	NA	0.0036 (c)
	SW-0617H		Estuarine	0.05 UJ	NA	0.0036 (c)
	SW-0617L		Estuarine	0.057 U	NA	0.0036 (c)
	SW-0618H		Estuarine	0.05 U	NA	0.0036 (c)
	SW-0618L		Estuarine	0.05 U	NA	0.0036 (c)
	SW-0619H		Estuarine	0.05 U	NA	0.0036 (c)
	SW-0619L		Estuarine	0.05 U	NA	0.0036 (c)
	SW-0620 (1)		Estuarine	0.05 U	NA	0.0036 (c)
Central Ditch Drainage Area	SW-1101H	Central Ditch	Estuarine	0.05 U	NA	0.0036 (c)
	SW-1101L		Estuarine	0.05 U	NA	0.0036 (c)
	SW-1102H		Estuarine	0.05 U	NA	0.0036 (c)
	SW-1102L		Estuarine	0.052 U	NA	0.0036 (c)
	SW-1103H		Estuarine	0.05 U	NA	0.0036 (c)
	SW-1103L		Estuarine	0.052 U	NA	0.0036 (c)
	SW-1104H		Estuarine	0.05 U	NA	0.0036 (c)
	SW-1104L		Estuarine	0.052 U	NA	0.0036 (c)
	SW-1625H	Isolated Estuarine Ponds	Estuarine	0.05 U	NA	0.0036 (c)
	SW-1625L		Estuarine	0.049 U	NA	0.0036 (c)
	SW-1622		Estuarine	0.051 U	NA	0.0036 (c)
	SW-1623	Isolated Freshwater	Freshwater	0.051 U	0.0038 (c)	NA
	SW-1626		Freshwater	0.05 U	0.0038 (c)	NA
	SW-1627 (2)		Freshwater	0.25 U	0.0038 (c)	NA
	SW-1621	Upgradient Contiguous Ponded Area	Freshwater	0.5 U	0.0038 (c)	NA
	SW-1624		Estuarine	0.24 U	NA	0.0036 (c)
County Park Drainage Area	SW-1006	Area 10 Southern Border Ditch	Freshwater	0.05 U	0.0038 (c)	NA
	SW-1902		Freshwater	0.05 U	0.0038 (c)	NA
	SW-1004	Open Lawn Ditch	Freshwater	0.051 U	0.0038 (c)	NA
	SW-1005		Freshwater	0.053 U	0.0038 (c)	NA
	SW-1012 (3)		Freshwater	0.052 U	0.0038 (c)	NA
	SW-1001	Western Boundary Ditch	Freshwater	0.05 U	0.0038 (c)	NA
	SW-1002		Freshwater	0.05 U	0.0038 (c)	NA
East Ditch Drainage Area	SW-1402	East Ditch	Freshwater	0.05 U	0.0038 (c)	NA
	SW-1403		Freshwater	0.053 U	0.0038 (c)	NA
	SW-1404		Freshwater	0.05 U	0.0038 (c)	NA
	SW-1405		Freshwater	0.05 U	0.0038 (c)	NA
	SW-1406		Freshwater	0.056 U	0.0038 (c)	NA
	SW-1407		Estuarine	0.052 U	NA	0.0036 (c)
	SW-1408H		Estuarine	0.052 U	NA	0.0036 (c)
	SW-1408L		Estuarine	0.05 U	NA	0.0036 (c)
	SW-1410	Unnamed Tributary	Freshwater	0.049 U	0.0038 (c)	NA
	SW-1411		Estuarine	0.049 U	NA	0.0036 (c)
	SW-1412		Estuarine	0.05 U	NA	0.0036 (c)

TABLE 4-3
SUMMARY OF PESTICIDE/PCB COMPOUNDS DETECTED IN SURFACE WATER (ug/l)
FORMER RARITAN ARSENAL EDISON, NEW JERSEY

DRAINAGES	SAMPLE ID	WATER FEATURE	FRESHWATER/ ESTUARINE	HEPTACHLOR EPOXIDE	NJDEP SURFACE WATER CRITERIA	
					FW-2	SE-1
Red Root Creek Drainage Area (Continued)	SW-0804	Area 8 Pond	Freshwater	0.052 U	0.0038 (c)	NA
	SW-0805		Freshwater	0.052 U	0.0038 (c)	NA
	SW-0806		Freshwater	0.052 U	0.0038 (c)	NA
	SW-0807 (9)		Freshwater	0.051 U	0.0038 (c)	NA
	SW-0601H	Red Root Creek	Estuarine	0.05 U	NA	0.0036 (c)
	SW-0601L		Estuarine	0.051 U	NA	0.0036 (c)
	SW-0602H		Freshwater	0.088 U	0.0038 (c)	NA
	SW-0602L		Freshwater	0.051 UJ	0.0038 (c)	NA
	SW-0603H		Estuarine	0.05 U	NA	0.0036 (c)
	SW-0603L		Estuarine	0.054 U	NA	0.0036 (c)
	SW-0604H		Estuarine	0.051 U	NA	0.0036 (c)
	SW-0604L		Estuarine	0.05 U	NA	0.0036 (c)
	SW-0605H		Estuarine	0.05 U	NA	0.0036 (c)
	SW-0605L		Estuarine	0.051 U	NA	0.0036 (c)
	SW-0606H		Estuarine	0.05 U	NA	0.0036 (c)
	SW-0606L		Estuarine	0.05 U	NA	0.0036 (c)
	SW-0607		Estuarine	0.052 U	NA	0.0036 (c)
	SW-0608H		Estuarine	0.05 U	NA	0.0036 (c)
	SW-0608L		Estuarine	0.05 U	NA	0.0036 (c)
	SW-0609H		Estuarine	0.05 U	NA	0.0036 (c)
	SW-0609L		Estuarine	0.051 U	NA	0.0036 (c)
	SW-0610	Sulfur Plant Ponds	Freshwater	0.051 U	0.0038 (c)	NA
	SW-0613		Freshwater	0.051 U	0.0038 (c)	NA
	SW-0614		Freshwater	0.051 U	0.0038 (c)	NA
	SW-0615		Freshwater	0.05 U	0.0038 (c)	NA

Notes:
(c) Represents the chronic aquatic life criterion.
(1) Sample SW-0620 is a QC duplicate of sample SW-0619.
(2) Sample SW-1627 is a QC duplicate of sample SW-1626.
(3) Sample SW-1012 is a QC duplicate of sample SW-1005.
(4) Sample SW-1628 is a QC duplicate of sample SW-1612.
(5) Sample SW-1631 is a QC duplicate of sample SW-1609.
(6) Sample SW-1911 is a QC duplicate of sample SW-1906.
(7) Sample SW-1911 is a QC duplicate of sample SW-1904.
(8) Sample SW-1818 is a QC duplicate of sample SW-1809.
(9) Sample SW-0807 is a QC duplicate of sample SW-0801.

TABLE 4-4
METALS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

EAST DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	EAST DITCH					UNNAMED TRIBUTARY	WATER QUALITY CRITERIA		
	SW-1402	SW-1403	SW-1404	SW-1405	SW-1406	SW-1410	NJDEP FW-2 (3)	USEPA (4) FW ACUTE	USEPA (4) FW CHRONIC
ALUMINUM	NA	930.00	NA	NA	NA	NA	NCA	NCA	NCA
ANTIMONY	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	6.60	12.20	9000.00	1600.00
ARSENIC	1.80 U	1.80 U	1.80 U	1.80 U	1.80 U	148.00	0.017	360.00	190.00
BARIUM	50.80	53.40	51.90	56.30	54.80	34.90	2000.00	NCA	NCA
BERYLLIUM	1.70 U	1.00 U	0.89 U	1.30 U	1.60 U	0.87 U	NCA	130.00	5.30
CADMIUM*	0.50 U	0.27	0.25	0.21	0.26		NCA	3.54	1.06
						1.8	NCA	111.12	11.63
CALCIUM	NA	25800.00	NA	NA	NA	NA	NCA	NCA	NCA
CHROMIUM*	3.80 U	3.80 U	3.80 U	3.80 U	3.80 U		160.00	1610.77	8.46
						8.20	160.00	19684.08	103.40
COBALT	NA	44.00	NA	NA	NA	NA	NCA	NCA	NCA
COPPER*	5.80 U	6.40 U	5.40 U	6.80 U	6.80 U		NCA	16.26	10.93
						608.00	NCA	289.50	148.90
IRON	NA	2020.00	NA	NA	NA	NA	NCA	NCA	1000.00
LEAD*	1.40 U	1.80 U	2.00 U	3.20 R	1.70 U		5.00	72.64	2.83
						9.20 U	5.00	3555.31	138.55
MAGNESIUM	NA	6510.00	NA	NA	NA	NA	NCA	NCA	NCA
MANGANESE	NA	772.00	NA	NA	NA	NA	NCA	NCA	NCA
MERCURY	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.24	0.144	2.40	0.012
NICKEL*	27.30	34.90	30.80	29.40	28.20		516.00	1312.29	145.89
						7.10 U	516.00	17416.04	1936.13
POTASSIUM	NA	2830.00	NA	NA	NA	NA	NCA	NCA	NCA
SELENIUM	1.60 U	1.60 U	1.60 U	1.60 U	1.60 U	8.00 U	10.00	20.00	5.00
SILVER**	2.30 U	2.30 U	2.30 U	2.30 U	2.30 U		164.00	3.47	0.120
						2.3 U	164.00	665.04	0.120
SODIUM	NA	50400.00	NA	NA	NA	NA	NCA	NCA	NCA
THALLIUM	1.60 U	1.60 U	1.60 U	1.60 U	1.60 U	1.60 U	1.70	1400.00	40.00
VANADIUM	NA	2.00 U	NA	NA	NA	NA	NCA	NCA	NCA
ZINC*	121.00 J	134.00 J	133.00 J	133.00 J	130.00 J		NCA	108.27	98.06
						239.00 J	NCA	1442.58	1306.60
CYANIDE	NA	10.00 U	NA	NA	NA	NA	5.20	22.00	5.20

NOTES:
*Cadmium, chromium, copper, lead, nickel and zinc USEPA Freshwater Acute and Chronic Surface Water Quality Criteria are based on the surface water hardness at that location.
** Silver USEPA Freshwater Acute Surface Water Quality Criterion is based on the surface water hardness at that location.

(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Qualit;y Criteria, 1992.

TABLE 4-4
METALS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

EAST DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	EAST DITCH					UNNAMED TRIBUTARY	WATER QUALITY CRITERIA		
	SW-1402	SW-1403	SW-1404	SW-1405	SW-1406	SW-1410	NJDEP FW-2 (3)	USEPA (4) FW ACUTE	USEPA (4) FW CHRONIC
ALUMINUM	NA	930.00	NA	NA	NA	NA	NCA	NCA	NCA
ANTIMONY	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	6.60	12.20	9000.00	1600.00
ARSENIC	1.80 U	1.80 U	1.80 U	1.80 U	1.80 U	148.00	0.017	360.00	190.00
BARIUM	50.80	53.40	51.90	56.30	54.80	34.90	2000.00	NCA	NCA
BERYLLIUM	1.70 U	1.00 U	0.89 U	1.30 U	1.60 U	0.87 U	NCA	130.00	5.30
CADMIUM*	0.50 U	0.27	0.25	0.21	0.26		NCA	3.54	1.06
						1.8	NCA	111.12	11.63
CALCIUM	NA	25800.00	NA	NA	NA	NA	NCA	NCA	NCA
CHROMIUM*	3.80 U	3.80 U	3.80 U	3.80 U	3.80 U		160.00	1610.77	8.46
						8.20	160.00	19684.08	103.40
COBALT	NA	44.00	NA	NA	NA	NA	NCA	NCA	NCA
COPPER*	5.80 U	6.40 U	5.40 U	6.80 U	6.80 U		NCA	16.26	10.93
						608.00	NCA	289.50	148.90
IRON	NA	2020.00	NA	NA	NA	NA	NCA	NCA	1000.00
LEAD*	1.40 U	1.80 U	2.00 U	3.20 U	1.70 U		5.00	72.64	2.83
						9.20 U	5.00	3555.31	138.55
MAGNESIUM	NA	6510.00	NA	NA	NA	NA	NCA	NCA	NCA
MANGANESE	NA	772.00	NA	NA	NA	NA	NCA	NCA	NCA
MERCURY	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.24	0.144	2.40	0.012
NICKEL*	27.30	34.90	30.80	29.40	28.20		516.00	1720.17	10.70
						7.10 U	516.00	17552.55	109.18
POTASSIUM	NA	2830.00	NA	NA	NA	NA	NCA	NCA	NCA
SELENIUM	1.60 U	1.60 U	1.60 U	1.60 U	1.60 U	8.00 U	10.00	260.00	35.00
SILVER**	2.30 U	2.30 U	2.30 U	2.30 U	2.30 U		164.00	3.47	0.120
						2.3 U	164.00	665.04	0.120
SODIUM	NA	50400.00	NA	NA	NA	NA	NCA	NCA	NCA
THALLIUM	1.60 U	1.60 U	1.60 U	1.60 U	1.60 U	1.60 U	1.70	1400.00	40.00
VANADIUM	NA	2.00 U	NA	NA	NA	NA	NCA	NCA	NCA
ZINC**	121.00 J	134.00 J	133.00 J	133.00 J	130.00 J		NCA	297.71	47.00
						239.00 J	NCA	3762.47	47.00
CYANIDE	NA	10.00 U	NA	NA	NA	NA	5.20	22.00	5.20

NOTES: *Cadmium, chromium, copper, lead and nickel USEPA Freshwater Acute and Chronic Surface Water Quality Criteria are based on the surface water hardness at that location.

** Silver and Zinc USEPA Freshwater Acute Surface Water Quality Criteria are based on the surface water hardness at that location.

(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.

(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.

(3) From NJAC 7:9B Surface Water Quality Standards.

(4) USEPA Water Qualit;y Criteria, 1986.

TABLE 4-4
METALS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	BLACK DITCH					WATER QUALITY CRITERIA		
	SW-0618H	SW-0618L	SW-0619H	SW-0619L	SW-0620 (Duplicate of SW-0619)	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
ALUMINUM	NA	NA	NA	426.00 U	368.00 U	NCA	NCA	NCA
ANTIMONY	3.00 UJ	3.00 UJ	3.00 UJ	3.00 UJ	3.00 UJ	43000.00	NCA	NCA
ARSENIC	23.00 UJ	7.80 J-	23.00 UJ	23.00 U	23.00 U	0.136	69.00	36.00
BARIUM	37.20	52.30	22.60	55.40 J-	51.80 J-	NCA	NCA	NCA
BERYLLIUM	0.60 U	0.60 U	0.60 U	1.60 J-	1.20 J-	NCA	NCA	NCA
CADMIUM	1.90 U	1.90 U	1.90 U	1.90 U	1.90 U	NCA	43.00	9.30
CALCIUM	NA	NA	NA	125000.00	115000.00	NCA	NCA	NCA
CHROMIUM	4.40 U	4.40 U	4.40 U	4.40 UJ	4.40 UJ	3230.00	10300.00	NCA
COBALT	NA	NA	NA	2.90 UJ	2.90 UJ	NCA	NCA	NCA
COPPER	7.30 U	11.90 U	3.50 U	5.50 U	6.30 U	NCA	2.90	2.90
IRON	NA	NA	NA	3190.00	3190.00	NCA	NCA	NCA
LEAD	2.40 U	7.80 U	2.40 U	2.40 UJ	2.40 UJ	NCA	140.00	5.60
MAGNESIUM	NA	NA	NA	396000.00	358000.00	NCA	NCA	NCA
MANGANESE	NA	NA	NA	378.00 J-	341.00 J-	100.00	NCA	NCA
MERCURY	0.11	0.10 U	0.10 U	0.10 U	0.32	0.146	2.10	0.025
NICKEL	8.10 U	11.80	8.10 U	12.10 J-	8.10 UJ	3900.00	140.00	7.10
POTASSIUM	NA	NA	NA	121000.00 J	109000.00 J	NCA	NCA	NCA
SELENIUM	1.30 UJ	1.30 UJ	1.30 UJ	14.00 J-	37.00 J-	NCA	410.00	54.00
SILVER	2.30 U	2.30 U	2.30 U	2.30 UJ	2.30 UJ	NCA	2.30	NCA
SODIUM	NA	NA	NA	3170000.00	2980000.00	NCA	NCA	NCA
THALLIUM	1.30 UJ	1.80 UJ	1.30 UJ	1.80 R	1.80 R	6.22	2130.00	NCA
VANADIUM	NA	NA	NA	62.30 J-	54.80 J-	NCA	NCA	NCA
ZINC	24.10 U	68.40 U	8.60 U	45.10 U	82.50 U	NCA	170.00	58.00
CYANIDE	NA	NA	NA	5.00 U	5.00 U	1.00	1.00	1.00

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1986.

TABLE 4-4
METALS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 4 DITCH	AREA 5 POND				BLACK DITCH				WATER QUALITY CRITERIA		
	SW-0406	SW-0501	SW-0502	SW-0503	SW-0504	SW-0407	SW-0408	SW-0505H	SW-0505L	NJDEP FW-2 (3)	USEPA (4) FW ACUTE	USEPA (4) FW CHRONIC
ALUMINUM	NA	2060.00	NA	NA	NA	1150.00 J	NA	NA	285.00	NCA	NCA	NCA
ANTIMONY	2.10 UJ	3.00 UJ	3.00 UJ	3.00 UJ	3.00 UJ	2.10 UJ	15.00 U	3.00 UJ	3.00 UJ	12.20	9000.00	1600.00
ARSENIC	5.10 J-	2.60 J-	3.40	2.30 U	2.30 U	13.70 J	2.30 U	2.30 U	2.30 UJ	0.017	360.00	190.00
BARIUM	88.30	91.50	40.30 J-	79.30 J-	61.60 J-	91.40 J	52.50	62.70 J-	55.10	2000.00	NCA	NCA
BERYLLIUM	0.90	0.60 U	0.60 U	0.60 U	0.60 U	0.60 U	0.60 U	0.60 U	0.60 U	NCA	130.00	5.30
CADMIUM*	1.90 U					1.90	1.90 U			NCA	3.91	1.13
		2.40	1.90 U	1.90 U	1.90 U			1.90 U	1.90 U	NCA	2.62	0.66
CALCIUM	NA	28000.00 J-	NA	NA	NA	26500.00 J	NA	NA	17800.00 J-	NCA	NCA	NCA
CHROMIUM*	20.10 J-					4.40 U	4.40			160.00	1732.10	9.10
		5.30	4.50 J-	5.60 J-	7.70 J-			4.40 UJ	4.40 U	160.00	1296.92	6.61
COBALT	NA	55.90 J-	NA	NA	NA	23.40 J	NA	NA	17.60 J-	NCA	NCA	NCA
COPPER*	83.10					3.00	3.90 U			NCA	17.67	11.79
		35.50	27.00 J-	24.20 J-	38.90 J-			9.70 U	1.60 U	NCA	12.67	8.72
IRON	NA	5980.00	NA	NA	NA	1160.00 J	NA	NA	1330.00	NCA	NCA	1000.00
LEAD*	22.70					1.30	2.40 U			5.00	81.32	3.17
		35.80 J	16.30	19.10	28.30			2.40 U	2.40 UJ	5.00	51.87	2.02
MAGNESIUM	NA	38200.00 J-	NA	NA	NA	8140.00 J	NA	NA	6210.00 J-	NCA	NCA	NCA
MANGANESE	NA	1730.00 J	NA	NA	NA	223.00 J	NA	NA	209.00 J	NCA	NCA	NCA
MERCURY	0.32 U	0.12	0.13	0.10 U	0.15	0.12 U	0.10 U	0.10 U	0.10 U	0.144	2.40	0.012
NICKEL*	14.10 J-					25.90	16.70			516.00	1840.09	11.45
		28.90 J-	20.60 J-	16.70 J-	17.00 J-			23.60 J-	13.20 J-	516.00	1406.79	8.75
POTASSIUM	NA	5480.00	NA	NA	NA	3070.00	NA	NA	2610.00	NCA	NCA	NCA
SELENIUM	1.60 UJ	2.70 J-	1.30 UJ	1.30 UJ	1.30 UJ	1.60 UJ	1.30 U	2.70 J	1.30 UJ	10.00	260.00	35.00
SILVER**	2.30 UJ					2.30 U	2.30 U			164.00	4.04	0.120
		3.70 J-	2.30 UJ	2.30 UJ	2.30 UJ			2.30 UJ	2.30 UJ	164.00	2.20	0.120
SODIUM	NA	363000.00	NA	NA	NA	57600.00 J	NA	NA	50700.00	NCA	NCA	NCA
THALLIUM	1.90 R	1.80 UJ	1.80 UJ	1.80 UJ	1.80 UJ	1.90 UJ	1.80 U	1.80 UJ	1.60 UJ	1.70	1400.00	40.00
VANADIUM	NA	23.00	NA	NA	NA	9.30 U	NA	NA	8.60	NCA	NCA	NCA
ZINC**	183.00 J-					82.70 J	97.40 U			NCA	320.45	47.00
		376.00 J-	164.00 U	102.00 U	140.00 U			92.10 U	55.10 J-	NCA	239.00	47.00
CYANIDE	NA	10.00 U	NA	NA	NA	10.00 U	NA	10.00 U	10.00 U	5.20	22.00	5.20

NOTES:

*Cadmium, chromium, copper, lead and nickel USEPA Freshwater Acute and Chronic Surface Water Quality Criteria are based on the surface water hardness at that location.

** Silver and Zinc USEPA Freshwater Acute Surface Water Quality Criteria are based on the surface water hardness at that location.

(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.

(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.

(3) From NJAC 7:9B Surface Water Quality Standards.

(4) USEPA Water Quality Criteria, 1986.

TABLE 4-4
METALS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	BLACK DITCH								WATER QUALITY CRITERIA		
	SW-0506H	SW-0506L	SW-0507H	SW-0507L	SW-0616H	SW-0616L	SW-0617H	SW-0617L	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
ALUMINUM	NA	NA	NA	NA	NA	1030.00 J-	NA	NA	NCA	NCA	NCA
ANTIMONY	3.00 UJ	3.00 UJ	3.00 UJ	3.00 UJ	3.00 UJ	3.00 UJ	3.00 UJ	3.00 UJ	43000.00	NCA	NCA
ARSENIC	2.30 U	2.30 U	2.30 U	2.30 U	2.30 UJ	4.00	2.30 UJ	2.30 UJ	0.136	69.00	36.00
BARIUM	50.70 J-	60.50 J-	56.80 J-	56.80 J-	64.30	70.20 J-	55.80	83.50	NCA	NCA	NCA
BERYLLIUM	0.70	0.90	0.60 U	0.60	0.60 U	0.60 UJ	0.60 U	0.60 U	NCA	NCA	NCA
CADMIUM	1.90 U	2.10	1.90 U	1.90 U	1.90 U	1.90 U	1.90 U	1.90 U	NCA	43.00	9.30
CALCIUM	NA	NA	NA	NA	NA	38200.00	NA	NA	NCA	NCA	NCA
CHROMIUM	4.40 UJ	4.40 UJ	4.40 UJ	4.40 UJ	4.40 U	5.60 J-	4.40 U	4.40 U	3230.00	10300.00	NCA
COBALT	NA	NA	NA	NA	NA	26.40 J-	NA	NA	NCA	NCA	NCA
COPPER	6.30 U	6.80 U	8.00 U	5.70 U	3.20 U	10.90 U	6.40 U	11.00 U	NCA	2.90	2.90
IRON	NA	NA	NA	NA	NA	5860.00	NA	NA	NCA	NCA	NCA
LEAD	2.40 U	2.50	2.40 U	2.40 U	2.40 U	16.70 J-	1.60 U	2.90 U	NCA	140.00	5.60
MAGNESIUM	NA	NA	NA	NA	NA	67800.00	NA	NA	NCA	NCA	NCA
MANGANESE	NA	NA	NA	NA	NA	1390.00 J-	NA	NA	100.00	NCA	NCA
MERCURY	0.10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.11	0.10 U	0.146	2.10	0.025
NICKEL	24.30 J-	25.90 J-	26.20 J-	27.90 J-	11.80	22.40 J-	10.30	21.90	3900.00	140.00	7.10
POTASSIUM	NA	NA	NA	NA	NA	23500.00 J	NA	NA	NCA	NCA	NCA
SELENIUM	1.30 UJ	1.30 UJ	1.30 UJ	1.30 UJ	1.90 J-	1.30 R	1.30 UJ	1.30 UJ	NCA	410.00	54.00
SILVER	2.30 UJ	2.30 UJ	2.30 UJ	2.30 UJ	2.30 U	2.30 UJ	2.30 U	2.30 U	NCA	2.30	NCA
SODIUM	NA	NA	NA	NA	NA	553000.00	NA	NA	NCA	NCA	NCA
THALLIUM	1.80 UJ	1.80 UJ	1.60 UJ	1.80 UJ	1.30 UJ	1.80 R	1.30 UJ	1.30 UJ	6.22	2130.00	NCA
VANADIUM	NA	NA	NA	NA	NA	11.80 J-	NA	NA	NCA	NCA	NCA
ZINC	99.90 U	110.00 U	110.00 U	110.00 U	115.00 U	140.00 U	115.00 U	146.00 U	NCA	170.00	58.00
CYANIDE	NA	NA	NA	NA	NA	5.00 U	NA	NA	1.00	1.00	1.00

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1986.

TABLE 4-4
METALS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	RED ROOT CREEK								WATER QUALITY CRITERIA		
	SW-0602H	SW-0602L	SW-0603H	SW-0603L	SW-0604H	SW-0604L	SW-0605H	SW-0605L	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
ALUMINUM	NA	NA	114.00 U	71.70	NA	NA	NA	NA	NCA	NCA	NCA
ANTIMONY	2.10 UJ	9.00 J-	2.10 UJ	2.10 UJ	2.10 U	2.70 U	2.10 U	2.10 U	43000.00	NCA	NCA
ARSENIC	17.50 J-	59.00 J-	10.00 U	10.00 UJ	10.00 U	10.00 U	6.50 U	10.00 U	0.136	69.00	36.00
BARIUM	63.20 J	134.00 J	194.00 J-	224.00	74.80 J	74.20 J	31.60 J	20.30 J	NCA	NCA	NCA
BERYLLIUM	0.60 U	2.10	0.60 U	0.60 U	0.60 UJ	0.60 UJ	0.60 UJ	0.60 UJ	NCA	NCA	NCA
CADMIUM	1.90 U	2.20	1.90 U	1.90 U	1.90 U	1.90 U	1.90 U	1.90 U	NCA	43.00	9.30
CALCIUM	NA	NA	108000.00	84800.00	NA	NA	NA	NA	NCA	NCA	NCA
CHROMIUM	13.30 J-	46.20 J-	4.40 UJ	4.40 U	4.40 UJ	4.40 UJ	4.40 UJ	4.40 UJ	3230.00	10300.00	NCA
COBALT	NA	NA	2.90 UJ	2.90 U	NA	NA	NA	NA	NCA	NCA	NCA
COPPER	67.00 J	253.00 J	4.40	2.20	6.60 U	5.00 U	16.90 J	7.50 U	NCA	2.90	2.90
IRON	NA	NA	3090.00 J	3040.00	NA	NA	NA	NA	NCA	NCA	NCA
LEAD	100.00 U	460.00 J	3.00 U	18.40	3.00 UJ	3.00 UJ	3.00 UJ	3.00 UJ	NCA	140.00	5.60
MAGNESIUM	NA	NA	312000.00	234000.00	NA	NA	NA	NA	NCA	NCA	NCA
MANGANESE	NA	NA	236.00 J	258.00	NA	NA	NA	NA	100.00	NCA	NCA
MERCURY	0.50 U	0.18 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.146	2.10	0.025
NICKEL	28.90 J-	69.50 J-	13.00 J-	10.40	8.10 UJ	8.10 UJ	8.10 UJ	8.10 UJ	3900.00	140.00	7.10
POTASSIUM	NA	NA	95500.00 J	70400.00	NA	NA	NA	NA	NCA	NCA	NCA
SELENIUM	1.60 UJ	5.10 J	8.00 U	8.00 U	8.30 J	4.00 R	4.00 R	4.00 R	NCA	410.00	54.00
SILVER	2.30 UJ	2.30 UJ	2.30 UJ	2.30 U	2.30 UJ	2.30 UJ	2.30 UJ	2.30 UJ	NCA	2.30	NCA
SODIUM	NA	NA	2760000.00 J	1940000.00	NA	NA	NA	NA	NCA	NCA	NCA
THALLIUM	1.90 UJ	1.90 UJ	9.50 UJ	9.50 UJ	7.00 R	7.00 R	7.00 R	7.00 R	6.22	2130.00	NCA
VANADIUM	NA	NA	48.80 J-	33.00	NA	NA	NA	NA	NCA	NCA	NCA
ZINC	299.00 J	809.00 J	8.10 J-	5.80	25.60 U	18.30 U	50.00 U	13.50 U	NCA	170.00	58.00
CYANIDE	NA	NA	5.00 U	5.00 U	NA	NA	NA	NA	1.00	1.00	1.00

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1986.

TABLE 4-4
METALS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 18C STREAM						WATER QUALITY CRITERIA		
	SW-1812	SW-1813	SW-1814	SW-1815	SW-1816	SW-1817	NJDEP FW-2 (3)	USEPA (4) FW ACUTE	USEPA (4) FW CHRONIC
ALUMINUM	229.00	NA	312.00	NA	NA	NA	NCA	NCA	NCA
ANTIMONY	0.80 U	8.00 U	0.92 U	8.00 U	0.80 U	8.00 U	12.20	9000.00	1600.00
ARSENIC	1.80 U	1.80 U	1.80 U	1.80 U	2.30	1.80 U	0.017	360.00	190.00
BARIUM	22.80	48.10	43.10	64.10	25.90	43.30	2000.00	NCA	NCA
BERYLLIUM	1.40 U	1.40 U	1.40 U	1.90	1.40 U	1.40 U	NCA	130.00	5.30
CADMIUM*		0.96	0.14	0.31			NCA	1.83	0.87
	0.34				0.18	0.21	NCA	3.92	1.13
CALCIUM	31500.00	NA	13600.00	NA	NA	NA	NCA	NCA	NCA
CHROMIUM*		3.60 U	3.60 U	3.60 U			160.00	998.55	5.25
	3.60 U				3.60 U	3.60 U	160.00	1734.57	9.11
COBALT	2.50 U	NA	7.60	NA	NA	NA	NCA	NCA	NCA
COPPER*		2.70	2.40	5.40			NCA	9.38	6.64
	12.80				3.70	4.30	NCA	17.70	11.81
IRON	271.00	NA	2260.00	NA	NA	NA	NCA	NCA	1000.00
LEAD*		15.30 U	0.60 U	5.60 U			5.00	34.55	1.35
	3.10 U				0.77 U	1.60 U	5.00	81.50	3.18
MAGNESIUM	5150.00	NA	4110.00	NA	NA	NA	NCA	NCA	NCA
MANGANESE	11.00	NA	70.90	NA	NA	NA	NCA	NCA	NCA
MERCURY	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.144	2.40	0.012
NICKEL*		11.70 U	12.60	11.70 U			516.00	1103.74	6.87
	11.70 U				11.70 U	11.70 U	516.00	1842.52	11.46
POTASSIUM	1450.00	NA	2710.00	NA	NA	NA	NCA	NCA	NCA
SELENIUM	1.60 U	1.60 U	1.60 U	1.60 U	1.60 U	1.60 U	10.00	260.00	35.00
SILVER**		2.10 U	2.10 U	2.10 U			164.00	1.270	0.120
	2.10 U				2.10 U	2.10 U	164.00	4.050	0.120
SODIUM	10000.00	NA	10900.00	NA	NA	NA	NCA	NCA	NCA
THALLIUM	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	1.70	1400.00	40.00
VANADIUM	2.20 U	NA	2.20 U	NA	NA	NA	NCA	NCA	NCA
ZINC**		38.40	41.30 U	42.10			NCA	183.37	47.00
	34.30 U				41.60	53.60	NCA	320.91	47.00
CYANIDE	10.00 U	NA	10.00 U	NA	NA	NA	5.20	22.00	5.20

*Cadmium, chromium, copper, lead and nickel USEPA Freshwater Acute and Chronic Surface Water Quality Criteria are based on the surface water hardness at that location.
** Silver and Zinc USEPA Freshwater Acute Surface Water Quality Criteria are based on the surface water hardness at that location.

(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1986.

TABLE 4-4
METALS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 20 DITCH	AREA 18B STREAM					WATER QUALITY CRITERIA		
	SW-2001	SW-1803	SW-1804	SW-1805	SW-1806	SW-1807	NJDEP FW-2 (3)	USEPA (4) FW ACUTE	USEPA (4) FW CHRONIC
ALUMINUM	NA	87.90 U	NA	NA	109.00	NA	NCA	NCA	NCA
ANTIMONY	2.10 UJ	0.80 U	0.80 U	0.80 U	8.00 U	0.80 U	12.20	9000.00	1600.00
ARSENIC	4.30 J	1.80 U	1.80 U	1.80 U	1.80 U	1.80 U	0.017	360.00	190.00
BARIUM	60.70	34.10	31.80	29.80	9.40	26.90	2000.00	NCA	NCA
BERYLLIUM	1.00	0.50 U	0.50 U	0.50 U	0.63 U	0.50 U	NCA	130.00	5.30
CADMIUM*	1.90 U						NCA	1.03	0.45
		0.31	0.24	0.20			NCA	1.75	0.65
					0.24	0.10 U	NCA	0.48	0.26
CALCIUM	NA	15600.00	NA	NA	4990.00	NA	NCA	NCA	NCA
CHROMIUM*	27.00						160.00	859.56	3.48
		3.80 U	3.80 U	3.80 U			160.00	967.52	5.08
					3.80 U	3.80 U	160.00	378.24	1.99
COBALT	NA	3.40 U	NA	NA	3.40 U	NA	NCA	NCA	NCA
COPPER*	38.70						NCA	5.82	4.31
		2.30 U	5.30 U	5.00 U			NCA	9.04	6.42
					7.20 U	4.50 U	NCA	3.07	2.41
IRON	NA	17.60	NA	NA	284.00	NA	NCA	NCA	NCA
LEAD*	25.30 J-						5.00	18.13	0.71
		0.90 U	1.80 ; U	0.60 U			5.00	32.89	1.28
					0.82 U	0.90 U	5.00	7.84	0.30
MAGNESIUM	NA	2430.00	NA	NA	751.00	NA	NCA	NCA	NCA
MANGANESE	NA	46.70	NA	NA	25.20	NA	NCA	NCA	NCA
MERCURY	0.22	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.144	2.40	0.012
NICKEL*	11.50 J						516.00	751.15	4.67
		7.10 U	7.10 U	7.10 U			516.00	1071.87	6.67
					7.10 U	7.10 U	516.00	448.37	2.79
POTASSIUM	NA	1540.00	NA	NA	550.00	NA	NCA	NCA	NCA
SELENIUM	2.00 J-	1.60 U	1.60 U	1.60 U	1.60 U	1.60 U	10.00	260.00	35.00
SILVER**	2.30 U						164.00	0.53	0.120
		2.30 U	2.30 U	2.30 U			164.00	1.19	0.120
					2.30 U	2.30 U	164.00	0.17	0.120
SODIUM	NA	19800.00	NA	NA	4250.00	NA	NCA	NCA	NCA
THALLIUM	2.90 UJ	1.70	1.60 U	1.60 U	1.60 U	1.60 U	1.70	1400.00	40.00
VANADIUM	NA	2.00 U	NA	NA	2.00 U	NA	NCA	NCA	NCA
ZINC**	148.00						NCA	120.45	47.00
		39.10 J	31.50 J	30.60 J			NCA	177.60	47.00
					45.40 J	37.80 J	NCA	68.56	47.00
CYANIDE	NA	10.00 U	NA	NA	10.00 U	NA	5.20	22.00	5.20

*Cadmium, chromium, copper, lead and nickel USEPA Freshwater Acute and Chronic Surface Water Quality Criteria are based on the surface water hardness at that location.

** Silver and Zinc USEPA Freshwater Acute Surface Water Quality Criteria are based on the surface water hardness at that location.

(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.

(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.

(3) From NJAC 7:9B Surface Water Quality Standards.

(4) USEPA Water Quality Criteria, 1986.

TABLE 4-4
METALS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 8 POND							WATER QUALITY CRITERIA		
	SW-0801	SW-0802	SW-0803	SW-0804	SW-0805	SW-0806	SW-0807 (Duplicate of SW-0801)	NJDEP FW-2 (3)	USEPA (4) FW ACUTE	USEPA (4) FW CHRONIC
ALUMINUM	232.00	NA	NA	573.00	NA	NA	228.00	NCA	NCA	NCA
ANTIMONY	8.00 U	8.00 U	8.00 U	8.00 U	8.00 U	8.00 U	8.00 U	12.20	9000.00	1600.00
ARSENIC	8.20	3.10	2.50	2.00	3.00	5.00	3.70	0.017	360.00	190.00
BARIUM	7.60	9.60	9.00	18.10	33.10	13.60	13.00	2000.00	NCA	NCA
BERYLLIUM	1.40 U	1.40 U	1.40 U	1.40 U	1.40 U	1.40 U	1.40 U	NCA	130.00	5.30
CADMIUM*	0.10	0.50 U					0.50 U	NCA	1.03	0.45
			0.50 U	0.50 U	0.50 U	0.50 U		NCA	1.63	0.62
CALCIUM	8950.00	NA	NA	12000.00	NA	NA	9520.00	NCA	NCA	NCA
CHROMIUM*	3.60 U	3.60 U					3.60 U	160.00	659.56	3.46
			3.60 U	3.60 U	3.60 U	3.60 U		160.00	917.71	4.82
COBALT	2.50 U	NA	NA	2.50 U	NA	NA	2.50 U	NCA	NCA	NCA
COPPER*	7.90 U	5.60 U					5.70 U	NCA	5.82	4.31
			4.00 U	5.30 U	7.00 U	9.00 U		NCA	8.51	6.08
IRON	4490.00	NA	NA	2950.00	NA	NA	4300.00	NCA	NCA	1000.00
LEAD*	7.80 J	4.70 U					5.20 U	5.00	18.13	0.71
			2.10 U	2.00 U	5.10 U	8.00 J		5.00	30.30	1.18
MAGNESIUM	2020.00	NA	NA	3870.00	NA	NA	2490.00	NCA	NCA	NCA
MANGANESE	225.00	NA	NA	134.00	NA	NA	255.00	NCA	NCA	NCA
MERCURY	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.144	2.40	0.012
NICKEL*	11.70 U	11.70 U					14.90	516.00	751.15	4.67
			11.70 U	11.70 U	11.70 U	11.70 U		516.00	1020.58	6.35
POTASSIUM	1270.00	NA	NA	3370.00	NA	NA	1190.00	NCA	NCA	NCA
SELENIUM	1.60 U	1.60 U	1.60 U	1.60 U	1.60 U	1.60 U	1.60 U	10.00	260.00	35.00
SILVER**	2.10 U	2.10 U					2.10 U	164.00	0.53	0.120
			2.10 U	2.10 U	2.10 U	2.10 U		164.00	1.06	0.120
SODIUM	20200.00	NA	NA	35900.00	NA	NA	22300.00	NCA	NCA	NCA
THALLIUM	7.50 U	7.50 U	7.50 U	7.50 U	7.50 U	7.50 U	7.50 U	1.70	1400.00	40.00
VANADIUM	5.00	NA	NA	4.00	NA	NA	3.50	NCA	NCA	NCA
ZINC**	15.60 J	9.60 J					14.30 J	NCA	120.45	47.00
			5.90 J	6.80 J	12.40 J	5.70 J		NCA	168.34	47.00
CYANIDE	10.00 U	NA	NA	10.00 U	NA	NA	10.00 U	5.20	22.00	5.20

NOTES:

*Cadmium, chromium, copper, lead and nickel USEPA Freshwater Acute and Chronic Surface Water Quality Criteria are based on the surface water hardness at that location.

**Silver and Zinc USEPA Freshwater Acute Surface Water Quality Criteria are based on the surface water hardness at that location.

(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.

(2) Refer to Salinity Map (Figure 3-2) and Appendix A.

(3) From NJAC 7:9B Surface Water Quality Standards

(4) USEPA Water Quality Criteria, 1986.

TABLE 4-4
METALS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	LOWER AREA 18B STREAM				WATER QUALITY CRITERIA		
	SW-0101	SW-0102	SW-0103	SW-0104	NJDEP FW-2 (3)	USEPA (4) FW ACUTE	USEPA (4) FW CHRONIC
ALUMINUM	NA	NA	NA	303.00	NCA	NCA	NCA
ANTIMONY	3.00 U	3.00 U	3.00 U	3.00 U	12.20	9000.00	1600.00
ARSENIC	2.30 U	2.30 U	2.30 U	2.30 U	0.017	360.00	190.00
BARIUM	32.70	38.00	33.60	40.30	2000.00	NCA	NCA
BERYLLIUM	1.60 U	1.60 U	1.60 U	0.90 U	NCA	130.00	5.30
CADMIUM*	1.90 U	1.90 U	1.90 U	1.90 U	NCA	1.10	0.47
CALCIUM	NA	NA	NA	8410.00	NCA	NCA	NCA
CHROMIUM*	4.40 U	4.40 U	4.40 U	4.40 U	160.00	690.76	3.63
COBALT	NA	NA	NA	4.40	NCA	NCA	NCA
COPPER*	3.40 U	3.40 U	3.40 U	3.00 U	NCA	6.14	4.52
IRON	NA	NA	NA	1370.00	NCA	NCA	1000.00
LEAD*	2.40 U	2.40 U	2.40 U	2.40 U	5.00	19.48	0.76
MAGNESIUM	NA	NA	NA	2780.00	NCA	NCA	NCA
MANGANESE	NA	NA	NA	68.20	NCA	NCA	NCA
MERCURY	0.16 U	0.14 U	0.15 U	0.10 U	0.144	2.40	0.01
NICKEL*	8.90	6.10 U	6.10 U	13.50	516.00	784.09	4.88
POTASSIUM	NA	NA	NA	1750.00	NCA	NCA	NCA
SELENIUM	2.10	1.60	1.30	1.30 U	10.00	260.00	35.00
SILVER**	2.30 U	2.30 U	2.30 U	2.30 U	164.00	0.59	0.120
SODIUM	NA	NA	NA	12000.00	NCA	NCA	NCA
THALLIUM	1.80 UJ	1.80 UJ	1.80 UJ	1.80	1.70	1400.00	40.00
VANADIUM	NA	NA	NA	7.70 UJ	NCA	NCA	NCA
ZINC**	26.50 U	34.90 U	34.20 U	37.90	NCA	126.23	47.00
CYANIDE	NA	NA	NA	10.00 U	5.20	22.00	5.20

NOTES:

*Cadmium, chromium, copper, lead and nickel USEPA Freshwater Acute and Chronic Surface Water Quality Criteria are based on the surface water hardness at that location.

** Silver and Zinc USEPA Freshwater Acute Surface Water Quality Criteria are based on the surface water hardness at that location.

(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.

(2) Refer to Salinity Map (Figure 3-2) and Appendix A.

(3) From NJAC 7:9B Surface Water Quality Standards

(4) USEPA Water Quality Criteria, 1986.

TABLE 4-4
METALS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	RED ROOT CREEK		SULFUR PLANT PONDS				WATER QUALITY CRITERIA		
	SW-0601H	SW-0601L	SW-0610	SW-0613	SW-0614	SW-0615	NJDEP FW-2 (3)	USEPA (4) FW ACUTE	USEPA (4) FW CHRONIC
ALUMINUM	NA	NA	NA	NA	NA	67300.00 J	NCA	NCA	NCA
ANTIMONY	2.10 UJ	2.10 UJ	2.10 U	2.10 U	2.10 U	2.10 UJ	12.20	9000.00	1600.00
ARSENIC	8.20 J-	38.00 J-	19.50	10.00 U	15.50	10.00 UJ	0.017	360.00	190.00
BARIUM	34.50 J	43.10 J	10.20 U	10.40 U	9.90 U	27.70 J-	2000.00	NCA	NCA
BERYLLIUM	0.60 U	0.60 U	12.40 J-	8.50 J-	12.40 J-	2.70	NCA	130.00	5.30
CADMIUM*			2.8	8	1.9 U	18.1	NCA	16.43	3.07
	1.90 U						NCA	86.62	9.78
		1.90 U					NCA	63.19	7.85
CALCIUM	NA	NA	NA	NA	NA	101000.00	NCA	NCA	NCA
CHROMIUM*			111 J-	92.5 J-	111 J-	264 J-	160.00	4912.32	25.80
	5.00 J-						160.00	16426.16	86.29
		5.80 J-					160.00	13066.14	68.63
COBALT	NA	NA	NA	NA	NA	45.50 J-	NCA	NCA	NCA
COPPER*			431 J	381 J	438 J	671	NCA	58.63	34.99
	5.40 J						NCA	235.13	123.30
		14.90 J					NCA	180.68	97.10
IRON	NA	NA	NA	NA	NA	55900.00 J	NCA	NCA	1000.00
LEAD*			5.1 J	3 UJ	13 J	17.5	5.00	411.04	16.02
	2.90 U						5.00	2684.25	104.60
		16.20 J					5.000	1880.43	73.28
MAGNESIUM	NA	NA	NA	NA	NA	25200.00	NCA	NCA	NCA
MANGANESE	NA	NA	NA	NA	NA	1370.00 J	NCA	NCA	NCA
MERCURY	0.19 U	0.19 U	0.10 U	0.10 U	0.10 U	0.10 U	0.144	2.40	0.012
NICKEL*			221 J-	221 J-	224 J-	56.8 J-	516.00	4841.04	30.11
	6.80 J-						516.00	14841.27	92.31
		8.10 UJ					516.00	12000.33	74.64
POTASSIUM	NA	NA	NA	NA	NA	3170.00 J	NCA	NCA	NCA
SELENIUM	1.60 UJ	1.60 UJ	4.00 R	4.00 R	4.00 R	8.00 U	10.00	260.00	35.00
SILVER**			8.9 J-	5.7 J-	9.9 J-	2.3 UJ	164.00	36.04	0.120
	2.30 UJ						164.00	454.92	0.120
		2.30 UJ					164.00	281.25	0.120
SODIUM	NA	NA	NA	NA	NA	4870.00 J	NCA	NCA	NCA
THALLIUM	1.90 UJ	1.90 UJ	7.00 R	7.00 R	6.40 J-	9.50 UJ	1.70	1400.00	40.00
VANADIUM	NA	NA	NA	NA	NA	10.80 J-	NCA	NCA	NCA
ZINC**			3280 J-	2900 J-	3280 J-	6940 J-	NCA	921.61	47.00
	39.60 J						NCA	3132.51	47.00
		41.10 J					NCA	2483.79	47.00
CYANIDE	NA	NA	NA	NA	NA	5.00 U	5.20	5.20	5.20

*Cadmium, chromium, copper, lead and nickel USEPA Freshwater Acute and Chronic Surface Water Quality Criteria are based on the surface water hardness at that location.

** Silver and Zinc USEPA Freshwater Acute Surface Water Quality Criteria are based on the surface water hardness at that location.

(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.

(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.

(3) From NJAC 7:9B Surface Water Quality Standards.

(4) USEPA Water Quality Criteria, 1986.

TABLE 4-4
METALS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	RED ROOT CREEK								WATER QUALITY CRITERIA		
	SW-0602H	SW-0602L	SW-0603H	SW-0603L	SW-0604H	SW-0604L	SW-0605H	SW-0605L	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
ALUMINUM	NA	NA	114.00 U	71.70	NA	NA	NA	NA	NCA	NCA	NCA
ANTIMONY	2.10 UJ	9.00 J-	2.10 UJ	2.10 UJ	2.10 U	2.70 U	2.10 U	2.10 U	43000.00	NCA	NCA
ARSENIC	17.50 J-	55.00 J-	10.00 U	10.00 UJ	10.00 U	10.00 U	6.50 U	10.00 U	0.136	69.00	36.00
BARIUM	63.20 J	134.00 J	194.00 J-	224.00	74.80 J	74.20 J	31.60 J	20.30 J	NCA	NCA	NCA
BERYLLIUM	0.60 U	2.10	0.60 U	0.60 U	0.60 UJ	0.60 UJ	0.60 UJ	0.60 UJ	NCA	NCA	NCA
CADMIUM	1.90 U	2.20	1.90 U	1.90 U	1.90 U	1.90 U	1.90 U	1.90 U	NCA	43.00	9.30
CALCIUM	NA	NA	108000.00	84800.00	NA	NA	NA	NA	NCA	NCA	NCA
CHROMIUM	13.30 J-	48.20 J-	4.40 UJ	4.40 U	4.40 UJ	4.40 UJ	4.40 UJ	4.40 UJ	3230.00	10300.00	NCA
COBALT	NA	NA	2.90 UJ	2.90 U	NA	NA	NA	NA	NCA	NCA	NCA
COPPER	67.00 J	253.00 J	4.40	2.20	8.60 U	5.00 U	16.90 J	7.50 U	NCA	2.90	2.90
IRON	NA	NA	3090.00 J	3040.00	NA	NA	NA	NA	NCA	NCA	NCA
LEAD	100.00 U	460.00 J	3.00 U	18.40	3.00 UJ	3.00 UJ	3.00 UJ	3.00 UJ	NCA	140.00	5.60
MAGNESIUM	NA	NA	312000.00	234000.00	NA	NA	NA	NA	NCA	NCA	NCA
MANGANESE	NA	NA	236.00 J	258.00	NA	NA	NA	NA	100.00	NCA	NCA
MERCURY	0.50 U	0.18 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.146	2.10	0.025
NICKEL	28.80 J-	89.50 J-	13.00 J-	10.40	8.10 UJ	8.10 UJ	8.10 UJ	8.10 UJ	3900.00	140.00	7.10
POTASSIUM	NA	NA	95500.00 J	70400.00	NA	NA	NA	NA	NCA	NCA	NCA
SELENIUM	1.60 UJ	5.10 J	8.00 U	8.00 U	8.30 J	4.00 R	4.00 R	4.00 R	NCA	410.00	54.00
SILVER	2.30 UJ	2.30 UJ	2.30 UJ	2.30 U	2.30 UJ	2.30 UJ	2.30 UJ	2.30 UJ	NCA	2.30	NCA
SODIUM	NA	NA	2760000.00 J	1940000.00	NA	NA	NA	NA	NCA	NCA	NCA
THALLIUM	1.90 UJ	1.90 UJ	9.50 UJ	9.50 UJ	7.00 R	7.00 R	7.00 R	7.00 R	6.22	2130.00	NCA
VANADIUM	NA	NA	48.80 J-	33.00	NA	NA	NA	NA	NCA	NCA	NCA
ZINC	299.00 J	809.00 J	8.10 J-	5.60	25.60 U	18.30 U	50.00 U	13.50 U	NCA	170.00	58.00
CYANIDE	NA	NA	5.00 U	5.00 U	NA	NA	NA	NA	1.00	1.00	1.00

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1986.

TABLE 4-4
METALS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

CENTRAL DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	CENTRAL DITCH								WATER QUALITY CRITERIA		
	SW-1101L	SW-1102L	SW-1103L	SW-1104L	SW-1101H	SW-1102H	SW-1103H	SW-1104H	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
ALUMINUM	NA	NA	NA	279.00	NA	NA	NA	176.00	NCA	NCA	NCA
ANTIMONY	8.00 U	28.00	8.00 U	8.00 U	8.00 U	8.00 U	9.10	8.00 U	43000.00	NCA	NCA
ARSENIC	25.90	21.40	8.70	8.20	26.60	29.80	16.00	10.80	0.136	69.00	36.00
BARIUM	48.70	38.40	40.30	50.50	40.50	38.20	36.40	36.80	NCA	NCA	NCA
BERYLLIUM	2.70	2.80	1.80	1.70	1.90	1.40 U	1.40 U	1.40 U	NCA	NCA	NCA
CADMIUM	0.50 U	0.20 U	0.50 U	0.50 U	0.20 U	0.10 U	0.50 U	0.10 U	NCA	43.00	9.30
CALCIUM	NA	NA	NA	193000.00	NA	NA	NA	163000.00	NCA	NCA	NCA
CHROMIUM	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U	3230.00	10300.00	NCA
COBALT	NA	NA	NA	2.50 U	NA	NA	NA	2.50 U	NCA	NCA	NCA
COPPER	8.10 U	2.20 U	2.60 U	9.40 U	5.00 U	2.10 U	3.60 U	5.00 U	NCA	2.90	2.90
IRON	NA	NA	NA	2690.00	NA	NA	NA	1050.00	NCA	NCA	NCA
LEAD	9.30 J	4.00 J	4.00 J	8.60 J	5.40 J	3.00 J	5.90 J	4.60 U	NCA	140.00	5.60
MAGNESIUM	NA	NA	NA	547000.00	NA	NA	NA	458000.00	NCA	NCA	NCA
MANGANESE	NA	NA	NA	201.00	NA	NA	NA	153.00	100.00	NCA	NCA
MERCURY	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.146	2.10	0.025
NICKEL	11.70 U	11.70 U	11.70 U	11.70 U	11.70 U	11.70 U	11.70 U	11.70 U	3900.00	140.00	7.10
POTASSIUM	NA	NA	NA	216000.00	NA	NA	NA	177000.00	NCA	NCA	NCA
SELENIUM	8.00 U	8.00 U	8.00 U	8.00 U	8.00 U	8.00 U	8.00 U	8.00 U	NCA	410.00	54.00
SILVER	2.10 U	2.10 U	2.10 U	2.10 U	2.10 U	2.10 U	2.10 U	2.10 U	NCA	2.30	NCA
SODIUM	NA	NA	NA	4620000.00	NA	NA	NA	3930000.00	NCA	NCA	NCA
THALLIUM	7.50 U	7.50 U	7.50 U	7.50 U	7.50 U	7.50 U	7.50 U	7.50 U	6.22	2130.00	NCA
VANADIUM	NA	NA	NA	10.50	NA	NA	NA	9.30	NCA	NCA	NCA
ZINC	2.40 U	2.40 U	2.40 U	2.40 U	2.40 U	2.40 U	2.40 U	2.40 U	NCA	170.00	58.00
CYANIDE	NA	NA	NA	10.00 U	NA	NA	NA	10.00 U	1.00	1.00	1.00

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1986.

TABLE 4-4
METALS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

CENTRAL DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	ISOLATED FRESHWATER POND				UPGRADIENT PONDED AREA	WATER QUALITY CRITERIA		
	SW-1622	SW-1623	SW-1626	SW-1627 (Duplicate of SW-1626)	SW-1621	NJDEP FW-2 (3)	USEPA (4) FW ACUTE	USEPA (4) FW CHRONIC
ALUMINUM	NA	NA	NA	NA	NA	NCA	NCA	NCA
ANTIMONY	10.20	8.00 U	8.00 U	8.00 U	10.80	12.20	9000.00	1600.00
ARSENIC	6.30	5.40	4.90	1.80 U	27.20	0.017	360.00	190.00
BARIUM	86.20	38.50	357.00	325.00	37.70	2000.00	NCA	NCA
BERYLLIUM	1.40 U	1.40 U	1.40 U	1.40 U	1.40 U	NCA	130.00	5.30
CADMIUM*	0.10 U	0.10	0.12	0.12	0.14	NCA	38.51	5.36
CALCIUM	NA	NA	NA	NA	NA	NCA	NCA	NCA
CHROMIUM*	3.60 U	3.60 U	5.60	3.60 U	3.60 U	160.00	8772.29	46.08
COBALT	NA	NA	NA	NA	NA	NCA	NCA	NCA
COPPER*	5.40 U	2.50 U	12.10	8.20 U	2.10 U	NCA	114.25	84.07
IRON	NA	NA	NA	NA	NA	NCA	NCA	NCA
LEAD*	6.30 J	2.60 J	7.60 J	10.00 J	2.60 J	5.00	1012.29	39.45
MAGNESIUM	NA	NA	NA	NA	NA	NCA	NCA	NCA
MANGANESE	NA	NA	NA	NA	NA	NCA	NCA	NCA
MERCURY	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.144	2.40	0.012
NICKEL*	11.70 U	11.70 U	11.70 U	11.70 U	11.70 U	516.00	8291.32	51.57
POTASSIUM	NA	NA	NA	NA	NA	NCA	NCA	NCA
SELENIUM	1.60 U	8.00 U	8.00 U	8.00 U	1.60 U	10.00	260.00	35.00
SILVER**	2.10 U	2.10 U	2.10 U	2.10 U	2.10 U	164.00	121.81	0.120
SODIUM	NA	NA	NA	NA	NA	NCA	NCA	NCA
THALLIUM	7.50 U	7.50 U	7.50 U	7.50 U	7.50 U	1.70	1400.00	40.00
VANADIUM	NA	NA	NA	NA	NA	NCA	NCA	NCA
ZINC**	3.70 U	2.40 U	20.30 U	16.50 U	2.40 U	NCA	1658.66	47.00
CYANIDE	NA	NA	NA	NA	NA	5.20	22.00	5.20

NOTES:
*Cadmium, chromium, copper, lead and nickel USEPA Freshwater Acute and Chronic Surface Water Quality Criteria are based on the surface water hardness at that location.
** Silver and Zinc USEPA Freshwater Acute Surface Water Quality Criteria are based on the surface water hardness at that location.

(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1986.

TABLE 4-4
METALS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

CENTRAL DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	ISOLATED ESTUARINE PONDS		UPGRADIENT PONDED AREA	WATER QUALITY CRITERIA		
	SW-1625H	SW-1625L	SW-1624	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
ALUMINUM	NA	NA	59.00	NCA	NCA	NCA
ANTIMONY	8.00 U	8.00 U	0.80 U	43000.00	NCA	NCA
ARSENIC	58.60	62.40	12.60	0.136	69.00	36.00
BARIUM	50.40	58.10	56.80	NCA	NCA	NCA
BERYLLIUM	1.40 U	1.40 U	1.40 U	NCA	NCA	NCA
CADMIUM	0.15	0.11	0.10 U	NCA	43.00	9.30
CALCIUM	NA	NA	58500.00	NCA	NCA	NCA
CHROMIUM	3.60 U	3.60 U	3.60 U	3230.00	10300.00	NCA
COBALT	NA	NA	2.50 U	NCA	NCA	NCA
COPPER	4.90 U	4.30 U	3.20 U	NCA	2.90	2.90
IRON	NA	NA	83.20	NCA	NCA	NCA
LEAD	8.60 J	6.10 J	1.60 U	NCA	140.00	5.60
MAGNESIUM	NA	NA	140000.00	NCA	NCA	NCA
MANGANESE	NA	NA	325.00	100.00	NCA	NCA
MERCURY	0.20 U	0.20 U	0.20 U	0.146	2.10	0.025
NICKEL	11.70 U	11.70 U	11.70 U	3900.00	140.00	7.10
POTASSIUM	NA	NA	52300.00	NCA	NCA	NCA
SELENIUM	8.00 U	8.00 U	8.00 U	NCA	410.00	54.00
SILVER	2.10 U	2.10 U	2.10 U	NCA	2.30	NCA
SODIUM	NA	NA	1290000.00	NCA	NCA	NCA
THALLIUM	7.50 U	7.50 U	7.50 U	6.22	2130.00	NCA
VANADIUM	NA	NA	5.90	NCA	NCA	NCA
ZINC	14.70 U	2.40 U	2.40 U	NCA	170.00	58.00
CYANIDE	NA	NA	10.00 U	1.00	1.00	1.00

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1986.

TABLE 4-4
METALS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

AREA 12 DRAINAGE
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 12 DITCH					WATER QUALITY CRITERIA		
	SW-1201	SW-1202H	SW-1202L	SW-1203H	SW-1203L	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
ALUMINUM	NA	NA	NA	309.00	1440.00	NCA	NCA	NCA
ANTIMONY	8.00 U	8.00 U	8.00 U	8.00 U	8.00 U	43000.00	NCA	NCA
ARSENIC	16.40	34.20	20.50	11.70	9.50	0.136	69.00	36.00
BARIUM	376.00	37.90	23.90	50.60	58.60	NCA	NCA	NCA
BERYLLIUM	1.80	1.40 U	1.40 U	2.10	1.90	NCA	NCA	NCA
CADMIUM	0.18	0.10 U	0.10 U	0.50 U	0.50 U	NCA	43.00	9.30
CALCIUM	NA	NA	NA	212000.00	205000.00	NCA	NCA	NCA
CHROMIUM	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U	3230.00	10300.00	NCA
COBALT	NA	NA	NA	2.50 U	2.50 U	NCA	NCA	NCA
COPPER	7.30 U	3.70 U	3.60 U	9.80 U	26.80	NCA	2.90	2.90
IRON	NA	NA	NA	1120.00	3350.00	NCA	NCA	NCA
LEAD	8.80	5.40	2.50	6.10 U	26.40 U	NCA	140.00	5.60
MAGNESIUM	NA	NA	NA	619000.00	596000.00	NCA	NCA	NCA
MANGANESE	NA	NA	NA	237.00	209.00	100.00	NCA	NCA
MERCURY	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.146	2.10	0.025
NICKEL	11.70 U	11.70 U	11.70 U	11.70 U	24.90	3900.00	140.00	7.10
POTASSIUM	NA	NA	NA	247000.00	238000.00	NCA	NCA	NCA
SELENIUM	8.00 U	8.00 U	8.00 U	8.00 U	8.00 U	NCA	410.00	54.00
SILVER	2.10 U	2.10 U	2.10 U	2.10 U	2.10 U	NCA	2.30	NCA
SODIUM	NA	NA	NA	5230000.00	5020000.00	NCA	NCA	NCA
THALLIUM	7.50 U	7.50 U	7.50 U	7.50 U	8.00	6.22	2130.00	NCA
VANADIUM	NA	NA	NA	9.50	16.30	NCA	NCA	NCA
ZINC	69.10	2.50 U	4.40 U	2.40 U	21.50	NCA	170.00	58.00
CYANIDE	NA	NA	NA	10.00 U	10.00 U	1.00	1.00	1.00

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1988.

TABLE 4-4
METALS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUNDS	AREA 16 ASSOCIATED DITCHES									WATER QUALITY CRITERIA		
	SW-1611	SW-1612	SW-1613	SW-1615	SW-1616H	SW-1616L	SW-1617	SW-1618	SW-1628 (Duplicate of SW-1612)	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
ALUMINUM	NA	NA	NA	NA	NA	NA	207.00 J+	NA	NA	NCA	NCA	NCA
ANTIMONY	8.00 U	8.00 U	8.00 U	12.00	8.00 U	8.00 U	8.00 U	8.00 U	8.00 U	43000.00	NCA	NCA
ARSENIC	1.80 U	30.10	1.80 U	22.80	13.70	28.40	19.70	19.80	29.00	0.136	69.00	36.00
BARIUM	43.70	173.00	41.80	61.60	49.10	47.40	45.60	56.20	175.00	NCA	NCA	NCA
BERYLLIUM	1.40 U	1.40 U	1.40 U	1.40 U	1.40 U	1.40 U	1.40 U	1.40 U	1.40 U	NCA	NCA	NCA
CADMIUM	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	NCA	43.00	9.30
CALCIUM	NA	NA	NA	NA	NA	NA	177000.00	NA	NA	NCA	NCA	NCA
CHROMIUM	3.80 U	3.80 U	6.40	3.80 U	11.30	3.80 U	5.00	7.10	4.50	3230.00	10300.00	NCA
COBALT	NA	NA	NA	NA	NA	NA	3.40 U	NA	NA	NCA	NCA	NCA
COPPER	1.90 U	1.90 U	1.90 U	1.90 U	38.80 J	1.90 U	1.90 U	25.10 J	3.70 J	NCA	2.90	2.90
IRON	NA	NA	NA	NA	NA	NA	4960.00	NA	NA	NCA	NCA	NCA
LEAD	17.80 J	13.80 J-	13.70 J	8.70 J-	17.80 J-	8.40 J-	5.70	16.50 J-	12.80 J-	NCA	140.00	5.60
MAGNESIUM	NA	NA	NA	NA	NA	NA	494000.00	NA	NA	NCA	NCA	NCA
MANGANESE	NA	NA	NA	NA	NA	NA	197.00	NA	NA	100.00	NCA	NCA
MERCURY	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.25	0.20 U	0.146	2.10	0.025
NICKEL	11.70 U	11.70 U	11.70 U	11.70 U	11.70 U	11.70 U	11.70 U	11.70 U	11.70 U	3900.00	140.00	7.10
POTASSIUM	NA	NA	NA	NA	NA	NA	135000.00	NA	NA	NCA	NCA	NCA
SELENIUM	34.00 R	34.00 UJ	34.00 R	34.00 UJ	34.00 UJ	34.00 UJ	34.00 U	34.00 UJ	34.00 UJ	NCA	410.00	54.00
SILVER	2.30 U	2.30 U	2.30 U	2.30 U	2.30 U	2.30 U	2.30 U	2.30 U	2.30 U	NCA	2.30	NCA
SODIUM	NA	NA	NA	NA	NA	NA	3750000.00	NA	NA	NCA	NCA	NCA
THALLIUM	14.00	10.00 U	10.00 U	10.00 U	10.00 U	10.00 U	10.00 U	10.00 U	10.00 U	6.22	2130.00	NCA
VANADIUM	NA	NA	NA	NA	NA	NA	10.30	NA	NA	NCA	NCA	NCA
ZINC	14.80	54.80	13.90	7.60 U	72.10	14.70 U	7.10 U	51.10	63.10	NCA	170.00	58.00
CYANIDE	NA	NA	NA	NA	NA	NA	10.00 U	NA	NA	1.00	1.00	1.00

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1986.

TABLE 4-4
METALS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	ASSOCIATED DITCHES	FORESTED WETLANDS	AREA 19 NORTHEASTERN WETLANDS			WATER QUALITY CRITERIA		
	SW-1614	SW-1903	SW-1908	SW-1909	SW-1910	NJDEP FW-2 (3)	USEPA (4) FW ACUTE	USEPA (4) FW CHRONIC
ALUMINUM	NA	NA	89.00 U	NA	NA	NCA	NCA	NCA
ANTIMONY	8.00 U	3.00 U	2.10 U	3.00 U	3.00 U	12.20	9000.00	1600.00
ARSENIC	2.80	945.00 J-	2.10 UJ	10.00 UJ	10.50 J-	0.017	360.00	190.00
BARIUM	71.10	501.00	57.90	13.10	41.70	2000.00	NCA	NCA
BERYLLIUM	1.40 U	0.90 J-	0.60 U	0.60 UJ	0.60 UJ	NCA	130.00	5.30
CADMIUM*	0.50 U	1.90 U	1.90 U	1.90 U	1.90 U	NCA	2.47	0.82
CALCIUM	NA	NA	18600.00	NA	NA	NCA	NCA	NCA
CHROMIUM*	3.80 U	4.40 U	4.40 U	4.40 U	4.40 U	160.00	1240.11	6.51
COBALT	NA	NA	13.40	NA	NA	NCA	NCA	NCA
COPPER*	7.80 J	28.40 J	2.10	7.20 J	5.00 J	NCA	12.03	8.32
IRON	NA	NA	17800.00	NA	NA	NCA	NCA	1000.00
LEAD*	8.00 J-	13.50 U	1.10	6.10 U	5.40 U	5.00	48.38	1.89
MAGNESIUM	NA	NA	4820.00	NA	NA	NCA	NCA	NCA
MANGANESE	NA	NA	905.00	NA	NA	NCA	NCA	NCA
MERCURY	0.20 U	0.10 U	0.10 U	0.10 U	0.10 U	0.144	2.40	0.012
NICKEL*	11.70 U	8.10 UJ	8.10 U	8.10 UJ	9.00 J-	516.00	1349.52	8.39
POTASSIUM	NA	NA	3580.00	NA	NA	NCA	NCA	NCA
SELENIUM	1.70 UJ	8.00 U	1.60 U	8.00 U	8.00 U	10.00	260.00	35.00
SILVER**	2.30 U	4.10	2.30 U	2.30 U	2.30 U	164.00	2.00	0.120
SODIUM	NA	NA	51500.00	NA	NA	NCA	NCA	NCA
THALLIUM	10.00 U	9.50 R	2.90 UJ	9.50 R	9.50 R	1.70	1400.00	40.00
VANADIUM	NA	NA	7.40 U	NA	NA	NCA	NCA	NCA
ZINC**	27.20	70.70	40.30 J	34.10	57.60	NCA	228.40	47.00
CYANIDE	NA	NA	10.00 U	NA	NA	5.20	22.00	5.20

NOTES:
*Cadmium, chromium, copper, lead and nickel USEPA Freshwater Acute and Chronic Surface Water Quality Criteria are based on the surface water hardness at that location.
** Silver and Zinc USEPA Freshwater Acute Surface Water Quality Criteria are based on the surface water hardness at that location.

(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
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TABLE 4-4
METALS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUNDS	WEST DITCH			OLD RED ROOT CREEK						WATER QUALITY CRITERIA		
	SW-1603H	SW-1603L	SW-1907	SW-1606	SW-1607	SW-1608	SW-1609H	SW-1609L	SW-1610	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
ALUMINUM	326.00	5590.00	NA	NA	224.00	145.00	171.00 J+	1960.00 J+	NA	NCA	NCA	NCA
ANTIMONY	8.00 U	8.00 U	2.10 UJ	8.00 U	8.00 U	8.00 U	8.00 U	8.00 U	8.00 U	43000.00	NCA	NCA
ARSENIC	9.00 U	15.40	38.00 J-	4.00	2.90	2.00	30.60	5.80	1.80 U	0.136	69.00	36.00
BARIUM	27.00	59.40	73.20 J-	43.70	40.00	39.40	23.20	23.80	82.00	NCA	NCA	NCA
BERYLLIUM	1.40 U	1.40 U	1.80 U	0.50 U	0.50 U	0.50 U	1.40 U	1.40 U	0.50 U	NCA	NCA	NCA
CADMIUM	0.50 U	0.55	1.90 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	NCA	43.00	9.30
CALCIUM	225000.00	156000.00	NA	NA	73600.00	74000.00	38500.00	18800.00	NA	NCA	NCA	NCA
CHROMIUM	3.80 U	16.90	6.90 J-	3.80 U	3.80 U	3.80 U	3.80 U	3.80 U	3.80 U	3230.00	10300.00	NCA
COBALT	3.40 U	3.40 U	NA	NA	3.40 U	3.40 U	3.40 U	3.40 U	NA	NCA	NCA	NCA
COPPER	1.90 U	39.90	26.70 U	1.90 U	1.90 U	1.90 U	4.50 J	11.20 J	1.90 U	NCA	2.90	2.90
IRON	756.00	15300.00	NA	NA	2270.00	1810.00	1690.00	4150.00	NA	NCA	NCA	NCA
LEAD	8.90 J	37.40 J	35.30 J	5.50 J	5.70 J	4.80 J	5.40	8.50	10.00 J	NCA	140.00	5.60
MAGNESIUM	679000.00	452000.00	NA	NA	189000.00	192000.00	90600.00	38000.00	NA	NCA	NCA	NCA
MANGANESE	129.00	471.00	NA	NA	298.00	288.00	235.00	179.00	NA	100.00	NCA	NCA
MERCURY	0.20 U	0.24	0.10 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.15	2.10	0.03
NICKEL	11.70 U	11.70 U	8.10 UJ	7.10 U	7.10 U	7.10 U	11.70 U	11.70 U	7.10 U	3900.00	140.00	7.10
POTASSIUM	201000.00	136000.00	NA	NA	55100.00	56100.00	27100.00	12900.00	NA	NCA	NCA	NCA
SELENIUM	34.00 R	34.00 R	78.10 U	8.00 R	8.00 R	8.00 R	1.70 U	1.70 U	32.00 R	NCA	410.00	54.00
SILVER	2.30 U	2.30 U	2.30 UJ	2.40	2.30 U	2.30 U	2.30 U	2.30 U	2.30 U	NCA	2.30	NCA
SODIUM	5370000.00	3740000.00	NA	NA	1590000.00	1560000.00	754000.00	304000.00	NA	NCA	NCA	NCA
THALLIUM	10.00 U	10.00 U	2.90 R	1.60 U	8.00 U	8.00 U	10.00 U	11.50	8.00 U	6.22	2130.00	NCA
VANADIUM	8.00	21.70	NA	NA	3.90	6.20	2.20 U	7.70	NA	NCA	NCA	NCA
ZINC	15.00	84.80	54.40 J-	25.40	18.30	16.00	15.90 U	33.90	6.20	NCA	170.00	58.00
CYANIDE	10.00 U	10.00 U	NA	NA	10.00 U	10.00 U	10.00 U	10.00 U	NA	1.00	1.00	1.00

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1986.

TABLE 4-4
METALS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

COUNTY PARK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 10 SOUTHERN BORDER DITCH		OPEN LAWN DITCH			WESTERN BOUNDARY DITCH		WATER QUALITY CRITERIA		
	SW-1006	SW-1002	SW-1004	SW-1005	SW-1012 (Duplicate of SW-1006)	SW-1001	SW-1002	NJDEP FW-2 (3)	USEPA (4) FW ACUTE	USEPA (4) FW CHRONIC
ALUMINUM	222.00 U	NA	NA	NA	NA	274.00	NA	NCA	NCA	NCA
ANTIMONY	2.10 UJ	2.10 U	2.10 UJ	2.10 U	5.10 J-	2.10 UJ	2.10 UJ	12.20	9000.00	1600.00
ARSENIC	2.10 U	2.50 J-	2.10 UJ	2.10 UJ	2.10 UJ	2.10 U	2.10 UJ	0.017	360.00	190.00
BARIUM	69.00	17.90	43.20	37.30	36.20	77.00	58.70	2000.00	NCA	NCA
BERYLLIUM	0.40 U	0.50 U	1.10 U	1.10 U	1.10 U	0.40 U	0.40 U	NCA	130.00	5.30
CADMIUM*	2.60 UJ	2.60 UJ	3.00 UJ	3.00 UJ	3.00 UJ			NCA	1.71	0.84
						3.70 J-	3.00 UJ	NCA	1.80	0.66
CALCIUM	11900.00	NA	NA	NA	NA	10500.00	NA	NCA	NCA	NCA
CHROMIUM*	5.80 U	6.40 J	5.80 UJ	36.80 J	5.80 UJ			160.00	950.58	4.99
						5.80 U	5.80 UJ	160.00	986.64	5.18
COBALT	16.80	NA	NA	NA	NA	4.60	NA	NCA	NCA	NCA
COPPER*	3.80 J	12.50 J	5.10 J	3.90 J	2.20 J			NCA	8.86	6.31
						8.40 J	6.50 J	NCA	9.25	6.56
IRON	20400.00 J	NA	NA	NA	NA	1410.00 J	NA	NCA	NCA	1000.00
LEAD*	1.70 J	1.00 U	1.00 U	1.00 U	1.40 U			5.00	32.00	1.25
						2.40 J	4.90 U	5.00	33.91	1.32
MAGNESIUM	4420.00	NA	NA	NA	NA	5810.00	NA	NCA	NCA	NCA
MANGANESE	781.00 J	NA	NA	NA	NA	67.70 J	NA	NCA	NCA	NCA
MERCURY	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.144	2.40	0.012
NICKEL*	10.30 U	10.30 U	16.20 J	51.70 J	17.50 J			516.00	1054.46	6.56
						10.30 U	10.30 U	516.00	1091.52	6.79
POTASSIUM	3200.00	NA	NA	NA	NA	3612.50	NA	NCA	NCA	NCA
SELENIUM	1.60 UJ	1.60 U	1.60 U	1.60 U	1.60 U	3.00 J-	2.40	10.00	260.00	35.00
SILVER**	2.00 UJ	2.00 U	2.00 U	2.00 U	2.00 U			164.00	1.15	0.120
						2.00 UJ	2.00 U	164.00	1.24	0.120
SODIUM	22900.00	NA	NA	NA	NA	30900.00	NA	NCA	NCA	NCA
THALLIUM	2.90 UJ	2.90 R	2.90 R	2.90 R	2.90 R	2.90 UJ	2.90 U	1.70	1400.00	40.00
VANADIUM	2.70 U	NA	NA	NA	NA	2.70 U	NA	NCA	NCA	NCA
ZINC**	22.70 J-	185.00 U	66.40 U	127.00 U	142.00 U			NCA	174.45	47.00
						44.60 J-	24.80 U	NCA	181.16	47.00
CYANIDE	10.00 U	NA	NA	NA	NA	10.00 U	NA	5.20	22.00	5.20

NOTES:

*Cadmium, chromium, copper, lead and nickel USEPA Freshwater Acute and Chronic Surface Water Quality Criteria are based on the surface water hardness at that location.

** Silver and Zinc USEPA Freshwater Acute Surface Water Quality

(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.

(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.

(3) From NJAC 7:9B Surface Water Quality Standards.

(4) USEPA Water Quality Criteria, 1986.

TABLE 4-5
PRIORITY POLLUTANT METALS IN SURFACE WATER (HIGH AND LOW TIDE) (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

ALL VALUES IN (ug/L)

SAMPLE ID	LEAD		MERCURY		NICKEL		SELENIUM		SILVER		THALLIUM		ZINC	
	High Tide	Low Tide	High Tide	Low Tide	High Tide	Low Tide	High Tide	Low Tide	High Tide	Low Tide	High Tide	Low Tide	High Tide	Low Tide
SW-0505	2.40 U	2.40 UJ	0.10 U	0.10 U	23.60 J-	13.20 J-	2.70 J	1.30 UJ	2.30 UJ	2.30 UJ	1.80 UJ	1.80 UJ	92.10 U	55.10 J-
SW-0506	2.40 U	2.50	0.10	0.10 U	24.30 J-	25.90 J-	1.30 UJ	1.30 UJ	2.30 UJ	2.30 UJ	1.80 UJ	1.80 UJ	99.90 U	110.00 U
SW-0507	2.40 U	2.40 U	0.10 U	0.10 U	28.20 J-	27.90 J-	1.30 UJ	1.30 UJ	2.30 UJ	2.30 UJ	1.80 UJ	1.80 UJ	110.00 U	110.00 U
SW-0601	2.90 U	16.20 J	0.19 U	0.19 U	8.80 J-	8.10 UJ	1.60 UJ	1.60 UJ	2.30 UJ	2.30 UJ	1.90 UJ	1.90 UJ	39.60 J	41.10 J
SW-0602	100.00 U	460.00 J	0.50 U	0.18 U	28.80 J-	69.50 J-	1.60 UJ	5.10 J	2.30 UJ	2.30 UJ	1.90 UJ	1.90 UJ	299.00 J	809.00 J
SW-0603	3.00 U	18.40	0.10 U	0.10 U	13.00 J-	10.40	8.00 U	8.00 U	2.30 UJ	2.30 U	9.50 UJ	9.50 UJ	8.10 J-	5.80
SW-0604	3.00 UJ	3.00 UJ	0.10 U	0.10 U	8.10 UJ	8.10 UJ	8.30 J	4.00 R	2.30 UJ	2.30 UJ	7.00 R	7.00 R	25.60 U	18.30 U
SW-0605	3.00 UJ	3.00 UJ	0.10 U	0.10 U	8.10 UJ	8.10 UJ	4.00 R	4.00 R	2.30 UJ	2.30 UJ	7.00 R	7.00 R	50.00 U	13.50 U
SW-0606	3.00 UJ	3.00 UJ	0.10 U	0.10 U	8.10 UJ	8.10 UJ	4.00 R	4.00 R	2.30 UJ	3.70 J-	7.00 R	7.00 R	21.80 U	15.40 U
SW-0608	3.30 J	3.00 UJ	0.10 U	0.10 U	8.10 UJ	8.10 UJ	26.70 J	8.00 R	2.10 UJ	2.30 UJ	7.00 R	7.00 R	20.40 U	19.80 U
SW-0609	3.40 J	3.00 UJ	0.10 U	0.10 U	8.10 UJ	8.10 UJ	4.00 R	4.00 J	2.30 UJ	2.30 UJ	7.00 R	7.00 R	27.40 U	12.60 U
SW-0616	2.40 U	16.70 J-	0.10 U	0.10 U	11.60	22.40 J-	1.90 J-	1.30 R	2.30 U	2.30 UJ	1.30 UJ	1.80 R	115.00 U	140.00 U
SW-0617	1.80 U	2.90 U	0.11	0.10 U	10.30	21.90	1.30 UJ	1.30 UJ	2.30 U	2.30 U	1.30 UJ	1.30 UJ	115.00 U	146.00 U
SW-0618	2.40 U	7.80 U	0.11	0.10 U	8.10 U	11.60	1.30 UJ	1.30 UJ	2.30 U	2.30 U	1.30 UJ	1.80 UJ	24.10 U	68.40 U
SW-0619	2.40 U	2.40 UJ	0.10 U	0.10 U	8.10 U	12.10 J-	1.30 UJ	14.00 J-	2.30 U	2.30 UJ	1.30 UJ	1.80 R	8.60 U	45.10 U
SW-1101	5.40 J	9.30 J	0.20 U	0.20 U	11.70 U	11.70 U	8.00 U	8.00 U	2.10 U	2.10 U	7.50 U	7.50 U	2.40 U	2.40 U
SW-1102	3.00 J	4.00 J	0.20 U	0.20 U	11.70 U	11.70 U	8.00 U	8.00 U	2.10 U	2.10 U	7.50 U	7.50 U	2.40 U	2.40 U
SW-1103	5.90 J	4.00 J	0.20 U	0.20 U	11.70 U	11.70 U	8.00 U	8.00 U	2.10 U	2.10 U	7.50 U	7.50 U	2.40 U	2.40 U
SW-1104	4.60 U	8.60 J	0.20 U	0.20 U	11.70 U	11.70 U	8.00 U	8.00 U	2.10 U	2.10 U	7.50 U	7.50 U	2.40 U	2.40 U
SW-1202	5.40	2.50	0.20 U	0.20 U	11.70 U	11.70 U	8.00 U	8.00 U	2.10 U	2.10 U	7.50 U	7.50 U	2.50 U	4.40 U
SW-1203	6.10 U	26.40 U	0.20 U	0.20 U	11.70 U	24.90	8.00 U	8.00 U	2.10 U	2.10 U	7.50 U	8.00	2.40 U	21.50
SW-1215	7.20 J-	13.80 J-	0.20 U	0.49	11.70 U	11.70 U	34.00 UJ	34.00 UJ	2.30 U	2.30 U	10.00 U	10.00 U	17.80	56.70
SW-1216	10.60 J-	14.00 J-	0.20 U	0.20 U	11.70 U	11.70 U	34.00 UJ	34.00 UJ	2.30 U	2.30 U	10.50	10.00 U	21.20	54.20
SW-1408	5.20 U	5.10 U	0.20 U	0.20 U	7.10 U	7.10 U	8.00 U	1.60 U	2.30 U	2.30 U	8.00 U	8.00 U	47.90 J	77.50 J
SW-1601	5.90 J	7.80 J	0.20 U	0.20 U	7.10 U	7.10 U	32.00 R	32.00 R	2.30 U	2.30 U	8.00 U	8.00 U	11.50	10.70
SW-1602	25.90 J	12.10 J	0.20 U	0.20 U	11.70 U	11.70 U	34.00 R	34.00 R	2.30 U	2.30 U	11.00	10.00 U	15.00	23.60
SW-1603	8.90 J	37.40 J	0.20 U	0.24	11.70 U	11.70 U	34.00 R	34.00 R	2.30 U	2.30 U	10.00 U	10.00 U	15.00	84.80
SW-1609	5.40	8.50	0.20 U	0.20 U	11.70 U	11.70 U	1.70 U	1.70 U	2.30 U	2.30 U	10.00 U	11.50	15.90 U	33.90
SW-1616	17.80 J-	8.40 J-	0.20 U	0.20 U	11.70 U	11.70 U	34.00 UJ	34.00 UJ	2.30 U	2.30 U	10.00 U	10.00 U	72.10	14.70 U
SW-1625	8.60 J	6.10 J	0.20 U	0.20 U	11.70 U	11.70 U	8.00 U	8.00 U	2.10 U	2.10 U	7.50 U	7.50 U	14.70 U	2.40 U

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.

TABLE 4-5
PRIORITY POLLUTANT METALS IN SURFACE WATER (HIGH AND LOW TIDE) (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

ALL VALUES IN (ug/L)

SAMPLE ID	ANTIMONY		ARSENIC		BARIUM		BERYLLIUM		CADMIUM		CHROMIUM		COPPER	
	High Tide	Low Tide	High Tide	Low Tide	High Tide	Low Tide	High Tide	Low Tide	High Tide	Low Tide	High Tide	Low Tide	High Tide	Low Tide
SW-0505	3.00 UJ	3.00 UJ	2.30 U	2.30 UJ	62.70 J-	55.10	0.60 U	0.60 U	1.90 U	1.90 U	4.40 UJ	4.40 U	9.70 U	1.60 U
SW-0506	3.00 UJ	3.00 UJ	2.30 U	2.30 U	50.70 J-	60.50 J-	0.70	0.90	1.90 U	2.10	4.40 UJ	4.40 UJ	6.30 U	6.80 U
SW-0507	3.00 UJ	3.00 UJ	2.30 U	2.30 U	56.80 J-	56.80 J-	0.60 U	0.60	1.90 U	1.90 U	4.40 UJ	4.40 UJ	8.00 U	5.70 U
SW-0601	2.10 UJ	2.10 UJ	8.20 J-	36.00 J-	34.50 J	43.10 J	0.60 U	0.60 U	1.90 U	1.90 U	5.00 J-	5.80 J-	5.40 J	14.90 J
SW-0602	2.10 UJ	9.00 J-	17.50 J-	59.00 J-	63.20 J	134.00 J	0.60 U	2.10	1.90 U	2.20	13.30 J-	48.20 J-	67.00 J	253.00 J
SW-0603	2.10 UJ	2.10 UJ	10.00 U	10.00 UJ	194.00 J-	224.00	0.60 U	0.60 U	1.90 U	1.90 U	4.40 UJ	4.40 U	4.40	2.20
SW-0604	2.10 U	2.70 U	10.00 U	10.00 U	74.80 J	74.20 J	0.60 UJ	0.60 UJ	1.90 U	1.90 U	4.40 UJ	4.40 UJ	8.60 U	5.00 U
SW-0605	2.10 U	2.10 U	6.50 U	10.00 U	31.60 J	20.30 J	0.60 UJ	0.60 UJ	1.90 U	1.90 U	4.40 UJ	4.40 UJ	16.90 J	7.50 U
SW-0606	2.10 U	2.60 U	10.00 U	10.00 U	32.20 J	33.30 J	0.60 UJ	0.60 J-	1.90 U	1.90 U	4.40 UJ	4.40 UJ	13.10 J	9.10 U
SW-0608	3.00 U	5.40 U	10.00 U	20.00 U	33.90 J	18.90 J	0.60 UJ	0.60 UJ	1.90 U	1.90 U	4.40 UJ	4.40 UJ	6.70 U	5.80 U
SW-0609	5.30 U	2.10 U	12.50	20.00 U	37.10 J	23.80 J	0.60 UJ	0.60 UJ	1.90 U	1.90 U	4.40 UJ	4.40 UJ	12.30 J	8.20 U
SW-0616	3.00 UJ	3.00 UJ	2.30 UJ	4.00	64.30	70.20 J-	0.60 U	0.60 UJ	1.90 U	1.90 U	4.40 U	5.60 J-	3.20 U	10.90 U
SW-0617	3.00 UJ	3.00 UJ	2.30 UJ	2.30 UJ	55.80	83.50	0.60 U	0.60 U	1.90 U	1.90 U	4.40 U	4.40 U	6.40 U	11.00 U
SW-0618	3.00 UJ	3.00 UJ	23.00 UJ	7.80 J-	37.20	52.30	0.60 U	0.60 U	1.90 U	1.90 U	4.40 U	4.40 U	7.30 U	11.90 U
SW-0619	3.00 UJ	3.00 UJ	23.00 UJ	23.00 U	22.60	55.40 J-	0.60 U	1.60 J-	1.90 U	1.90 U	4.40 U	4.40 UJ	3.50 U	5.50 U
SW-1101	8.00 U	8.00 U	26.80	25.90	40.50	48.70	1.90	2.70	0.20 U	0.50 U	3.60 U	3.60 U	5.00 U	8.10 U
SW-1102	8.00 U	28.00	29.80	21.40	38.20	38.40	1.40 U	2.80	0.10 U	0.20 U	3.60 U	3.60 U	2.10 U	2.20 U
SW-1103	9.10	8.00 U	16.00	6.70	36.40	40.30	1.40 U	1.80	0.50 U	0.50 U	3.60 U	3.60 U	3.60 U	2.60 U
SW-1104	8.00 U	8.00 U	10.80	8.20	36.80	50.50	1.40 U	1.70	0.10 U	0.50 U	3.60 U	3.60 U	5.00 U	9.40 U
SW-1202	8.00 U	8.00 U	34.20	20.50	37.90	23.90	1.40 U	1.40 U	0.10 U	0.10 U	3.60 U	3.60 U	3.70 U	3.60 U
SW-1203	8.00 U	8.00 U	11.70	9.50	50.80	58.80	2.10	1.90	0.50 U	0.50 U	3.60 U	3.60 U	9.80 U	26.80
SW-1215	8.00 U	8.00 U	9.00 U	14.20	31.00	50.60	1.40 U	1.40 U	0.50 U	0.50 U	3.80 U	4.50	1.90 U	23.50 J
SW-1216	8.00 U	8.00 U	9.00 U	27.80	27.40	49.20	1.40 U	1.40 U	0.50 U	0.50 U	3.80 U	10.60	1.90 U	27.40 J
SW-1408	8.00 U	8.00 U	1.80 U	1.80 U	34.00	41.90	0.50 U	0.50 U	0.10 U	0.50 U	3.80 U	3.80 U	1.90 U	1.90 U
SW-1601	8.00 U	8.00 U	1.80 U	1.80 U	38.60	65.20	0.50 U	0.50 U	0.50 U	0.50 U	3.80 U	3.80 U	1.90 U	1.90 U
SW-1602	8.00 U	8.00 U	9.00 U	7.20 U	28.70	46.20	1.40 U	1.40 U	0.50 U	0.50 U	3.80 U	6.00	1.90 U	1.90 U
SW-1603	8.00 U	8.00 U	9.00 U	15.40	27.00	59.40	1.40 U	1.40 U	0.50 U	0.55	3.80 U	16.90	1.90 U	39.90
SW-1609	8.00 U	8.00 U	30.60	5.80	23.20	23.80	1.40 U	1.40 U	0.50 U	0.50 U	3.80 U	3.80 U	4.50 J	11.20 J
SW-1616	8.00 U	8.00 U	13.70	28.40	49.10	47.40	1.40 U	1.40 U	0.50 U	0.50 U	11.30	3.80 U	36.60 J	1.90 U
SW-1625	8.00 U	8.00 U	58.60	62.40	50.40	58.10	1.40 U	1.40 U	0.15	0.11	3.60 U	3.60 U	4.90 U	4.30 U

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.

TABLE 4-6
EXPLOSIVE COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

EAST DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	EAST DITCH					UNNAMED TRIBUTARY	WATER QUALITY CRITERIA		
	SW-1402	SW-1403	SW-1404	SW-1405	SW-1406	SW-1410	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
AMINO-DNT'S	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	NCA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-6
EXPLOSIVE COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

EAST DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	EAST DITCH			UNNAMED TRIBUTARY		WATER QUALITY CRITERIA		
	SW-1407	SW-1408H	SW-1408L	SW-1411	SW-1412	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
AMINO-DNT'S	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	NCA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-6
EXPLOSIVE COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	BLACK DITCH					WATER QUALITY CRITERIA		
	SW-0618H	SW-0618L	SW-0619H	SW-0619L	SW-0620 (Duplicate of SW-0619)	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
AMINO-DNT'S	0.12 U	0.25	0.12 U	0.12 U	0.12 U	NCA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-6
EXPLOSIVE COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	BLACK DITCH								WATER QUALITY CRITERIA		
	SW-0506H	SW-0506L	SW-0507H	SW-0507L	SW-0616H	SW-0616L	SW-0617H	SW-0617L	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
AMINO-DNT'S	0.85	0.47	0.77	0.54	0.79	0.56	0.37	0.57	NCA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-6
EXPLOSIVE COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	RED ROOT CREEK							WATER QUALITY CRITERIA		
	SW-0601H	SW-0601L	SW-0603H	SW-0603L	SW-0604H	SW-0604L	SW-0605H	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
AMINO-DNT'S	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	NCA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-6
EXPLOSIVE COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 4 DITCH	AREA 5 POND				BLACK DITCH				WATER QUALITY CRITERIA		
	SW-0406	SW-0501	SW-0502	SW-0503	SW-0504	SW-0407	SW-0408	SW-0505H	SW-0505L	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 UJ	0.13 U	0.13 U	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	0.13 U	0.41	0.13 U	0.13 U	0.13 U	0.13 U	0 65 J-	0.13 U	0.13 U	NCA	NCA	NCA
AMINO-DNT'S	0.12 U	0.98	0.12 U	0.12 U	0.12 U	0.12 U	1 40 J-	0.86	0.12 U	NCA	NCA	NCA

NOTES:
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(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-6
EXPLOSIVE COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 20 DITCH	AREA 18B STREAM								WATER QUALITY CRITERIA		
	SW-2001	SW-1803	SW-1804	SW-1805	SW-1806	SW-1807	SW-1808	SW-1809	SW-1818 (Duplicate of SW-1809)	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.15	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	0.13 U	0.14	2.80	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
AMINO-DNT'S	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	NCA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
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TABLE 4-6
EXPLOSIVE COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - SURFACE WATER
EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
ESTUARINE

COMPOUND	RED ROOT CREEK								WATER QUALITY CRITERIA		
	SW-0605L	SW-0606H	SW-0606L	SW-0607	SW-0608H	SW-0608L	SW-0609H	SW-0609L	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
AMINO-DNT'S	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	NCA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
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TABLE 4-6
EXPLOSIVE COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	LOWER AREA 18B STREAM			AREA 8 POND						WATER QUALITY CRITERIA		
	SW-0102	SW-0103	SW-0104	SW-0801	SW-0802	SW-0803	SW-0804	SW-0805	SW-0806	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
AMINO-DNT'S	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	NCA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
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TABLE 4-6
EXPLOSIVE COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 18C STREAM								LOWER 18B STREAM	WATER QUALITY CRITERIA		
	SW-1810	SW-1811	SW-1812	SW-1813	SW-1814	SW-1815	SW-1816	SW-1817	SW-0101	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
AMINO-DNT'S	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	NCA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
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TABLE 4-6
EXPLOSIVE COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

CENTRAL DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	ISOLATED FRESHWATER POND			UPGRADIENT PONDED AREA	WATER QUALITY CRITERIA		
	SW-1623	SW-1626	SW-1627 (Duplicate of SW-1626)	SW-1621	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
AMINO-DNT'S	0.12 U	0.12 U	0.12 U	0.12 U	NCA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
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TABLE 4-6
EXPLOSIVE COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 8 POND	RED ROOT CREEK		SULFUR PLANT PONDS				WATER QUALITY CRITERIA		
	SW-0807 (Duplicate of SW-0801)	SW-0602H	SW-0602L	SW-0610	SW-0613	SW-0614	SW-0615	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
AMINO-DNT'S	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	NCA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
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TABLE 4-6
EXPLOSIVE COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

CENTRAL DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	ISOLATED ESTUARINE POND			UPGRADIENT PONDED AREA	WATER QUALITY CRITERIA		
	SW-1622	SW-1625H	SW-1625L	SW-1624	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
AMINO-DNT'S	0.12 U	0.12 U	0.12 U	0.12 U	NCA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
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TABLE 4-6
EXPLOSIVE COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

CENTRAL DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	CENTRAL DITCH								WATER QUALITY CRITERIA		
	SW-1101H	SW-1101L	SW-1102H	SW-1102L	SW-1103H	SW-1103L	SW-1104H	SW-1104L	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
AMINO-DNT'S	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	NCA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
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TABLE 4-6
EXPLOSIVE COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 16 ASSOCIATED DITCHES								WATER QUALITY CRITERIA		
	SW-1611	SW-1612	SW-1613	SW-1615	SW-1616H	SW-1616L	SW-1617	SW-1618	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
AMINO-DNT'S	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	NCA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
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TABLE 4-6
EXPLOSIVE COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

AREA 12 DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 12 DITCH					WATER QUALITY CRITERIA		
	SW-1201	SW-1202H	SW-1202L	SW-1203H	SW-1203L	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
AMINO-DNT'S	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	NCA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
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TABLE 4-6
EXPLOSIVE COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 16 ASSOCIATED DITCHES			OLD RED ROOT CREEK					WATER QUALITY CRITERIA		
	SW-1628 (Duplicate of SW-1612)	SW-1629	SW-1630	SW-1606	SW-1607	SW-1608	SW-1609H	SW-1609L	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
AMINO-DNT'S	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	NCA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
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TABLE 4-6
EXPLOSIVE COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	WEST DITCH							SOUTHWEST DITCH	WATER QUALITY CRITERIA		
	SW-1601H	SW-1601L	SW-1602H	SW-1602L	SW-1603H	SW-1603L	SW-1907	SW-1215L	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 UJ	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 UJ	NCA	NCA	NCA
AMINO-DNT'S	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 UJ	NCA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
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TABLE 4-6
EXPLOSIVE COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	ASSOCIATED DITCHES	FORESTED WETLANDS	AREA 19 NORTHEAST WETLANDS			OLD RED ROOT CREEK		WATER QUALITY CRITERIA		
	SW-1614	SW-1903	SW-1908	SW-1909	SW-1910	SW-1604	SW-1605	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
AMINO-DNT'S	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	NCA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
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TABLE 4-6
EXPLOSIVE COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 19 SOUTHWESTERN WETLANDS						WATER QUALITY CRITERIA		
	SW-1904		SW-1905		SW-1912 (Duplicate of SW-1904)		NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
1,3,5-TRINITROBENZENE	0.13	U	0.13	U	0.13	U	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	0.13	U	0.13	U	0.13	U	NCA	NCA	NCA
AMINO-DNT'S	0.12	U	0.12	U	0.12	U	NCA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
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TABLE 4-6
EXPLOSIVE COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	SOUTHWEST DITCH					AREA 19 SOUTHWESTERN WETLANDS		WATER QUALITY CRITERIA		
	SW-1215H	SW-1216L	SW-1216H	SW-1619	SW-1620	SW-1906	SW-1911 (Duplicate of SW-1906)	NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,3,5-TRINITROBENZENE	0.13 UJ	0.13 UJ	0.13 UJ	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	0.13 UJ	0.13 UJ	0.13 UJ	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
AMINO-DNT'S	0.12 UJ	0.12 UJ	0.12 UJ	0.12 U	0.12 U	0.12 U	0.12 U	NCA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
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TABLE 4-6
EXPLOSIVE COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (ug/L)

COMPOUND	OLD RED ROOT CREEK				WATER QUALITY CRITERIA		
	SW-1610		SW-1631 (Duplicate of SW-1609)		NJDEP SE-1 (3)	USEPA (4) MARINE ACUTE	USEPA (4) MARINE CHRONIC
1,3,5-TRINITROBENZENE	0.13	U	0.13	U	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	0.13	U	0.13	U	NCA	NCA	NCA
AMINO-DNT'S	0.12	U	0.12	U	NCA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
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TABLE 4-6
EXPLOSIVE COMPOUNDS DETECTED IN SURFACE WATER (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

COUNTY PARK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (ug/L)

COMPOUND	AREA 10 SOUTHERN BORDER DITCH		OPEN LAWN DITCH			WESTERN BOUNDARY DITCH		WATER QUALITY CRITERIA		
	SW-1006	SW-1902	SW-1004	SW-1005	SW-1012 (Duplicate of SW-1005)	SW-1001	SW-1002	NJDEP FW-2 (3)	USEPA (4) FRESH ACUTE	USEPA (4) FRESH CHRONIC
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	NCA	NCA	NCA
AMINO-DNT'S	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	NCA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) From NJAC 7:9B Surface Water Quality Standards.
(4) USEPA Water Quality Criteria, 1992.

TABLE 4-7
VOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

EAST DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	EAST DITCH		UNNAMED TRIBUTARY		SEDIMENT QUALITY CRITERIA (3)	
	SD-1407	SD-1408	SD-1411	SD-1412	NOAA ER-L	NOAA ER-M
1,1,1-TRICHLOROETHANE	0.017 UJ	0.012 UJ	0.017 UJ	0.011 UJ	NCA	NCA
2-HEXANONE	0.035 UJ	0.024 UJ	0.035 UJ	0.021 UJ	NCA	NCA
ACETONE	0.095 U	0.024 UJ	0.210 U	0.075 U	NCA	NCA
CARBON DISULFIDE	0.021 J	0.012 UJ	0.052 J	0.011 UJ	NCA	NCA
ETHYL BENZENE	0.017 UJ	0.012 UJ	0.017 UJ	0.011 UJ	NCA	NCA
METHYL CHLORIDE	0.035 UJ	0.024 UJ	0.035 UJ	0.021 UJ	NCA	NCA
METHYL ETHYL KETONE	0.035 UJ	0.024 UJ	0.044 J	0.021 UJ	NCA	NCA
METHYL ISOBUTYL KETONE	0.035 UJ	0.024 UJ	0.035 UJ	0.021 UJ	NCA	NCA
TETRACHLOROETHYLENE(PCE)	0.017 UJ	0.012 UJ	0.017 UJ	0.011 UJ	NCA	NCA
TOLUENE	0.017 UJ	0.012 UJ	0.017 UJ	0.011 UJ	NCA	NCA
TOTAL-1,2-DICHLOROETHENE	0.017 UJ	0.012 UJ	0.017 UJ	0.011 UJ	NCA	NCA
TRICHLOROETHYLENE (TCE)	0.017 UJ	0.012 UJ	0.017 UJ	0.011 UJ	NCA	NCA
XYLENES (TOTAL)	0.017 UJ	0.012 UJ	0.020 J	0.011 UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-7
VOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

EAST DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	EAST DITCH					UNNAMED TRIBUTARY	SCIRPUS MARSH	SEDIMENT QUALITY CRITERIA (3)	
	SD-1402	SD-1403	SD-1404	SD-1405	SD-1406	SD-1410	SD-1401	Ontario LEL	Ontario SEL (Based on TOC) (4)
1,1,1-TRICHLOROETHANE	0.006 U	0.010 U	0.016 UJ	0.016 UJ	0.009 U	0.024 UJ	0.008 U	NCA	NCA
2-HEXANONE	0.012 U	0.020 U	0.032 UJ	0.032 UJ	0.017 U	0.049 UJ	0.016 U	NCA	NCA
ACETONE	0.012 U	0.140 U	0.510 J	2.700 J	0.092 U	0.380 U	0.016 U	NCA	NCA
CARBON DISULFIDE	0.006 U	0.010 U	0.010 J	0.016 J	0.009 U	0.024 UJ	0.008 U	NCA	NCA
ETHYL BENZENE	0.006 U	0.010 U	0.016 UJ	0.016 UJ	0.009 U	0.024 UJ	0.008 U	NCA	NCA
METHYL CHLORIDE	0.012 U	0.020 U	0.032 UJ	0.032 UJ	0.017 U	0.049 UJ	0.016 U	NCA	NCA
METHYL ETHYL KETONE	0.012 U	0.020 U	0.140 J	0.260 J	0.015 J	0.096 J	0.016 U	NCA	NCA
METHYL ISOBUTYL KETONE	0.012 U	0.020 U	0.032 UJ	0.032 UJ	0.017 U	0.049 UJ	0.016 U	NCA	NCA
TETRACHLOROETHYLENE(PCE)	0.006 U	0.010 U	0.016 UJ	0.016 UJ	0.009 U	0.024 UJ	0.008 U	NCA	NCA
TOLUENE	0.006 U	0.010 U	0.016 UJ	0.016 UJ	0.009 U	0.024 UJ	0.008 U	NCA	NCA
TOTAL-1,2-DICHLOROETHENE	0.006 U	0.010 U	0.016 UJ	0.016 UJ	0.009 U	0.024 UJ	0.008 U	NCA	NCA
TRICHLOROETHYLENE (TCE)	0.006 U	0.010 U	0.016 UJ	0.016 UJ	0.009 U	0.024 UJ	0.008 U	NCA	NCA
XYLENES (TOTAL)	0.006 U	0.006 J	0.005 J	0.011 J	0.009 U	0.024 UJ	0.008 U	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-7
VOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	BLACK DITCH							SEDIMENT QUALITY CRITERIA (3)	
	SD-0506	SD-0507	SD-0616	SD-0617	SD-0618	SD-0619	SD-0620 (Duplicate of SD-0619)	NOAA ER-L	NOAA ER-M
1,1,1-TRICHLOROETHANE	0.006 U	0.006 U	0.012 UJ	0.015 UJ	0.017 UJ	0.020 UJ	0.019 UJ	NCA	NCA
2-HEXANONE	0.013 U	0.013 U	0.024 UJ	0.030 UJ	0.034 UJ	0.039 UJ	0.038 UJ	NCA	NCA
ACETONE	0.015 U	0.015 U	0.130 U	0.790 J	0.220 U	0.390 U	0.470 J	NCA	NCA
CARBON DISULFIDE	0.006 U	0.006 U	0.012 UJ	0.015 UJ	0.017 UJ	0.020 UJ	0.019 UJ	NCA	NCA
ETHYL BENZENE	0.006 U	0.006 U	0.012 UJ	0.015 UJ	0.017 UJ	0.020 UJ	0.019 UJ	NCA	NCA
METHYL CHLORIDE	0.013 U	0.013 U	0.024 UJ	0.030 UJ	0.034 UJ	0.039 UJ	0.038 UJ	NCA	NCA
METHYL ETHYL KETONE	0.013 U	0.013 U	0.028 J	0.150 J	0.044 J	0.093 J	0.089 J	NCA	NCA
METHYL ISOBUTYL KETONE	0.013 U	0.013 U	0.024 UJ	0.030 UJ	0.034 UJ	0.039 UJ	0.038 UJ	NCA	NCA
TETRACHLOROETHYLENE(PCE)	0.006 U	0.006 U	0.012 UJ	0.015 UJ	0.017 UJ	0.020 UJ	0.019 UJ	NCA	NCA
TOLUENE	0.006 U	0.006 U	0.012 UJ	0.015 UJ	0.017 UJ	0.020 UJ	0.019 UJ	NCA	NCA
TOTAL-1,2-DICHLOROETHENE	0.006 U	0.006 U	0.012 UJ	0.015 UJ	0.017 UJ	0.020 UJ	0.019 UJ	NCA	NCA
TRICHLOROETHYLENE (TCE)	0.006 U	0.006 U	0.012 UJ	0.015 UJ	0.017 UJ	0.020 UJ	0.019 UJ	NCA	NCA
XYLENES (TOTAL)	0.006 U	0.006 U	0.012 UJ	0.015 UJ	0.017 UJ	0.020 UJ	0.019 UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-7
VOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 4 DITCH						SEDIMENT QUALITY CRITERIA (3)	
	SD-0401	SD-0402	SD-0403	SD-0404	SD-0405	SD-0406	Ontario LEL	Ontario SEL (Based on TOC) (4)
1,1,1-TRICHLOROETHANE	0.027 UJ	0.028 UJ	0.016 UJ	0.010 U	0.016 UJ	0.013 UJ	NCA	NCA
2-HEXANONE	0.054 UJ	0.057 UJ	0.031 UJ	0.020 U	0.033 UJ	0.026 UJ	NCA	NCA
ACETONE	0.110 U	0.120 U	0.031 UJ	0.020 U	0.093 U	0.026 UJ	NCA	NCA
CARBON DISULFIDE	0.027 UJ	0.028 UJ	0.016 UJ	0.010 U	0.016 UJ	0.013 UJ	NCA	NCA
ETHYL BENZENE	0.027 UJ	0.028 UJ	0.016 UJ	0.010 U	0.016 UJ	0.013 UJ	NCA	NCA
METHYL CHLORIDE	0.054 UJ	0.057 UJ	0.031 UJ	0.020 U	0.033 UJ	0.026 UJ	NCA	NCA
METHYL ETHYL KETONE	0.054 UJ	0.053 J	0.031 UJ	0.020 U	0.029 J	0.026 UJ	NCA	NCA
METHYL ISOBUTYL KETONE	0.054 UJ	0.057 UJ	0.031 UJ	0.020 U	0.033 UJ	0.026 UJ	NCA	NCA
TETRACHLOROETHYLENE(PCE)	0.027 UJ	0.028 UJ	0.016 UJ	0.010 U	0.016 UJ	0.013 UJ	NCA	NCA
TOLUENE	0.009 J	0.007 J	0.016 UJ	0.010 U	0.011 J	0.013 UJ	NCA	NCA
TOTAL-1,2-DICHLOROETHENE	0.027 UJ	0.028 UJ	0.016 UJ	0.010 U	0.016 UJ	0.013 UJ	NCA	NCA
TRICHLOROETHYLENE (TCE)	0.027 UJ	0.028 UJ	0.016 UJ	0.010 U	0.016 UJ	0.013 UJ	NCA	NCA
XYLENES (TOTAL)	0.027 UJ	0.028 UJ	0.016 UJ	0.010 U	0.016 UJ	0.013 UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-7
VOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 5 POND				BLACK DITCH			SEDIMENT QUALITY CRITERIA (3)	
	SD-0501	SD-0502	SD-0503	SD-0504	SD-0407	SD-0408	SD-0506	Ontario LEL	Ontario SEL (Based on TOC) (4)
1,1,1-TRICHLOROETHANE	0.014 UJ	0.018 UJ	0.016 UJ	0.017 UJ	0.006 U	0.006 U	0.016 U	NCA	NCA
2-HEXANONE	0.027 UJ	0.037 UJ	0.032 UJ	0.034 UJ	0.012 U	0.013 U	0.033 U	NCA	NCA
ACETONE	0.190 U	0.270 U	0.520 J	0.150 U	0.012 U	0.013 U	0.041 U	NCA	NCA
CARBON DISULFIDE	0.014 UJ	0.018 UJ	0.016 UJ	0.017 UJ	0.006 U	0.006 U	0.016 U	NCA	NCA
ETHYL BENZENE	0.014 UJ	0.018 UJ	0.016 UJ	0.017 UJ	0.006 U	0.006 U	0.016 U	NCA	NCA
METHYL CHLORIDE	0.027 UJ	0.037 UJ	0.032 UJ	0.034 UJ	0.012 U	0.013 U	0.033 U	NCA	NCA
METHYL ETHYL KETONE	0.044 J	0.067 J	0.210 J	0.031 J	0.012 U	0.013 U	0.033 U	NCA	NCA
METHYL ISOBUTYL KETONE	0.027 UJ	0.037 UJ	0.032 UJ	0.034 UJ	0.012 U	0.013 U	0.033 U	NCA	NCA
TETRACHLOROETHYLENE(PCE)	0.014 UJ	0.018 UJ	0.016 UJ	0.017 UJ	0.006 U	0.006 U	0.016 U	NCA	NCA
TOLUENE	0.021 J	0.018 UJ	0.041 J	0.016 UJ	0.006 U	0.006 U	0.016 U	NCA	NCA
TOTAL-1,2-DICHLOROETHENE	0.014 UJ	0.016 UJ	0.016 UJ	0.017 UJ	0.006 U	0.006 U	0.016 U	NCA	NCA
TRICHLOROETHYLENE (TCE)	0.014 UJ	0.018 UJ	0.016 UJ	0.017 UJ	0.006 U	0.006 U	0.016 U	NCA	NCA
XYLENES (TOTAL)	0.014 UJ	0.018 UJ	0.016 UJ	0.017 UJ	0.006 U	0.006 U	0.016 U	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-7
VOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	RED ROOT CREEK								SEDIMENT QUALITY CRITERIA (3)	
	SD-0602	SD-0603	SD-0604	SD-0605	SD-0606	SD-0607	SD-0608	SD-0609	NOAA ER-L	NOAA ER-M
1,1,1-TRICHLOROETHANE	0.047 UJ	0.012 UJ	0.098 UJ	0.014 UJ	0.016 UJ	0.011 UJ	0.016 UJ	0.014 UJ	NCA	NCA
2-HEXANONE	0.094 UJ	0.025 UJ	0.200 UJ	0.029 UJ	0.033 UJ	0.022 UJ	0.032 UJ	0.028 UJ	NCA	NCA
ACETONE	0.320 U	0.470 J	2.900 J	0.025 J	0.087 J	0.030 J	0.065 J	0.066 J	NCA	NCA
CARBON DISULFIDE	0.047 UJ	0.005 J	0.098 UJ	0.014 UJ	0.016 UJ	0.011 UJ	0.017 J	0.008 J	NCA	NCA
ETHYL BENZENE	0.047 UJ	0.012 UJ	0.098 UJ	0.014 UJ	0.016 UJ	0.011 UJ	0.016 UJ	0.014 UJ	NCA	NCA
METHYL CHLORIDE	0.094 UJ	0.025 UJ	0.200 UJ	0.029 UJ	0.033 UJ	0.022 UJ	0.032 UJ	0.028 UJ	NCA	NCA
METHYL ETHYL KETONE	0.098 J	0.090 J	0.580 J	0.029 UJ	0.033 UJ	0.022 UJ	0.021 J	0.028 UJ	NCA	NCA
METHYL ISOBUTYL KETONE	0.094 UJ	0.025 UJ	0.200 UJ	0.029 UJ	0.033 UJ	0.022 UJ	0.032 UJ	0.028 UJ	NCA	NCA
TETRACHLOROETHYLENE(PCE)	0.047 UJ	0.012 UJ	0.098 UJ	0.014 UJ	0.016 UJ	0.011 UJ	0.016 UJ	0.014 UJ	NCA	NCA
TOLUENE	0.220 J	0.012 UJ	0.098 UJ	0.014 UJ	0.016 UJ	0.011 UJ	0.016 UJ	0.014 UJ	NCA	NCA
TOTAL-1,2-DICHLOROETHENE	0.047 UJ	0.012 UJ	0.098 UJ	0.014 UJ	0.016 UJ	0.011 UJ	0.016 UJ	0.014 UJ	NCA	NCA
TRICHLOROETHYLENE (TCE)	0.047 UJ	0.012 UJ	0.098 UJ	0.014 UJ	0.016 UJ	0.011 UJ	0.016 UJ	0.014 UJ	NCA	NCA
XYLENES (TOTAL)	0.047 UJ	0.012 UJ	0.098 UJ	0.014 UJ	0.016 UJ	0.011 UJ	0.016 UJ	0.014 UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-7
VOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 20 DITCH		AREA 18B STREAM						SEDIMENT QUALITY CRITERIA (3)	
	SD-2001	SD-2002	SD-1803	SD-1804	SD-1805	SD-1806	SD-1807	SD-1808	Ontario LEL	Ontario SEL (Based on TOC) (4)
1,1,1-TRICHLOROETHANE	0.008 U	0.006 U	0.020 J	0.007 U	0.007 U	0.007 U	0.020 UJ	0.006 U	NCA	NCA
2-HEXANONE	0.015 U	0.013 U	0.021	0.014 U	0.014 U	0.014 U	0.041 UJ	0.012 U	NCA	NCA
ACETONE	0.026 U	0.058 U	0.008 U	0.014 U	0.014 U	0.014 U	0.041 UJ	0.012 U	NCA	NCA
CARBON DISULFIDE	0.008 U	0.006 U	0.017 U	0.007 U	0.007 U	0.007 U	0.020 UJ	0.006 U	NCA	NCA
ETHYL BENZENE	0.008 U	0.004 J	0.017 U	0.007 U	0.007 U	0.007 U	0.020 UJ	0.006 U	NCA	NCA
METHYL CHLORIDE	0.015 U	0.013 U	0.008 U	0.014 U	0.014 U	0.014 U	0.041 UJ	0.012 U	NCA	NCA
METHYL ETHYL KETONE	0.015 U	0.013 U	0.990	0.014 U	0.014 U	0.014 U	0.041 UJ	0.012 U	NCA	NCA
METHYL ISOBUTYL KETONE	0.015 U	0.013 U	0.017 U	0.014 U	0.014 U	0.014 U	0.041 UJ	0.012 U	NCA	NCA
TETRACHLOROETHYLENE(PCE)	0.008 U	0.006 U	0.008 U	0.007 U	0.007 U	0.007 U	0.020 UJ	0.006 U	NCA	NCA
TOLUENE	0.008 U	0.003 J	0.008 U	0.007 U	0.007 U	0.007 U	0.020 UJ	0.006 U	NCA	NCA
TOTAL-1,2-DICHLOROETHENE	0.008 U	0.002 J	0.017 U	0.007 U	0.007 U	0.007 U	0.020 UJ	0.006 U	NCA	NCA
TRICHLOROETHYLENE (TCE)	0.008 U	0.006 U	0.990	0.007 U	0.007 U	0.007 U	0.020 UJ	0.010	NCA	NCA
XYLENES (TOTAL)	0.008 U	0.013	0.008 U	0.007 U	0.007 U	0.007 U	0.020 UJ	0.006 U	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-7
VOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 18B STREAM (CONT)		AREA 18C STREAM						SEDIMENT QUALITY CRITERIA (3)	
	SD-1809	SD-1818 (Duplicate of SD-1809)	SD-1810	SD-1811	SD-1812	SD-1813	SD-1814	SD-1815	Ontario LEL	Ontario SEL (Based on TOC) (4)
1,1,1-TRICHLOROETHANE	0.006 U	0.006 U	0.006 U	0.007 U	0.006 U	0.008 U	0.006 U	0.008	NCA	NCA
2-HEXANONE	0.012 U	0.012 U	0.012 U	0.014 U	0.012 U	0.017 U	0.013 U	0.013 U	NCA	NCA
ACETONE	0.016 U	0.012 U	0.012 U	0.014 U	0.012 U	0.022 U	0.013 U	0.013 U	NCA	NCA
CARBON DISULFIDE	0.006 U	0.006 U	0.006 U	0.007 U	0.006 U	0.008 U	0.006 U	0.007 U	NCA	NCA
ETHYL BENZENE	0.006 U	0.006 U	0.006 U	0.007 U	0.006 U	0.008 U	0.006 U	0.007 U	NCA	NCA
METHYL CHLORIDE	0.012 U	0.012 U	0.012 U	0.014 U	0.012 U	0.017 U	0.013 U	0.013 U	NCA	NCA
METHYL ETHYL KETONE	0.012 U	0.012 U	0.012 U	0.014 U	0.012 U	0.017 U	0.013 U	0.013 U	NCA	NCA
METHYL ISOBUTYL KETONE	0.012 U	0.012 U	0.012 U	0.014 U	0.012 U	0.017 U	0.013 U	0.013 U	NCA	NCA
TETRACHLOROETHYLENE(PCE)	0.006 U	0.006 U	0.006 U	0.007 U	0.006 U	0.008 U	0.006 U	0.007 U	NCA	NCA
TOLUENE	0.006	0.006 U	0.006 U	0.007 U	0.006 U	0.008 U	0.006 U	0.007 U	NCA	NCA
TOTAL-1,2-DICHLOROETHENE	0.006 U	0.006 U	0.006 U	0.007 U	0.006 U	0.008 U	0.006 U	0.007 U	NCA	NCA
TRICHLOROETHYLENE (TCE)	0.006 U	0.006 U	0.006 U	0.007 U	0.006 U	0.008 U	0.006 U	0.007 U	NCA	NCA
XYLENES (TOTAL)	0.006 U	0.006 U	0.006 U	0.007 U	0.006 U	0.008 U	0.006 U	0.007 U	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-7
VOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 18C STREAM (CONT)		LOWER AREA 18B STREAM				AREA 8 POND		SEDIMENT QUALITY CRITERIA (3)	
	SD-1816	SD-1817	SD-0101	SD-0102	SD-0103	SD-0104	SD-0801	SD-0802	Ontario LEL	Ontario SEL (Based on TOC) (4)
1,1,1-TRICHLOROETHANE	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.025 UJ	0.038 UJ	NCA	NCA
2-HEXANONE	0.012 U	0.012 U	0.013 U	0.013 U	0.013 U	0.012 U	0.050 UJ	0.075 UJ	NCA	NCA
ACETONE	0.012 U	0.012 U	0.013 U	0.015 U	0.023 U	0.015 U	0.450 U	0.530 U	NCA	NCA
CARBON DISULFIDE	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.025 UJ	0.038 UJ	NCA	NCA
ETHYL BENZENE	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.025 UJ	0.038 UJ	NCA	NCA
METHYL CHLORIDE	0.012 U	0.012 U	0.013 U	0.013 U	0.013 U	0.012 U	0.050 UJ	0.075 UJ	NCA	NCA
METHYL ETHYL KETONE	0.012 U	0.012 U	0.013 U	0.013 U	0.013 U	0.012 U	0.130 J	0.150 J	NCA	NCA
METHYL ISOBUTYL KETONE	0.012 U	0.012 U	0.013 U	0.013 U	0.013 U	0.012 U	0.050 UJ	0.075 UJ	NCA	NCA
TETRACHLOROETHYLENE(PCE)	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.025 UJ	0.038 UJ	NCA	NCA
TOLUENE	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.025 UJ	0.038 UJ	NCA	NCA
TOTAL-1,2-DICHLOROETHENE	0.006 U	0.006 U	0.008	0.002 J	0.006 U	0.006 U	0.025 UJ	0.038 UJ	NCA	NCA
TRICHLOROETHYLENE (TCE)	0.006 U	0.006 U	0.015	0.009	0.002 J	0.006 U	0.025 UJ	0.038 UJ	NCA	NCA
XYLENES (TOTAL)	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.025 UJ	0.038 UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-7
VOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 8 POND (CONT)					RED ROOT CREEK	SULFER PLANT PONDS		SEDIMENT QUALITY CRITERIA (3)	
	SD-0803	SD-0804	SD-0805	SD-0806	SD-0807 (Duplicate of SD-0801)	SD-0601	SD-0610	SD-0611	Ontario LEL	Ontario SEL (Based on TOC) (4)
1,1,1-TRICHLOROETHANE	0.017 UJ	0.007 U	0.007 U	0.013 UJ	0.026 UJ	0.026 UJ	0.011 UJ	0.010 U	NCA	NCA
2-HEXANONE	0.034 UJ	0.015 U	0.015 U	0.027 UJ	0.052 UJ	0.052 UJ	0.022 UJ	0.021 U	NCA	NCA
ACETONE	0.038 U	0.140 U	0.04 U	0.098 U	0.230 U	0.300 U	0.200 J	0.160 J	NCA	NCA
CARBON DISULFIDE	0.017 UJ	0.007 U	0.007 U	0.013 UJ	0.026 UJ	0.026 UJ	0.011 UJ	0.006 J	NCA	NCA
ETHYL BENZENE	0.017 UJ	0.007 U	0.007 U	0.013 UJ	0.026 UJ	0.026 UJ	0.011 UJ	0.010 U	NCA	NCA
METHYL CHLORIDE	0.034 UJ	0.015 U	0.025 J	0.027 UJ	0.052 UJ	0.052 UJ	0.022 UJ	0.021 U	NCA	NCA
METHYL ETHYL KETONE	0.034 UJ	0.036 J	0.015 U	0.027 UJ	0.052 UJ	0.120 J	0.024 J	0.028 J	NCA	NCA
METHYL ISOBUTYL KETONE	0.034 UJ	0.015 U	0.015 U	0.027 UJ	0.052 UJ	0.052 UJ	0.022 UJ	0.021 U	NCA	NCA
TETRACHLOROETHYLENE(PCE)	0.017 UJ	0.007 U	0.007 U	0.013 UJ	0.026 UJ	0.026 UJ	0.011 UJ	0.010 U	NCA	NCA
TOLUENE	0.017 UJ	0.005 J	0.007 U	0.013 UJ	0.026 UJ	0.026 UJ	0.011 UJ	0.010 U	NCA	NCA
TOTAL-1,2-DICHLOROETHENE	0.017 UJ	0.007 U	0.007 U	0.013 UJ	0.026 UJ	0.026 UJ	0.011 UJ	0.010 U	NCA	NCA
TRICHLOROETHYLENE (TCE)	0.017 UJ	0.007 U	0.007 U	0.013 UJ	0.026 UJ	0.026 UJ	0.011 UJ	0.010 U	NCA	NCA
XYLENES (TOTAL)	0.017 UJ	0.007 U	0.007 U	0.013 UJ	0.026 UJ	0.026 UJ	0.011 UJ	0.010 U	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-7
VOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	SULFUR PLANT PONDS (CONT)				SEDIMENT QUALITY CRITERIA (3)	
	SD-0612	SD-0613	SD-0614	SD-0615	Ontario LEL	Ontario SEL (Based on TOC) (4)
1,1,1-TRICHLOROETHANE	0.010 UJ	0.007 U	0.007 UJ	0.011 UJ	NCA	NCA
2-HEXANONE	0.021 UJ	0.014 U	0.004 J	0.022 UJ	NCA	NCA
ACETONE	0.033 J	0.013 J	0.033 J	0.016 J	NCA	NCA
CARBON DISULFIDE	0.010 UJ	0.007 U	0.001 J	0.011 UJ	NCA	NCA
ETHYL BENZENE	0.010 UJ	0.007 U	0.007 UJ	0.011 UJ	NCA	NCA
METHYL CHLORIDE	0.021 UJ	0.014 U	0.014 UJ	0.022 UJ	NCA	NCA
METHYL ETHYL KETONE	0.021 UJ	0.014 U	0.009 J	0.022 UJ	NCA	NCA
METHYL ISOBUTYL KETONE	0.002 J	0.003 J	0.003 J	0.022 UJ	NCA	NCA
TETRACHLOROETHYLENE(PCE)	0.010 UJ	0.007 U	0.007 UJ	0.011 UJ	NCA	NCA
TOLUENE	0.010 UJ	0.007 U	0.007 UJ	0.011 UJ	NCA	NCA
TOTAL-1,2-DICHLOROETHENE	0.010 UJ	0.007 U	0.007 UJ	0.011 UJ	NCA	NCA
TRICHLOROETHYLENE (TCE)	0.002 J	0.003 J	0.001 J	0.011 UJ	NCA	NCA
XYLENES (TOTAL)	0.010 UJ	0.007 U	0.007 UJ	0.011 UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-7
VOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

CENTRAL DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	CENTRAL DITCH				ESTUARINE PONDS		UPGRADIENT PONDED AREA	SEDIMENT QUALITY CRITERIA (3)	
	SD-1101	SD-1102	SD-1103	SD-1104	SD-1622	SD-1625	SD-1624	NOAA ER-L	NOAA ER-M
1,1,1-TRICHLOROETHANE	0.010 U	0.010 U	0.006 U	0.008 U	0.011 UJ	0.032 UJ	0.009 U	NCA	NCA
2-HEXANONE	0.020 U	0.020 U	0.013 U	0.015 U	0.022 UJ	0.064 UJ	0.018 U	NCA	NCA
ACETONE	0.038 U	0.044 U	0.013 U	0.077 U	0.530 U	0.180 U	0.060 U	NCA	NCA
CARBON DISULFIDE	0.010 U	0.010 U	0.006 U	0.008 U	0.011 UJ	0.032 UJ	0.009 U	NCA	NCA
ETHYL BENZENE	0.010 U	0.010 U	0.006 U	0.008 U	0.011 UJ	0.032 UJ	0.009 U	NCA	NCA
METHYL CHLORIDE	0.020 U	0.020 U	0.013 U	0.015 U	0.022 UJ	0.064 UJ	0.018 U	NCA	NCA
METHYL ETHYL KETONE	0.020 U	0.020 U	0.013 U	0.018	0.160 J	0.064 UJ	0.018 U	NCA	NCA
METHYL ISOBUTYL KETONE	0.020 U	0.020 U	0.013 U	0.015 U	0.022 UJ	0.064 UJ	0.018 U	NCA	NCA
TETRACHLOROETHYLENE(PCE)	0.010 U	0.010 U	0.006 U	0.008 U	0.011 UJ	0.032 UJ	0.009 U	NCA	NCA
TOLUENE	0.010 U	0.010 U	0.006 U	0.008 U	0.039 J	0.032 UJ	0.009 U	NCA	NCA
TOTAL-1,2-DICHLOROETHENE	0.010 U	0.010 U	0.006 U	0.008 U	0.011 UJ	0.032 UJ	0.009 U	NCA	NCA
TRICHLOROETHYLENE (TCE)	0.010 U	0.010 U	0.006 U	0.008 U	0.011 UJ	0.032 UJ	0.009 U	NCA	NCA
XYLENES (TOTAL)	0.010 U	0.010 U	0.006 U	0.008 U	0.011 UJ	0.032 UJ	0.009 U	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-7
VOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

CENTRAL DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	ISOLATED FRESHWATER POND			UPGRADIENT PONDED AREA	SEDIMENT QUALITY CRITERIA (3)	
	SD-1623	SD-1626	SD-1627 (Duplicate of SD-1626)	SD-1621	Ontario LEL	Ontario SEL (Based on TOC) (4)
1,1,1-TRICHLOROETHANE	0.008 U	0.008 U	0.011 UJ	0.011 UJ	NCA	NCA
2-HEXANONE	0.015 U	0.016 U	0.021 UJ	0.022 UJ	NCA	NCA
ACETONE	0.170 U	0.033 U	0.064 U	0.062 U	NCA	NCA
CARBON DISULFIDE	0.008 U	0.008 U	0.011 UJ	0.011 UJ	NCA	NCA
ETHYL BENZENE	0.008 U	0.008 U	0.011 UJ	0.011 UJ	NCA	NCA
METHYL CHLORIDE	0.015 U	0.016 U	0.021 UJ	0.022 UJ	NCA	NCA
METHYL ETHYL KETONE	0.038 J	0.016 U	0.021 UJ	0.022 UJ	NCA	NCA
METHYL ISOBUTYL KETONE	0.015 U	0.016 U	0.021 UJ	0.022 UJ	NCA	NCA
TETRACHLOROETHYLENE(PCE)	0.008 U	0.008 U	0.011 UJ	0.011 UJ	NCA	NCA
TOLUENE	0.004 J	0.008 U	0.011 UJ	0.011 UJ	NCA	NCA
TOTAL-1,2-DICHLOROETHENE	0.008 U	0.008 U	0.011 UJ	0.011 UJ	NCA	NCA
TRICHLOROETHYLENE (TCE)	0.008 U	0.008 U	0.011 UJ	0.011 UJ	NCA	NCA
XYLENES (TOTAL)	0.008 U	0.008 U	0.011 UJ	0.011 UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-7
VOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

AREA 12 DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 12 DITCH			SEDIMENT QUALITY CRITERIA (3)	
	SD-1201	SD-1202	SD-1203	NOAA ER-L	NOAA ER-M
1,1,1-TRICHLOROETHANE	0.011 UJ	0.012 UJ	0.030 UJ	NCA	NCA
2-HEXANONE	0.021 UJ	0.025 UJ	0.060 UJ	NCA	NCA
ACETONE	0.200 U	0.140 U	0.550 U	NCA	NCA
CARBON DISULFIDE	0.011 UJ	0.012 UJ	0.026 J	NCA	NCA
ETHYL BENZENE	0.011 UJ	0.012 UJ	0.030 UJ	NCA	NCA
METHYL CHLORIDE	0.021 UJ	0.025 UJ	0.060 UJ	NCA	NCA
METHYL ETHYL KETONE	0.059 J	0.027 J	0.060 UJ	NCA	NCA
METHYL ISOBUTYL KETONE	0.021 UJ	0.025 UJ	0.060 UJ	NCA	NCA
TETRACHLOROETHYLENE(PCE)	0.011 UJ	0.012 UJ	0.030 UJ	NCA	NCA
TOLUENE	0.011 UJ	0.012 UJ	0.030 UJ	NCA	NCA
TOTAL-1,2-DICHLOROETHENE	0.011 UJ	0.012 UJ	0.030 UJ	NCA	NCA
TRICHLOROETHYLENE (TCE)	0.011 UJ	0.012 UJ	0.030 UJ	NCA	NCA
XYLENES (TOTAL)	0.011 UJ	0.012 UJ	0.030 UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-7
VOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	ASSOCIATED DITCHES - AREA 16									SEDIMENT QUALITY CRITERIA (3)	
	SD-1611	SD-1612	SD-1613	SD-1615	SD-1616	SD-1617	SD-1618	SD-1628 (Duplicate of SD-1612)	SD-1629	NOAA ER-L	NOAA ER-M
1,1,1-TRICHLOROETHANE	0.024 UJ	0.030 UJ	0.013 UJ	0.014 UJ	0.021 UJ	0.028 UJ	0.015 UJ	0.025 UJ	0.060 U	NCA	NCA
2-HEXANONE	0.049 UJ	0.059 UJ	0.026 UJ	0.028 UJ	0.043 UJ	0.055 UJ	0.030 UJ	0.051 UJ	0.120 U	NCA	NCA
ACETONE	0.260 U	0.230 U	0.053 U	0.055 U	0.052 U	0.910 U	0.043 U	0.320 U	0.210 U	NCA	NCA
CARBON DISULFIDE	0.024 UJ	0.030 UJ	0.013 UJ	0.025 J	0.021 UJ	0.028 UJ	0.015 UJ	0.025 UJ	0.060 U	NCA	NCA
ETHYL BENZENE	0.024 UJ	0.030 UJ	0.013 UJ	0.014 UJ	0.021 UJ	0.028 UJ	0.015 UJ	0.025 UJ	0.060 U	NCA	NCA
METHYL CHLORIDE	0.049 UJ	0.059 UJ	0.026 UJ	0.028 UJ	0.043 UJ	0.055 UJ	0.030 UJ	0.051 UJ	0.120 U	NCA	NCA
METHYL ETHYL KETONE	0.053 J	0.083 U	0.026 UJ	0.038 U	0.043 UJ	0.140 U	0.032 U	0.100 U	0.120 U	NCA	NCA
METHYL ISOBUTYL KETONE	0.049 UJ	0.059 UJ	0.026 UJ	0.028 UJ	0.043 UJ	0.055 UJ	0.030 UJ	0.051 UJ	0.120 U	NCA	NCA
TETRACHLOROETHYLENE(PCE)	0.024 UJ	0.030 UJ	0.013 UJ	0.014 UJ	0.021 UJ	0.028 UJ	0.015 UJ	0.025 UJ	0.060 U	NCA	NCA
TOLUENE	0.024 UJ	0.030 UJ	0.013 UJ	0.014 UJ	0.021 UJ	0.028 UJ	0.015 UJ	0.025 UJ	0.060 U	NCA	NCA
TOTAL-1,2-DICHLOROETHENE	0.024 UJ	0.030 UJ	0.013 UJ	0.014 UJ	0.021 UJ	0.028 UJ	0.015 UJ	0.025 UJ	0.060 U	NCA	NCA
TRICHLOROETHYLENE (TCE)	0.024 UJ	0.030 UJ	0.013 UJ	0.014 UJ	0.021 UJ	0.028 UJ	0.015 UJ	0.025 UJ	0.060 U	NCA	NCA
XYLENES (TOTAL)	0.024 UJ	0.030 UJ	0.013 UJ	0.014 UJ	0.021 UJ	0.028 UJ	0.015 UJ	0.025 UJ	0.060 U	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-7
VOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	ASSOCIATED DITCHES	OLD RED ROOT CREEK						AREA 19 SW WETLANDS		SEDIMENT QUALITY CRITERIA (3)	
	SD-1630	SD-1606	SD-1607	SD-1608	SD-1609	SD-1610	SD-1631 (Duplicate of SD-1609)	SD-1906	SD-1911 (Duplicate of SD_1906)	NOAA ER-L	NOAA ER-M
1,1,1-TRICHLOROETHANE	0.010 UJ	0.020 UJ	0.025 UJ	0.026 UJ	0.013 UJ	0.027 UJ	0.015 UJ	0.014 UJ	0.020 UJ	NCA	NCA
2-HEXANONE	0.021 UJ	0.040 UJ	0.050 UJ	0.053 UJ	0.027 UJ	0.054 UJ	0.030 UJ	0.027 UJ	0.039 UJ	NCA	NCA
ACETONE	0.052 U	0.360 J	0.140 U	0.310 U	0.170 U	0.110 U	0.200 U	0.380 U	0.710 U	NCA	NCA
CARBON DISULFIDE	0.010 UJ	0.020 UJ	0.025 UJ	0.015 J	0.013 UJ	0.035 J	0.015 UJ	0.032 J	0.020 UJ	NCA	NCA
ETHYL BENZENE	0.010 UJ	0.020 UJ	0.025 UJ	0.026 UJ	0.013 UJ	0.027 UJ	0.015 UJ	0.014 UJ	0.020 UJ	NCA	NCA
METHYL CHLORIDE	0.021 UJ	0.040 UJ	0.050 UJ	0.053 UJ	0.027 UJ	0.054 UJ	0.030 UJ	0.027 UJ	0.039 UJ	NCA	NCA
METHYL ETHYL KETONE	0.021 UJ	0.085 J	0.050 UJ	0.065 J	0.057 U	0.054 UJ	0.200 U	0.170 J	0.330 J	NCA	NCA
METHYL ISOBUTYL KETONE	0.021 UJ	0.040 UJ	0.050 UJ	0.053 UJ	0.027 UJ	0.054 UJ	0.030 UJ	0.027 UJ	0.039 UJ	NCA	NCA
TETRACHLOROETHYLENE(PCE)	0.010 UJ	0.020 UJ	0.025 UJ	0.026 UJ	0.013 UJ	0.027 UJ	0.015 UJ	0.014 UJ	0.020 UJ	NCA	NCA
TOLUENE	0.010 UJ	0.020 UJ	0.025 UJ	0.026 UJ	0.013 UJ	0.027 UJ	0.015 UJ	0.014 UJ	0.020 UJ	NCA	NCA
TOTAL-1,2-DICHLOROETHENE	0.010 UJ	0.020 UJ	0.025 UJ	0.026 UJ	0.013 UJ	0.027 UJ	0.015 UJ	0.014 UJ	0.020 UJ	NCA	NCA
TRICHLOROETHYLENE (TCE)	0.010 UJ	0.020 UJ	0.025 UJ	0.026 UJ	0.013 UJ	0.027 UJ	0.015 UJ	0.014 UJ	0.020 UJ	NCA	NCA
XYLENES (TOTAL)	0.010 UJ	0.020 UJ	0.025 UJ	0.026 UJ	0.013 UJ	0.027 UJ	0.015 UJ	0.014 UJ	0.020 UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-7
VOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	SOUTHWEST DITCH				WEST DITCH				SEDIMENT QUALITY CRITERIA (3)	
	SD-1215	SD-1216	SD-1619	SD-1620	SD-1601	SD-1602	SD-1603	SD-1907	NOAA ER-L	NOAA ER-M
1,1,1-TRICHLOROETHANE	0.016 UJ	0.013 UJ	0.033 UJ	0.017 UJ	0.021 UJ	0.023 UJ	0.009 U	0.026 UJ	NCA	NCA
2-HEXANONE	0.032 UJ	0.026 UJ	0.066 UJ	0.034 UJ	0.042 UJ	0.046 UJ	0.018 U	0.051 UJ	NCA	NCA
ACETONE	0.110 U	0.430 J	0.077 U	0.450 J	0.091 U	0.160 U	0.033 U	0.390 U	NCA	NCA
CARBON DISULFIDE	0.016 UJ	0.013 UJ	0.033 UJ	0.017 UJ	0.021 UJ	0.023 UJ	0.009 U	0.026 UJ	NCA	NCA
ETHYL BENZENE	0.016 UJ	0.013 UJ	0.033 UJ	0.017 UJ	0.021 UJ	0.023 UJ	0.009 U	0.026 UJ	NCA	NCA
METHYL CHLORIDE	0.032 UJ	0.026 UJ	0.066 UJ	0.034 UJ	0.042 UJ	0.046 UJ	0.018 U	0.051 UJ	NCA	NCA
METHYL ETHYL KETONE	0.032 UJ	0.091 J	0.066 UJ	0.086 J	0.042 UJ	0.046 UJ	0.018 U	0.087 J	NCA	NCA
METHYL ISOBUTYL KETONE	0.032 UJ	0.026 UJ	0.066 UJ	0.034 UJ	0.042 UJ	0.046 UJ	0.018 U	0.051 UJ	NCA	NCA
TETRACHLOROETHYLENE(PCE)	0.016 UJ	0.013 UJ	0.033 UJ	0.017 UJ	0.021 UJ	0.023 UJ	0.009 U	0.026 UJ	NCA	NCA
TOLUENE	0.018 UJ	0.013 UJ	0.033 UJ	0.017 UJ	0.021 UJ	0.023 UJ	0.009 U	0.026 UJ	NCA	NCA
TOTAL-1,2-DICHLOROETHENE	0.016 UJ	0.013 UJ	0.033 UJ	0.017 UJ	0.021 UJ	0.023 UJ	0.009 U	0.026 UJ	NCA	NCA
TRICHLOROETHYLENE (TCE)	0.016 UJ	0.013 UJ	0.033 UJ	0.017 UJ	0.021 UJ	0.023 UJ	0.009 U	0.026 UJ	NCA	NCA
XYLENES (TOTAL)	0.016 UJ	0.013 UJ	0.033 UJ	0.017 UJ	0.021 UJ	0.023 UJ	0.009 U	0.026 UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-7
VOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	ASSOCIATED DITCHES	AREA 19 FORESTED WETLANDS		AREA 19 NE WETLANDS			SEDIMENT QUALITY CRITERIA (3)	
	SD-1614	SD-1901	SD-1903	SD-1908	SD-1909	SD-1910	Ontario LEL	Ontario SEL (Based on TOC) (4)
1,1,1-TRICHLOROETHANE	0.019 UJ	0.010 U	0.016 UJ	0.007 U	0.026 UJ	0.016 UJ	NCA	NCA
2-HEXANONE	0.038 UJ	0.019 U	0.031 UJ	0.014 U	0.053 UJ	0.031 UJ	NCA	NCA
ACETONE	0.065 U	0.019 U	0.100 U	0.044 U	0.240 U	0.047 U	NCA	NCA
CARBON DISULFIDE	0.019 UJ	0.010 U	0.016 UJ	0.007 U	0.026 UJ	0.016 UJ	NCA	NCA
ETHYL BENZENE	0.019 UJ	0.010 U	0.016 UJ	0.007 U	0.026 UJ	0.016 UJ	NCA	NCA
METHYL CHLORIDE	0.038 UJ	0.019 U	0.031 UJ	0.014 U	0.053 UJ	0.031 UJ	NCA	NCA
METHYL ETHYL KETONE	0.038 UJ	0.019 U	0.029 J	0.017	0.094 J	0.031 UJ	NCA	NCA
METHYL ISOBUTYL KETONE	0.038 UJ	0.019 U	0.031 UJ	0.014 U	0.053 UJ	0.031 UJ	NCA	NCA
TETRACHLOROETHYLENE(PCE)	0.019 UJ	0.010 U	0.016 UJ	0.007 U	0.026 UJ	0.016 UJ	NCA	NCA
TOLUENE	0.017 J	0.010 U	0.016 UJ	0.007 U	0.016 J	0.016 UJ	NCA	NCA
TOTAL-1,2-DICHLOROETHENE	0.019 UJ	0.010 U	0.016 UJ	0.003 J	0.026 UJ	0.016 UJ	NCA	NCA
TRICHLOROETHYLENE (TCE)	0.019 UJ	0.010 U	0.016 UJ	0.007 U	0.026 UJ	0.016 UJ	NCA	NCA
XYLENES (TOTAL)	0.019 UJ	0.010 U	0.016 UJ	0.007 U	0.026 UJ	0.016 UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-7
VOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	OLD RED ROOT CREEK		AREA 19 SW WETLANDS		DRY TRIBUTARY AREA 18		SEDIMENT QUALITY CRITERIA (3)	
	SD-1604	SD-1605	SD-1904	SD-1905	SD-1801	SD-1802	Ontario LEL	Ontario SEL (Based on TOC) (4)
1,1,1-TRICHLOROETHANE	0.007 U	0.006 U	0.012 UJ	0.007 U	0.007 U	0.010 U	NCA	NCA
2-HEXANONE	0.014 U	0.013 U	0.025 UJ	0.014 U	0.013 U	0.020 U	NCA	NCA
ACETONE	0.020 U	0.015 U	0.090 U	0.029 U	0.013 U	0.020 U	NCA	NCA
CARBON DISULFIDE	0.007 U	0.006 U	0.012 UJ	0.007 U	0.007 U	0.010 U	NCA	NCA
ETHYL BENZENE	0.007 U	0.006 U	0.012 UJ	0.007 U	0.007 U	0.010 U	NCA	NCA
METHYL CHLORIDE	0.014 U	0.013 U	0.025 UJ	0.014 U	0.013 U	0.020 U	NCA	NCA
METHYL ETHYL KETONE	0.014 U	0.092 U	0.024 J	0.010 J	0.013 U	0.020 U	NCA	NCA
METHYL ISOBUTYL KETONE	0.014 U	0.013 U	0.025 UJ	0.014 U	0.013 U	0.020 U	NCA	NCA
TETRACHLOROETHYLENE(PCE)	0.006 J	0.006 U	0.012 UJ	0.007 U	0.007 U	0.010 U	NCA	NCA
TOLUENE	0.007 U	0.006 U	0.024 J	0.007 U	0.007 U	0.010 U	NCA	NCA
TOTAL-1,2-DICHLOROETHENE	0.007 U	0.006 U	0.012 UJ	0.007 U	0.007 U	0.010 U	NCA	NCA
TRICHLOROETHYLENE (TCE)	0.007 U	0.006 U	0.012 UJ	0.007 U	0.007 U	0.010 U	NCA	NCA
XYLENES (TOTAL)	0.007 U	0.006 U	0.012 UJ	0.007 U	0.007 U	0.010 U	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-7
VOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

COUNTY PARK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 10 SOUTHERN BORDER DITCH		OPEN LAWN DITCH				SEDIMENT QUALITY CRITERIA (3)	
	SD-1006	SD-1902	SD-1003	SD-1004	SD-1005	SD-1012 (Duplicate of SD-1005)	Ontario LEL	Ontario SEL (Based on TOC) (4)
1,1,1-TRICHLOROETHANE	0.006 U	0.016 UJ	0.010 UJ	0.006 U	0.007 U	0.006 U	NCA	NCA
2-HEXANONE	0.013 U	0.033 UJ	0.021 UJ	0.013 U	0.014 U	0.012 U	NCA	NCA
ACETONE	0.013 U	0.120 U	0.021 U	0.028 U	0.110 U	0.053 U	NCA	NCA
CARBON DISULFIDE	0.006 U	0.016 UJ	0.010 UJ	0.006 U	0.007 U	0.006 U	NCA	NCA
ETHYL BENZENE	0.006 U	0.016 UJ	0.010 UJ	0.006 U	0.007 U	0.006 U	NCA	NCA
METHYL CHLORIDE	0.013 U	0.033 UJ	0.021 UJ	0.013 U	0.014 U	0.012 U	NCA	NCA
METHYL ETHYL KETONE	0.013 U	0.028 J	0.021 UJ	0.013 U	0.014 U	0.012 U	NCA	NCA
METHYL ISOBUTYL KETONE	0.013 U	0.033 UJ	0.021 UJ	0.013 U	0.014 U	0.012 U	NCA	NCA
TETRACHLOROETHYLENE(PCE)	0.006 U	0.016 UJ	0.010 UJ	0.006 U	0.007 U	0.006 U	NCA	NCA
TOLUENE	0.006 U	0.004 J	0.010 UJ	0.006 U	0.007 U	0.006 U	NCA	NCA
TOTAL-1,2-DICHLOROETHENE	0.006 U	0.016 UJ	0.010 UJ	0.006 U	0.007 U	0.006 U	NCA	NCA
TRICHLOROETHYLENE (TCE)	0.006 U	0.016 UJ	0.010 UJ	0.006 U	0.007 U	0.006 U	NCA	NCA
XYLENES (TOTAL)	0.006 U	0.016 UJ	0.010 UJ	0.006 U	0.007 U	0.006 U	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-7
VOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

COUNTY PARK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	MAINTENANCE AREA DITCH					WESTERN BOUNDARY DITCH		SEDIMENT QUALITY CRITERIA (3)	
	SD-1007	SD-1008	SD-1009	SD-1010	SD-1011	SD-1001	SD-1002	Ontario LEL	Ontario SEL (Based on TOC) (4)
1,1,1-TRICHLOROETHANE	0.006 U	0.016 UJ	0.009 U	0.008 U	0.005 U	0.007 U	0.008 U	NCA	NCA
2-HEXANONE	0.012 U	0.032 UJ	0.018 U	0.017 U	0.010 U	0.014 U	0.015 U	NCA	NCA
ACETONE	0.047 U	0.032 U	0.018 U	0.017 U	0.010 U	0.020 U	0.021 U	NCA	NCA
CARBON DISULFIDE	0.006 U	0.016 UJ	0.009 U	0.008 U	0.005 U	0.007 U	0.008 U	NCA	NCA
ETHYL BENZENE	0.006 U	0.016 UJ	0.009 U	0.008 U	0.005 U	0.007 U	0.008 U	NCA	NCA
METHYL CHLORIDE	0.012 U	0.032 UJ	0.018 U	0.017 U	0.010 U	0.014 U	0.015 U	NCA	NCA
METHYL ETHYL KETONE	0.012 U	0.032 UJ	0.018 U	0.017 U	0.010 U	0.014 U	0.015 U	NCA	NCA
METHYL ISOBUTYL KETONE	0.012 U	0.032 UJ	0.018 U	0.017 U	0.010 U	0.014 U	0.015 U	NCA	NCA
TETRACHLOROETHYLENE(PCE)	0.006 U	0.016 UJ	0.005 J	0.004 J	0.002 J	0.007 U	0.008 U	NCA	NCA
TOLUENE	0.006 U	0.016 UJ	0.009 U	0.008 U	0.005 U	0.007 U	0.008 U	NCA	NCA
TOTAL-1,2-DICHLOROETHENE	0.006 U	0.016 UJ	0.009 U	0.008 U	0.005 U	0.007 U	0.008 U	NCA	NCA
TRICHLOROETHYLENE (TCE)	0.006 U	0.016 UJ	0.009 U	0.008 U	0.005 U	0.007 U	0.008 U	NCA	NCA
XYLENES (TOTAL)	0.006 U	0.016 UJ	0.009 U	0.008 U	0.005 U	0.007 U	0.008 U	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-8
SVOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

EAST DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	EAST DITCH		UNNAMED TRIBUTARY		SEDIMENT QUALITY CRITERIA (3)	
	SD-1407	SD-1408L	SD-1411	SD-1412	NOAA ER-L	NOAA ER-M
2,4-DIMETHYLPHENOL	57.000 UJ	0.770 UJ	11.000 UJ	0.700 UJ	NCA	NCA
2-METHYLNAPHTHALENE	57.000 UJ	0.770 UJ	11.000 UJ	0.700 UJ	0.065	0.67
2-METHYLPHENOL (O-CRESOL)	57.000 UJ	0.770 UJ	11.000 UJ	0.700 UJ	NCA	NCA
4-METHYLPHENOL	57.000 UJ	0.770 UJ	11.000 UJ	0.700 UJ	NCA	NCA
ACENAPHTHENE	57.000 UJ	0.770 UJ	11.000 UJ	0.700 UJ	0.15	0.65
ACENAPTHYLENE	57.000 UJ	0.770 UJ	11.000 UJ	0.700 UJ	NCA	NCA
ANTHRACENE	57.000 UJ	0.770 UJ	11.000 UJ	0.700 UJ	0.085	0.96
BENZO(A)ANTHRACENE	57.000 UJ	0.770 UJ	11.000 UJ	0.100 J	0.23	1.6
BENZO(A)PYRENE	57.000 UJ	0.770 UJ	11.000 UJ	0.700 UJ	0.4	2.5
BENZO(B)FLUORANTHRENE	57.000 UJ	0.770 UJ	11.000 UJ	0.260 J	NCA	NCA
BENZO(GHI)PERYLENE	57.000 UJ	0.770 UJ	11.000 UJ	0.700 UJ	NCA	NCA
BENZO(K)FLUORANTHRENE	57.000 UJ	0.770 UJ	11.000 UJ	0.083 J	NCA	NCA
BENZYL BUTYL PHTHALATE	57.000 UJ	0.770 UJ	11.000 UJ	0.700 UJ	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	91.000 U	0.770 UJ	22.000 U	1.500 U	NCA	NCA
CARBAZOLE	57.000 UJ	0.770 UJ	11.000 UJ	0.700 UJ	NCA	NCA
CHRYSENE	57.000 UJ	0.770 UJ	11.000 UJ	0.150 J	0.4	2.8
DI-N-OCTYL PHTHALATE	57.000 UJ	0.770 UJ	11.000 UJ	0.700 UJ	NCA	NCA
DIBENZO(A,H)ANTHRACENE	57.000 UJ	0.770 UJ	11.000 UJ	0.700 UJ	0.06	0.26
DIBENZOFURAN	57.000 UJ	0.770 UJ	11.000 UJ	0.700 UJ	NCA	NCA
DIMETHYL PHTHALATE	57.000 UJ	0.770 UJ	11.000 UJ	0.700 UJ	NCA	NCA
FLUORANTHRENE	57.000 UJ	0.770 UJ	11.000 UJ	0.150 J	0.6	3.6
FLUORENE	57.000 UJ	0.770 UJ	11.000 UJ	0.700 UJ	0.035	0.64
INDENO(1,2,3-C,D)PYRENE	57.000 UJ	0.770 UJ	11.000 UJ	0.700 UJ	NCA	NCA
NAPHTHALENE	57.000 UJ	0.770 UJ	11.000 UJ	0.700 UJ	0.34	2.1
PENTACHLOROPHENOL	280.000 UJ	3.800 UJ	57.000 UJ	3.500 UJ	NCA	NCA
PHENANTHRENE	57.000 UJ	0.770 UJ	11.000 UJ	0.700 UJ	0.225	1.38
PHENOL	57.000 UJ	0.770 UJ	11.000 UJ	0.700 UJ	NCA	NCA
PYRENE	57.000 UJ	0.770 UJ	11.000 UJ	0.140 J	0.35	2.2
TOTAL PAHs (NOAA) (4)	ND	ND	ND	0.883	4	35

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) Total PAHs for Freshwater/Estuarine sediment samples were calculated from the lists provided in Appendix F.

TABLE 4-8
SVOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

EAST DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	EAST DITCH					UNNAMED TRIBUTARY	UPGRADIENT SCIRPUS MARSH	SEDIMENT QUALITY CRITERIA (3)	
	SD-1402	SD-1403	SD-1404	SD-1405	SD-1406	SD-1410	SD-1401	Ontario LEL	Ontario SEL (Based on TOC) (4)
2,4-DIMETHYLPHENOL	0.400 U	0.650 U	1.100 UJ	5.300 UJ	0.570 U	1.600 UJ	0.550 U	NCA	NCA
2-METHYLNAPHTHALENE	0.400 U	0.650 U	1.100 UJ	5.300 UJ	0.570 U	1.600 UJ	0.550 U	NCA	NCA
2-METHYLPHENOL (O-CRESOL)	0.400 U	0.650 U	1.100 UJ	5.300 UJ	0.570 U	1.600 UJ	0.550 U	NCA	NCA
4-METHYLPHENOL	0.400 U	0.650 U	1.100 UJ	5.300 UJ	0.570 U	1.600 UJ	0.550 U	NCA	NCA
ACENAPHTHENE	0.400 U	0.650 U	1.100 UJ	5.300 UJ	0.570 U	1.600 UJ	0.550 U	NCA	NCA
ACENAPTHYLENE	0.400 U	0.650 U	1.100 UJ	5.300 UJ	0.570 U	1.600 UJ	0.320 J	NCA	NCA
ANTHRACENE	0.400 U	0.650 U	1.100 UJ	5.300 UJ	0.570 U	1.600 UJ	0.200 J	0.220	370
BENZO(A)ANTHRACENE	0.400 U	0.084 J	1.100 UJ	5.300 UJ	0.130 J	0.340 J	0.270 J	0.320	1480
BENZO(A)PYRENE	0.400 U	0.650 U	1.100 UJ	5.300 UJ	0.120 J	0.390 J	0.410 J	0.370	1440
BENZO(B)FLUORANTHRENE	0.085 J	0.120 J	1.100 UJ	5.300 UJ	0.170 J	0.470 J	0.860	NCA	NCA
BENZO(GHI)PERYLENE	0.400 U	0.650 U	1.100 UJ	5.300 UJ	0.570 U	1.600 UJ	0.400 J	0.170	320
BENZO(K)FLUORANTHRENE	0.400 U	0.078 J	1.100 UJ	5.300 UJ	0.092 J	0.260 J	0.250 J	0.240	1340
BENZYL BUTYL PHTHALATE	0.400 U	0.650 U	1.100 UJ	5.300 UJ	0.570 U	1.600 UJ	0.550 U	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	0.400 U	0.650 U	5.200 J	57.000 J	6.900	1.600 U	0.600 U	NCA	NCA
CARBAZOLE	0.400 U	0.650 U	1.100 UJ	5.300 UJ	0.570 U	1.600 UJ	0.550 U	NCA	NCA
CHRYSENE	0.400 U	0.140 J	1.100 UJ	5.300 UJ	0.210 J	0.440 J	0.620	0.340	460
DI-N-OCTYL PHTHALATE	0.400 U	0.650 U	1.100 UJ	5.300 UJ	0.570 U	1.600 UJ	0.550 U	NCA	NCA
DIBENZO(A,H)ANTHRACENE	0.400 U	0.650 U	1.100 UJ	5.300 UJ	0.570 U	1.600 UJ	0.550 U	0.060	130
DIBENZOFURAN	0.400 U	0.650 U	1.100 UJ	5.300 UJ	0.570 U	1.600 UJ	0.550 U	NCA	NCA
DIMETHYL PHTHALATE	0.400 U	0.650 U	1.100 UJ	5.300 UJ	0.570 U	1.600 UJ	0.550 U	NCA	NCA
FLUORANTHRENE	0.400 U	0.650 U	0.250 J	5.300 UJ	0.220 J	0.500 J	0.480 J	0.750	1020
FLUORENE	0.400 U	0.650 U	1.100 UJ	5.300 UJ	0.570 U	1.600 UJ	0.550 U	0.190	160
INDENO(1,2,3-C,D)PYRENE	0.400 U	0.650 U	1.100 UJ	5.300 UJ	0.570 U	1.600 UJ	0.550 U	0.200	320
NAPHTHALENE	0.400 U	0.650 U	1.100 UJ	5.300 UJ	0.570 U	1.600 UJ	0.550 U	NCA	NCA
PENTACHLOROPHENOL	2.000 U	3.200 U	5.300 UJ	26.000 UJ	2.900 U	8.100 UJ	2.700 U	NCA	NCA
PHENANTHRENE	0.400 U	0.650 U	1.100 UJ	5.300 UJ	0.160 J	1.600 UJ	0.330 J	0.560	950
PHENOL	0.400 U	0.650 U	1.100 UJ	5.300 UJ	0.570 U	1.600 UJ	0.550 U	NCA	NCA
PYRENE	0.400 U	0.180 J	0.290 J	5.300 UJ	0.250 J	0.550 J	0.570	0.490	850
TOTAL PAHs (Ontario) (5)	ND	0.482	0.540	ND	1.182	2.480	3.850	4	10000

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.
(5) Total PAHs for Freshwater/Estuarine sediment samples were calculated from the lists provided in Appendix F.

TABLE 4-8
SVOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	BLACK DITCH							SEDIMENT QUALITY CRITERIA (3)	
	SD-0506	SD-0507	SD-0616	SD-0617	SD-0618	SD-0619	SD-0620 (Duplicate of SD-0619)	NOAA ER-L	NOAA ER-M
2,4-DIMETHYLPHENOL	0.470 U	0.430 U	1.400 UJ	1.800 UJ	1.200 UJ	0.940 UJ	0.820 UJ	NCA	NCA
2-METHYLNAPHTHALENE	0.470 U	0.430 U	1.400 UJ	1.800 UJ	1.200 UJ	0.940 UJ	0.820 UJ	0.065	0.67
2-METHYLPHENOL (O-CRESOL)	0.470 U	0.430 U	1.400 UJ	1.800 UJ	1.200 UJ	0.940 UJ	0.820 UJ	NCA	NCA
4-METHYLPHENOL	0.470 U	0.430 U	1.400 UJ	1.800 UJ	1.200 UJ	0.940 UJ	0.820 UJ	NCA	NCA
ACENAPHTHENE	0.470 U	0.430 U	1.400 UJ	0.220 J	0.120 J	0.940 UJ	0.820 UJ	0.15	0.65
ACENAPTHYLENE	0.470 U	0.430 U	1.400 UJ	1.800 UJ	1.200 UJ	0.099 J	0.820 UJ	NCA	NCA
ANTHRACENE	0.150 J	0.430 U	0.420 J	0.420 J	0.470 J	0.230 J	0.090 J	0.085	0.96
BENZO(A)ANTHRACENE	0.300 J	0.052 J	1.300 J	1.900 J	1.400 J	0.840 J	0.630 J	0.23	1.6
BENZO(A)PYRENE	0.350 J	0.047 J	1.800 J	2.700 J	1.600 J	0.720 J	0.640 J	0.4	2.5
BENZO(B)FLUORANTHRENE	0.200 J	0.058 J	1.700 J	2.800 J	2.100 J	1.200 J	0.840 J	NCA	NCA
BENZO(GHI)PERYLENE	0.470 U	0.430 U	0.620 J	0.780 J	0.900 J	0.430 J	0.820 UJ	NCA	NCA
BENZO(K)FLUORANTHRENE	0.350 J	0.053 J	2.200 J	2.200 J	2.000 J	0.910 J	0.810 J	NCA	NCA
BENZYL BUTYL PHTHALATE	0.470 U	0.430 U	0.250 J	1.800 UJ	1.200 UJ	0.940 UJ	0.820 UJ	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	0.470 U	0.430 U	2.000 U	4.500 J	5.700 J	4.000 J	2.800 U	NCA	NCA
CARBAZOLE	0.470 U	0.430 U	1.400 UJ	1.800 UJ	1.200 UJ	0.940 UJ	0.820 UJ	NCA	NCA
CHRYSENE	0.400 J	0.081 J	2.300 J	3.000 J	2.300 J	1.200 J	0.860 J	0.4	2.8
DI-N-OCTYL PHTHALATE	0.470 U	0.430 U	1.400 UJ	1.800 UJ	0.360 J	0.180 J	0.120 J	NCA	NCA
DIBENZO(A,H)ANTHRACENE	0.470 U	0.430 U	0.130 J	1.800 UJ	0.620 J	0.940 UJ	0.820 UJ	0.06	0.26
DIBENZOFURAN	0.470 U	0.430 U	1.400 UJ	1.800 UJ	1.200 UJ	0.940 UJ	0.820 UJ	NCA	NCA
DIMETHYL PHTHALATE	0.470 U	0.430 U	1.400 UJ	1.800 UJ	1.200 UJ	0.940 UJ	0.820 UJ	NCA	NCA
FLUORANTHRENE	0.680	0.095 J	3.600 J	4.900 J	4.200 J	1.900 J	1.600 J	0.6	3.6
FLUORENE	0.054 J	0.430 U	1.400 UJ	0.310 J	0.270 J	0.110 J	0.096 J	0.035	0.64
INDENO(1,2,3-C,D)PYRENE	0.470 U	0.430 U	0.950 J	0.760 J	0.940 J	0.410 J	0.820 UJ	NCA	NCA
NAPHTHALENE	0.470 U	0.430 U	1.400 UJ	1.800 UJ	1.200 UJ	0.940 UJ	0.820 UJ	0.34	2.1
PENTACHLOROPHENOL	2.300 U	2.100 U	7.100 UJ	9.100 UJ	5.800 UJ	4.700 UJ	4.100 UJ	NCA	NCA
PHENANTHRENE	0.550	0.054 J	1.600 J	1.800 J	1.300 J	0.900 J	0.810 J	0.225	1.38
PHENOL	0.470 U	0.430 U	1.400 UJ	1.800 UJ	1.200 UJ	0.940 UJ	0.820 UJ	NCA	NCA
PYRENE	0.610	0.085 J	2.300 J	3.600 J	2.800 J	1.400 J	0.960 J	0.35	2.2
TOTAL PAHs (NOAA) (4)	1.804	0.525	19.320	28.190	21.020	10.349	7.358	4	35

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) Total PAHs for Freshwater/Estuarine sediment samples were calculated from the lists provided in Appendix F.

TABLE 4-8
SVOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 4 DITCH						SEDIMENT QUALITY CRITERIA (3)	
	SD-0401	SD-0402	SD-0403	SD-0404	SD-0405	SD-0406	Ontario LEL	Ontario SEL (Based on TOC) (4)
2,4-DIMETHYLPHENOL	1.900 UJ	1.600 UJ	1.000 UJ	0.640 U	0.630 U	0.820 UJ	NCA	NCA
2-METHYLNAPHTHALENE	1.900 UJ	1.600 UJ	1.000 UJ	0.640 U	0.630 U	0.820 UJ	NCA	NCA
2-METHYLPHENOL (O-CRESOL)	1.900 UJ	1.600 UJ	1.000 UJ	0.640 U	0.630 U	0.820 UJ	NCA	NCA
4-METHYLPHENOL	1.900 UJ	1.600 UJ	1.000 UJ	0.640 U	0.630 U	0.820 UJ	NCA	NCA
ACENAPHTHENE	1.900 UJ	1.600 UJ	1.000 UJ	0.640 U	0.630 U	0.820 UJ	NCA	NCA
ACENAPTHYLENE	1.900 UJ	1.600 UJ	0.230 J	0.640 U	0.630 U	0.820 UJ	NCA	NCA
ANTHRACENE	1.900 UJ	1.600 UJ	0.420 J	0.640 U	0.096 J	0.820 UJ	0.220	370
BENZO(A)ANTHRACENE	1.900 UJ	1.600 UJ	1.500 J	0.640 U	0.230 J	0.820 UJ	0.320	1480
BENZO(A)PYRENE	1.900 UJ	0.260 J	1.100 J	0.640 U	0.220 J	0.820 UJ	0.370	1440
BENZO(B)FLUORANTHRENE	1.900 UJ	0.390 J	1.700 J	0.640 U	0.230 J	0.820 UJ	NCA	NCA
BENZO(GHI)PERYLENE	1.900 UJ	1.600 UJ	0.770 J	0.640 U	0.150 J	0.820 UJ	0.170	320
BENZO(K)FLUORANTHRENE	1.900 UJ	0.370 J	1.600 J	0.640 U	0.240 J	0.820 UJ	0.240	1340
BENZYL BUTYL PHTHALATE	1.900 UJ	1.600 UJ	1.000 UJ	0.640 U	0.630 U	0.820 UJ	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	0.380 J	1.600 UJ	0.340 J	0.170 J	0.630 U	0.820 UJ	NCA	NCA
CARBAZOLE	1.900 UJ	1.600 UJ	1.000 UJ	0.640 U	0.630 U	0.820 UJ	NCA	NCA
CHRYSENE	1.900 UJ	1.600 UJ	1.800 J	0.640 U	0.320 J	0.820 UJ	0.340	460
DI-N-OCTYL PHTHALATE	1.900 UJ	1.600 UJ	1.000 UJ	0.640 U	0.630 U	0.820 UJ	NCA	NCA
DIBENZO(A,H)ANTHRACENE	1.900 UJ	1.600 UJ	0.270 J	0.640 U	0.630 U	0.820 UJ	0.060	130
DIBENZOFURAN	1.900 UJ	1.600 UJ	1.000 UJ	0.640 U	0.630 U	0.820 UJ	NCA	NCA
DIMETHYL PHTHALATE	1.900 UJ	1.600 UJ	1.000 UJ	0.640 U	0.630 U	0.820 UJ	NCA	NCA
FLUORANTHRENE	0.790 J	0.770 J	3.000 J	0.230 J	0.560 J	0.390 J	0.750	1020
FLUORENE	1.900 UJ	1.600 UJ	1.000 UJ	0.640 U	0.630 U	0.820 UJ	0.190	160
INDENO(1,2,3-C,D)PYRENE	1.900 UJ	1.600 UJ	0.750 J	0.640 U	0.130 J	0.820 UJ	0.200	320
NAPHTHALENE	1.900 UJ	1.600 UJ	1.000 UJ	0.640 U	0.630 U	0.820 UJ	NCA	NCA
PENTACHLOROPHENOL	9.300 UJ	7.800 UJ	5.000 UJ	3.200 U	3.100 U	4.100 UJ	NCA	NCA
PHENANTHRENE	1.900 UJ	0.350 J	0.790 J	0.640 U	0.370 J	0.160 J	0.560	950
PHENOL	1.900 UJ	1.600 UJ	1.000 UJ	0.640 U	0.630 U	0.820 UJ	NCA	NCA
PYRENE	0.780 J	0.790 J	2.800 J	0.220 J	0.520 J	0.400 J	0.490	850
TOTAL PAHs (Ontario) (5)	1.570	2.540	14.830	0.450	2.836	0.950	4	10000

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.
(5) Total PAHs for Freshwater/Estuarine sediment samples were calculated from the lists provided in Appendix F.

TABLE 4-8
SVOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 5 POND				BLACK DITCH			SEDIMENT QUALITY CRITERIA (3)	
	SD-0501	SD-0502	SD-0503	SD-0504	SD-0407	SD-0408	SD-0505	Ontario LEL	Ontario SEL (Based on TOC) (4)
2,4-DIMETHYLPHENOL	0.760 UJ	1.300 UJ	0.760 UJ	0.980 UJ	0.410 U	0.480 U	0.390 U	NCA	NCA
2-METHYLNAPHTHALENE	0.760 UJ	1.300 UJ	0.760 UJ	0.980 UJ	0.410 U	0.480 U	0.390 U	NCA	NCA
2-METHYLPHENOL (O-CRESOL)	0.760 UJ	1.300 UJ	0.760 UJ	0.980 UJ	0.410 U	0.480 U	0.390 U	NCA	NCA
4-METHYLPHENOL	0.760 UJ	1.300 UJ	0.760 UJ	0.980 UJ	0.410 U	0.480 U	0.390 U	NCA	NCA
ACENAPHTHENE	0.760 UJ	1.300 UJ	0.760 UJ	0.980 UJ	0.410 U	0.480 U	0.390 U	NCA	NCA
ACENAPTHYLENE	0.760 UJ	1.300 UJ	0.760 UJ	0.980 UJ	0.410 U	0.480 U	0.390 U	NCA	NCA
ANTHRACENE	0.760 UJ	1.300 UJ	0.760 UJ	0.980 UJ	0.410 U	0.067 J	0.390 U	0.220	370
BENZO(A)ANTHRACENE	0.200 J	0.350 J	0.220 J	0.270 J	0.410 U	0.260 J	0.390 U	0.320	1480
BENZO(A)PYRENE	0.230 J	0.530 J	0.280 J	0.370 J	0.410 U	0.310 J	0.390 U	0.370	1440
BENZO(B)FLUORANTHRENE	0.210 J	0.550 J	0.290 J	0.340 J	0.410 U	0.220 J	0.390 U	NCA	NCA
BENZO(GHI)PERYLENE	0.760 UJ	1.300 UJ	0.760 UJ	0.980 UJ	0.410 U	0.480 U	0.390 U	0.170	320
BENZO(K)FLUORANTHRENE	0.140 J	0.480 J	0.280 J	0.360 J	0.410 U	0.210 J	0.044 J	0.240	1340
BENZYL BUTYL PHTHALATE	0.760 UJ	1.300 UJ	0.760 UJ	0.980 UJ	0.410 U	0.084 J	0.390 U	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	0.760 U	1.300 U	0.760 U	0.980 U	0.410 U	0.480 U	0.390 U	NCA	NCA
CARBAZOLE	0.760 UJ	1.300 UJ	0.760 UJ	0.980 UJ	0.410 U	0.480 U	0.390 U	NCA	NCA
CHRYSENE	0.320 J	0.560 J	0.400 J	0.390 J	0.410 U	0.420 J	0.059 J	0.340	460
DI-N-OCTYL PHTHALATE	0.760 UJ	1.300 UJ	0.760 UJ	0.980 UJ	0.410 U	0.480 U	0.390 U	NCA	NCA
DIBENZO(A,H)ANTHRACENE	0.760 UJ	1.300 UJ	0.760 UJ	0.980 UJ	0.410 U	0.480 U	0.390 U	0.060	130
DIBENZOFURAN	0.760 UJ	1.300 UJ	0.760 UJ	0.980 UJ	0.410 U	0.480 U	0.390 U	NCA	NCA
DIMETHYL PHTHALATE	0.760 UJ	1.300 UJ	0.760 UJ	0.980 UJ	0.410 U	0.480 U	0.390 U	NCA	NCA
FLUORANTHRENE	0.390 J	0.700 J	0.450 J	0.580 J	0.410 U	0.460 J	0.046 J	0.750	1020
FLUORENE	0.760 UJ	1.300 UJ	0.760 UJ	0.980 UJ	0.410 U	0.480 U	0.390 U	0.190	160
INDENO(1,2,3-C,D)PYRENE	0.760 UJ	1.300 UJ	0.760 UJ	0.980 UJ	0.410 U	0.480 U	0.390 U	0.200	320
NAPHTHALENE	0.760 UJ	1.300 UJ	0.760 UJ	0.980 UJ	0.410 U	0.480 U	0.390 U	NCA	NCA
PENTACHLOROPHENOL	3.800 UJ	6.600 UJ	3.800 UJ	4.900 UJ	2.000 U	2.400 U	1.900 U	NCA	NCA
PHENANTHRENE	0.170 J	0.230 J	0.200 J	0.230 J	0.410 U	0.350 J	0.390 U	0.560	950
PHENOL	0.760 UJ	1.300 UJ	0.760 UJ	0.980 UJ	0.410 U	0.480 U	0.390 U	NCA	NCA
PYRENE	0.330 J	0.800 J	0.380 J	0.480 J	0.410 U	0.490	0.051 J	0.490	850
TOTAL PAHs (Ontario) (5)	1.780	3.650	2.210	2.700	ND	2.567	0.200	4	10000

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.
(5) Total PAHs for Freshwater/Estuarine sediment samples were calculated from the lists provided in Appendix F.

TABLE 4-8
SVOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	RED ROOT CREEK								SEDIMENT QUALITY CRITERIA (3)	
	SD-0601	SD-0603	SD-0604	SD-0605	SD-0606	SD-0607	SD-0608	SD-0609	NOAA ER-L	NOAA ER-M
2,4-DIMETHYLPHENOL	1.600 UJ	0.820 UJ	1.900 UJ	1.000 UJ	1.100 UJ	1.400 UJ	0.830 UJ	1.000 UJ	NCA	NCA
2-METHYLNAPHTHALENE	1.600 UJ	0.820 UJ	1.900 UJ	1.000 UJ	1.100 UJ	1.400 UJ	0.830 UJ	1.000 UJ	0.065	0.67
2-METHYLPHENOL (O-CRESOL)	1.600 UJ	0.820 UJ	1.900 UJ	1.000 UJ	1.100 UJ	1.400 UJ	0.830 UJ	1.000 UJ	NCA	NCA
4-METHYLPHENOL	1.600 UJ	0.820 UJ	1.900 UJ	1.000 UJ	1.100 UJ	1.400 UJ	0.830 UJ	1.000 UJ	NCA	NCA
ACENAPHTHENE	1.600 UJ	0.180 J	1.900 UJ	1.000 UJ	1.100 UJ	0.260 J	0.830 UJ	1.000 UJ	0.15	0.65
ACENAPTHYLENE	1.600 UJ	0.150 J	1.900 UJ	1.000 UJ	0.150 J	1.400 UJ	0.830 UJ	1.000 UJ	NCA	NCA
ANTHRACENE	1.600 UJ	0.250 J	1.900 UJ	1.000 UJ	0.130 J	0.420 J	0.830 UJ	1.000 UJ	0.085	0.96
BENZO(A)ANTHRACENE	0.410 J	0.740 J	0.470 J	0.230 J	0.520 J	1.500 J	0.290 J	1.000 UJ	0.23	1.6
BENZO(A)PYRENE	0.400 J	0.640 J	0.540 J	0.270 J	0.440 J	2.000 J	0.290 J	1.000 UJ	0.4	2.5
BENZO(B)FLUORANTHRENE	0.540 J	0.750 J	0.520 J	0.210 J	0.550 J	2.200 J	0.340 J	1.000 UJ	NCA	NCA
BENZO(GHI)PERYLENE	1.600 UJ	0.190 J	0.560 J	0.190 J	0.290 J	0.610 J	0.830 UJ	1.000 UJ	NCA	NCA
BENZO(K)FLUORANTHRENE	0.440 J	1.100 J	0.560 J	0.260 J	0.810 J	2.500 J	0.350 J	1.000 UJ	NCA	NCA
BENZYL BUTYL PHTHALATE	1.600 UJ	0.820 UJ	1.900 UJ	1.000 UJ	1.100 UJ	0.150 J	0.830 UJ	1.000 UJ	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	1.600 UJ	8.100 J	2.100 U	1.000 U	1.100 U	5.300 J	2.600 J	2.000 U	NCA	NCA
CARBAZOLE	1.600 UJ	0.820 UJ	1.900 UJ	1.000 UJ	1.100 UJ	1.400 UJ	0.830 UJ	1.000 UJ	NCA	NCA
CHRYSENE	0.650 J	1.100 J	0.730 J	0.340 J	0.800 J	2.200 J	0.390 J	1.000 UJ	0.4	2.8
DI-N-OCTYL PHTHALATE	1.600 UJ	0.200 J	1.900 UJ	1.000 UJ	1.100 UJ	0.350 J	0.830 UJ	1.000 UJ	NCA	NCA
DIBENZO(A,H)ANTHRACENE	1.600 UJ	0.820 UJ	0.220 J	1.000 UJ	1.100 UJ	0.250 J	0.830 UJ	1.000 UJ	0.06	0.26
DIBENZOFURAN	1.600 UJ	0.820 UJ	1.900 UJ	1.000 UJ	1.100 UJ	1.400 UJ	0.830 UJ	1.000 UJ	NCA	NCA
DIMETHYL PHTHALATE	1.600 UJ	0.820 UJ	1.900 UJ	1.000 UJ	1.100 UJ	1.400 UJ	0.830 UJ	1.000 UJ	NCA	NCA
FLUORANTHRENE	1.100 J	1.400 J	0.800 J	0.360 J	0.820 J	2.600 J	0.680 J	0.420 J	0.6	3.6
FLUORENE	1.600 UJ	0.200 J	1.900 UJ	1.000 UJ	1.100 UJ	0.560 J	0.830 UJ	1.000 UJ	0.035	0.64
INDENO(1,2,3-C,D)PYRENE	1.600 UJ	0.280 J	0.510 J	0.180 J	0.300 J	0.750 J	0.830 UJ	1.000 UJ	NCA	NCA
NAPHTHALENE	1.600 UJ	0.820 UJ	1.900 UJ	1.000 UJ	1.100 UJ	1.400 UJ	0.830 UJ	1.000 UJ	0.34	2.1
PENTACHLOROPHENOL	8.000 UJ	4.100 UJ	9.700 UJ	5.100 UJ	5.400 UJ	6.900 UJ	4.200 UJ	5.000 UJ	NCA	NCA
PHENANTHRENE	0.540 J	0.650 J	0.330 J	0.150 J	0.310 J	1.000 J	0.160 J	1.000 UJ	0.225	1.38
PHENOL	1.600 UJ	0.820 UJ	1.900 UJ	1.000 UJ	1.100 UJ	1.400 UJ	0.830 UJ	1.000 UJ	NCA	NCA
PYRENE	1.100 J	1.600 J	0.710 J	0.320 J	0.540 J	1.700 J	0.400 J	0.440 J	0.35	2.2
TOTAL PAHs (NOAA) (4)	5.180	9.430	5.950	2.510	5.660	18.550	2.900	0.860	4	35

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) Total PAHs for Freshwater/Estuarine sediment samples were calculated from the lists provided in Appendix F.

TABLE 4-8
SVOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 20 DITCH		AREA 18B STREAM						SEDIMENT QUALITY CRITERIA (3)	
	SD-2001	SD-2002	SD-1803	SD-1804	SD-1805	SD-1806	SD-1807	SD-1808	Ontario LEL	Ontario SEL (Based on TOC) (4)
2,4-DIMETHYLPHENOL	0.490 U	0.470 U	0.350 J	47.000 U	0.460 U	0.460 U	1.400 UJ	0.410 U	NCA	NCA
2-METHYLNAPHTHALENE	0.490 U	0.470 U	24.000	30.000 J	0.680	0.460 U	1.400 UJ	0.410 U	NCA	NCA
2-METHYLPHENOL (O-CRESOL)	0.490 U	0.470 U	0.240 J	47.000 U	0.460 U	0.460 U	1.400 UJ	0.410 U	NCA	NCA
4-METHYLPHENOL	0.490 U	0.470 U	0.890 J	47.000 U	0.460 U	0.460 U	1.400 UJ	0.410 U	NCA	NCA
ACENAPHTHENE	0.490 U	0.470 U	110.000	110.000	3.000	0.120 J	1.400 UJ	0.410 U	NCA	NCA
ACENAPTHYLENE	0.490 U	0.470 U	3.400	47.000 U	0.460 U	0.460 U	1.400 UJ	0.410 U	NCA	NCA
ANTHRACENE	0.490 U	0.470 U	280.000	230.000	6.100	0.330 J	1.400 UJ	0.410 U	0.220	370
BENZO(A)ANTHRACENE	0.049 J	0.470 U	380.000	410.000	22.000	2.200	1.400 UJ	0.410 U	0.320	1450
BENZO(A)PYRENE	0.490 U	0.470 U	300.000	320.000	4.900	2.200	1.400 UJ	0.410 U	0.370	1440
BENZO(B)FLUORANTHRENE	0.059 J	0.470 U	400.000	450.000	23.000	4.700	1.400 UJ	0.095 J	NCA	NCA
BENZO(GHI)PERYLENE	0.490 U	0.470 U	240.000	150.000	10.000	0.810	1.400 UJ	0.410 U	0.170	320
BENZO(K)FLUORANTHRENE	0.055 J	0.470 U	49.000	150.000	3.700	0.730	1.400 UJ	0.410 U	0.240	1340
BENZYL BUTYL PHTHALATE	0.490 U	0.470 U	2.100 U	47.000 U	0.460 U	0.460 U	1.400 UJ	0.410 U	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	0.490 U	0.470 U	2.200	47.000 U	0.460 U	0.460 U	1.400 UJ	0.410 U	NCA	NCA
CARBAZOLE	0.490 U	0.470 U	260.000	160.000	5.800	0.390 J	1.400 UJ	0.410 U	NCA	NCA
CHRYSENE	0.069 J	0.470 U	400.000	400.000	23.000	2.800	1.400 UJ	0.087 J	0.340	460
DI-N-OCTYL PHTHALATE	0.490 U	0.470 U	2.100 U	47.000 U	0.460 U	0.460 U	1.400 UJ	0.410 U	NCA	NCA
DIBENZO(A,H)ANTHRACENE	0.490 U	0.470 U	29.000	10.000 J	3.400	0.170 J	1.400 UJ	0.410 U	0.060	130
DIBENZOFURAN	0.490 U	0.470 U	71.000	72.000	1.600	0.065 J	1.400 UJ	0.410 U	NCA	NCA
DIMETHYL PHTHALATE	0.490 U	0.470 U	2.100 U	47.000 U	0.460 U	0.460 U	1.400 UJ	0.410 U	NCA	NCA
FLUORANTHRENE	0.095 J	0.470 U	820.000	1100.000	46.000	4.500	1.400 UJ	0.130 J	0.750	1020
FLUORENE	0.490 U	0.470 U	97.000	98.000	2.900	0.120 J	1.400 UJ	0.410 U	0.190	160
INDENO(1,2,3-C,D)PYRENE	0.490 U	0.470 U	220.000	150.000	11.000	0.930	1.400 UJ	0.410 U	0.200	320
NAPHTHALENE	0.490 U	0.470 U	82.000	81.000	1.300	0.460 U	1.400 UJ	0.410 U	NCA	NCA
PENTACHLOROPHENOL	2.400 U	2.300 U	11.000 U	230.000 U	2.300 U	2.300 U	6.800 UJ	2.100 U	NCA	NCA
PHENANTHRENE	0.051 J	0.470 U	760.000	880.000	30.000	1.900	1.400 UJ	0.410 U	0.560	850
PHENOL	0.490 U	0.470 U	0.620 J	47.000 U	0.460 U	0.460 U	1.400 UJ	0.410 U	NCA	NCA
PYRENE	0.096 J	0.470 U	740.000	810.000	34.000	3.900	1.400 UJ	0.120 J	0.490	850
TOTAL PAHs (Ontario) (5)	0.415	ND	4510.400	4909.000	201.300	20.710	ND	0.337	4	10000

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.
(5) Total PAHs for Freshwater/Estuarine sediment samples were calculated from the lists provided in Appendix F.

TABLE 4-8
SVOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 18B STREAM (CONT.)		AREA 18C STREAM						SEDIMENT QUALITY CRITERIA (3)	
	SD-1809	SD-1818 (Duplicate of SD-1809)	SD-1810	SD-1811	SD-1812	SD-1813	SD-1814	SD-1815	Ontario LEL	Ontario SEL (Based on TOC) (4)
2,4-DIMETHYLPHENOL	0.410 U	0.400 U	0.400 U	0.470 U	0.410 U	0.540 U	0.430 U	0.430 U	NCA	NCA
2-METHYLNAPHTHALENE	0.410 U	0.400 U	0.340 J	0.100 J	0.090 J	0.190 J	0.430 U	0.500	NCA	NCA
2-METHYLPHENOL (O-CRESOL)	0.410 U	0.400 U	0.400 U	0.470 U	0.410 U	0.540 U	0.430 U	0.430 U	NCA	NCA
4-METHYLPHENOL	0.410 U	0.400 U	0.400 U	0.470 U	0.410 U	0.540 U	0.430 U	0.430 U	NCA	NCA
ACENAPHTHENE	0.410 U	0.400 U	1.100	0.420 J	0.330 J	0.780	0.430 U	1.200	NCA	NCA
ACENAPTHYLENE	0.410 U	0.400 U	0.640	0.480	0.410 U	0.260 J	0.430 U	0.480	NCA	NCA
ANTHRACENE	0.410 U	0.400 U	2.800	1.300	0.430	1.500	0.430 U	2.100	0.220	370
BENZO(A)ANTHRACENE	0.170 J	0.076 J	6.400	2.700	1.200	2.500	0.430 U	4.500	0.320	1480
BENZO(A)PYRENE	0.170 J	0.098 J	4.700	2.600	1.100	2.100	0.430 U	3.400	0.370	1440
BENZO(B)FLUORANTHRENE	0.240 J	0.110 J	4.400	3.800	1.600	3.300	0.430 U	5.100	NCA	NCA
BENZO(GHI)PERYLENE	0.130 J	0.140 J	2.500	1.300	0.500	0.920	0.430 U	1.600	0.170	320
BENZO(K)FLUORANTHRENE	0.090 J	0.056 J	0.920	0.480	0.160 J	0.350 J	0.430 U	0.550	0.240	1340
BENZYL BUTYL PHTHALATE	0.410 U	0.400 U	0.400 U	0.470 U	0.410 U	0.540 U	0.430 U	8.500	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	0.410 U	0.400 U	0.220 J	0.230 J	0.210 J	0.250 J	0.430 U	1.500	NCA	NCA
CARBAZOLE	0.410 U	0.400 U	2.000	0.710	0.480	1.400	0.430 U	2.500	NCA	NCA
CHRYSENE	0.180 J	0.100 J	5.000	2.700	1.200	2.900	0.430 U	4.200	0.340	460
DI-N-OCTYL PHTHALATE	0.410 U	0.400 U	0.400 U	0.470 U	0.410 U	0.540 U	0.430 U	0.430 U	NCA	NCA
DIBENZO(A,H)ANTHRACENE	0.410 U	0.400 U	0.580	0.290 J	0.094 J	0.210 J	0.430 U	0.410 J	0.060	130
DIBENZOFURAN	0.410 U	0.400 U	0.910	0.300 J	0.220 J	0.710	0.430 U	1.400	NCA	NCA
DIMETHYL PHTHALATE	0.410 U	0.400 U	0.400 U	0.470 U	0.410 U	0.540 U	0.430 U	0.430 U	NCA	NCA
FLUORANTHRENE	0.290 J	0.140 J	8.200	5.800	3.100	6.700	0.430 U	7.800	0.750	1020
FLUORENE	0.410 U	0.400 U	1.300	0.470	0.290 J	0.980	0.430 U	1.200	0.190	160
INDENO(1,2,3-C,D)PYRENE	0.130 J	0.400 U	2.500	1.300	0.500	0.890	0.430 U	1.600	0.200	320
NAPHTHALENE	0.410 U	0.400 U	0.900	0.230 J	0.170 J	0.280 J	0.430 U	0.950	NCA	NCA
PENTACHLOROPHENOL	2.000 U	2.000 U	2.000 U	2.300 U	2.000 U	2.700 U	2.100 U	2.200 U	NCA	NCA
PHENANTHRENE	0.140 J	0.400 U	6.800	4.500	2.900	6.000	0.430 U	9.100	0.560	950
PHENOL	0.410 U	0.400 U	0.400 U	0.470 U	0.410 U	0.540 U	0.430 U	0.430 U	NCA	NCA
PYRENE	0.280 J	0.140 J	6.500	4.400	2.200	4.700	0.430 U	5.600	0.490	850
TOTAL PAHs (Ontario) (5)	1.580	0.748	50.840	28.970	14.174	33.070	ND	44.690	4	10000

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.
(5) Total PAHs for Freshwater/Estuarine sediment samples were calculated from the lists provided in Appendix F.

TABLE 4-8
SVOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 18C STREAM (CONT.)		LOWER AREA 18B STREAM				AREA 8 POND		SEDIMENT QUALITY CRITERIA (3)	
	SD-1816	SD-1817	SD-0101	SD-0102	SD-0103	SD-0104	SD-0801	SD-0802	Ontario LEL	Ontario SEL (Based on TOC) (4)
2,4-DIMETHYLPHENOL	0.400 U	0.400 U	0.380 U	0.380 U	0.390 U	0.400 U	1.600 UJ	2.400 UJ	NCA	NCA
2-METHYLNAPHTHALENE	0.400 U	0.400 U	0.380 U	0.380 U	0.390 U	0.400 U	1.600 UJ	2.400 UJ	NCA	NCA
2-METHYLPHENOL (O-CRESOL)	0.400 U	0.400 U	0.380 U	0.380 U	0.390 U	0.400 U	1.600 UJ	2.400 UJ	NCA	NCA
4-METHYLPHENOL	0.400 U	0.400 U	0.380 U	0.380 U	0.390 U	0.400 U	1.600 UJ	2.400 UJ	NCA	NCA
ACENAPHTHENE	0.400 U	0.400 U	0.380 U	0.380 U	0.390 U	0.400 U	1.600 UJ	2.400 UJ	NCA	NCA
ACENAPTHYLENE	0.400 U	0.400 U	0.380 U	0.380 U	0.390 U	0.400 U	1.600 UJ	2.400 UJ	NCA	NCA
ANTHRACENE	0.400 U	0.400 U	0.380 U	0.380 U	0.390 U	0.400 U	0.210 J	2.400 UJ	0.220	370
BENZO(A)ANTHRACENE	0.400 U	0.400 U	0.190 J	0.064 J	0.390 U	0.400 U	2.000 J	0.660 J	0.320	1480
BENZO(A)PYRENE	0.400 U	0.400 U	0.190 J	0.070 J	0.390 U	0.400 U	2.500 J	0.880 J	0.370	1440
BENZO(B)FLUORANTHRENE	0.400 U	0.400 U	0.210 J	0.073 J	0.390 U	0.400 U	3.200 J	1.000 J	NCA	NCA
BENZO(GHI)PERYLENE	0.400 U	0.400 U	0.160 J	0.055 J	0.390 U	0.400 U	3.200 J	2.400 UJ	0.170	320
BENZO(K)FLUORANTHRENE	0.400 U	0.400 U	0.210 J	0.082 J	0.390 U	0.400 U	0.870 J	0.610 J	0.240	1340
BENZYL BUTYL PHTHALATE	0.400 U	0.400 U	0.380 U	0.380 U	0.390 U	0.400 U	1.600 UJ	2.400 UJ	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	0.400 U	0.400 U	0.380 U	0.380 U	0.390 U	0.400 U	2.500 J	0.850 J	NCA	NCA
CARBAZOLE	0.400 U	0.400 U	0.380 U	0.380 U	0.390 U	0.400 U	1.600 UJ	2.400 UJ	NCA	NCA
CHRYSENE	0.400 U	0.400 U	0.280 J	0.097 J	0.390 U	0.400 U	2.800 J	0.990 J	0.340	460
DI-N-OCTYL PHTHALATE	0.400 U	0.400 U	0.380 U	0.380 U	0.390 U	0.400 U	1.600 UJ	2.400 UJ	NCA	NCA
DIBENZO(A,H)ANTHRACENE	0.400 U	0.400 U	0.044 J	0.380 U	0.390 U	0.400 U	1.600 UJ	2.400 UJ	0.060	130
DIBENZOFURAN	0.400 U	0.400 U	0.380 U	0.380 U	0.390 U	0.400 U	1.600 UJ	2.400 UJ	NCA	NCA
DIMETHYL PHTHALATE	0.400 U	0.400 U	0.380 U	0.380 U	0.390 U	0.400 U	1.600 UJ	2.400 UJ	NCA	NCA
FLUORANTHRENE	0.400 U	0.400 U	0.460	0.160 J	0.056 J	0.400 U	2.500 J	1.400 J	0.750	1020
FLUORENE	0.400 U	0.400 U	0.380 U	0.380 U	0.390 U	0.400 U	1.600 UJ	2.400 UJ	0.190	160
INDENO(1,2,3-C,D)PYRENE	0.400 U	0.400 U	0.150 J	0.055 J	0.390 U	0.400 U	3.200 J	0.980 J	0.200	320
NAPHTHALENE	0.400 U	0.400 U	0.380 U	0.380 U	0.390 U	0.400 U	1.600 UJ	2.400 UJ	NCA	NCA
PENTACHLOROPHENOL	2.000 U	2.000 U	1.900 U	1.900 U	1.900 U	2.000 U	8.100 UJ	12.000 UJ	NCA	NCA
PHENANTHRENE	0.400 U	0.400 U	0.190 J	0.059 J	0.390 U	0.400 U	1.500 J	0.460 J	0.560	950
PHENOL	0.400 U	0.400 U	0.380 U	0.380 U	0.390 U	0.400 U	1.600 UJ	2.400 UJ	NCA	NCA
PYRENE	0.400 U	0.400 U	0.410	0.140 J	0.051 J	0.400 U	9.600 J	3.000 J	0.490	850
TOTAL PAHs (Ontario) (5)	ND	ND	2.284	0.782	0.107	ND	28.380	8.960	4	10000

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.
(5) Total PAHs for Freshwater/Estuarine sediment samples were calculated from the lists provided in Appendix F.

TABLE 4-8
SVOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 8 POND (CONT.)					RED ROOT CREEK	SULFER PLANT PONDS		SEDIMENT QUALITY CRITERIA (3)	
	SD-0803	SD-0804	SD-0805	SD-0806	SD-0807 (Duplicate of SD-0801)	SD-0602	SD-0610	SD-0611	Ontario LEL	Ontario SEL (Based on TOC) (4)
2,4-DIMETHYLPHENOL	1.100 UJ	0.490 U	0.490 U	0.870 UJ	1.700 UJ	2.700 UJ	0.910 UJ	0.620 U	NCA	NCA
2-METHYLNAPHTHALENE	1.100 UJ	0.490 U	0.490 U	0.870 UJ	1.700 UJ	2.700 UJ	0.910 UJ	0.620 U	NCA	NCA
2-METHYLPHENOL (O-CRESOL)	1.100 UJ	0.490 U	0.490 U	0.870 UJ	1.700 UJ	2.700 UJ	0.910 UJ	0.620 U	NCA	NCA
4-METHYLPHENOL	1.100 UJ	0.490 U	0.490 U	0.870 UJ	1.700 UJ	2.700 UJ	0.910 UJ	0.620 U	NCA	NCA
ACENAPHTHENE	1.100 UJ	0.490 U	0.049 J	0.870 UJ	1.700 UJ	2.700 UJ	0.910 UJ	0.620 U	NCA	NCA
ACENAPTHYLENE	1.100 UJ	0.490 U	0.490 U	0.870 UJ	1.700 UJ	2.700 UJ	0.910 UJ	0.620 U	NCA	NCA
ANTHRACENE	1.100 UJ	0.490 U	0.130 J	0.870 UJ	0.180 J	2.700 UJ	0.910 UJ	0.620 U	0.220	370
BENZO(A)ANTHRACENE	0.170 J	0.490 U	0.320 J	0.160 J	2.000 J	2.700 UJ	0.910 UJ	0.620 U	0.320	1480
BENZO(A)PYRENE	1.100 UJ	0.490 U	0.330 J	0.870 UJ	2.900 J	2.700 UJ	0.910 UJ	0.620 U	0.370	1440
BENZO(B)FLUORANTHRENE	1.100 UJ	0.490 U	0.420 J	0.190 J	3.300 J	2.700 UJ	0.910 UJ	0.620 U	NCA	NCA
BENZO(GHI)PERYLENE	1.100 UJ	0.490 U	0.490 U	0.870 UJ	4.300 J	2.700 UJ	0.910 UJ	0.620 U	0.170	320
BENZO(K)FLUORANTHRENE	1.100 UJ	0.490 U	0.220 J	0.870 UJ	1.300 J	2.700 UJ	0.910 UJ	0.620 U	0.240	1340
BENZYL BUTYL PHTHALATE	1.100 UJ	0.490 U	0.490 U	0.870 UJ	1.700 UJ	2.700 UJ	0.910 UJ	0.620 U	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	0.280 J	0.085 J	0.490 U	0.870 UJ	3.200 J	2.700 UJ	0.910 U	0.620 U	NCA	NCA
CARBAZOLE	1.100 UJ	0.490 U	0.069 J	0.870 UJ	0.210 J	2.700 UJ	0.910 UJ	0.620 U	NCA	NCA
CHRYSENE	0.210 J	0.490 U	0.330 J	0.190 J	3.200 J	2.700 UJ	0.910 UJ	0.620 U	0.340	460
DI-N-OCTYL PHTHALATE	1.100 UJ	0.490 U	0.490 U	0.870 UJ	1.700 UJ	2.700 UJ	0.910 UJ	0.620 U	NCA	NCA
DIBENZO(A,H)ANTHRACENE	1.100 UJ	0.490 U	0.490 U	0.870 UJ	1.700 UJ	2.700 UJ	0.910 UJ	0.620 U	0.060	130
DIBENZOFURAN	1.100 UJ	0.490 U	0.490 U	0.870 UJ	1.700 UJ	2.700 UJ	0.910 UJ	0.620 U	NCA	NCA
DIMETHYL PHTHALATE	1.100 UJ	0.490 U	0.490 U	0.870 UJ	1.700 UJ	2.700 UJ	0.910 UJ	0.620 U	NCA	NCA
FLUORANTHRENE	0.340 J	0.058 J	0.790	0.290 J	2.300 J	2.700 UJ	0.560 J	0.620 U	0.750	1020
FLUORENE	1.100 UJ	0.490 U	0.490 U	0.870 UJ	1.700 UJ	2.700 UJ	0.910 UJ	0.620 U	0.190	160
INDENO(1,2,3-C,D)PYRENE	1.100 UJ	0.490 U	0.490 U	0.870 UJ	4.300 J	2.700 UJ	0.910 UJ	0.620 U	0.200	320
NAPHTHALENE	1.100 UJ	0.490 U	0.490 U	0.870 UJ	1.700 UJ	2.700 UJ	0.910 UJ	0.620 U	NCA	NCA
PENTACHLOROPHENOL	5.600 UJ	2.500 U	2.400 U	4.300 UJ	8.400 UJ	14.000 UJ	4.600 UJ	3.100 U	NCA	NCA
PHENANTHRENE	0.150 J	0.490 U	0.470 J	0.097 J	1.600 J	2.700 UJ	0.370 J	0.620 U	0.560	950
PHENOL	1.100 UJ	0.490 U	0.490 U	0.870 UJ	1.700 UJ	2.700 UJ	0.910 UJ	0.620 U	NCA	NCA
PYRENE	0.830 J	0.110 J	0.690	0.750 J	9.600 J	2.700 UJ	0.520 J	0.620 U	0.490	850
TOTAL PAHs (Ontario) (5)	1.700	0.168	3.329	1.487	31.680	ND	1.450	ND	4	10000

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.
(5) Total PAHs for Freshwater/Estuarine sediment samples were calculated from the lists provided in Appendix F.

TABLE 4-8
SVOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	SULFUR PLANT PONDS (CONT.)				SEDIMENT QUALITY CRITERIA (3)	
	SD-0612	SD-0613	SD-0614	SD-0615	Ontario LEL	Ontario SEL (Based on TOC) (4)
2,4-DIMETHYLPHENOL	0.920 UJ	0.480 U	0.700 UJ	0.770 UJ	NCA	NCA
2-METHYLNAPHTHALENE	0.920 UJ	0.480 U	0.700 UJ	0.770 UJ	NCA	NCA
2-METHYLPHENOL (O-CRESOL)	0.920 UJ	0.480 U	0.700 UJ	0.770 UJ	NCA	NCA
4-METHYLPHENOL	0.920 UJ	0.480 U	0.310 J	0.770 UJ	NCA	NCA
ACENAPHTHENE	0.920 UJ	0.480 U	0.700 UJ	0.770 UJ	NCA	NCA
ACENAPTHYLENE	0.920 UJ	0.480 U	0.700 UJ	0.770 UJ	NCA	NCA
ANTHRACENE	0.920 UJ	0.480 U	0.700 UJ	0.770 UJ	0.220	370
BENZO(A)ANTHRACENE	0.920 UJ	0.480 U	0.240 J	0.510 J	0.320	1480
BENZO(A)PYRENE	0.920 UJ	0.480 U	0.190 J	0.560 J	0.370	1440
BENZO(B)FLUORANTHRENE	0.920 UJ	0.480 U	0.240 J	0.940 J	NCA	NCA
BENZO(GHI)PERYLENE	0.920 UJ	0.480 U	0.190 J	0.400 J	0.170	320
BENZO(K)FLUORANTHRENE	0.920 UJ	0.480 U	0.260 J	0.710 J	0.240	1340
BENZYL BUTYL PHTHALATE	0.920 UJ	0.480 U	0.700 UJ	0.770 UJ	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	0.920 UJ	0.480 U	0.700 U	1.100 U	NCA	NCA
CARBAZOLE	0.920 UJ	0.480 U	0.700 UJ	0.770 UJ	NCA	NCA
CHRYSENE	0.920 UJ	0.480 U	0.360 J	1.100 J	0.340	460
DI-N-OCTYL PHTHALATE	0.920 UJ	0.480 U	0.700 UJ	0.770 UJ	NCA	NCA
DIBENZO(A,H)ANTHRACENE	0.920 UJ	0.480 U	0.700 UJ	0.770 UJ	0.060	130
DIBENZOFURAN	0.920 UJ	0.480 U	0.700 UJ	0.770 UJ	NCA	NCA
DIMETHYL PHTHALATE	0.920 UJ	0.480 U	0.700 UJ	0.770 UJ	NCA	NCA
FLUORANTHRENE	0.240 J	0.069 J	0.340 J	0.990 J	0.750	1020
FLUORENE	0.920 UJ	0.480 U	0.700 UJ	0.770 UJ	0.190	160
INDENO(1,2,3-C,D)PYRENE	0.920 UJ	0.480 U	0.170 J	0.360 J	0.200	320
NAPHTHALENE	0.290 J	0.480 U	0.700 UJ	0.770 UJ	NCA	NCA
PENTACHLOROPHENOL	4.600 UJ	2.400 U	3.500 UJ	3.900 UJ	NCA	NCA
PHENANTHRENE	0.920 UJ	0.480 U	0.190 J	0.270 J	0.560	950
PHENOL	0.920 UJ	0.065 J	0.700 UJ	0.770 UJ	NCA	NCA
PYRENE	0.240 J	0.083 J	0.410 J	1.000 J	0.490	850
TOTAL PAHs (Ontario) (5)	0.770	0.152	2.350	5.900	4	10000

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.
(5) Total PAHs for Freshwater/Estuarine sediment samples were calculated from the lists provided in Appendix F.

TABLE 4-8
SVOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

CENTRAL DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	CENTRAL DITCH				ISOLATED ESTUARINE PONDS		UPGRADIENT PONDED AREA	SEDIMENT QUALITY CRITERIA (3)	
	SD-1101	SD-1102	SD-1103	SD-1104	SD-1622	SD-1625	SD-1624	NOAA ER-L	NOAA ER-M
2,4-DIMETHYLPHENOL	0.640 U	0.650 U	0.420 U	0.490 U	0.700 UJ	2.100 UJ	0.580 U	NCA	NCA
2-METHYLNAPHTHALENE	0.640 U	0.650 U	0.420 U	0.053 J	0.700 UJ	2.100 UJ	0.580 U	0.065	0.67
2-METHYLPHENOL (O-CRESOL)	0.640 U	0.650 U	0.420 U	0.490 U	0.700 UJ	2.100 UJ	0.580 U	NCA	NCA
4-METHYLPHENOL	0.640 U	0.650 U	0.420 U	0.490 U	0.700 UJ	2.100 UJ	1.500	NCA	NCA
ACENAPHTHENE	0.640 U	0.650 U	0.500	0.120 J	0.700 UJ	2.100 UJ	0.580 U	0.15	0.65
ACENAPTHYLENE	0.640 U	0.650 U	0.160 J	0.070 J	0.700 UJ	2.100 UJ	0.580 U	NCA	NCA
ANTHRACENE	0.640 U	0.650 U	1.900	0.320 J	0.700 UJ	2.100 UJ	0.580 U	0.085	0.96
BENZO(A)ANTHRACENE	0.640 U	0.650 U	5.000	0.880	0.360 J	2.100 UJ	0.210 J	0.23	1.6
BENZO(A)PYRENE	0.210 J	0.650 U	4.000	0.650	0.470 J	2.100 UJ	0.180 J	0.4	2.5
BENZO(B)FLUORANTHRENE	0.640 U	0.085 J	6.500	0.990	0.580 J	0.290 J	0.300 J	NCA	NCA
BENZO(GHI)PERYLENE	0.640 U	0.650 U	1.400	0.210 J	0.700 UJ	2.100 UJ	0.580 U	NCA	NCA
BENZO(K)FLUORANTHRENE	0.640 U	0.650 U	2.300	0.350 J	0.270 J	2.100 UJ	0.190 J	NCA	NCA
BENZYL BUTYL PHTHALATE	0.640 U	0.650 U	0.420 U	0.490 U	0.700 UJ	2.100 UJ	0.580 U	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	0.640 U	0.650 U	12.000	0.310 J	0.700 UJ	2.100 UJ	0.580 U	NCA	NCA
CARBAZOLE	0.640 U	0.650 U	0.120 J	0.110 J	0.700 UJ	2.100 UJ	0.580 U	NCA	NCA
CHRYSENE	0.640 U	0.650 U	4.300	0.690	0.400 J	0.230 J	0.210 J	0.4	2.8
DI-N-OCTYL PHTHALATE	0.640 U	0.650 U	0.420 U	0.490 U	0.700 UJ	2.100 UJ	0.580 U	NCA	NCA
DIBENZO(A,H)ANTHRACENE	0.640 U	0.650 U	0.240 J	0.490 U	0.700 UJ	2.100 UJ	0.580 U	0.06	0.26
DIBENZOFURAN	0.640 U	0.650 U	0.240 J	0.074 J	0.700 UJ	2.100 UJ	0.580 U	NCA	NCA
DIMETHYL PHTHALATE	0.640 U	0.650 U	1.000	0.490 U	0.700 UJ	2.100 UJ	0.580 U	NCA	NCA
FLUORANTHRENE	0.640 U	0.200 J	11.000	1.500	0.610 J	0.440 J	0.390 J	0.6	3.6
FLUORENE	0.640 U	0.650 U	0.500	0.160 J	0.700 UJ	2.100 UJ	0.580 U	0.035	0.64
INDENO(1,2,3-C,D)PYRENE	0.640 U	0.650 U	1.700	0.270 J	0.260 J	2.100 UJ	0.580 U	NCA	NCA
NAPHTHALENE	0.640 U	0.650 U	0.420 U	0.490 U	0.700 UJ	2.100 UJ	0.580 U	0.34	2.1
PENTACHLOROPHENOL	3.200 U	3.300 U	2.100 U	2.400 U	3.500 UJ	10.000 UJ	2.900 U	NCA	NCA
PHENANTHRENE	0.640 U	0.650 U	4.200	0.930	0.220 J	0.270 J	0.200 J	0.225	1.38
PHENOL	0.640 U	0.650 U	0.420 U	0.490 U	0.700 UJ	2.100 UJ	0.580 U	NCA	NCA
PYRENE	0.640 U	0.160 J	18.000	1.300	0.910 J	0.560 J	0.370 J	0.35	2.2
TOTAL PAHs (NOAA) (4)	0.210	0.445	62.030	8.367	3.520	1.790	2.050	4	35

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) Total PAHs for Freshwater/Estuarine sediment samples were calculated from the lists provided in Appendix F.

TABLE 4-8
SVOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

CENTRAL DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	ISOLATED FRESHWATER POND			UPGRADIENT PONDED AREA	SEDIMENT QUALITY CRITERIA (3)	
	SD-1623	SD-1626	SD-1627 (Duplicate of SD-1626)	SD-1621	Ontario LEL	Ontario SEL (Based on TOC) (4)
2,4-DIMETHYLPHENOL	0.510 U	0.520 U	0.690 UJ	0.730 UJ	NCA	NCA
2-METHYLNAPHTHALENE	0.510 U	0.520 U	0.690 UJ	0.730 UJ	NCA	NCA
2-METHYLPHENOL (O-CRESOL)	0.510 U	0.520 U	0.690 UJ	0.730 UJ	NCA	NCA
4-METHYLPHENOL	0.510 U	0.520 U	0.690 UJ	0.730 UJ	NCA	NCA
ACENAPHTHENE	0.510 U	0.520 U	0.690 UJ	0.730 UJ	NCA	NCA
ACENAPTHYLENE	0.510 U	0.520 U	0.690 UJ	0.730 UJ	NCA	NCA
ANTHRACENE	0.060 J	0.520 U	0.690 UJ	0.730 UJ	0.220	370
BENZO(A)ANTHRACENE	0.200 J	0.520 U	0.690 UJ	0.730 UJ	0.320	1480
BENZO(A)PYRENE	0.190 J	0.520 U	0.690 UJ	0.730 UJ	0.370	1440
BENZO(B)FLUORANTHRENE	0.520	0.067 J	0.690 UJ	0.730 UJ	NCA	NCA
BENZO(GHI)PERYLENE	0.230 J	0.520 U	0.690 UJ	0.730 UJ	0.170	320
BENZO(K)FLUORANTHRENE	0.120 J	0.520 U	0.690 UJ	0.730 UJ	0.240	1340
BENZYL BUTYL PHTHALATE	0.510 U	0.520 U	0.690 UJ	0.730 UJ	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	0.510 U	0.520 U	0.690 UJ	0.730 UJ	NCA	NCA
CARBAZOLE	0.510 U	0.520 U	0.690 UJ	0.730 UJ	NCA	NCA
CHRYSENE	0.300 J	0.520 U	0.690 UJ	0.730 UJ	0.340	460
DI-N-OCTYL PHTHALATE	0.510 U	0.520 U	0.690 UJ	0.730 UJ	NCA	NCA
DIBENZO(A,H)ANTHRACENE	0.510 U	0.520 U	0.690 UJ	0.730 UJ	0.060	130
DIBENZOFURAN	0.510 U	0.520 U	0.690 UJ	0.730 UJ	NCA	NCA
DIMETHYL PHTHALATE	0.510 U	0.520 U	0.690 UJ	0.730 UJ	NCA	NCA
FLUORANTHRENE	0.790	0.110 J	0.100 J	0.730 UJ	0.750	1020
FLUORENE	0.054 J	0.520 U	0.690 UJ	0.730 UJ	0.190	160
INDENO(1,2,3-C,D)PYRENE	0.250 J	0.520 U	0.690 UJ	0.730 UJ	0.200	320
NAPHTHALENE	0.510 U	0.520 U	0.690 UJ	0.730 UJ	NCA	NCA
PENTACHLOROPHENOL	2.600 U	2.600 U	3.500 UJ	3.600 UJ	NCA	NCA
PHENANTHRENE	0.430 J	0.053 J	0.085 J	0.730 UJ	0.560	950
PHENOL	0.510 U	0.520 U	0.690 UJ	0.730 UJ	NCA	NCA
PYRENE	1.200	0.120 J	0.150 J	0.730 UJ	0.490	850
TOTAL PAHs (Ontario) (5)	3.824	0.283	0.335	ND	4	10000

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.
(5) Total PAHs for Freshwater/Estuarine sediment samples were calculated from the lists provided in Appendix F.

TABLE 4-8
SVOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

AREA 12 DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 12 DITCH			SEDIMENT QUALITY CRITERIA (3)	
	SD-1201	SD-1202	SD-1203	NOAA ER-L	NOAA ER-M
2,4-DIMETHYLPHENOL	0.710 UJ	0.810 UJ	1.900 UJ	NCA	NCA
2-METHYLNAPHTHALENE	0.710 UJ	0.810 UJ	1.900 UJ	0.065	0.67
2-METHYLPHENOL (O-CRESOL)	0.710 UJ	0.810 UJ	1.900 UJ	NCA	NCA
4-METHYLPHENOL	0.710 UJ	0.810 UJ	1.900 UJ	NCA	NCA
ACENAPHTHENE	0.710 UJ	0.810 UJ	1.900 UJ	0.15	0.65
ACENAPTHYLENE	0.710 UJ	0.810 UJ	1.900 UJ	NCA	NCA
ANTHRACENE	0.710 UJ	0.240 J	0.330 J	0.085	0.96
BENZO(A)ANTHRACENE	0.190 J	0.380 J	1.100 J	0.23	1.6
BENZO(A)PYRENE	0.710 UJ	0.280 J	1.300 J	0.4	2.5
BENZO(B)FLUORANTHRENE	0.710 UJ	0.490 J	3.000 J	NCA	NCA
BENZO(GHI)PERYLENE	0.710 UJ	0.810 UJ	0.930 J	NCA	NCA
BENZO(K)FLUORANTHRENE	0.710 UJ	0.320 J	1.100 J	NCA	NCA
BENZYL BUTYL PHTHALATE	0.710 UJ	0.810 UJ	1.900 UJ	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	0.710 UJ	0.810 UJ	0.350 J	NCA	NCA
CARBAZOLE	0.710 UJ	0.810 UJ	1.900 UJ	NCA	NCA
CHRYSENE	0.710 UJ	0.350 J	2.000 J	0.4	2.8
DI-N-OCTYL PHTHALATE	0.710 UJ	0.810 UJ	1.900 UJ	NCA	NCA
DIBENZO(A,H)ANTHRACENE	0.710 UJ	0.810 UJ	1.900 UJ	0.06	0.26
DIBENZOFURAN	0.710 UJ	0.810 UJ	1.900 UJ	NCA	NCA
DIMETHYL PHTHALATE	0.710 UJ	0.810 UJ	1.900 UJ	NCA	NCA
FLUORANTHRENE	0.230 J	1.100 J	4.300 J	0.6	3.6
FLUORENE	0.710 UJ	0.810 UJ	1.900 UJ	0.035	0.64
INDENO(1,2,3-C,D)PYRENE	0.710 UJ	0.810 UJ	1.900 UJ	NCA	NCA
NAPHTHALENE	0.710 UJ	0.810 UJ	1.900 UJ	0.34	2.1
PENTACHLOROPHENOL	3.500 UJ	4.100 UJ	9.700 UJ	NCA	NCA
PHENANTHRENE	0.170 J	1.000 J	1.000 J	0.225	1.38
PHENOL	0.710 UJ	0.810 UJ	1.900 UJ	NCA	NCA
PYRENE	0.190 J	0.940 J	4.300 J	0.35	2.2
TOTAL PAHs (NOAA) (4)	0.780	5.100	19.360	4	35

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) Total PAHs for Freshwater/Estuarine sediment samples were calculated from the lists provided in Appendix F.

TABLE 4-8
SVOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	ASSOCIATED DITCHES - AREA 16									SEDIMENT QUALITY CRITERIA (3)	
	SD-1611	SD-1612	SD-1613	SD-1615	SD-1616	SD-1617	SD-1618	SD-1628 (Duplicate of SD-1612)	SD-1629	NOAA ER-L	NOAA ER-M
2,4-DIMETHYLPHENOL	1.600 UJ	1.900 UJ	0.880 UJ	0.930 UJ	1.400 UJ	1.800 UJ	0.980 UJ	1.700 UJ	3.900 U	NCA	NCA
2-METHYLNAPHTHALENE	8.000 UJ	9.600 UJ	4.400 UJ	0.930 UJ	1.400 UJ	1.800 UJ	0.980 UJ	1.700 UJ	3.900 U	0.065	0.67
2-METHYLPHENOL (O-CRESOL)	1.600 UJ	1.900 UJ	0.880 UJ	0.930 UJ	1.400 UJ	1.800 UJ	0.980 UJ	1.700 UJ	3.900 U	NCA	NCA
4-METHYLPHENOL	3.200 UJ	3.800 UJ	1.800 UJ	0.930 UJ	1.400 UJ	1.800 UJ	0.980 UJ	1.700 UJ	2.400 J	NCA	NCA
ACENAPHTHENE	1.600 UJ	1.900 UJ	0.880 UJ	0.930 UJ	1.400 UJ	1.800 UJ	0.980 UJ	1.700 UJ	3.900 U	0.15	0.65
ACENAPTHYLENE	1.600 UJ	1.900 UJ	0.880 UJ	0.930 UJ	1.400 UJ	1.800 UJ	0.980 UJ	1.700 UJ	3.900 U	NCA	NCA
ANTHRACENE	1.600 UJ	1.900 UJ	0.880 UJ	0.190 J	1.400 UJ	1.800 UJ	0.160 J	1.700 UJ	3.900 U	0.085	0.96
BENZO(A)ANTHRACENE	1.600 UJ	1.900 UJ	0.880 UJ	0.460 J	0.260 J	1.800 UJ	0.290 J	0.290 J	3.900 U	0.23	1.6
BENZO(A)PYRENE	1.600 UJ	1.900 UJ	0.880 UJ	0.460 J	0.350 J	1.800 UJ	0.320 J	0.340 J	3.900 U	0.4	2.5
BENZO(B)FLUORANTHRENE	1.600 UJ	0.330 J	0.230 J	0.530 J	0.500 J	0.470 J	0.530 J	0.560 J	3.900 U	NCA	NCA
BENZO(GHI)PERYLENE	1.600 UJ	1.900 UJ	0.880 UJ	0.230 J	1.400 UJ	1.800 UJ	0.270 J	1.700 UJ	3.900 U	NCA	NCA
BENZO(K)FLUORANTHRENE	1.600 UJ	1.900 UJ	0.880 UJ	0.240 J	0.220 J	1.800 UJ	0.220 J	0.190 J	3.900 U	NCA	NCA
BENZYL BUTYL PHTHALATE	1.600 UJ	1.900 UJ	0.880 UJ	0.930 UJ	1.400 UJ	1.800 UJ	0.980 UJ	1.700 UJ	3.900 U	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	1.600 UJ	1.900 UJ	0.880 UJ	0.930 UJ	1.700 J	1.800 U	2.300 J	1.700 UJ	0.860 J	NCA	NCA
CARBAZOLE	1.600 UJ	1.900 UJ	0.880 UJ	0.930 UJ	1.400 UJ	1.800 UJ	0.980 UJ	1.700 UJ	3.900 U	NCA	NCA
CHRYSENE	1.600 UJ	0.290 J	0.880 UJ	0.560 J	0.330 J	1.800 UJ	0.390 J	0.470 J	3.900 U	0.4	2.8
DI-N-OCTYL PHTHALATE	1.600 U	3.800 U	0.880 U	0.930 UJ	1.400 UJ	1.800 UJ	0.980 UJ	1.700 UJ	3.900 U	NCA	NCA
DIBENZO(A,H)ANTHRACENE	1.600 UJ	1.900 UJ	0.880 UJ	0.930 UJ	1.400 UJ	1.800 UJ	0.980 UJ	1.700 UJ	3.900 U	0.06	0.26
DIBENZOFURAN	1.600 UJ	1.900 UJ	0.880 UJ	0.930 UJ	1.400 UJ	1.800 UJ	0.980 UJ	1.700 UJ	3.900 U	NCA	NCA
DIMETHYL PHTHALATE	1.600 UJ	1.900 UJ	0.880 UJ	0.930 UJ	1.400 UJ	1.800 UJ	0.980 UJ	1.700 UJ	3.900 U	NCA	NCA
FLUORANTHRENE	0.710 J	1.900 UJ	0.300 J	0.670 J	0.600 J	0.500 J	0.700 J	0.560 J	3.900 U	0.6	3.6
FLUORENE	1.600 UJ	1.900 UJ	0.880 UJ	0.930 UJ	1.400 UJ	1.800 UJ	0.980 UJ	1.700 UJ	3.900 U	0.035	0.64
INDENO(1,2,3-C,D)PYRENE	1.600 UJ	1.900 UJ	0.880 UJ	0.220 J	1.400 UJ	1.800 UJ	0.300 J	1.700 UJ	3.900 U	NCA	NCA
NAPHTHALENE	1.600 UJ	1.900 UJ	0.880 UJ	0.930 UJ	1.400 UJ	1.800 UJ	0.980 UJ	1.700 UJ	3.900 U	0.34	2.1
PENTACHLOROPHENOL	1.600 UJ	1.900 UJ	0.880 UJ	4.600 UJ	7.000 UJ	9.000 UJ	4.900 UJ	8.400 UJ	20.000 U	NCA	NCA
PHENANTHRENE	0.230 J	1.900 UJ	0.130 J	0.790 J	1.400 UJ	1.800 UJ	0.230 J	0.390 J	3.900 U	0.225	1.38
PHENOL	1.600 UJ	1.900 UJ	0.880 UJ	0.930 UJ	1.400 UJ	1.800 UJ	0.980 UJ	1.700 UJ	0.620 J	NCA	NCA
PYRENE	0.770 J	0.400 J	0.370 J	0.920 J	0.500 J	0.670 J	0.590 J	0.670 J	0.510 J	0.35	2.2
TOTAL PAHs (NOAA) (4)	1.710	1.020	0.800	5.270	2.760	1.540	4.000	3.470	0.510	4	35

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) Total PAHs for Freshwater/Estuarine sediment samples were calculated from the lists provided in Appendix F.

TABLE 4-8
SVOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	OLD RED ROOT CREEK							AREA 19 SW WETLANDS		SEDIMENT QUALITY CRITERIA (3)	
	SD-1630	SD-1606	SD-1607	SD-1608	SD-1609	SD-1610	SD-1631 (Duplicate of SD-1609)	SD-1906	SD-1911 (Duplicate of SD-1906)	NOAA ER-L	NOAA ER-M
2,4-DIMETHYLPHENOL	0.680 UJ	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ	NCA	NCA
2-METHYLNAPHTHALENE	0.680 UJ	1.300 UJ	1.600 UJ	8.700 UJ	4.500 UJ	9.000 UJ	0.990 UJ	0.840 UJ	1.400 UJ	0.065	0.67
2-METHYLPHENOL (O-CRESOL)	0.680 UJ	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ	NCA	NCA
4-METHYLPHENOL	0.680 UJ	1.300 UJ	1.600 UJ	3.500 UJ	1.800 UJ	3.600 UJ	0.990 UJ	0.840 UJ	1.400 UJ	NCA	NCA
ACENAPHTHENE	0.680 UJ	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ	0.15	0.65
ACENAPTHYLENE	0.680 UJ	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ	NCA	NCA
ANTHRACENE	0.099 J	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ	0.085	0.96
BENZO(A)ANTHRACENE	0.430 J	0.580 J	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ	0.23	1.6
BENZO(A)PYRENE	0.430 J	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ	0.400	2.5
BENZO(B)FLUORANTHRENE	0.640 J	0.610 J	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ	NCA	NCA
BENZO(GHI)PERYLENE	0.680 UJ	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ	NCA	NCA
BENZO(K)FLUORANTHRENE	0.240 J	0.280 J	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ	NCA	NCA
BENZYL BUTYL PHTHALATE	0.680 UJ	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	0.680 UJ	5.000 J	11.000 J	1.700 UJ	0.890 UJ	1.800 UJ	1.000 U	0.840 UJ	1.400 UJ	NCA	NCA
CARBAZOLE	0.680 UJ	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ	NCA	NCA
CHRYSENE	0.400 J	0.290 J	0.220 J	1.700 UJ	0.120 J	1.800 UJ	0.990 UJ	0.086 J	1.400 UJ	0.400	2.8
DI-N-OCTYL PHTHALATE	0.680 UJ	1.300 UJ	1.600 UJ	1.700 U	0.980 U	1.800 U	0.990 UJ	0.840 UJ	1.400 UJ	NCA	NCA
DIBENZO(A,H)ANTHRACENE	0.680 UJ	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ	0.06	0.26
DIBENZOFURAN	0.680 UJ	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ	NCA	NCA
DIMETHYL PHTHALATE	0.680 UJ	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ	NCA	NCA
FLUORANTHRENE	1.000 J	0.420 J	0.290 J	0.220 J	0.200 J	1.800 UJ	0.990 UJ	0.130 J	0.180 J	0.600	3.6
FLUORENE	0.680 UJ	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ	0.035	0.64
INDENO(1,2,3-C,D)PYRENE	0.110 J	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ	NCA	NCA
NAPHTHALENE	0.680 UJ	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ	0.34	2.1
PENTACHLOROPHENOL	3.400 UJ	6.600 UJ	8.200 UJ	8.700 UJ	4.500 UJ	9.000 UJ	4.900 UJ	4.200 UJ	6.900 UJ	NCA	NCA
PHENANTHRENE	0.530 J	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ	0.225	1.38
PHENOL	0.680 UJ	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ	NCA	NCA
PYRENE	1.200 J	0.540 J	0.56 J	0.420 J	0.400 J	1.800 UJ	0.150 J	0.130 J	0.180 J	0.35	2.2
TOTAL PAHs (NOAA) (4)	5.079	2.720	0.510	0.640	0.720	ND	0.150	0.346	0.360	4	35

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) Total PAHs for Freshwater/Estuarine sediment samples were calculated from the lists provided in Appendix F.

TABLE 4-8
SVOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	SOUTHWEST DITCH				WEST DITCH				SEDIMENT QUALITY CRITERIA (3)	
	SD-1215	SD-1216	SD-1619	SD-1620	SD-1601	SD-1602	SD-1603	SD-1907	NOAA ER-L	NOAA ER-M
2,4-DIMETHYLPHENOL	1.100 UJ	0.870 UJ	2.200 UJ	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ	NCA	NCA
2-METHYLNAPHTHALENE	1.100 UJ	0.870 UJ	0.770 J	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ	0.065	0.67
2-METHYLPHENOL (O-CRESOL)	1.100 UJ	0.870 UJ	2.200 UJ	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ	NCA	NCA
4-METHYLPHENOL	1.100 UJ	0.870 UJ	2.200 UJ	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ	NCA	NCA
ACENAPHTHENE	1.100 UJ	0.870 UJ	2.100 J	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ	0.15	0.65
ACENAPTHYLENE	1.100 UJ	0.870 UJ	0.530 J	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ	NCA	NCA
ANTHRACENE	1.100 UJ	0.870 UJ	5.000 J	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ	0.085	0.96
BENZO(A)ANTHRACENE	0.430 J	0.220 J	8.600 J	0.390 J	0.320 J	1.500 UJ	0.084 J	1.800 UJ	0.23	1.6
BENZO(A)PYRENE	1.100 UJ	0.870 UJ	6.700 J	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ	0.4	2.5
BENZO(B)FLUORANTHRENE	0.710 J	0.330 J	10.000 J	0.770 J	0.360 J	1.500 UJ	0.110 J	1.800 UJ	NCA	NCA
BENZO(GHI)PERYLENE	1.100 UJ	0.170 J	1.300 J	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ	NCA	NCA
BENZO(K)FLUORANTHRENE	0.240 J	0.150 J	4.300 J	0.290 J	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ	NCA	NCA
BENZYL BUTYL PHTHALATE	1.100 UJ	0.870 UJ	2.200 UJ	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	3.500 J	1.500 J	0.340 J	2.500 J	1.100 J	0.510 J	0.500 J	0.400 J	NCA	NCA
CARBAZOLE	1.100 UJ	0.870 UJ	2.700 J	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ	NCA	NCA
CHRYSENE	1.100 UJ	0.210 J	6.200 J	0.350 J	1.400 UJ	1.500 UJ	0.085 J	1.800 UJ	0.4	2.8
DI-N-OCTYL PHTHALATE	0.180 J	0.870 UJ	2.200 UJ	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ	NCA	NCA
DIBENZO(A,H)ANTHRACENE	1.100 UJ	0.870 UJ	2.200 UJ	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ	0.06	0.26
DIBENZOFURAN	1.100 UJ	0.870 UJ	1.900 J	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ	NCA	NCA
DIMETHYL PHTHALATE	1.100 UJ	0.870 UJ	2.200 UJ	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ	NCA	NCA
FLUORANTHRENE	0.790 J	0.480 J	12.000 J	0.840 J	0.320 J	0.200 J	0.150 J	0.220 J	0.6	3.6
FLUORENE	1.100 UJ	0.870 UJ	2.900 J	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ	0.035	0.64
INDENO(1,2,3-C,D)PYRENE	1.100 UJ	0.870 UJ	1.900 J	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ	NCA	NCA
NAPHTHALENE	1.100 UJ	0.870 UJ	1.100 J	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ	0.34	2.1
PENTACHLOROPHENOL	5.300 UJ	4.400 UJ	11.000 UJ	5.600 UJ	6.900 UJ	7.600 UJ	3.000 U	8.900 UJ	NCA	NCA
PHENANTHRENE	0.290 J	0.170 J	18.000 J	0.300 J	1.400 UJ	1.500 UJ	0.061 J	1.800 UJ	0.225	1.38
PHENOL	1.100 UJ	0.870 UJ	2.200 UJ	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ	NCA	NCA
PYRENE	1.200 J	0.520 J	19.000 J	1.200 J	0.370 J	0.230 J	0.180 J	0.230 J	0.35	2.2
TOTAL PAHs (NOAA) (4)	3.660	2.250	102.500	4.140	1.370	0.430	0.670	0.450	4	35

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) Total PAHs for Freshwater/Estuarine sediment samples were calculated from the lists provided in Appendix F.

TABLE 4-8
SVOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	ASSOCIATED DITCHES	AREA 19 FORESTED WETLANDS		AREA 19 NE WETLANDS			SEDIMENT QUALITY CRITERIA (3)	
	SD-1614	SD-1901	SD-1903	SD-1908	SD-1909	SD-1910	Ontario LEL	Ontario SEL (Based on TOC) (4)
2,4-DIMETHYLPHENOL	1.200 UJ	0.640 U	1.300 UJ	2.800 U	1.600 UJ	0.960 UJ	NCA	NCA
2-METHYLNAPHTHALENE	1.200 UJ	0.640 U	1.300 UJ	2.800 U	1.600 UJ	0.960 UJ	NCA	NCA
2-METHYLPHENOL (O-CRESOL)	1.200 UJ	0.640 U	1.300 UJ	2.800 U	1.600 UJ	0.960 UJ	NCA	NCA
4-METHYLPHENOL	1.200 UJ	0.640 U	1.300 UJ	2.800 U	1.600 UJ	0.960 UJ	NCA	NCA
ACENAPHTHENE	1.200 UJ	0.640 U	1.300 UJ	2.800 U	1.600 UJ	0.960 UJ	NCA	NCA
ACENAPTHYLENE	1.200 UJ	0.640 U	1.300 UJ	2.800 U	1.600 UJ	0.960 UJ	NCA	NCA
ANTHRACENE	1.200 UJ	0.640 U	1.300 UJ	2.800 U	1.600 UJ	0.960 UJ	0.220	370
BENZO(A)ANTHRACENE	0.210 J	0.640 U	1.300 UJ	0.350 J	1.600 UJ	0.960 UJ	0.320	1480
BENZO(A)PYRENE	1.200 UJ	0.640 U	1.300 UJ	0.480 J	1.600 UJ	0.960 UJ	0.370	1440
BENZO(B)FLUORANTHRENE	0.300 J	0.640 U	1.300 UJ	0.420 J	1.600 UJ	0.960 UJ	NCA	NCA
BENZO(GHI)PERYLENE	1.200 UJ	0.640 U	1.300 UJ	0.350 J	1.600 UJ	0.960 UJ	0.170	320
BENZO(K)FLUORANTHRENE	0.120 J	0.640 U	1.300 UJ	0.400 J	1.600 UJ	0.960 UJ	0.240	1340
BENZYL BUTYL PHTHALATE	1.200 UJ	0.640 U	1.300 UJ	2.800 U	1.600 UJ	0.960 UJ	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	1.200 UJ	0.076 J	1.300 U	2.800 U	1.600 U	0.960 UJ	NCA	NCA
CARBAZOLE	1.200 UJ	0.640 U	1.300 UJ	2.800 U	1.600 UJ	0.960 UJ	NCA	NCA
CHRYSENE	0.300 J	0.640 U	1.300 UJ	0.410 J	0.170 J	0.960 UJ	0.340	460
DI-N-OCTYL PHTHALATE	1.200 UJ	0.640 U	1.300 UJ	2.800 U	1.600 UJ	0.960 UJ	NCA	NCA
DIBENZO(A,H)ANTHRACENE	1.200 UJ	0.640 U	1.300 UJ	2.800 U	1.600 UJ	0.960 UJ	0.060	130
DIBENZOFURAN	1.200 UJ	0.640 U	1.300 UJ	2.800 U	1.600 UJ	0.960 UJ	NCA	NCA
DIMETHYL PHTHALATE	1.200 UJ	0.640 U	1.300 UJ	2.800 U	1.600 UJ	0.960 UJ	NCA	NCA
FLUORANTHRENE	0.440 J	0.640 U	0.160 J	0.520 J	0.230 J	0.960 UJ	0.750	1020
FLUORENE	1.200 UJ	0.640 U	1.300 UJ	2.800 U	1.600 UJ	0.960 UJ	0.190	160
INDENO(1,2,3-C,D)PYRENE	1.200 UJ	0.640 U	1.300 UJ	0.290 J	1.600 UJ	0.960 UJ	0.200	320
NAPHTHALENE	1.200 UJ	0.640 U	1.300 UJ	2.800 U	1.600 UJ	0.960 UJ	NCA	NCA
PENTACHLOROPHENOL	6.200 UJ	3.200 U	6.400 UJ	14.000 U	7.900 UJ	4.800 UJ	NCA	NCA
PHENANTHRENE	1.200 UJ	0.640 U	1.300 UJ	2.800 U	1.600 UJ	0.960 UJ	0.560	950
PHENOL	1.200 UJ	0.640 U	1.300 UJ	2.800 U	1.600 UJ	0.960 UJ	NCA	NCA
PYRENE	0.490 J	0.640 U	0.150 J	0.540 J	0.230 J	0.960 UJ	0.490	850
TOTAL PAHs (Ontario) (5)	1.560	ND	0.310	3.340	0.630	ND	4	10000

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.
(5) Total PAHs for Freshwater/Estuarine sediment samples were calculated from the lists provided in Appendix F.

TABLE 4-8
SVOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	OLD RED ROOT CREEK		AREA 19 SW WETLANDS		DRY TRIBUTARY AREA 18		SEDIMENT QUALITY CRITERIA (3)	
	SD-1604	SD-1605	SD-1904	SD-1905	SD-1801	SD-1802	Ontario LEL	Ontario SEL (Based on TOC) (4)
2,4-DIMETHYLPHENOL	0.480 U	0.410 U	0.870 UJ	0.520 U	0.440 U	0.650 U	NCA	NCA
2-METHYLNAPHTHALENE	0.480 U	0.410 U	0.870 UJ	0.069 J	0.440 U	0.650 U	NCA	NCA
2-METHYLPHENOL (O-CRESOL)	0.480 U	0.410 U	0.870 UJ	0.520 U	0.440 U	0.650 U	NCA	NCA
4-METHYLPHENOL	0.480 U	0.410 U	0.870 UJ	0.520 U	0.440 U	0.650 U	NCA	NCA
ACENAPHTHENE	0.480 U	0.410 U	0.870 UJ	0.590	0.440 U	0.650 U	NCA	NCA
ACENAPTHYLENE	0.480 U	0.095 J	0.870 UJ	0.520 U	0.440 U	0.650 U	NCA	NCA
ANTHRACENE	0.480 U	0.130 J	0.870 UJ	1.400	0.110 J	0.071 J	0.220	370
BENZO(A)ANTHRACENE	0.110 J	0.290 J	0.870 UJ	3.200	0.760	0.340 J	0.320	1480
BENZO(A)PYRENE	0.480 U	0.340 J	0.870 UJ	2.200	0.710	0.350 J	0.370	1440
BENZO(B)FLUORANTHRENE	0.480 U	0.380 J	0.870 UJ	2.000	1.100	0.540 J	NCA	NCA
BENZO(GHI)PERYLENE	0.480 U	0.190 J	0.870 UJ	1.200	0.660	0.290 J	0.170	320
BENZO(K)FLUORANTHRENE	0.480 U	0.160 J	0.870 UJ	2.000	0.400 J	0.200 J	0.240	1340
BENZYL BUTYL PHTHALATE	0.480 U	0.410 U	0.870 UJ	0.520 U	0.440 U	0.650 U	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	0.160 J	0.410 U	0.870 UJ	0.520 U	0.080 J	0.190 J	NCA	NCA
CARBAZOLE	0.480 U	0.410 U	0.870 UJ	0.940	0.120 J	0.650 U	NCA	NCA
CHRYSENE	0.480 U	0.390 J	0.870 UJ	3.200	0.930	0.410 J	0.340	460
DI-N-OCTYL PHTHALATE	0.480 U	0.410 U	0.870 UJ	0.520 U	0.440 U	0.650 U	NCA	NCA
DIBENZO(A,H)ANTHRACENE	0.480 U	0.410 U	0.870 UJ	0.470 J	0.110 J	0.650 U	0.060	130
DIBENZOFURAN	0.480 U	0.410 U	0.870 UJ	0.380 J	0.440 U	0.650 U	NCA	NCA
DIMETHYL PHTHALATE	0.480 U	0.410 U	0.870 UJ	0.520 U	0.440 U	0.650 U	NCA	NCA
FLUORANTHRENE	0.480 U	0.520	0.870 UJ	6.300	1.500	0.740	0.750	1020
FLUORENE	0.480 U	0.410 U	0.870 UJ	0.680	0.440 U	0.650 U	0.190	160
INDENO(1,2,3-C,D)PYRENE	0.480 U	0.190 J	0.870 UJ	1.200	0.570	0.290 J	0.200	320
NAPHTHALENE	0.480 U	0.410 U	0.870 UJ	0.087 J	0.440 U	0.650 U	NCA	NCA
PENTACHLOROPHENOL	2.400 U	2.100 U	4.400 UJ	2.600 U	2.200 U	3.200 U	NCA	NCA
PHENANTHRENE	0.480 U	0.380 J	0.870 UJ	6.200	0.710	0.340 J	0.560	950
PHENOL	0.480 U	0.410 U	0.870 UJ	0.520 U	0.440 U	0.650 U	NCA	NCA
PYRENE	0.480 U	0.880	0.870 UJ	5.600	1.500	0.670	0.490	850
TOTAL PAHs (Ontario)	0.110	2.845	ND	34.327	7.850	3.701	4	10000

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.
(5) Total PAHs for Freshwater/Estuarine sediment samples were calculated from the lists provided in Appendix F.

TABLE 4-8
SVOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

COUNTY PARK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 10 SOUTHERN BORDER DITCH		OPEN LAWN DITCH				SEDIMENT QUALITY CRITERIA (3)	
	SD-1006	SD-1902	SD-1003	SD-1004	SD-1005	SD-1012 (Duplicate of SD-1005)	Ontario LEL	Ontario SEL (Based on TOC) (4)
2,4-DIMETHYLPHENOL	0.450 U	1.500 UJ	0.980 UJ	0.480 U	0.540 U	0.520 U	NCA	NCA
2-METHYLNAPHTHALENE	0.450 U	1.500 UJ	0.980 UJ	0.480 U	0.540 U	0.520 U	NCA	NCA
2-METHYLPHENOL (O-CRESOL)	0.450 U	1.500 UJ	0.980 UJ	0.480 U	0.540 U	0.520 U	NCA	NCA
4-METHYLPHENOL	0.450 U	1.500 UJ	0.980 UJ	0.480 U	0.540 U	0.520 U	NCA	NCA
ACENAPHTHENE	0.450 U	1.500 UJ	0.980 UJ	0.480 U	0.540 U	0.520 U	NCA	NCA
ACENAPTHYLENE	0.450 U	1.500 UJ	0.980 UJ	0.480 U	0.540 U	0.520 U	NCA	NCA
ANTHRACENE	0.450 U	1.500 UJ	0.270 J	0.480 U	0.540 U	0.520 U	0.220	370
BENZO(A)ANTHRACENE	0.450 U	1.500 UJ	1.100 J	0.100 J	0.540 U	0.520 U	0.320	1480
BENZO(A)PYRENE	0.450 U	1.500 UJ	0.850 J	0.058 J	0.540 U	0.520 U	0.370	1440
BENZO(B)FLUORANTHRENE	0.450 U	1.500 UJ	1.100 J	0.075 J	0.540 U	0.520 U	NCA	NCA
BENZO(GHI)PERYLENE	0.450 U	1.500 UJ	0.690 J	0.480 U	0.540 U	0.520 U	0.170	320
BENZO(K)FLUORANTHRENE	0.450 U	1.500 UJ	0.140 J	0.050 J	0.540 U	0.520 U	0.240	1340
BENZYL BUTYL PHTHALATE	0.450 U	0.170 J	0.140 J	0.480 U	0.540 U	0.070 J	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	0.048 J	0.400 J	0.300 J	0.480 U	0.130 J	0.130 J	NCA	NCA
CARBAZOLE	0.450 U	1.500 UJ	0.980 UJ	0.480 U	0.540 U	0.520 U	NCA	NCA
CHRYSENE	0.450 U	1.500 UJ	1.100 J	0.096 J	0.540 U	0.520 U	0.340	460
DI-N-OCTYL PHTHALATE	0.450 U	1.500 UJ	0.980 UJ	0.480 U	0.540 U	0.520 U	NCA	NCA
DIBENZO(A,H)ANTHRACENE	0.450 U	1.500 UJ	0.350 J	0.480 U	0.540 U	0.520 U	0.060	130
DIBENZOFURAN	0.450 U	1.500 UJ	0.980 UJ	0.480 U	0.540 U	0.520 U	NCA	NCA
DIMETHYL PHTHALATE	0.450 U	0.280 J	0.980 UJ	0.480 U	0.540 U	0.520 U	NCA	NCA
FLUORANTHRENE	0.047 J	0.170 J	1.900 J	0.190 J	0.540 U	0.520 U	0.750	1020
FLUORENE	0.450 U	1.500 UJ	0.980 UJ	0.480 U	0.540 U	0.520 U	0.190	160
INDENO(1,2,3-C,D)PYRENE	0.450 U	1.500 UJ	0.630 J	0.480 U	0.540 U	0.520 U	0.200	320
NAPHTHALENE	0.450 U	1.500 UJ	0.980 UJ	0.480 U	0.540 U	0.520 U	NCA	NCA
PENTACHLOROPHENOL	2.300 U	7.700 UJ	0.130 J	2.400 U	2.700 U	2.600 U	NCA	NCA
PHENANTHRENE	0.450 U	1.500 UJ	1.400 J	0.088 J	0.540 U	0.520 U	0.560	950
PHENOL	0.450 U	1.500 UJ	0.980 UJ	0.480 U	0.540 U	0.520 U	NCA	NCA
PYRENE	0.055 J	0.180 J	2.500 J	0.190 J	0.055 J	0.520 U	0.490	850
TOTAL PAHs (Ontario) (5)	0.102	0.350	10.930	0.772	0.055	ND	4	10000

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.
(5) Total PAHs for Freshwater/Estuarine sediment samples were calculated from the lists provided in Appendix F.

TABLE 4-8
SVOCs DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

COUNTY PARK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	MAINTENANCE AREA DITCH					WESTERN BOUNDARY DITCH		SEDIMENT QUALITY CRITERIA (3)	
	SD-1007	SD-1008	SD-1009	SD-1010	SD-1011	SD-1001	SD-1002	Ontario LEL	Ontario SEL (Based on TOC) (4)
2,4-DIMETHYLPHENOL	0.400 U	1.100 UJ	0.610 U	0.560 U	0.340 U	0.480 U	0.510 U	NCA	NCA
2-METHYLNAPHTHALENE	0.400 U	1.100 UJ	0.610 U	0.560 U	0.340 U	0.480 U	0.510 U	NCA	NCA
2-METHYLPHENOL (O-CRESOL)	0.400 U	1.100 UJ	0.610 U	0.560 U	0.340 U	0.480 U	0.510 U	NCA	NCA
4-METHYLPHENOL	0.400 U	1.100 UJ	0.610 U	0.560 U	0.340 U	0.480 U	0.510 U	NCA	NCA
ACENAPHTHENE	0.400 U	1.100 UJ	0.610 U	0.560 U	0.340 U	0.480 U	0.510 U	NCA	NCA
ACENAPTHYLENE	0.400 U	1.100 UJ	0.610 U	0.560 U	0.340 U	0.480 U	0.510 U	NCA	NCA
ANTHRACENE	0.400 U	1.100 UJ	0.610 U	0.560 U	0.340 U	0.480 U	0.510 U	0.220	370
BENZO(A)ANTHRACENE	0.400 U	0.350 J	0.610 U	0.560 U	0.340 U	0.150 J	0.510 U	0.320	1480
BENZO(A)PYRENE	0.400 U	0.480 J	0.610 U	0.560 U	0.340 U	0.110 J	0.510 U	0.370	1440
BENZO(B)FLUORANTHRENE	0.400 U	0.380 J	0.079 J	0.560 U	0.340 U	0.240 J	0.510 U	NCA	NCA
BENZO(GHI)PERYLENE	0.400 U	1.100 UJ	0.610 U	0.560 U	0.340 U	0.480 U	0.510 U	0.170	320
BENZO(K)FLUORANTHRENE	0.400 U	0.260 J	0.056 J	0.560 U	0.340 U	0.480 U	0.510 U	0.240	1340
BENZYL BUTYL PHTHALATE	0.400 U	1.100 UJ	0.610 U	0.560 U	0.340 U	0.480 U	0.510 U	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	0.074 J	0.380 J	0.120 J	0.560 U	0.340 U	0.220 J	0.510 U	NCA	NCA
CARBAZOLE	0.400 U	1.100 UJ	0.610 U	0.560 U	0.340 U	0.480 U	0.510 U	NCA	NCA
CHRYSENE	0.400 U	0.390 J	0.610 U	0.560 U	0.340 U	0.140 J	0.510 U	0.340	460
DI-N-OCTYL PHTHALATE	0.400 U	1.100 UJ	0.610 U	0.560 U	0.340 U	0.480 U	0.510 U	NCA	NCA
DIBENZO(A,H)ANTHRACENE	0.400 U	1.100 UJ	0.610 U	0.560 U	0.340 U	0.480 U	0.510 U	0.060	130
DIBENZOFURAN	0.400 U	1.100 UJ	0.610 U	0.560 U	0.340 U	0.480 U	0.510 U	NCA	NCA
DIMETHYL PHTHALATE	0.400 U	1.100 UJ	0.610 U	0.560 U	0.340 U	0.480 U	0.510 U	NCA	NCA
FLUORANTHRENE	0.048 J	0.560 J	0.070 J	0.560 U	0.340 U	0.200 J	0.510 U	0.750	1020
FLUORENE	0.400 U	1.100 UJ	0.610 U	0.560 U	0.340 U	0.480 U	0.510 U	0.190	160
INDENO(1,2,3-C,D)PYRENE	0.400 U	1.100 UJ	0.610 U	0.560 U	0.340 U	0.480 U	0.510 U	0.200	320
NAPHTHALENE	0.400 U	1.100 UJ	0.610 U	0.560 U	0.340 U	0.480 U	0.510 U	NCA	NCA
PENTACHLOROPHENOL	2.000 U	5.500 UJ	3.100 U	2.800 U	1.700 U	2.400 U	2.600 U	NCA	NCA
PHENANTHRENE	0.400 U	0.330 J	0.610 U	0.560 U	0.340 U	0.110 J	0.510 U	0.560	950
PHENOL	0.400 U	1.100 UJ	0.610 U	0.560 U	0.340 U	0.480 U	0.510 U	NCA	NCA
PYRENE	0.053 J	0.670 J	0.079 J	0.560 U	0.340 U	0.280 J	0.510 U	0.490	850
TOTAL PAHs (Ontario) (5)	0.101	3.060	0.205	ND	ND	0.990	ND	4	10000

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.
(5) Total PAHs for Freshwater/Estuarine sediment samples were calculated from the lists provided in Appendix F.

TABLE 4-9
PESTICIDE/POLYCHLORINATED BIPHENYL COMPOUNDS DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

EAST DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	EAST DITCH		UNNAMED TRIBUTARY		SEDIMENT QUALITY CRITERIA (3)	
	SD-1407	SD-1408	SD-1411	SD-1412	NOAA ER-L	NOAA ER-M
4,4'-DDD	2.800 UJ	0.190 UJ	1.400 UJ	0.850 UJ	0.002	0.02
4,4'-DDE	2.800 UJ	0.190 UJ	1.400 UJ	0.850 UJ	0.002	0.015
4,4'-DDT	2.800 UJ	0.190 UJ	1.400 UJ	0.850 UJ	0.001	0.007
ALDRIN	1.400 UJ	0.094 UJ	0.690 UJ	0.430 UJ	NCA	NCA
ALPHA ENDOSULFAN	1.400 UJ	0.094 UJ	0.690 UJ	0.430 UJ	NCA	NCA
AROCLOR-1260	28.000 UJ	1.900 UJ	14.000 UJ	8.500 UJ	0.05	0.40
BETA BHC	1.400 UJ	0.094 UJ	0.690 UJ	0.430 UJ	NCA	NCA
BETA ENDOSULFAN	2.800 UJ	0.190 UJ	1.400 UJ	0.850 UJ	NCA	NCA
DIELDRIN	2.800 UJ	0.190 UJ	1.400 UJ	0.850 UJ	0.00002	0.008
ENDRIN KETONE	2.800 UJ	0.190 UJ	1.400 UJ	0.850 UJ	NCA	NCA
HEPTACHLOR EPOXIDE	1.400 UJ	0.094 UJ	0.690 UJ	0.430 UJ	NCA	NCA
METHOXYCHLOR	14.000 UJ	0.940 UJ	6.900 UJ	4.300 UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-9
PESTICIDE/POLYCHLORINATED BIPHENYL COMPOUNDS DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

EAST DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	UPGRADIENT SCIRPUS MARSH	EAST DITCH					UNNAMED TRIBUTARY	SEDIMENT QUALITY CRITERIA (3)	
	SD-1401	SD-1402	SD-1403	SD-1404	SD-1405	SD-1406	SD-1410	Ontario LEL	Ontario SEL (Based on TOC) (4)
4,4'-DDD	0.130 U	0.049 U	0.160 U	1.300 UJ	1.300 UJ	0.140 U	0.130 J	0.008	6.00
4,4'-DDE	0.130 U	0.049 U	0.160 U	1.300 UJ	1.300 UJ	0.140 U	0.390 UJ	0.005	19.00
4,4'-DDT	0.130 U	0.049 U	0.160 U	1.300 UJ	1.300 UJ	0.140 U	0.390 UJ	0.007	12.00
ALDRIN	0.022	0.024 U	0.080 U	0.630 UJ	0.650 UJ	0.068 U	0.200 UJ	0.002	8.00
ALPHA ENDOSULFAN	0.065 U	0.024 U	0.080 U	0.630 UJ	0.650 UJ	0.068 U	0.200 UJ	NCA	NCA
AROCLOR-1260	1.300 U	0.490 U	1.600 U	13.000 UJ	13.000 UJ	1.400 U	3.900 UJ	0.005	24.00
BETA BHC	0.065 U	0.006	0.027	0.630 UJ	0.650 UJ	0.068 U	0.200 UJ	0.005	21.00
BETA ENDOSULFAN	0.130 U	0.049 U	0.160 U	1.300 UJ	1.300 UJ	0.140 U	0.390 UJ	NCA	NCA
DIELDRIN	0.130 U	0.049 U	0.160 U	1.300 UJ	1.300 UJ	0.140 U	0.390 UJ	0.002	91.00
ENDRIN KETONE	0.130 U	0.049 U	0.160 U	1.300 UJ	1.300 UJ	0.140 U	0.390 UJ	NCA	NCA
HEPTACHLOR EPOXIDE	0.065 U	0.024 U	0.080 U	0.630 UJ	0.650 UJ	0.068 U	0.200 UJ	0.005	5.00
METHOXYCHLOR	0.650 U	0.240 U	0.800 U	6.300 UJ	6.500 UJ	0.680 U	2.000 UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-9
PESTICIDE/POLYCHLORINATED BIPHENYL COMPOUNDS DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	RED ROOT CREEK								SEDIMENT QUALITY CRITERIA (3)	
	SD-0602	SD-0603	SD-0604	SD-0605	SD-0606	SD-0607	SD-0608	SD-0609	NOAA ER-L	NOAA ER-M
4,4'-DDD	0.065 UJ	0.190 J	0.250 UJ	0.019 J	0.037 J	0.033 UJ	0.038 J	0.014 J	0.002	0.02
4,4'-DDE	0.065 UJ	0.200 UJ	0.250 UJ	0.013 J	0.031 J	0.033 UJ	0.032 J	0.013 J	0.002	0.015
4,4'-DDT	0.065 UJ	0.200 UJ	0.250 UJ	0.024 UJ	0.025 UJ	0.033 UJ	0.020 UJ	0.024 UJ	0.001	0.007
ALDRIN	0.033 UJ	0.099 UJ	0.120 UJ	0.012 UJ	0.013 UJ	0.017 UJ	0.010 UJ	0.012 UJ	NCA	NCA
ALPHA ENDOSULFAN	0.033 UJ	0.099 UJ	0.120 UJ	0.012 UJ	0.013 UJ	0.017 UJ	0.010 UJ	0.012 UJ	NCA	NCA
AROCLOR-1260	0.650 UJ	4.200 J	3.800 J	0.240 UJ	0.250 UJ	0.330 UJ	0.200 UJ	0.240 UJ	0.05	0.40
BETA BHC	0.033 UJ	0.099 UJ	0.120 UJ	0.012 UJ	0.013 UJ	0.017 UJ	0.010 UJ	0.012 UJ	NCA	NCA
BETA ENDOSULFAN	0.065 UJ	0.200 UJ	0.200 UJ	0.024 UJ	0.025 UJ	0.033 UJ	0.020 UJ	0.024 UJ	NCA	NCA
DIELDRIN	0.065 UJ	0.200 UJ	0.250 UJ	0.024 UJ	0.025 UJ	0.033 UJ	0.020 UJ	0.024 UJ	0.00002	0.008
ENDRIN KETONE	0.065 UJ	0.200 UJ	0.250 UJ	0.024 UJ	0.025 UJ	0.033 UJ	0.020 UJ	0.024 UJ	NCA	NCA
HEPTACHLOR EPOXIDE	0.033 UJ	0.099 UJ	0.120 UJ	0.012 UJ	0.013 UJ	0.017 UJ	0.010 UJ	0.012 UJ	NCA	NCA
METHOXYCHLOR	0.330 UJ	0.990 UJ	1.200 UJ	0.120 UJ	0.130 UJ	0.170 UJ	0.100 UJ	0.120 UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-9
PESTICIDE/POLYCHLORINATED BIPHENYL COMPOUNDS DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 5 POND		BLACK DITCH DRAINAGE			SEDIMENT QUALITY CRITERIA (3)	
	SD-0503	SD-0504	SD-0407	SD-0408	SD-0505	Ontario LEL	Ontario SEL (Based on TOC) (4)
4,4'-DDD	0.062 J	0.056 J	0.010 U	0.011 U	0.011 U	0.008	6.00
4,4'-DDE	0.012 J	0.015 J	0.010 U	0.011 U	0.011 U	0.005	19.00
4,4'-DDT	0.018 UJ	0.034 J	0.010 U	0.011 U	0.011 U	0.007	12.00
ALDRIN	0.009 UJ	0.012 UJ	0.005 U	0.006 U	0.005 U	0.002	8.00
ALPHA ENDOSULFAN	0.009 UJ	0.012 UJ	0.005 U	0.006 U	0.005 U	NCA	NCA
AROCLOR-1260	0.180 UJ	0.240 UJ	0.098 U	0.110 U	0.110 U	0.005	24.00
BETA BHC	0.009 UJ	0.012 UJ	0.005 U	0.006 U	0.005 U	0.005	21.00
BETA ENDOSULFAN	0.018 UJ	0.024 UJ	0.010 U	0.011 U	0.011 U	NCA	NCA
DIELDRIN	0.018 UJ	0.024 UJ	0.010 U	0.011 U	0.011 U	0.002	91.00
ENDRIN KETONE	0.018 UJ	0.024 UJ	0.010 U	0.011 U	0.011 U	NCA	NCA
HEPTACHLOR EPOXIDE	0.009 UJ	0.012 UJ	0.005 U	0.006 U	0.005 U	0.005	5.00
METHOXYCHLOR	0.090 UJ	0.120 UJ	0.049 U	0.056 U	0.054 U	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-9
PESTICIDE/POLYCHLORINATED BIPHENYL COMPOUNDS DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 4 DITCH						AREA 5 POND		SEDIMENT QUALITY CRITERIA (3)	
	SD-0401	SD-0402	SD-0403	SD-0404	SD-0405	SD-0406	SD-0501	SD-0502	Ontario LEL	Ontario SEL (Based on TOC) (4)
4,4'-DDD	0.034 J	0.038 UJ	0.020 J	0.015 U	0.015 U	0.020 UJ	0.070 J	0.032 UJ	0.008	6.00
4,4'-DDE	0.045 UJ	0.038 UJ	0.031 J	0.009 J	0.015 U	0.020 UJ	0.015 J	0.016 J	0.005	19.00
4,4'-DDT	0.045 UJ	0.038 UJ	0.019 J	0.008 J	0.015 U	0.020 UJ	0.036 J	0.032 UJ	0.007	12.00
ALDRIN	0.022 UJ	0.019 UJ	0.012 UJ	0.008 U	0.007 U	0.010 UJ	0.011 UJ	0.016 UJ	0.002	8.00
ALPHA ENDOSULFAN	0.022 UJ	0.019 UJ	0.012 UJ	0.008 U	0.007 U	0.010 UJ	0.011 UJ	0.016 UJ	NCA	NCA
AROCLOR-1260	0.450 UJ	0.380 UJ	0.240 UJ	0.150 U	0.150 U	0.200 UJ	0.210 UJ	0.320 UJ	0.005	24.00
BETA BHC	0.022 UJ	0.019 UJ	0.012 UJ	0.008 U	0.007 U	0.010 UJ	0.011 UJ	0.016 UJ	0.005	21.00
BETA ENDOSULFAN	0.045 UJ	0.038 UJ	0.024 UJ	0.015 U	0.015 U	0.020 UJ	0.021 UJ	0.032 UJ	NCA	NCA
DIELDRIN	0.045 UJ	0.038 UJ	0.024 UJ	0.015 U	0.015 U	0.020 UJ	0.021 UJ	0.032 UJ	0.002	91.00
ENDRIN KETONE	0.045 UJ	0.038 UJ	0.024 UJ	0.015 U	0.015 U	0.020 UJ	0.021 UJ	0.032 UJ	NCA	NCA
HEPTACHLOR EPOXIDE	0.022 UJ	0.019 UJ	0.012 UJ	0.008 U	0.007 U	0.010 UJ	0.011 UJ	0.016 UJ	0.005	5.00
METHOXYCHLOR	0.220 UJ	0.190 UJ	0.120 UJ	0.075 U	0.074 U	0.098 UJ	0.110 UJ	0.160 UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-9
PESTICIDE/POLYCHLORINATED BIPHENYL COMPOUNDS DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	BLACK DITCH DRAINAGE							SEDIMENT QUALITY CRITERIA (3)	
	SD-0506	SD-0507	SD-0616	SD-0617	SD-0618	SD-0619	SD-0620 (Duplicate of SD-0619)	NOAA ER-L	NOAA ER-M
4,4'-DDD	0.011 U	0.010 U	0.016 UJ	0.023 UJ	0.018 J	0.025 UJ	0.022 UJ	0.002	0.02
4,4'-DDE	0.011 U	0.010 U	0.016 UJ	0.013 J	0.018 J	0.017 J	0.015 J	0.002	0.015
4,4'-DDT	0.011 U	0.010 U	0.016 UJ	0.023 UJ	0.028 UJ	0.025 UJ	0.022 UJ	0.001	0.007
ALDRIN	0.005 U	0.005 U	0.008 UJ	0.012 UJ	0.014 UJ	0.013 UJ	0.011 UJ	NCA	NCA
ALPHA ENDOSULFAN	0.005 U	0.005 U	0.008 UJ	0.012 UJ	0.014 UJ	0.013 UJ	0.011 UJ	NCA	NCA
AROCLOR-1260	0.110 U	0.100 U	0.160 UJ	0.230 UJ	0.280 UJ	0.250 UJ	0.220 UJ	0.05	0.40
BETA BHC	0.005 U	0.005 U	0.008 UJ	0.012 UJ	0.014 UJ	0.013 UJ	0.011 UJ	NCA	NCA
BETA ENDOSULFAN	0.011 U	0.010 U	0.016 UJ	0.023 UJ	0.028 UJ	0.025 UJ	0.022 UJ	NCA	NCA
DIELDRIN	0.011 U	0.010 U	0.016 UJ	0.023 UJ	0.028 UJ	0.025 UJ	0.022 UJ	0.00002	0.008
ENDRIN KETONE	0.011 U	0.010 U	0.016 UJ	0.023 UJ	0.028 UJ	0.025 UJ	0.022 UJ	NCA	NCA
HEPTACHLOR EPOXIDE	0.005 U	0.005 U	0.008 UJ	0.012 UJ	0.014 UJ	0.013 UJ	0.011 UJ	NCA	NCA
METHOXYCHLOR	0.054 U	0.051 U	0.081 UJ	0.120 UJ	0.140 UJ	0.130 UJ	0.110 UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-9
PESTICIDE/POLYCHLORINATED BIPHENYL COMPOUNDS DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 18B STREAM								SEDIMENT QUALITY CRITERIA (3)	
	SD-1803	SD-1804	SD-1805	SD-1806	SD-1807	SD-1808	SD-1809	SD-1818 (Duplicate of SD-1809)	Ontario LEL	Ontario SEL (Based on TOC) (4)
4,4'-DDD	0.510 U	0.560 U	0.550 U	0.110 U	0.012 J	0.010 U	0.001 J	0.047 U	0.008	6.00
4,4'-DDE	0.180	0.130	0.550 U	0.110 U	0.033 UJ	0.010 U	0.010 U	0.047 U	0.005	19.00
4,4'-DDT	0.510 U	0.560 U	0.550 U	0.110 U	0.033 UJ	0.010 U	0.002 J	0.047 U	0.007	12.00
ALDRIN	0.690 J	0.350 J	0.320 J	0.055 U	0.016 UJ	0.005 U	0.005 U	0.024 U	0.002	8.00
ALPHA ENDOSULFAN	0.250 U	0.280 U	0.280 U	0.055 U	0.016 UJ	0.005 U	0.005 U	0.024 U	NCA	NCA
AROCLOR-1260	5.100 U	5.600 U	5.500 U	1.100 U	0.330 UJ	0.099 U	0.097 U	0.470 U	0.005	24.00
BETA BHC	0.250 U	0.280 U	0.280 U	0.055 U	0.016 UJ	0.005 U	0.005 U	0.024 U	0.005	21.00
BETA ENDOSULFAN	0.180	0.140	0.550 U	0.110 U	0.033 UJ	0.010 U	0.010 U	0.047 U	NCA	NCA
DIELDRIN	0.510 U	0.560 U	0.550 U	0.110 U	0.033 UJ	0.010 U	0.010 U	0.047 U	0.002	91.00
ENDRIN KETONE	0.230	0.200	0.200	0.110 U	0.033 UJ	0.010 U	0.010 U	0.047 U	NCA	NCA
HEPTACHLOR EPOXIDE	3.600	2.000	1.800	0.065	0.016 UJ	0.001	0.002 J	0.024 U	0.005	5.00
METHOXYCHLOR	0.610	0.670	0.610	0.550 U	0.160 UJ	0.049 U	0.048 U	0.240 U	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-9
PESTICIDE/POLYCHLORINATED BIPHENYL COMPOUNDS DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 18C STREAM								SEDIMENT QUALITY CRITERIA (3)	
	SD-1810	SD-1811	SD-1812	SD-1813	SD-1814	SD-1815	SD-1816	SD-1817	Ontario LEL	Ontario SEL (Based on TOC) (4)
4,4'-DDD	0.032	0.086	0.098 U	0.130 U	0.010 U	0.100 U	0.096 U	0.010 U	0.008	6.00
4,4'-DDE	0.037	0.031	0.098 U	0.130 U	0.010 U	0.100 U	0.096 U	0.010 U	0.005	19.00
4,4'-DDT	0.110	0.220	0.098 U	0.034	0.010 U	0.100 U	0.096 U	0.010 U	0.007	12.00
ALDRIN	0.048 U	0.056 U	0.049 U	0.066 U	0.005 U	0.052 U	0.048 U	0.005 U	0.002	8.00
ALPHA ENDOSULFAN	0.048 U	0.056 U	0.049 U	0.066 U	0.005 U	0.052 U	0.048 U	0.005 U	NCA	NCA
AROCLOR-1260	0.960 U	1.100 U	0.980 U	1.300 U	0.100 U	1.000 U	0.960 U	0.096 U	0.005	24.00
BETA BHC	0.048 U	0.056 U	0.049 U	0.066 U	0.005 U	0.052 U	0.048 U	0.005 U	0.005	21.00
BETA ENDOSULFAN	0.096 U	0.110 U	0.098 U	0.130 U	0.010 U	0.100 U	0.096 U	0.010 U	NCA	NCA
DIELDRIN	0.096 U	0.110 U	0.098 U	0.130 U	0.010 U	0.100 U	0.096 U	0.010 U	0.002	91.00
ENDRIN KETONE	0.096 U	0.110 U	0.098 U	0.130 U	0.010 U	0.100 U	0.096 U	0.010 U	NCA	NCA
HEPTACHLOR EPOXIDE	0.087	0.036	0.038	0.035	0.003 J	0.084	0.067	0.005 U	0.005	5.00
METHOXYCHLOR	0.480 U	0.560 U	0.490 U	0.660 U	0.050 U	0.520 U	0.480 U	0.048 U	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-9
PESTICIDE/POLYCHLORINATED BIPHENYL COMPOUNDS DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 20 DITCH		LOWER AREA 18B STREAM				AREA 8 POND		SEDIMENT QUALITY CRITERIA (3)	
	SD-2001	SD-2002	SD-0101	SD-0102	SD-0103	SD-0104	SD-0801	SD-0802	Ontario LEL	Ontario SEL (Based on TOC) (4)
4,4'-DDD	0.011 U	0.011 U	0.010 U	0.010 U	0.010 U	0.009 U	0.390 UJ	0.590 UJ	0.008	6.00
4,4'-DDE	0.011 U	0.011 U	0.010 U	0.010 U	0.010 U	0.009 U	0.390 UJ	0.590 UJ	0.005	19.00
4,4'-DDT	0.011 U	0.011 U	0.010 U	0.010 U	0.010 U	0.009 U	0.390 UJ	0.590 UJ	0.007	12.00
ALDRIN	0.006 U	0.006 U	0.005 U	0.005 U	0.005 U	0.005 U	0.190 UJ	0.300 UJ	0.002	8.00
ALPHA ENDOSULFAN	0.006 U	0.006 U	0.005 U	0.005 U	0.005 U	0.005 U	0.190 UJ	0.300 UJ	NCA	NCA
AROCLOR-1260	0.110 U	0.130	0.100 U	0.096 U	0.098 U	0.094 U	3.900 UJ	5.900 UJ	0.005	24.00
BETA BHC	0.006 U	0.006 U	0.005 U	0.005 U	0.005 U	0.005 U	0.190 UJ	0.300 UJ	0.005	21.00
BETA ENDOSULFAN	0.011 U	0.011 U	0.010 U	0.010 U	0.010 U	0.009 U	0.390 UJ	0.590 UJ	NCA	NCA
DIELDRIN	0.011 U	0.011 U	0.010 U	0.010 U	0.010 U	0.009 U	0.390 UJ	0.590 UJ	0.002	91.00
ENDRIN KETONE	0.011 U	0.011 U	0.010 U	0.010 U	0.010 U	0.009 U	0.390 UJ	0.590 UJ	NCA	NCA
HEPTACHLOR EPOXIDE	0.006 U	0.006 U	0.005 U	0.005 U	0.005 U	0.005 U	0.026 J	0.300 UJ	0.005	5.00
METHOXYCHLOR	0.057 U	0.055 U	0.052 U	0.048 U	0.049 U	0.047 U	1.900 UJ	3.000 UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-9
PESTICIDE/POLYCHLORINATED BIPHENYL COMPOUNDS DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 8 POND					RED ROOT CREEK	SULFUR PLANT PONDS		SEDIMENT QUALITY CRITERIA (3)	
	SD-0803	SD-0804	SD-0805	SD-0806	SD-0807 (Duplicate of SD-0801)	SD-0601	SD-0610	SD-0611	Ontario LEL	Ontario SEL (Based on TOC) (4)
4,4'-DDD	0.260 UJ	0.120 U	0.120 U	0.210 UJ	0.410 UJ	0.027 J	0.022 UJ	0.015 U	0.008	6.00
4,4'-DDE	0.260 UJ	0.120 U	0.120 U	0.210 UJ	0.410 UJ	0.038 UJ	0.022 UJ	0.015 U	0.005	19.00
4,4'-DDT	0.260 UJ	0.120 U	0.120 U	0.210 UJ	0.410 UJ	0.038 UJ	0.022 UJ	0.008 J	0.007	12.00
ALDRIN	0.130 UJ	0.058 U	0.059 U	0.100 UJ	0.200 UJ	0.019 UJ	0.011 UJ	0.007 U	0.002	8.00
ALPHA ENDOSULFAN	0.130 UJ	0.058 U	0.059 U	0.100 UJ	0.200 UJ	0.019 UJ	0.011 UJ	0.007 U	NCA	NCA
AROCLOR-1260	2.600 UJ	1.200 U	1.200 U	2.100 UJ	4.100 UJ	0.380 UJ	0.220 UJ	0.150 U	0.005	24.00
BETA BHC	0.130 UJ	0.058 U	0.059 U	0.100 UJ	0.200 UJ	0.019 UJ	0.011 UJ	0.007 U	0.005	21.00
BETA ENDOSULFAN	0.260 UJ	0.120 U	0.120 U	0.210 UJ	0.410 UJ	0.038 UJ	0.022 UJ	0.015 U	NCA	NCA
DIELDRIN	0.260 UJ	0.120 U	0.120 U	0.210 UJ	0.410 UJ	0.038 UJ	0.022 UJ	0.015 U	0.002	91.00
ENDRIN KETONE	0.260 UJ	0.120 U	0.120 U	0.210 UJ	0.410 UJ	0.038 UJ	0.022 UJ	0.015 U	NCA	NCA
HEPTACHLOR EPOXIDE	0.130 UJ	0.058 U	0.059 U	0.100 UJ	0.034 J	0.019 UJ	0.011 UJ	0.007 U	0.005	5.00
METHOXYCHLOR	1.300 UJ	0.580 U	0.590 U	1.000 UJ	2.000 UJ	0.190 UJ	0.110 UJ	0.074 U	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-9
PESTICIDE/POLYCHLORINATED BIPHENYL COMPOUNDS DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	SULFUR PLANT PONDS				SEDIMENT QUALITY CRITERIA (3)	
	SD-0612	SD-0613	SD-0614	SD-0615	Ontario LEL	Ontario SEL (Based on TOC) (4)
4,4'-DDD	0.017 J	0.009 J	0.017 UJ	0.011 J	0.008	8.00
4,4'-DDE	0.020 J	0.011 U	0.017 UJ	0.024 J	0.005	19.00
4,4'-DDT	0.021 UJ	0.011 U	0.017 UJ	0.010 J	0.007	12.00
ALDRIN	0.011 UJ	0.006 U	0.008 UJ	0.010 UJ	0.002	8.00
ALPHA ENDOSULFAN	0.011 UJ	0.006 U	0.008 UJ	0.010 UJ	NCA	NCA
AROCLOR-1260	0.210 UJ	0.110 U	0.170 UJ	0.200 UJ	0.005	24.00
BETA BHC	0.011 UJ	0.006 U	0.008 UJ	0.010 UJ	0.005	21.00
BETA ENDOSULFAN	0.021 UJ	0.011 U	0.017 UJ	0.020 UJ	NCA	NCA
DIELDRIN	0.021 UJ	0.011 U	0.017 UJ	0.020 UJ	0.002	91.00
ENDRIN KETONE	0.021 UJ	0.011 U	0.017 UJ	0.020 UJ	NCA	NCA
HEPTACHLOR EPOXIDE	0.011 UJ	0.006 U	0.008 UJ	0.010 UJ	0.005	5.00
METHOXYCHLOR	0.110 UJ	0.057 U	0.083 UJ	0.098 UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-9
PESTICIDE/POLYCHLORINATED BIPHENYL COMPOUNDS DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

CENTRAL DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	CENTRAL DITCH				ISOLATED ESTUARINE PONDS		UGRAD. CONT. PONDED AREA	SEDIMENT QUALITY CRITERIA (3)	
	SD-1101	SD-1102	SD-1103	SD-1104	SD-1622	SD-1625	SD-1624	NOAA ER-L	NOAA ER-M
4,4'-DDD	0.016 U	0.007	0.050 U	0.600 U	0.170 UJ	0.500 UJ	0.140 U	0.002	0.02
4,4'-DDE	0.016 U	0.006	0.050 U	0.600 U	0.170 UJ	0.500 UJ	0.140 U	0.002	0.015
4,4'-DDT	0.016 U	0.016 U	0.050 U	0.600 U	0.170 UJ	0.500 UJ	0.140 U	0.001	0.007
ALDRIN	0.008 U	0.008 U	0.025 U	0.300 U	0.017 J	0.250 UJ	0.069 U	NCA	NCA
ALPHA ENDOSULFAN	0.008 U	0.008 U	0.025 U	0.300 U	0.085 UJ	0.250 UJ	0.069 U	NCA	NCA
AROCLOR-1260	0.160 U	0.160 U	0.500 U	6.000 U	1.700 UJ	5.000 UJ	1.400 U	0.05	0.40
BETA BHC	0.008 U	0.008 U	0.025 U	0.300 U	0.085 UJ	0.250 UJ	0.069 U	NCA	NCA
BETA ENDOSULFAN	0.016 U	0.016 U	0.050 U	0.600 U	0.170 UJ	0.500 UJ	0.140 U	NCA	NCA
DIELDRIN	0.016 U	0.016 U	0.050 U	0.600 U	0.170 UJ	0.500 UJ	0.140 U	0.00002	0.008
ENDRIN KETONE	0.016 U	0.016 U	0.050 U	0.600 U	0.170 UJ	0.500 UJ	0.140 U	NCA	NCA
HEPTACHLOR EPOXIDE	0.008 U	0.001	0.025 U	0.300 U	0.085 UJ	0.250 UJ	0.069 U	NCA	NCA
METHOXYCHLOR	0.078 U	0.078 U	0.250 U	3.000 U	0.850 UJ	2.500 UJ	0.690 U	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-9
PESTICIDE/POLYCHLORINATED BIPHENYL COMPOUNDS DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

CENTRAL DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	UPGRADIENT PONDED AREA		ISOLATED FRESHWATER POND						SEDIMENT QUALITY CRITERIA (3)	
	SD-1621		SD-1623		SD-1626		SD-1627 (Duplicate of SD-1626)		Ontario LEL	Ontario SEL (Based on TOC) (4)
4,4'-DDD	0.170	UJ	0.120	U	0.013	U	0.017	UJ	0.008	6.00
4,4'-DDE	0.170	UJ	0.120	U	0.013	U	0.017	UJ	0.005	19.00
4,4'-DDT	0.170	UJ	0.120	U	0.013	U	0.017	UJ	0.007	12.00
ALDRIN	0.086	UJ	0.019		0.002		0.003	J	0.002	8.00
ALPHA ENDOSULFAN	0.086	UJ	0.061	U	0.006	U	0.008	UJ	NCA	NCA
AROCLOR-1260	1.700	UJ	1.200	U	0.130	U	0.170	UJ	0.005	24.00
BETA BHC	0.086	UJ	0.061	U	0.006	U	0.008	UJ	0.005	21.00
BETA ENDOSULFAN	0.170	UJ	0.120	U	0.013	U	0.017	UJ	NCA	NCA
DIELDRIN	0.170	UJ	0.120	U	0.013	U	0.017	UJ	0.002	91.00
ENDRIN KETONE	0.170	UJ	0.120	U	0.013	U	0.017	UJ	NCA	NCA
HEPTACHLOR EPOXIDE	0.086	UJ	0.061	U	0.006	U	0.008	UJ	0.005	5.00
METHOXYCHLOR	0.860	UJ	0.610	U	0.063	U	0.083	UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-9
PESTICIDE/POLYCHLORINATED BIPHENYL COMPOUNDS DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

AREA 12 DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 12 DITCH						SEDIMENT QUALITY CRITERIA (3)	
	SD-1201		SD-1202		SD-1203		NOAA ER-L	NOAA ER-M
4,4'-DDD	0.006	J	0.190	UJ	0.400	J	0.002	0.02
4,4'-DDE	0.002	J	0.190	UJ	0.110	J	0.002	0.015
4,4'-DDT	0.017	UJ	0.190	UJ	0.410	J	0.001	0.007
ALDRIN	0.008	UJ	0.096	UJ	0.230	UJ	NCA	NCA
ALPHA ENDOSULFAN	0.008	UJ	0.096	UJ	0.230	UJ	NCA	NCA
AROCLOR-1260	0.170	UJ	1.900	UJ	4.600	UJ	0.05	0.40
BETA BHC	0.008	UJ	0.096	UJ	0.230	UJ	NCA	NCA
BETA ENDOSULFAN	0.017	UJ	0.190	UJ	0.460	UJ	NCA	NCA
DIELDRIN	0.017	UJ	0.190	UJ	0.460	UJ	0.00002	0.008
ENDRIN KETONE	0.017	UJ	0.190	UJ	0.460	UJ	NCA	NCA
HEPTACHLOR EPOXIDE	0.008	UJ	0.021	J	0.230	UJ	NCA	NCA
METHOXYCHLOR	0.083	UJ	0.960	UJ	2.300	UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locatio
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 5 Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-9
PESTICIDE/POLYCHLORINATED BIPHENYL COMPOUNDS DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	SOUTHWEST DITCH				WEST DITCH				SEDIMENT QUALITY CRITERIA (3)	
	SD-1215	SD-1216	SD-1619	SD-1620	SD-1601	SD-1602	SD-1603	SD-1907	NOAA ER-L	NOAA ER-M
4,4'-DDD	0.260 UJ	0.210 UJ	0.240 J	1.400 UJ	0.330 UJ	0.180 UJ	0.073 U	0.043 UJ	0.002	0.02
4,4'-DDE	0.260 UJ	0.210 UJ	0.098 J	1.400 UJ	0.330 UJ	0.180 UJ	0.073 U	0.023 J	0.002	0.015
4,4'-DDT	0.260 UJ	0.210 UJ	0.220 J	1.400 UJ	0.330 UJ	0.160 UJ	0.073 U	0.043 UJ	0.001	0.007
ALDRIN	0.130 UJ	0.110 UJ	0.260 UJ	0.680 UJ	0.160 UJ	0.089 UJ	0.036 U	0.021 UJ	NCA	NCA
ALPHA ENDOSULFAN	0.130 UJ	0.110 UJ	0.260 UJ	0.680 UJ	0.160 UJ	0.089 UJ	0.036 U	0.021 UJ	NCA	NCA
AROCLOR-1260	2.600 UJ	2.100 UJ	5.200 UJ	14.000 UJ	3.300 UJ	1.800 UJ	0.730 U	0.430 UJ	0.05	0.40
BETA BHC	0.130 UJ	0.110 UJ	0.260 UJ	0.680 UJ	0.160 UJ	0.089 UJ	0.036 U	0.021 UJ	NCA	NCA
BETA ENDOSULFAN	0.260 UJ	0.210 UJ	0.520 UJ	1.400 UJ	0.330 UJ	0.180 UJ	0.073 U	0.043 UJ	NCA	NCA
DIELDRIN	0.260 UJ	0.210 UJ	0.520 UJ	1.400 UJ	0.330 UJ	0.180 UJ	0.073 U	0.043 UJ	0.00002	0.008
ENDRIN KETONE	0.260 UJ	0.210 UJ	0.520 UJ	1.400 UJ	0.330 UJ	0.180 UJ	0.073 U	0.043 UJ	NCA	NCA
HEPTACHLOR EPOXIDE	0.130 UJ	0.110 UJ	0.150 J	0.680 UJ	0.160 UJ	0.089 UJ	0.036 U	0.021 UJ	NCA	NCA
METHOXYCHLOR	1.300 UJ	1.100 UJ	2.600 UJ	6.800 UJ	1.600 UJ	0.890 UJ	0.360 U	0.210 UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-9
PESTICIDE/POLYCHLORINATED BIPHENYL COMPOUNDS DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	OLD RED ROOT CREEK						ASSOCIATED DITCHES AREA 16		SEDIMENT QUALITY CRITERIA (3)	
	SD-1606	SD-1607	SD-1608	SD-1609	SD-1610	SD-1631 (Duplicate of SD-1609)	SD-1611	SD-1612	NOAA ER-L	NOAA ER-M
4,4'-DDD	0.320 UJ	0.390 UJ	0.410 UJ	0.053 J	0.430 UJ	0.068 J	0.390 UJ	0.530 J	0.002	0.02
4,4'-DDE	0.320 UJ	0.390 UJ	0.410 UJ	0.210 UJ	0.430 UJ	0.230 UJ	0.390 UJ	0.470 UJ	0.002	0.015
4,4'-DDT	0.320 UJ	0.062 J	0.410 UJ	0.210 UJ	0.430 UJ	0.230 UJ	0.390 UJ	0.180 J	0.001	0.007
ALDRIN	0.160 UJ	0.200 UJ	0.200 UJ	0.110 UJ	0.210 UJ	0.120 UJ	0.190 UJ	0.230 UJ	NCA	NCA
ALPHA ENDOSULFAN	0.160 UJ	0.200 UJ	0.200 UJ	0.110 UJ	0.210 UJ	0.120 UJ	0.190 UJ	0.230 UJ	NCA	NCA
AROCLOR-1260	3.200 UJ	3.900 UJ	4.100 UJ	2.100 UJ	4.300 UJ	2.300 UJ	3.900 UJ	4.700 UJ	0.05	0.40
BETA BHC	0.160 UJ	0.200 UJ	0.200 UJ	0.110 UJ	0.210 UJ	0.120 UJ	0.190 UJ	0.230 UJ	NCA	NCA
BETA ENDOSULFAN	0.320 UJ	0.390 UJ	0.410 UJ	0.210 UJ	0.430 UJ	0.230 UJ	0.390 UJ	0.470 UJ	NCA	NCA
DIELDRIN	0.320 UJ	0.390 UJ	0.410 UJ	0.210 UJ	0.430 UJ	0.230 UJ	0.390 UJ	0.470 UJ	0.00002	0.008
ENDRIN KETONE	0.320 UJ	0.390 UJ	0.410 UJ	0.210 UJ	0.430 UJ	0.230 UJ	0.390 UJ	0.470 UJ	NCA	NCA
HEPTACHLOR EPOXIDE	0.160 UJ	0.200 UJ	0.200 UJ	0.110 UJ	0.210 UJ	0.120 UJ	0.190 UJ	0.230 UJ	NCA	NCA
METHOXYCHLOR	1.600 UJ	2.000 UJ	2.000 UJ	1.100 UJ	2.100 UJ	1.200 UJ	1.900 UJ	2.300 UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-9
PESTICIDE/POLYCHLORINATED BIPHENYL COMPOUNDS DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	ASSOCIATED DITCHES - AREA 16							AREA 19 SW WETLANDS		SEDIMENT QUALITY CRITERIA (3)	
	SD-1615	SD-1616	SD-1617	SD-1618	SD-1628 (Duplicate of SD-1612)	SD-1629	SD-1630	SD-1906	SD-1911 (Duplicate of SD_1906)	NOAA ER-L	NOAA ER-M
4,4'-DDD	0.230 UJ	0.340 UJ	0.430 UJ	0.240 UJ	0.620 J	0.960 U	1.700 UJ	0.018 J	0.040 J	0.002	0.02
4,4'-DDE	0.230 UJ	0.340 UJ	0.430 UJ	0.240 UJ	0.400 UJ	0.960 U	1.700 UJ	0.030 J	0.060 J	0.002	0.015
4,4'-DDT	0.230 UJ	0.340 UJ	0.430 UJ	0.240 UJ	0.210 J	0.960 U	1.700 UJ	0.011 J	0.029 J	0.001	0.007
ALDRIN	0.110 UJ	0.170 UJ	0.220 UJ	0.120 UJ	0.200 UJ	0.480 U	0.830 UJ	0.010 UJ	0.016 UJ	NCA	NCA
ALPHA ENDOSULFAN	0.110 UJ	0.170 UJ	0.220 UJ	0.120 UJ	0.200 UJ	0.480 U	0.830 UJ	0.010 UJ	0.016 UJ	NCA	NCA
AROCLOR-1260	2.300 UJ	3.400 UJ	4.300 UJ	2.400 UJ	4.000 UJ	9.600 U	17.000 UJ	0.210 UJ	0.330 UJ	0.05	0.40
BETA BHC	0.110 UJ	0.170 UJ	0.220 UJ	0.120 UJ	0.200 UJ	0.480 U	0.830 UJ	0.010 UJ	0.016 UJ	NCA	NCA
BETA ENDOSULFAN	0.230 UJ	0.340 UJ	0.430 UJ	0.240 UJ	0.400 UJ	0.960 U	1.700 UJ	0.021 UJ	0.033 UJ	NCA	NCA
DIELDRIN	0.230 UJ	0.340 UJ	0.430 UJ	0.240 UJ	0.400 UJ	0.960 U	1.700 UJ	0.023 J	0.049 J	0.00002	0.008
ENDRIN KETONE	0.230 UJ	0.340 UJ	0.430 UJ	0.240 UJ	0.400 UJ	0.960 U	1.700 UJ	0.021 UJ	0.033 UJ	NCA	NCA
HEPTACHLOR EPOXIDE	0.110 UJ	0.170 UJ	0.220 UJ	0.120 UJ	0.200 UJ	0.480 U	0.830 UJ	0.010 UJ	0.016 UJ	NCA	NCA
METHOXYCHLOR	1.100 UJ	1.700 UJ	2.200 UJ	1.200 UJ	2.000 UJ	4.800 U	8.300 UJ	0.100 UJ	0.160 UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-9
PESTICIDE/POLYCHLORINATED BIPHENYL COMPOUNDS DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	DRY TRIBUTARY AREA 18		AREA 19 FORESTED WETLANDS		AREA 19 NE WETLANDS			AREA 19 SW WETLANDS		SEDIMENT QUALITY CRITERIA (3)	
	SD-1801	SD-1802	SD-1901	SD-1903	SD-1908	SD-1909	SD-1910	SD-1904	SD-1905	Ontario LEL	Ontario SEL (Based on TOC) (4)
4,4'-DDD	0.052 U	0.015	0.016 U	0.310 J	0.013 U	0.039 UJ	0.023 UJ	0.021 UJ	0.013 U	0.008	6.00
4,4'-DDE	0.052 U	0.025	0.016 U	0.120 J	0.013 U	0.039 UJ	0.023 UJ	0.021 UJ	0.006 J	0.005	19.00
4,4'-DDT	0.052 U	0.053	0.016 U	0.160 UJ	0.013 U	0.039 UJ	0.023 UJ	0.021 UJ	0.007 J	0.007	12.00
ALDRIN	0.026 U	0.039 U	0.008 U	0.078 UJ	0.007 U	0.020 UJ	0.012 UJ	0.010 UJ	0.006 U	0.002	8.00
ALPHA ENDOSULFAN	0.026 U	0.039 U	0.008 U	0.078 UJ	0.007 U	0.020 UJ	0.012 UJ	0.010 UJ	0.006 U	NCA	NCA
AROCLOR-1260	0.520 U	0.770 U	0.160 U	1.600 UJ	0.130 U	0.390 UJ	0.230 UJ	0.210 UJ	0.130 U	0.005	24.00
BETA BHC	0.026 U	0.039 U	0.008 U	0.078 UJ	0.007 U	0.020 UJ	0.012 UJ	0.010 UJ	0.006 U	0.005	21.00
BETA ENDOSULFAN	0.052 U	0.077 U	0.016 U	0.160 UJ	0.013 U	0.039 UJ	0.023 UJ	0.021 UJ	0.013 U	NCA	NCA
DIELDRIN	0.052 U	0.077 U	0.016 U	0.160 UJ	0.013 U	0.039 UJ	0.023 UJ	0.021 UJ	0.013 U	0.002	91.00
ENDRIN KETONE	0.052 U	0.077 U	0.016 U	0.160 UJ	0.013 U	0.039 UJ	0.023 UJ	0.021 UJ	0.013 U	NCA	NCA
HEPTACHLOR EPOXIDE	0.018	0.039 U	0.008 U	0.078 UJ	0.007 U	0.020 UJ	0.012 UJ	0.010 UJ	0.006 U	0.005	5.00
METHOXYCHLOR	0.260 U	0.390 U	0.079 U	0.780 UJ	0.067 U	0.200 UJ	0.120 UJ	0.100 UJ	0.063 U	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-9
PESTICIDE/POLYCHLORINATED BIPHENYL COMPOUNDS DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	OLD RED ROOT CREEK		ASSOCIATED DITCHES AREA 16		SEDIMENT QUALITY CRITERIA (3)	
	SD-1604	SD-1605	SD-1613	SD-1614	Ontario LEL	Ontario SEL (Based on TOC) (4)
4,4'-DDD	0.011 U	0.100 U	0.100 UJ	0.300 UJ	0.008	6.00
4,4'-DDE	0.011 U	0.100 U	0.100 UJ	0.300 UJ	0.005	19.00
4,4'-DDT	0.011 U	0.100 U	0.100 UJ	0.300 UJ	0.007	12.00
ALDRIN	0.006 U	0.050 U	0.052 UJ	0.150 UJ	0.002	8.00
ALPHA ENDOSULFAN	0.006 U	0.050 U	0.052 UJ	0.150 UJ	NCA	NCA
AROCLOR-1260	0.110 UJ	1.000 U	1.000 UJ	3.000 UJ	0.005	24.00
BETA BHC	0.006 U	0.050 U	0.052 UJ	0.150 UJ	0.005	21.00
BETA ENDOSULFAN	0.011 U	0.100 U	0.100 UJ	0.300 UJ	NCA	NCA
DIELDRIN	0.011 U	0.100 U	0.100 UJ	0.300 UJ	0.002	91.00
ENDRIN KETONE	0.011 U	0.100 U	0.100 UJ	0.300 UJ	NCA	NCA
HEPTACHLOR EPOXIDE	0.006 U	0.050 U	0.052 UJ	0.150 UJ	0.005	5.00
METHOXYCHLOR	0.056 U	0.500 U	0.520 UJ	1.500 UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-9
PESTICIDE/POLYCHLORINATED BIPHENYL COMPOUNDS DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

COUNTY PARK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	OPEN LAWN DITCH				MAINTENANCE AREA DITCH				SEDIMENT QUALITY CRITERIA (3)	
	SD-1003	SD-1004	SD-1005	SD-1012 (Duplicate of SD-1005)	SD-1007	SD-1008	SD-1009	SD-1010	Ontario LEL	Ontario SEL (Based on TOC) (4)
4,4'-DDD	0.046 UJ	0.011 U	0.027 U	0.025 U	0.010 U	0.610 J	0.015 U	0.014 U	0.008	6.00
4,4'-DDE	0.046 UJ	0.011 U	0.027 U	0.025 U	0.010 U	0.110 J	0.015 U	0.014 U	0.005	19.00
4,4'-DDT	0.046 UJ	0.011 U	0.027 U	0.025 U	0.006 J	1.300 J	0.010 J	0.014 U	0.007	12.00
ALDRIN	0.023 UJ	0.006 U	0.014 U	0.012 U	0.005 U	0.013 UJ	0.008 U	0.007 U	0.002	8.00
ALPHA ENDOSULFAN	0.023 UJ	0.006 U	0.014 U	0.012 U	0.005 U	0.011 J	0.008 U	0.007 U	NCA	NCA
AROCLOR-1260	0.460 UJ	0.110 U	0.270 U	0.250 U	0.098 U	0.260 UJ	0.150 U	0.140 U	0.005	24.00
BETA BHC	0.023 UJ	0.006 U	0.014 U	0.012 U	0.005 U	0.013 UJ	0.008 U	0.007 U	0.005	21.00
BETA ENDOSULFAN	0.046 UJ	0.011 U	0.027 U	0.025 U	0.010 U	0.021 J	0.015 U	0.014 U	NCA	NCA
DIELDRIN	0.046 UJ	0.011 U	0.027 U	0.025 U	0.010 U	0.026 UJ	0.015 U	0.014 U	0.002	91.00
ENDRIN KETONE	0.046 UJ	0.011 U	0.027 U	0.025 U	0.010 U	0.026 UJ	0.015 U	0.014 U	NCA	NCA
HEPTACHLOR EPOXIDE	0.023 UJ	0.006 U	0.014 U	0.012 U	0.005 U	0.013 UJ	0.008 U	0.007 U	0.005	5.00
METHOXYCHLOR	0.230 UJ	0.056 U	0.140 U	0.120 U	0.049 U	0.130 UJ	0.077 U	0.068 U	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-9
PESTICIDE/POLYCHLORINATED BIPHENYL COMPOUNDS DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

COUNTY PARK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	MAINTENANCE AREA DITCH (CONT.)		WESTERN BOUNDARY DITCH				AREA 10 SOUTHERN BORDER DITCH				SEDIMENT QUALITY CRITERIA (3)	
	SD-1011		SD-1001		SD-1002		SD-1006		SD-1902		Ontario LEL	Ontario SEL (Based on TOC) (4)
4,4'-DDD	0.008	U	0.023	U	0.025	U	0.011	U	0.072	UJ	0.008	6.00
4,4'-DDE	0.008	U	0.023	U	0.025	U	0.011	U	0.072	UJ	0.005	19.00
4,4'-DDT	0.008	U	0.023	U	0.025	U	0.011	U	0.072	UJ	0.007	12.00
ALDRIN	0.004	U	0.011	U	0.012	U	0.005	U	0.036	UJ	0.002	8.00
ALPHA ENDOSULFAN	0.004	U	0.011	U	0.012	U	0.005	U	0.036	UJ	NCA	NCA
AROCLOR-1260	0.082	U	0.230	U	0.250	U	0.110	U	0.720	UJ	0.005	24.00
BETA BHC	0.004	U	0.011	U	0.012	U	0.005	U	0.036	UJ	0.005	21.00
BETA ENDOSULFAN	0.008	U	0.023	U	0.025	U	0.011	U	0.072	UJ	NCA	NCA
DIELDRIN	0.008	U	0.023	U	0.025	U	0.011	U	0.072	UJ	0.002	91.00
ENDRIN KETONE	0.008	U	0.023	U	0.025	U	0.011	U	0.072	UJ	NCA	NCA
HEPTACHLOR EPOXIDE	0.004	U	0.011	U	0.012	U	0.005	U	0.036	UJ	0.005	5.00
METHOXYCHLOR	0.041	U	0.110	U	0.120	U	0.053	U	0.360	UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-10
METALS AND CYANIDE DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

EAST DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	UPGRADIENT SCIRPUS MARSH	EAST DITCH					UNNAMED TRIBUTARY	SEDIMENT QUALITY CRITERIA (3)	
	SD-1401	SD-1402	SD-1403	SD-1404	SD-1405	SD-1406	SD-1410	Ontario LEL	Ontario SEL (Based on TOC) (4)
ALUMINUM	66.50	0.25 J-	10500.00	1.30 J	1.30 J	11.20 J-	21.60 J	NCA	NCA
ANTIMONY	NA	NA	0.32 J-	NA	NA	NA	NA	NCA	NCA
ARSENIC	186.00	3.20 J-	6.10 J-	10.20 J	9.30 J	30.20	176.00 J	6	33
BARIUM	263.00 J	5.10 J	43.00	44.20 J	39.30 J	46.60 J	184.00 J	NCA	NCA
BERYLLIUM	1.40	0.14 U	0.74	3.30 J	1.90 J	0.85	7.90 J	NCA	NCA
CADMIUM	1.30	0.01 U	0.12	0.70 J	0.66 J	0.38	9.90 J	0.6	10
CALCIUM	NA	NA	550.00	NA	NA	NA	NA	NCA	NCA
CHROMIUM	209.00	7.10	28.80	44.70 J	36.70 J	35.80	155.00 J	26	110
COBALT	NA	NA	4.30	NA	NA	NA	NA	NCA	NCA
COPPER	294.00	8.00	29.10	83.60 J	90.80 J	78.80	2650.00 J	16	110
IRON	NA	NA	13500.00	NA	NA	NA	NA	20000	40000
LEAD	316.00	9.60 J	44.70	62.80 J	58.70 J	50.90	203.00 J	31	250
MAGNESIUM	NA	NA	605.00	NA	NA	NA	NA	NCA	NCA
MANGANESE	NA	NA	54.50	NA	NA	NA	NA	460	1100
MERCURY	5.50	0.09 U	0.20 U	0.28 UJ	0.31 UJ	0.49	3.20 J	0.2	2
NICKEL	28.00	1.20 U	5.10	44.30 J	19.50 J	14.10	43.00 J	16	75
POTASSIUM	NA	NA	1060.00 J-	NA	NA	NA	NA	NCA	NCA
SELENIUM	8.50	0.84 U	1.30 U	2.20 UJ	2.20 UJ	1.40	8.40 J	NCA	NCA
SILVER	8.10	0.21 U	0.38	0.57 UJ	0.55 UJ	1.70	7.00 J	NCA	NCA
SODIUM	NA	NA	151.00 U	NA	NA	NA	NA	NCA	NCA
THALLIUM	1.10 U	0.17 U	1.30 U	0.56 J	2.20 UJ	1.20 U	3.20 UJ	NCA	NCA
VANADIUM	NA	NA	36.60	NA	NA	NA	NA	NCA	NCA
ZINC	127.00 J	11.90 J	45.80	238.00 J	156.00 J	105.00 J	1120.00 J	120	820
CYANIDE	NA	NA	0.66	NA	NA	NA	NA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-10
METALS AND CYANIDE DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

EAST DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	EAST DITCH		UNNAMED TRIBUTARY		SEDIMENT QUALITY CRITERIA (3)	
	SD-1407	SD-1408	SD-1411	SD-1412	NOAA ER-L	NOAA ER-M
ALUMINUM	8450.00 J	0.15 UJ	6.00 J	8350.00 J	NCA	NCA
ANTIMONY	9.80 J	NA	NA	2.20 J	2.00	25.00
ARSENIC	58.60 J	14.10 J	54.80 J	19.60 J	33.00	85.00
BARIUM	682.00 J	57.50 J	131.00 J	52.40 J	NCA	NCA
BERYLLIUM	0.63 J	1.20 J	2.10 J	0.85 J	NCA	NCA
CADMIUM	5.30 J	0.06 J	10.20 J	1.70 J	5.00	9.00
CALCIUM	1500.00 J	NA	NA	1880.00 J	NCA	NCA
CHROMIUM	40.60 J	43.70 J	74.10 J	33.20 J	80.00	145.00
COBALT	8.70 J	NA	NA	5.80 J	NCA	NCA
COPPER	148.00 J	25.60 J	712.00 J	166.00 J	70.00	390.00
IRON	18600.00 J	NA	NA	19600.00 J	NCA	NCA
LEAD	57.30 J	27.70 J	111.00 J	44.10 J	35.00	110.00
MAGNESIUM	3090.00 J	NA	NA	2630.00 J	NCA	NCA
MANGANESE	124.00 J	NA	NA	96.60 J	NCA	NCA
MERCURY	1.50 J	0.18 UJ	1.30 J	0.43 J	0.15	1.30
NICKEL	22.70 J	31.80 J	42.70 J	16.10 J	30.00	50.00
POTASSIUM	1650.00 J	NA	NA	1550.00 J	NCA	NCA
SELENIUM	6.50 J	0.72 J	2.30 UJ	1.50 UJ	NCA	NCA
SILVER	1.70 J	0.66 J	4.10 J	1.60 J	1.00	2.20
SODIUM	11600.00 J	NA	NA	3780.00 J	NCA	NCA
THALLIUM	2.30 UJ	1.60 UJ	2.30 UJ	1.50 UJ	NCA	NCA
VANADIUM	33.50 J	NA	NA	30.40 J	NCA	NCA
ZINC	271.00 J	89.30 J	1110.00 J	273.00 J	120.00	270.00
CYANIDE	1.30 J	NA	NA	0.79 J	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-10
METALS AND CYANIDE DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 4 DITCH						BLACK DITCH		SEDIMENT QUALITY CRITERIA (3)	
	SD-0401	SD-0402	SD-0403	SD-0404	SD-0405	SD-0406	SD-0408	SD-0505	Ontario LEL	Ontario SEL (Based on TOC) (4)
ALUMINUM	8.43 UJ	7.01 UJ	5120.00 J	3.40	2.84 U	3.75 UJ	2.40 U	512.20 J+	NCA	NCA
ANTIMONY	NA	NA	14.20 U	NA	NA	NA	NA	2.06 UJ	NCA	NCA
ARSENIC	9.40 J	13.00 J	8.10 U	6.90	3.90	6.30 J	2.40 J-	1.90	6	33
BARIUM	38.90 J	55.90 J	159.00 J	42.60	36.90	40.60 J	8.80 J	4.60 J	NCA	NCA
BERYLLIUM	0.67 J	0.52 J	0.48 J	0.31	0.91	1.10 J	0.35 J	0.26	NCA	NCA
CADMIUM	3.10 J	1.30 J	1.00 J	1.10	0.51	0.70 J	0.30 U	0.30	0.6	10
CALCIUM	NA	NA	5080.00 J	NA	NA	NA	NA	506.60 J	NCA	NCA
CHROMIUM	10.50 J	19.20 J	20.70 J	13.90	25.50	30.10 J	7.60 J	3.10	26	110
COBALT	NA	NA	5.30 J	NA	NA	NA	NA	3.10	NCA	NCA
COPPER	112.00 J	163.00 J	207.00 J	140.00 J	110.00 J	76.90 J	12.00 J	4.60	16	110
IRON	NA	NA	12000.00 J	NA	NA	NA	NA	2927.40	20000	40000
LEAD	130.00 J	309.00 J	327.00 J	162.00	115.00	72.70 J	9.20 J	4.60	31	250
MAGNESIUM	NA	NA	673.00 J	NA	NA	NA	NA	354.40 J	NCA	NCA
MANGANESE	NA	NA	23.80 J	NA	NA	NA	NA	5.30	460	1100
MERCURY	0.91 J	0.70 J	0.61 J	0.39	0.07 U	0.10 UJ	0.08 U	0.07 U	0.2	2
NICKEL	13.70 J	20.40 J	20.10 J	4.80	8.90	10.70 J	2.60 J	2.40	16	75
POTASSIUM	NA	NA	306.00 J	NA	NA	NA	NA	113.00 U	NCA	NCA
SELENIUM	3.83 J	3.84 J	0.65 J	2.32 J-	1.09 J-	1.79 J	0.83 UJ	0.89 U	NCA	NCA
SILVER	1.29 UJ	2.90 J	1.90 J	1.00	0.78	1.60 J	0.46	0.73 J-	NCA	NCA
SODIUM	NA	NA	588.00 U	NA	NA	NA	NA	151.30 U	NCA	NCA
THALLIUM	6.50 UJ	5.50 UJ	2.60 UJ	2.22 U	2.20 U	2.90 UJ	1.44 U	1.24 U	NCA	NCA
VANADIUM	NA	NA	46.40 J	NA	NA	NA	NA	5.60	NCA	NCA
ZINC	507.00 J	117.00 J	197.00 J	34.00 J	70.10 J	99.00 J	16.90 U	11.70 U	120	820
CYANIDE	NA	NA	1.70 UJ	NA	NA	NA	NA	0.69 U	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-10
METALS AND CYANIDE DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	BLACK DITCH	AREA 6 POND				SEDIMENT QUALITY CRITERIA (3)	
	SD-0407	SD-0501	SD-0502	SD-0503	SD-0504	Ontario LEL	Ontario SEL (Based on TOC) (4)
ALUMINUM	657.00	5270.00 J	6.40 UJ	3.80 J	4.70 UJ	NCA	NCA
ANTIMONY	1.70 U	4.57 UJ	NA	NA	NA	NCA	NCA
ARSENIC	1.10 U	15.90 J	8.20 U	6.60 U	15.30 U	6	33
BARIUM	2.40 J	21.90 J	31.70 J	20.10 J	16.10 J	NCA	NCA
BERYLLIUM	0.20 J-	0.67 J	2.10 U	1.40 U	1.20 U	NCA	NCA
CADMIUM	0.25 U	0.58 UJ	0.81 UJ	0.49 J	0.59 UJ	0.6	10
CALCIUM	250.00 J	628.00 J	NA	NA	NA	NCA	NCA
CHROMIUM	4.90 J-	21.30 J	17.00 J	14.80 J	9.20 J	26	110
COBALT	1.40 J-	5.20 J	NA	NA	NA	NCA	NCA
COPPER	10.70 J	107.00 J	88.60 J	58.70 J	59.00 J	16	110
IRON	4140.00 J	15700.00 J	NA	NA	NA	20000	40000
LEAD	12.40 J	132.00 J	166.00 J	95.20 J	205.00 J	31	250
MAGNESIUM	93.60	833.00 J	NA	NA	NA	NCA	NCA
MANGANESE	6.40 J	34.90 J	NA	NA	NA	460	1100
MERCURY	0.05 U	0.25 J	0.44 J	0.16 J	0.38 J	0.2	2
NICKEL	1.50 J-	7.70 J	7.80 J	7.50 J	3.70 J	16	75
POTASSIUM	107.00 U	495.00 J	NA	NA	NA	NCA	NCA
SELENIUM	0.21 R	5.30 J	2.80 J	1.50 UJ	3.40 J	NCA	NCA
SILVER	0.30 UJ	0.70 UJ	1.30 J	0.53 UJ	0.72 UJ	NCA	NCA
SODIUM	70.90 U	2010.00 J	NA	NA	NA	NCA	NCA
THALLIUM	0.99 U	2.74 UJ	3.80 UJ	2.10 UJ	2.80 UJ	NCA	NCA
VANADIUM	11.00 J	33.50 J	NA	NA	NA	NCA	NCA
ZINC	21.70	53.70 J	61.60 U	67.70 J	22.20 U	120	820
CYANIDE	0.65 UJ	1.50 UJ	NA	NA	NA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-10
METALS AND CYANIDE DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	BLACK DITCH							SEDIMENT QUALITY CRITERIA (3)	
	SD-0606	SD-0607	SD-0616	SD-0617	SD-0618	SD-0619	SD-0620 (Duplicate of SD-0619)	NOAA ER-L	NOAA ER-M
ALUMINUM	NA	1.90 U	3.30 J	4.50 UJ	5.34 UJ	11100.00 J	14400.00 J	NCA	NCA
ANTIMONY	2.50	NA	NA	NA	NA	5.45 UJ	4.80 J	2.00	25.00
ARSENIC	1.30 UJ	1.20 UJ	9.20 J	16.30 J	8.00 J	29.50 J	16.90 J	33.00	85.00
BARIUM	6.70	0.88	24.00 J	34.30 J	45.80 J	35.30 J	37.80 J	NCA	NCA
BERYLLIUM	0.88 U	0.58 U	1.90 J	2.20 J	2.50 J	1.70 J	2.00 J	NCA	NCA
CADMIUM	0.28 U	0.24 U	0.41 UJ	0.57 UJ	1.50 J	0.69 UJ	0.75 J	5.00	9.00
CALCIUM	NA	NA	NA	NA	NA	1470.00 J	1190.00 J	NCA	NCA
CHROMIUM	9.40	2.40	26.90 J	35.70 J	50.20 J	35.60 J	38.50 J	80.00	145.00
COBALT	NA	NA	NA	NA	NA	10.80 J	13.30 J	NCA	NCA
COPPER	14.40 J	3.40 J	75.70 J	98.80 J	150.00 J	96.40 J	99.70 J	70.00	390.00
IRON	NA	NA	NA	NA	NA	26700.00 J	28700.00 J	NCA	NCA
LEAD	15.70 J	10.10 J	96.30 J	109.00 J	47.30 J	120.00 J	73.60 J	35.00	110.00
MAGNESIUM	NA	NA	NA	NA	NA	3800.00 J	3180.00 J	NCA	NCA
MANGANESE	NA	NA	NA	NA	NA	99.30 J	99.60 J	NCA	NCA
MERCURY	0.06 U	0.07 U	0.33 J	0.67 J	1.10 J	0.74 J	0.60 J	0.15	1.30
NICKEL	2.90	1.00 U	17.30 J	17.40 J	27.60 J	15.60 J	16.20 J	30.00	50.00
POTASSIUM	NA	NA	NA	NA	NA	1390.00 J	1440.00 J	NCA	NCA
SELENIUM	0.93 UJ	1.70 J	1.11 UJ	2.10 J	1.90 UJ	3.50 J	1.90 J	NCA	NCA
SILVER	0.34 UJ	0.29 UJ	0.71 J	1.90 J	0.82 UJ	1.80 J	1.40 J	1.00	2.20
SODIUM	NA	NA	NA	NA	NA	13600.00 J	7360.00 J	NCA	NCA
THALLIUM	1.30 U	1.20 U	1.54 UJ	2.14 UJ	2.60 UJ	3.30 UJ	2.30 UJ	NCA	NCA
VANADIUM	NA	NA	NA	NA	NA	22.40 J	31.90 J	NCA	NCA
ZINC	32.90 J	13.20 U	225.80 J	274.00 J	334.00 J	204.00 J	247.00 J	120.00	270.00
CYANIDE	NA	NA	NA	NA	NA	1.80 UJ	1.30 UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-10
METALS AND CYANIDE DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 18C STREAM								SEDIMENT QUALITY CRITERIA (3)	
	SD-1810	SD-1811	SD-1812	SD-1813	SD-1814	SD-1815	SD-1816	SD-1817	Ontario LEL	Ontario SEL (Based on TOC) (4)
ALUMINUM	0.44 J	0.37 J	1840.00 J	0.56 J	413.00 J	0.35 J	0.07 UJ	0.09 J	NCA	NCA
ANTIMONY	NA	NA	0.24 J	NA	0.08 UJ	NA	NA	NA	NCA	NCA
ARSENIC	32.90 J-	1.90 J-	1.70 J-	1.40 J-	0.62 J-	2.10 J-	0.25 J-	0.71 J-	6	33
BARIUM	40.10	6.10	16.50	15.10	1.60	17.40	0.72	2.20	NCA	NCA
BERYLLIUM	0.38	0.16 U	0.24	0.44	0.14 U	0.29	0.12 U	0.13 U	NCA	NCA
CADMIUM	0.07 J	0.14 J	0.30 J	0.27 J	0.03 J	0.29 J	0.02 J	0.03 J	0.6	10
CALCIUM	NA	NA	1700.00 J	NA	44.30 J	NA	NA	NA	NCA	NCA
CHROMIUM	20.80	7.80	12.60	25.80	5.70	20.50	3.10	6.20	26	110
COBALT	NA	NA	1.40 J	NA	0.51 J	NA	NA	NA	NCA	NCA
COPPER	48.70 J	13.50 J	18.20 J	28.10 J	3.20 J	25.40 J	2.40 J	5.20 J	16	110
IRON	NA	NA	7580.00	NA	2240.00	NA	NA	NA	20000	40000
LEAD	111.00	39.60	52.60	48.40	3.30	47.50	2.30	2.90	31	250
MAGNESIUM	NA	NA	881.00 J	NA	27.70 J	NA	NA	NA	NCA	NCA
MANGANESE	NA	NA	40.80 J	NA	2.80 J	NA	NA	NA	460	1100
MERCURY	0.09 U	0.14 U	0.09 U	0.11 U	0.10 U	0.13	0.10 U	0.09 U	0.2	2
NICKEL	5.80 J	1.60 J	3.60 J	4.00 J	1.10 U	5.80 J	1.00 U	1.60 J	16	75
POTASSIUM	NA	NA	196.00	NA	46.50 U	NA	NA	NA	NCA	NCA
SELENIUM	0.16 U	0.19 U	0.18 U	0.25 U	0.19 U	0.16 U	0.16 U	0.14 U	NCA	NCA
SILVER	0.55 U	0.25 U	0.35 U	0.44 U	0.20 U	0.27 U	0.18 U	0.22 U	NCA	NCA
SODIUM	NA	NA	59.20	NA	13.90 U	NA	NA	NA	NCA	NCA
THALLIUM	0.82 U	0.19 U	0.16 U	0.25 U	0.19 U	0.82 U	0.16 U	0.14 U	NCA	NCA
VANADIUM	NA	NA	15.10	NA	11.40	NA	NA	NA	NCA	NCA
ZINC	121.00	24.30	55.80	52.20	5.30	79.00	4.50	11.10	120	820
CYANIDE	NA	NA	0.60	NA	0.46 U	NA	NA	NA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-10
METALS AND CYANIDE DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 8 POND					RED ROOT CREEK	SULFUR PLANT PONDS		SEDIMENT QUALITY CRITERIA (3)	
	SD-0803	SD-0804	SD-0805	SD-0806	SD-0807 (Duplicate of SD-0801)	SD-0601	SD-0610	SD-0611	Ontario LEL	Ontario SEL (Based on TOC) (4)
ALUMINUM	2.10 UJ	5710.00	0.95 UJ	1.60 UJ	3.10 UJ	6.80 J	3.83 UJ	4.90 U	NCA	NCA
ANTIMONY	NA	1.50 J-	NA	NA	NA	NA	NA	NA	NCA	NCA
ARSENIC	11.10 J	1.50	1.50	6.10 J	9.60 J	38.30 J	22.60 J	15.60 J-	6	33
BARIUM	41.10 J	15.50	21.00	54.70 J	69.40 J	98.10 J	130.00 J	118.00 J	NCA	NCA
BERYLLIUM	1.00 J	0.22	0.29	0.69 J	1.00 J	1.00 J	0.23 U	0.43 U	NCA	NCA
CADMIUM	1.10 J	0.05 J-	0.05 J-	0.08 J	2.80 J	0.93 UJ	0.49 UJ	7.30	0.6	10
CALCIUM	NA	249.00	NA	NA	NA	NA	NA	NA	NCA	NCA
CHROMIUM	33.80 J	16.70	11.80	26.70 J	59.00 J	74.80 J	14.60 J	1110.00 J	26	110
COBALT	NA	1.80	NA	NA	NA	NA	NA	NA	NCA	NCA
COPPER	51.30 J	10.00	14.30	35.80 J	117.00 J	61.90 J	17.20 J	144.00 J	16	110
IRON	NA	10500.00	NA	NA	NA	NA	NA	NA	20000	40000
LEAD	59.30 J	11.60 J	18.80	32.70 J	135.00 J	155.00 J	64.50 J	193.00 J	31	250
MAGNESIUM	NA	560.00	NA	NA	NA	NA	NA	NA	NCA	NCA
MANGANESE	NA	44.60	NA	NA	NA	NA	NA	NA	460	1100
MERCURY	0.27 UJ	0.12 U	0.10 U	0.25 UJ	0.41 UJ	0.62 J	0.15 J	0.10 U	0.2	2
NICKEL	18.10 J	3.30	4.80	9.70 J	27.80 J	21.70 J	2.07 UJ	183.00 J-	16	75
POTASSIUM	NA	777.00	NA	NA	NA	NA	NA	NA	NCA	NCA
SELENIUM	2.10 UJ	0.20	0.19 U	1.70 UJ	1.90 J	6.30 U	1.76 UJ	1.19 UJ	NCA	NCA
SILVER	0.54 UJ	0.25 U	0.25 U	0.43 UJ	0.81 UJ	1.12 UJ	2.30 J	4.10 J-	NCA	NCA
SODIUM	NA	90.40	NA	NA	NA	NA	NA	NA	NCA	NCA
THALLIUM	2.00 UJ	0.88 U	0.89 U	1.60 UJ	3.10 UJ	4.63 UJ	1.56 R	1.06 R	NCA	NCA
VANADIUM	NA	29.20	NA	NA	NA	NA	NA	NA	NCA	NCA
ZINC	171.00 J	12.50 J-	23.40 J-	27.60 J	426.00 J	81.00 J	15.00 U	155.00 J	120	820
CYANIDE	NA	0.49	NA	NA	NA	NA	NA	NA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-10
METALS AND CYANIDE DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	RED ROOT CREEK								SEDIMENT QUALITY CRITERIA (3)	
	SD-0602	SD-0603	SD-0604	SD-0605	SD-0606	SD-0607	SD-0608	SD-0609	NOAA ER-L	NOAA ER-M
ALUMINUM	13.20 J	8500.00 J	9.15 UJ	6.80 U	30.00 U	10600.00 J	7.80 U	4.26 UJ	NCA	NCA
ANTIMONY	NA	3.10 UJ	NA	NA	NA	15.50 U	NA	NA	2.00	25.00
ARSENIC	43.30 J	15.10 J	61.50 J	62.80 J	61.30 J	105.00 J	55.20 J	43.20 J	33.00	85.00
BARIUM	57.40 J	20.60 J	51.40 J	33.80 J	89.30 J	100.00 J	36.50 J	29.80 J	NCA	NCA
BERYLLIUM	0.72 J	1.20 J	2.60 U	2.00 J	1.10 U	0.98 J	1.60 J	0.88 U	NCA	NCA
CADMIUM	1.52 UJ	0.70 UJ	1.50 J	0.61 UJ	0.56 UJ	0.56 UJ	0.72 J	0.65 J	5.00	9.00
CALCIUM	NA	1530.00 J	NA	NA	NA	1610.00 J	NA	NA	NCA	NCA
CHROMIUM	34.60 J	25.70 J	82.80 J	55.50 J	113.00 J	74.80 J	64.90 J	37.20 J	80.00	145.00
COBALT	NA	11.70 J	NA	NA	NA	9.10 J	NA	NA	NCA	NCA
COPPER	195.00 J	98.10 J	238.00 J	144.00 J	125.00 J	112.00 J	201.00 J	104.00 J	70.00	390.00
IRON	NA	26400.00 J	NA	NA	NA	54900.00 J	NA	NA	NCA	NCA
LEAD	339.00 J	117.00 J	170.00 J	115.00 J	205.00 J	228.00 J	114.00 J	70.80 J	35.00	110.00
MAGNESIUM	NA	1480.00 J	NA	NA	NA	4720.00 J	NA	NA	NCA	NCA
MANGANESE	NA	43.60 J	NA	NA	NA	91.60 J	NA	NA	NCA	NCA
MERCURY	0.63 J	0.56 J	1.18 J	1.03 J	2.64 J	2.10 J	2.00 J	0.88 J	0.15	1.30
NICKEL	22.80 J	13.40 J	31.50 J	26.00 J	12.70 J	15.30 J	24.00 J	25.00 J	30.00	50.00
POTASSIUM	NA	409.00 J	NA	NA	NA	1920.00 J	NA	NA	NCA	NCA
SELENIUM	27.30 U	2.95 J	4.80 J	3.50 J	12.70 J	10.20 J	4.00 J	2.60 J	NCA	NCA
SILVER	1.84 UJ	2.60 J	4.10 J	2.90 J	3.60 J	5.60 J	4.50 J	3.60 J	1.00	2.20
SODIUM	NA	4550.00 J	NA	NA	NA	13700.00 J	NA	NA	NCA	NCA
THALLIUM	7.98 UJ	3.21 UJ	3.50 R	1.76 R	1.74 R	2.50 UJ	1.43 R	1.76 R	NCA	NCA
VANADIUM	NA	34.00 J	NA	NA	NA	55.10 J	NA	NA	NCA	NCA
ZINC	224.00 J	169.00 J	435.00 J	239.00 J	104.00 J	104.00 J	207.00 J	137.00 J	120.00	270.00
CYANIDE	NA	1.80 UJ	NA	NA	NA	1.60 UJ	NA	NA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-10
METALS AND CYANIDE DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	SULFUR PLANT PONDS								SEDIMENT QUALITY CRITERIA (3)	
	SD-0612		SD-0613		SD-0614		SD-0615		Ontario LEL	Ontario SEL (Based on TOC) (4)
ALUMINUM	4.01	UJ	2.24	UJ	3.08	UJ	3810.00	J	NCA	NCA
ANTIMONY	NA		NA		NA		1.90	UJ	NCA	NCA
ARSENIC	7.60	J	16.50	J-	13.90	J	3.20	J	6	33
BARIUM	109.00	J	53.60	J	242.00	J	137.00	J	NCA	NCA
BERYLLIUM	0.78	U	0.45	U	0.74	U	0.31	J	NCA	NCA
CADMIUM	0.51	UJ	1.40		0.39	UJ	0.43	UJ	0.6	10
CALCIUM	NA		NA		NA		293.00	U	NCA	NCA
CHROMIUM	104.00	J	24.50	J	22.20	J	30.60	J	26	110
COBALT	NA		NA		NA		2.70	J	NCA	NCA
COPPER	91.20	J	107.00	J	26.60	J	54.30	J	16	110
IRON	NA		NA		NA		18600.00	J	20000	40000
LEAD	40.60	J	36.90	J	182.00	J	168.00	J	31	250
MAGNESIUM	NA		NA		NA		571.00	J	NCA	NCA
MANGANESE	NA		NA		NA		33.70	J	460	1100
MERCURY	0.14	J	0.16		0.24	J	1.93	J	0.2	2
NICKEL	6.20	J	10.20	J-	1.70	J	3.90	J	16	75
POTASSIUM	NA		NA		NA		858.00	J	NCA	NCA
SELENIUM	1.72	UJ	0.95	UJ	1.33	UJ	1.79	UJ	NCA	NCA
SILVER	1.00	J	0.73	J-	2.90	J	1.90	J	NCA	NCA
SODIUM	NA		NA		NA		276.00	U	NCA	NCA
THALLIUM	1.54	R	0.85	R	1.19	R	1.95	UJ	NCA	NCA
VANADIUM	NA		NA		NA		30.00	J	NCA	NCA
ZINC	16.70	U	96.30	J	27.40	J	32.00	J	120	820
CYANIDE	NA		NA		NA		1.20	UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-10
METALS AND CYANIDE DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 20 DITCH		LOWER AREA 18B STREAM				AREA 8 POND		SEDIMENT QUALITY CRITERIA (3)	
	SD-2001	SD-2002	SD-0101	SD-0102	SD-0103	SD-0104	SD-0801	SD-0802	Ontario LEL	Ontario SEL (Based on TOC) (4)
ALUMINUM	4330.00	0.30 U	2.00 U	1.80 U	1.90 U	404.00 J	20700.00 J	4.90 UJ	NCA	NCA
ANTIMONY	1.56 U	NA	NA	NA	NA	0.36 U	3.30 UJ	NA	NCA	NCA
ARSENIC	1.24 UJ	1.10	1.50 U	1.40 U	1.50 U	1.10 U	14.80 J	11.50 J	6	33
BARIUM	14.90	10.70	3.00 J	1.10 J	0.98 J	0.80 J	75.00 J	81.30 J	NCA	NCA
BERYLLIUM	0.31	0.27	0.16 U	0.07 U	0.08 U	0.12 U	1.20 J	1.20 J	NCA	NCA
CADMIUM	0.44 U	0.27 U	0.25 U	0.22 U	0.24 U	0.23 U	3.60 J	3.00 J	0.6	10
CALCIUM	841.00	NA	NA	NA	NA	23.70 U	2850.00 J	NA	NCA	NCA
CHROMIUM	13.70	12.90	5.80 J	3.40 J	2.80 J	3.70 J	59.90 J	48.30 J	26	110
COBALT	3.90	NA	NA	NA	NA	0.56	16.20 J	NA	NCA	NCA
COPPER	20.80 U	10.00	5.60 J-	2.70 J-	2.10 J-	4.00 J	138.00 J	125.00 J	16	110
IRON	10900.00	NA	NA	NA	NA	6890.00 J	30100.00 J	NA	20000	40000
LEAD	11.70 J	6.80 J	7.50 J-	4.60 J-	4.60 J-	3.30	193.00 J	148.00 J	31	250
MAGNESIUM	1160.00	NA	NA	NA	NA	20.40 J	2660.00 J	NA	NCA	NCA
MANGANESE	38.30	NA	NA	NA	NA	3.10	169.00 J	NA	460	1100
MERCURY	0.07 U	0.07 U	0.07 U	0.06 U	0.06 U	0.06 U	0.51 J	0.65 UJ	0.2	2
NICKEL	5.20	1.14 U	1.10 U	0.95 U	1.00 U	0.97 U	30.20 J	40.90 J	16	75
POTASSIUM	215.10	NA	NA	NA	NA	98.00 U	1310.00 J	NA	NCA	NCA
SELENIUM	1.18 UJ	1.12 UJ	0.17 UJ	0.15 UJ	0.17 UJ	0.15 U	2.60 J	2.70 J	NCA	NCA
SILVER	0.68	0.32 U	0.30 U	0.27 U	0.29 U	0.57	0.87 UJ	1.30 UJ	NCA	NCA
SODIUM	145.00 U	NA	NA	NA	NA	26.80 U	673.00 J	NA	NCA	NCA
THALLIUM	0.86 U	0.81 U	1.20 U	1.10 U	1.10 U	1.08 U	3.00 UJ	4.70 UJ	NCA	NCA
VANADIUM	31.00	NA	NA	NA	NA	6.50 U	98.90 J	NA	NCA	NCA
ZINC	19.90 U	12.90	9.90 U	3.30 U	3.50 U	3.40 U	480.00 J	408.00 J	120	820
CYANIDE	0.74 U	NA	NA	NA	NA	0.60 U	2.10 J	NA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-10
METALS AND CYANIDE DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 18B STREAM								SEDIMENT QUALITY CRITERIA (3)	
	SD-1803	SD-1804	SD-1805	SD-1806	SD-1807	SD-1808	SD-1809	SD-1818 (Duplicate of SD-1809)	Ontario LEL	Ontario SEL (Based on TOC) (4)
ALUMINUM	3070.00	0.58 J-	0.35 J-	608.00	1.70 J	0.09 UJ	0.22 J-	0.10 J-	NCA	NCA
ANTIMONY	1.50 J	NA	NA	0.20 J	NA	NA	NA	NA	NCA	NCA
ARSENIC	5.80 J-	6.30 J-	1.50	1.10 J-	7.40 J	0.79 J-	1.20 J-	2.60 J-	6	33
BARIUM	33.00 J	17.30 J	10.50 J	2.10 J	18.10 J	0.77 J	1.40 J	1.60 J	NCA	NCA
BERYLLIUM	0.67	0.52	0.16 U	0.28	1.00 J	0.15 U	0.14 U	0.14 U	NCA	NCA
CADMIUM	0.61	0.25	0.07	0.08	0.12 J	0.01 U	0.05 U	0.05	0.6	10
CALCIUM	1050.00 J+	NA	NA	119.00 J+	NA	NA	NA	NA	NCA	NCA
CHROMIUM	12.70 J	10.50	10.10	3.80 J	8.70 J	3.70	5.10	9.60	26	110
COBALT	4.60	NA	NA	0.34 U	NA	NA	NA	NA	NCA	NCA
COPPER	84.10	50.10	48.50	10.40	38.10 J	1.90	5.90	8.50	16	110
IRON	15700.00	NA	NA	1440.00	NA	NA	NA	NA	20000	40000
LEAD	127.00	88.90	63.20	13.60	40.90 J	8.10 J	4.90 J	7.40 J	31	250
MAGNESIUM	696.00	NA	NA	45.40	NA	NA	NA	NA	NCA	NCA
MANGANESE	85.40 J+	NA	NA	11.10 J+	NA	NA	NA	NA	460	1100
MERCURY	0.09 U	0.14 U	0.09 U	0.13 U	0.94 J	0.09 U	0.10 U	0.13	0.2	2
NICKEL	14.00	7.50	8.00	1.60 U	4.00 UJ	1.20 U	1.20 U	1.20 U	16	75
POTASSIUM	206.00	NA	NA	64.30 U	NA	NA	NA	NA	NCA	NCA
SELENIUM	0.92 U	0.19 U	0.19 U	0.22 U	2.60 UJ	0.24	0.16 U	0.16 U	NCA	NCA
SILVER	1.00 U	0.39	0.25 U	0.28 U	1.90 J	0.22 U	0.25	0.25	NCA	NCA
SODIUM	89.00	NA	NA	16.70 U	NA	NA	NA	NA	NCA	NCA
THALLIUM	0.18 U	0.97 U	0.93 U	0.22 U	0.55 UJ	0.17 U	0.16 U	0.16 U	NCA	NCA
VANADIUM	27.20	NA	NA	8.40	NA	NA	NA	NA	NCA	NCA
ZINC	244.00	151.00 J	194.00 J	16.40	31.10 J	1.70 U	8.90 J	11.70 J	120	820
CYANIDE	0.63	NA	NA	0.68	NA	NA	NA	NA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-10
METALS AND CYANIDE DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

CENTRAL DITCH DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	UPGRADIENT PONDED AREA		ISOLATED FRESHWATER POND			SEDIMENT QUALITY CRITERIA (3)	
	SD-1621	SD-1623	SD-1626	SD-1627 (Duplicate of SD-1626)		Ontario LEL	Ontario SEL (Based on TOC) (4)
ALUMINUM	0.34 U	0.25 U	0.31 U	0.38 U		NCA	NCA
ANTIMONY	NA	NA	NA	NA		NCA	NCA
ARSENIC	15.20 J	3.30	3.00	9.20 J		6	33
BARIUM	11.20 J	19.70	13.60	20.00 J		NCA	NCA
BERYLLIUM	0.31 J	0.27	0.22	0.53 J		NCA	NCA
CADMIUM	0.26 J	0.08	0.02	0.06 J		0.6	10
CALCIUM	NA	NA	NA	NA		NCA	NCA
CHROMIUM	15.30 J	12.70	13.20	23.20 J		26	110
COBALT	NA	NA	NA	NA		NCA	NCA
COPPER	18.80 J	18.20	6.90	12.40 J		16	110
IRON	NA	NA	NA	NA		20000	40000
LEAD	19.40 J	23.90	5.70 J+	12.20 J		31	250
MAGNESIUM	NA	NA	NA	NA		NCA	NCA
MANGANESE	NA	NA	NA	NA		460	1100
MERCURY	0.16 UJ	0.12 U	0.11 U	0.18 UJ		0.2	2
NICKEL	4.90 J	4.20	1.60 U	2.20 UJ		16	75
POTASSIUM	NA	NA	NA	NA		NCA	NCA
SELENIUM	0.34 J	0.92 U	0.18 U	1.60 UJ		NCA	NCA
SILVER	0.37 UJ	0.31 U	0.37	0.73 J		NCA	NCA
SODIUM	NA	NA	NA	NA		NCA	NCA
THALLIUM	[illegible] UJ	0.87 U	0.87 U	1.50 UJ		NCA	NCA
VANADIUM	NA	NA	NA	NA		NCA	NCA
ZINC	84.20 J	22.60	11.70	19.10 J		120	820
CYANIDE	NA	NA	NA	NA		NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-10
METALS AND CYANIDE DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

CENTRAL DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	CENTRAL DITCH				ISOLATED ESTUARINE PONDS		UPGRADIENT PONDED AREA	SEDIMENT QUALITY CRITERIA (3)	
	SD-1101	SD-1102	SD-1103	SD-1104	SD-1622	SD-1625	SD-1624	NOAA ER-L	NOAA ER-M
ALUMINUM	0.29 U	1.10 U	0.50 U	8220.00	0.62 U	3.70 U	3100.00	NCA	NCA
ANTIMONY	NA	NA	NA	1.90 J-	NA	NA	0.29 U	2.00	25.00
ARSENIC	29.40	15.60	3.00	23.60	26.40 J	21.80 J	5.00	33.00	85.00
BARIUM	68.40	22.70	3.90	44.90	39.20 J	58.80 J	12.20	NCA	NCA
BERYLLIUM	1.60	0.49	0.17	0.62	0.49 J	1.60 J	0.22	NCA	NCA
CADMIUM	0.42	0.13	0.11	0.36	0.18 J	0.32 J	0.09	5.00	9.00
CALCIUM	NA	NA	NA	3830.00 J	NA	NA	1970.00 J	NCA	NCA
CHROMIUM	39.10	19.40	6.70	23.20	20.10 J	45.60 J	15.90	80.00	145.00
COBALT	NA	NA	NA	9.00	NA	NA	1.80	NCA	NCA
COPPER	24.60	33.90	11.70	64.50	30.30 J	236.00 J	12.70	70.00	390.00
IRON	NA	NA	NA	21100.00	NA	NA	9260.00	NCA	NCA
LEAD	42.50	87.40	21.30	98.50	47.60 J	200.00 J	19.10 J+	35.00	110.00
MAGNESIUM	NA	NA	NA	4430.00	NA	NA	791.00	NCA	NCA
MANGANESE	NA	NA	NA	212.00	NA	NA	40.60	NCA	NCA
MERCURY	0.16 U	0.18	0.10 U	0.18	0.17 UJ	0.87 J	0.14 U	0.15	1.30
NICKEL	28.50	11.00	1.30	18.20	6.60 J	25.20 J	3.00	30.00	50.00
POTASSIUM	NA	NA	NA	1250.00	NA	NA	350.00	NCA	NCA
SELENIUM	1.20	0.71	0.92 U	1.40	0.57 J	4.50 UJ	0.25 U	NCA	NCA
SILVER	0.68	0.43	0.23 U	0.50	0.54 J	1.60 J	0.66	1.00	2.20
SODIUM	NA	NA	NA	3000.00	NA	NA	1230.00	NCA	NCA
THALLIUM	1.30	1.50 U	0.86 U	1.10 U	1.50 UJ	4.20 UJ	1.20 U	NCA	NCA
VANADIUM	NA	NA	NA	34.70 J	NA	NA	27.30 J	NCA	NCA
ZINC	85.80	86.00	56.10	190.00	55.90 J	97.60 J	32.00	120.00	270.00
CYANIDE	NA	NA	NA	0.60	NA	NA	3.80	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-10
METALS AND CYANIDE DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

AREA 12 DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 12 DITCH						SEDIMENT QUALITY CRITERIA (3)	
	SD-1201		SD-1202		SD-1203		NOAA ER-L	NOAA ER-M
ALUMINUM	1.30	J	0.15	UJ	10400.00	J	NCA	NCA
ANTIMONY	NA		NA		3.40	J	2.00	25.00
ARSENIC	24.70	J	5.30	J	18.20	J	33.00	85.00
BARIUM	88.50	J	9.00	J	54.10	J	NCA	NCA
BERYLLIUM	0.82	J	0.28	J	0.94	J	NCA	NCA
CADMIUM	0.11	J	0.12	J	0.46	J	5.00	9.00
CALCIUM	NA		NA		3650.00	J	NCA	NCA
CHROMIUM	54.90	J	10.40	J	33.90	J	80.00	145.00
COBALT	NA		NA		5.30	J	NCA	NCA
COPPER	64.90	J	9.40	J	187.00	J	70.00	390.00
IRON	NA		NA		23000.00	J	NCA	NCA
LEAD	61.10	J	10.20	J	333.00	J	35.00	110.00
MAGNESIUM	NA		NA		6090.00	J	NCA	NCA
MANGANESE	NA		NA		123.00	J	NCA	NCA
MERCURY	0.42	J	0.17	UJ	0.68	J	0.15	1.30
NICKEL	19.00	J	2.10	UJ	18.60	J	30.00	50.00
POTASSIUM	NA		NA		2200.00	J	NCA	NCA
SELENIUM	3.30	J	0.27	UJ	4.00	J	NCA	NCA
SILVER	1.00	J	0.38	UJ	1.80	J	1.00	2.20
SODIUM	NA		NA		24500.00	J	NCA	NCA
THALLIUM	1.40	UJ	1.20	UJ	4.30	UJ	NCA	NCA
VANADIUM	NA		NA		50.40	J	NCA	NCA
ZINC	86.60	J	20.60	J	280.00	J	120.00	270.00
CYANIDE	NA		NA		2.20	J	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-10
METALS AND CYANIDE DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	ASSOCIATED DITCHES AREA 16		OLD RED ROOT CREEK						SEDIMENT QUALITY CRITERIA (3)	
	SD-1629	SD-1630	SD-1606	SD-1607	SD-1608	SD-1609	SD-1610	SD-1631 (Duplicate of SD-1609)	NOAA ER-L	NOAA ER-M
ALUMINUM	7.20 U	1.60 UJ	2.50 UJ	25600.00 J	23600.00 J	13400.00 J	3.40 UJ	14800.00 J	NCA	NCA
ANTIMONY	NA	NA	NA	3.30 UJ	3.50 UJ	1.70 UJ	NA	2.90 J	2.00	25.00
ARSENIC	25.10	42.30 J	43.00 J	43.60 J	39.30 J	29.50 J	50.00 J	46.60 J	33.00	85.00
BARIUM	24.70	16.40 J	61.20 J	65.20 J	61.60 J	33.40 J	45.10 J	35.10 J	NCA	NCA
BERYLLIUM	1.30 U	0.27 UJ	1.30 J	2.50 J	2.00 J	1.30 J	1.00 J	1.40 J	NCA	NCA
CADMIUM	1.40 U	0.10 UJ	2.40 J	3.30 J	2.90 J	0.89 J	0.94 J	1.30 J	5.00	9.00
CALCIUM	NA	NA	NA	3080.00 J	2960.00 J	2370.00 J	NA	1510.00 J	NCA	NCA
CHROMIUM	28.30	9.60 J	49.40 J	61.60 J	57.40 J	47.80 J	39.60 J	49.00 J	80.00	145.00
COBALT	NA	NA	NA	41.50 J	39.40 J	22.00 J	NA	21.70 J	NCA	NCA
COPPER	63.60	11.60 J	100.00 J	131.00 J	125.00 J	73.80 J	100.00 J	72.70 J	70.00	390.00
IRON	NA	NA	NA	69400.00 J	66400.00 J	33100.00 J	NA	34800.00 J	NCA	NCA
LEAD	60.10	12.20 J	65.80 J	101.00 J	94.80 J	69.30 J	88.20 J	89.60 J	35.00	110.00
MAGNESIUM	NA	NA	NA	6980.00 J	7000.00 J	3220.00 J	NA	3190.00 J	NCA	NCA
MANGANESE	NA	NA	NA	162.00 J	167.00 J	84.90 J	NA	88.90 J	NCA	NCA
MERCURY	1.00 U	0.19 UJ	0.67 J	0.51 J	0.57 J	0.29 J	0.53 J	0.31 J	0.15	1.30
NICKEL	27.90	2.60 J	41.90 J	52.30 J	48.20 J	34.90 J	41.40 J	36.20 J	30.00	50.00
POTASSIUM	NA	NA	NA	2620.00 J	2670.00 J	1580.00 J	NA	1720.00 J	NCA	NCA
SELENIUM	2.00	0.39 J	2.50 J	3.30 UJ	2.10 J	1.60 J	2.50 J	2.00 J	NCA	NCA
SILVER	2.10 U	0.45 UJ	0.73 UJ	1.90 J	1.40 J	0.49 UJ	0.99 UJ	0.59 UJ	1.00	2.20
SODIUM	NA	NA	NA	15300.00 J	16800.00 J	5170.00 J	NA	5040.00 J	NCA	NCA
THALLIUM	1.80 U	1.70 UJ	3.80 UJ	3.10 UJ	3.20 UJ	2.20 UJ	5.00 UJ	2.30 UJ	NCA	NCA
VANADIUM	NA	NA	NA	78.30 J	71.10 J	48.90 J	NA	50.10 J	NCA	NCA
ZINC	279.00	19.90 J	525.00 J	624.00 J	591.00 J	201.00 J	208.00 J	183.00 J	120.00	270.00
CYANIDE	NA	NA	NA	1.50 UJ	2.00 UJ	0.84 UJ	NA	1.30 UJ	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-10
METALS AND CYANIDE DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	ASSOCIATED DITCHES - AREA 16								SEDIMENT QUALITY CRITERIA (3)	
	SD-1611	SD-1612	SD-1613	SD-1615	SD-1616	SD-1617	SD-1618	SD-1628 (Duplicate of SD-1612)	NOAA ER-L	NOAA ER-M
ALUMINUM	3.60 UJ	5.50 J	1.80 UJ	2.10 UJ	2.90 UJ	17900.00 J	2.40 UJ	11.10 J	NCA	NCA
ANTIMONY	NA	NA	NA	NA	NA	4.30 UJ	NA	NA	2.00	25.00
ARSENIC	44.40 J	46.80 J	21.00 J	8.70 J	36.10 J	152.00 J	40.10 J	45.70 J	33.00	85.00
BARIUM	69.60 J	55.30 J	51.50 J	13.30 J	70.50 J	113.00 J	58.80 J	45.30 J	NCA	NCA
BERYLLIUM	1.60 J	0.85 U	0.64 J	0.47 U	1.90 U	1.30 J	1.30 U	0.96 U	NCA	NCA
CADMIUM	0.99 U	0.61 J	0.34 U	0.20 J	1.40 J	1.10 U	1.[illegible] J	0.37 J	5.00	9.00
CALCIUM	NA	NA	NA	NA	NA	6740.00 J	[illegible]	NA	NCA	NCA
CHROMIUM	64.10 J	30.50 J	34.00 J	13.20 J	63.60 J	58.00 J	50.70 J	28.70 J	80.00	145.00
COBALT	NA	NA	NA	NA	NA	11.00 J	NA	NA	NCA	NCA
COPPER	129.00 J	171.00 J	49.50 J	27.60 J	152.00 J	116.00 J	118.00 J	147.00 J	70.00	390.00
IRON	NA	NA	NA	NA	NA	98100.00 J	NA	NA	NCA	NCA
LEAD	133.00 J	176.00 J	84.30 J	49.40 J	114.00 J	104.00 J	95.10 J	174.00 J	35.00	110.00
MAGNESIUM	NA	NA	NA	NA	NA	9500.00 J	NA	NA	NCA	NCA
MANGANESE	NA	NA	NA	NA	NA	261.00 J	NA	NA	NCA	NCA
MERCURY	0.54 J	0.55 J	0.25 J	0.20 UJ	0.89 J	0.53 J	0.65 J	0.43 J	0.15	1.30
NICKEL	33.80 J	17.90 J	18.50 J	4.60 J	28.90 J	30.70 J	23.70 J	17.80 J	30.00	50.00
POTASSIUM	NA	NA	NA	NA	NA	3740.00 J	NA	NA	NCA	NCA
SELENIUM	3.00 J	5.90 J	1.40 J	0.82 J	2.20 J	2.40 J	1.80 J	0.78 UJ	NCA	NCA
SILVER	2.40 J	1.10 UJ	0.90 J	0.69 U	4.30 U	2.40 J	3.50 U	1.00 U	1.00	2.20
SODIUM	NA	NA	NA	NA	NA	22900.00 J	NA	NA	NCA	NCA
THALLIUM	4.00 UJ	5.30 UJ	2.20 UJ	2.40 UJ	3.80 UJ	4.40 UJ	2.50 UJ	4.60 UJ	NCA	NCA
VANADIUM	NA	NA	NA	NA	NA	93.60 J	NA	NA	NCA	NCA
ZINC	230.00 J	116.00 J	54.40 J	60.20 J	259.00 J	247.00 J	219.00 J	144.00 J	120.00	270.00
CYANIDE	NA	NA	NA	NA	NA	2.30 UJ	NA	NA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-10
METALS AND CYANIDE DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	AREA 19 SW WETLANDS		SOUTHWEST DITCH				WEST DITCH		SEDIMENT QUALITY CRITERIA (3)	
	SD-1906	SD-1911 (Duplicate of SD_1906)	SD-1215	SD-1216	SD-1619	SD-1620	SD-1601	SD-1602	NOAA ER-L	NOAA ER-M
ALUMINUM	22.00 J	15.10 J	2.00 UJ	16600.00 J	4.60 UJ	2.60 UJ	2.70 UJ	3.30 J	NCA	NCA
ANTIMONY	NA	NA	NA	2.00 UJ	NA	NA	NA	NA	2.00	25.00
ARSENIC	21.10 U	31.80 U	26.40 J	34.60 J	85.60 J	44.70 J	41.10 J	22.50 J	33.00	85.00
BARIUM	17.40 J	25.80 J	85.50 J	64.60 J	107.00 J	99.90 J	75.80 J	47.70 J	NCA	NCA
BERYLLIUM	0.34 J	0.53 J	1.40 J	1.30 J	1.60 J	1.80 J	1.10 J	0.89 J	NCA	NCA
CADMIUM	0.49 UJ	0.78 UJ	1.60 J	1.20 J	0.97 U	1.30 J	0.81 J	0.29 U	5.00	9.00
CALCIUM	NA	NA	NA	10000.00 J	NA	NA	NA	NA	NCA	NCA
CHROMIUM	14.30 J	20.50 J	70.70 J	58.10 J	39.30 J	77.00 J	47.80 J	43.00 J	80.00	145.00
COBALT	NA	NA	NA	10.30 J	NA	NA	NA	NA	NCA	NCA
COPPER	47.20 J	65.10 J	155.00 J	132.00 J	437.00 J	155.00 J	107.00 J	33.10 J	70.00	390.00
IRON	NA	NA	NA	37900.00 J	NA	NA	NA	NA	NCA	NCA
LEAD	37.10 J	54.70 J	158.00 J	103.00 J	223.00 J	123.00 J	98.30 J	42.80 J	35.00	110.00
MAGNESIUM	NA	NA	NA	6310.00 J	NA	NA	NA	NA	NCA	NCA
MANGANESE	NA	NA	NA	200.00 J	NA	NA	NA	NA	NCA	NCA
MERCURY	0.39 J	0.41 J	0.83 J	0.65 J	0.55 UJ	0.78 J	0.65 J	0.44 UJ	0.15	1.30
NICKEL	6.70 J	6.20 J	32.70 J	27.20 J	29.60 J	34.90 J	26.30 J	16.90 J	30.00	50.00
POTASSIUM	NA	NA	NA	2880.00 J	NA	NA	NA	NA	NCA	NCA
SELENIUM	10.90 U	15.20 U	2.30 J	1.80 J	2.90 J	2.20 J	2.90 J	1.50 J	NCA	NCA
SILVER	1.50 J	1.60 J	3.70 J	2.00 J	1.30 UJ	3.10 J	1.50 J	1.00 J	1.00	2.20
SODIUM	NA	NA	NA	11100.00 J	NA	NA	NA	NA	NCA	NCA
THALLIUM	2.50 UJ	3.90 UJ	2.50 UJ	2.10 UJ	5.30 UJ	2.80 UJ	3.80 UJ	3.70 UJ	NCA	NCA
VANADIUM	NA	NA	NA	54.30 J	NA	NA	NA	NA	NCA	NCA
ZINC	24.90 J	25.40 J	264.00 J	233.00 J	231.00 J	268.00 J	164.00 J	79.40 J	120.00	270.00
CYANIDE	NA	NA	NA	0.85 UJ	NA	NA	NA	NA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-10
METALS AND CYANIDE DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	OLD RED ROOT CREEK		ASOCIATED DITCHES	SEDIMENT QUALITY CRITERIA (3)	
	SD-1604	SD-1606	SD-1614	Ontario LEL	Ontario SEL (Based on TOC) (4)
ALUMINUM	0.91 U	1.70 J-	2.90 UJ	NCA	NCA
ANTIMONY	NA	NA	NA	NCA	NCA
ARSENIC	3.20	1.70 J+	8.10 J	6	33
BARIUM	22.80	12.00	21.70 J	NCA	NCA
BERYLLIUM	0.17	0.16 U	0.51 UJ	NCA	NCA
CADMIUM	0.06 U	0.05 U	0.17 UJ	0.6	10
CALCIUM	NA	NA	NA	NCA	NCA
CHROMIUM	18.00	9.50	12.30 J	26	110
COBALT	NA	NA	NA	NCA	NCA
COPPER	12.30	11.00	24.80 J	16	110
IRON	NA	NA	NA	20000	40000
LEAD	14.00	6.40	28.80 J	31	250
MAGNESIUM	NA	NA	NA	NCA	NCA
MANGANESE	NA	NA	NA	460	1100
MERCURY	0.12 U	0.09 U	0.36 UJ	0.2	2
NICKEL	1.30 U	1.90	4.30 UJ	16	75
POTASSIUM	NA	NA	NA	NCA	NCA
SELENIUM	0.37	0.35 U	0.96 J	NCA	NCA
SILVER	0.26 U	0.25 U	0.85 UJ	NCA	NCA
SODIUM	NA	NA	NA	NCA	NCA
THALLIUM	1.10 U	1.00 U	3.40 UJ	NCA	NCA
VANADIUM	NA	NA	NA	NCA	NCA
ZINC	5.10	14.60	41.00 J	120	820
CYANIDE	NA	NA	NA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine lo
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-10
METALS AND CYANIDE DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	WEST DITCH				SEDIMENT QUALITY CRITERIA (3)	
	SD-1603		SD-1907		NOAA ER-L	NOAA ER-M
ALUMINUM	6190.00		7.80	J	NCA	NCA
ANTIMONY	1.10	U	NA		2.00	25.00
ARSENIC	24.70		26.60	J	33.00	85.00
BARIUM	23.90		47.00	J	NCA	NCA
BERYLLIUM	0.56		1.30	J	NCA	NCA
CADMIUM	0.28	U	1.00	UJ	5.00	9.00
CALCIUM	1690.00		NA		NCA	NCA
CHROMIUM	21.20		32.30	J	80.00	145.00
COBALT	5.00		NA		NCA	NCA
COPPER	30.00		92.10	J	70.00	390.00
IRON	19700.00		NA		NCA	NCA
LEAD	28.90		76.30	J	35.00	110.00
MAGNESIUM	2620.00		NA		NCA	NCA
MANGANESE	77.40		NA		NCA	NCA
MERCURY	0.14	U	0.60	J	0.15	1.30
NICKEL	11.90		17.80	J	30.00	50.00
POTASSIUM	1310.00		NA		NCA	NCA
SELENIUM	0.66		4.30	UJ	NCA	NCA
SILVER	0.70		2.40	J	1.00	2.20
SODIUM	4950.00		NA		NCA	NCA
THALLIUM	1.50	U	5.10	UJ	NCA	NCA
VANADIUM	26.40		NA		NCA	NCA
ZINC	73.10		141.00	J	120.00	270.00
CYANIDE	0.55	U	NA		NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-10
METALS AND CYANIDE DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

OLD RED ROOT CREEK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	DRY TRIBUTARY AREA 18		AREA 19 FORESTED WETLANDS		AREA 19 NE WETLANDS			AREA 19 SW WETLANDS		SEDIMENT QUALITY CRITERIA (3)	
	SD-1801	SD-1802	SD-1901	SD-1903	SD-1908	SD-1909	SD-1910	SD-1904	SD-1905	Ontario LEL	Ontario SEL (Based on TOC) (4)
ALUMINUM	3.10 J-	1.80 J-	NA	50.30 J	1190.00	16.10 J	3.50 UJ	3.20 UJ	2080.00	NCA	NCA
ANTIMONY	NA	NA	2.090 U	NA	1.16 U	NA	NA	NA	1.31 U	NCA	NCA
ARSENIC	3.30 J-	6.90 J-	25.900 J	78.10 J	3.50	39.20 U	8.90 U	8.30 U	6.10	6	33
BARIUM	17.70 J	22.70 J	49.200	48.20 J	6.60	82.60 J	47.90 J	54.70 J	9.50	NCA	NCA
BERYLLIUM	0.22	0.71	0.880	1.00 J	0.10	1.10 J	0.64 J	0.64 J	0.14	NCA	NCA
CADMIUM	0.05	0.23	0.780	0.74 UJ	0.26 U	2.20 J	0.55 UJ	0.51 UJ	0.30 U	0.6	10
CALCIUM	NA	NA	NA	NA	248.00	NA	NA	NA	1290.00	NCA	NCA
CHROMIUM	16.80	22.80	15.300	16.90 J	9.10	35.50 J	28.50 J	10.90 J	6.60	26	110
COBALT	NA	NA	NA	NA	2.90	NA	NA	NA	1.70	NCA	NCA
COPPER	48.30	48.30	39.900	108.00 J	9.60	89.10 J	31.50 J	20.00 J	20.20	16	110
IRON	NA	NA	NA	NA	6270.00	NA	NA	NA	5260.00	20000	40000
LEAD	586.00	171.00	37.900	60.90 J	4.60	65.90 J	21.30 J	11.10 J	17.50	31	250
MAGNESIUM	NA	NA	NA	NA	308.00	NA	NA	NA	1600.00	NCA	NCA
MANGANESE	NA	NA	NA	NA	13.20	NA	NA	NA	25.90	460	1100
MERCURY	0.11 U	0.18 U	0.100 U	0.39 J	0.07 U	0.38 J	0.15 UJ	0.21 J	0.06 U	0.2	2
NICKEL	3.80	7.40	5.200	13.20 J	2.40	20.20 J	4.80 J	2.40 J	4.00	16	75
POTASSIUM	NA	NA	NA	NA	113.00 U	NA	NA	NA	480.00	NCA	NCA
SELENIUM	0.86	1.30 U	1.200 UJ	10.10 U	1.12 UJ	12.30 U	3.00 U	9.80 U	1.25 UJ	NCA	NCA
SILVER	0.95	0.50	0.400 U	1.40 J	0.38 J-	1.40 J	0.67 UJ	0.62 UJ	0.58 J-	NCA	NCA
SODIUM	NA	NA	NA	NA	87.60 U	NA	NA	NA	5880.00 U	NCA	NCA
THALLIUM	0.88 U	1.30 U	0.840 U	3.60 UJ	1.22 U	4.60 UJ	2.80 UJ	2.50 UJ	1.36 R	NCA	NCA
VANADIUM	NA	NA	NA	NA	11.30	NA	NA	NA	6.00	NCA	NCA
ZINC	21.70 J	56.50 J	23.500	59.10 J	72.90	254.00 J	20.10 J	13.40 J	26.50	120	820
CYANIDE	NA	NA	NA	NA	0.72 U	NA	NA	NA	0.78 U	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-10
METALS AND CYANIDE DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

COUNTY PARK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	MAINTENANCE AREA DITCH (CONT.)	WESTERN BOUNDARY DITCH		AREA 10 SOUTHERN BORDER DITCH	SEDIMENT QUALITY CRITERIA (3)	
	SD-1011	SD-1001	SD-1002	SD-1006	Ontario LEL	Ontario SEL (Based on TOC) (4)
ALUMINUM	937.00	1240.00	1.64 U	1280.00	NCA	NCA
ANTIMONY	1.04 U	1.52 U	NA	1.42 U	NCA	NCA
ARSENIC	1.20 J-	1.70 J-	1.30 U	2.90 J-	6	33
BARIUM	2.70	17.00	11.20	5.40	NCA	NCA
BERYLLIUM	0.13 J	0.42 J	0.25 U	0.22 J	NCA	NCA
CADMIUM	0.26 U	0.38 U	0.41 U	0.35 U	0.6	10
CALCIUM	70.40 J	531.00 J	NA	240.00 J	NCA	NCA
CHROMIUM	3.00	6.30	5.40	6.70	26	110
COBALT	1.00 J	3.30 J	NA	2.30 J	NCA	NCA
COPPER	4.10 J	29.70 J	7.90 J	8.60 J	16	110
IRON	4660.00 J	23500.00 J	NA	5530.00 J	20000	40000
LEAD	5.50	25.50	12.00 J	10.80	31	250
MAGNESIUM	137.00	193.00	NA	111.00	NCA	NCA
MANGANESE	10.40	17.50	NA	23.10	460	1100
MERCURY	0.05 U	0.07 U	0.08 U	0.07 U	0.2	2
NICKEL	1.90	3.40	2.40	3.10	16	75
POTASSIUM	64.20 U	93.90 U	NA	87.60 U	NCA	NCA
SELENIUM	0.63 U	0.93 U	0.25 U	0.87 U	NCA	NCA
SILVER	0.26 J	1.70 J	0.31 U	0.51 J	NCA	NCA
SODIUM	29.90 U	74.80 U	NA	45.30 U	NCA	NCA
THALLIUM	0.86 U	1.26 U	1.80 U	1.16 U	NCA	NCA
VANADIUM	5.20 J	31.30 J	NA	10.60 J	NCA	NCA
ZINC	20.40 U	51.20 J	29.70 U	14.00 U	120	820
CYANIDE	0.52 U	0.72 U	NA	0.68 U	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-10
METALS AND CYANIDE DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

COUNTY PARK DRAINAGE AREA
FRESHWATER (2)
ALL VALUES IN (mg/kg)

COMPOUND	OPEN LAWN DITCH				MAINTENANCE AREA DITCH				SEDIMENT QUALITY CRITERIA (3)	
	SD-1003	SD-1004	SD-1005	SD-1012 (Duplicate of SD-1005)	SD-1007	SD-1008	SD-1009	SD-1010	Ontario LEL	Ontario SEL (Based on TOC) (4)
ALUMINUM	3.11 UJ	1.48 U	1.78 U	1.61 U	1.28 U	3.39 UJ	1.95 U	1.66 U	NCA	NCA
ANTIMONY	NA	NA	NA	NA	NA	NA	NA	NA	NCA	NCA
ARSENIC	7.40 J	1.30	4.40	8.20	5.60	18.40 J	32.40	14.30	6	33
BARIUM	49.30 J	7.90	4.80	7.50	22.00	123.00 J	9.00	9.00	NCA	NCA
BERYLLIUM	0.83 J	0.25 U	0.27 U	0.38	0.40	1.50 J	1.20	0.57	NCA	NCA
CADMIUM	0.77 UJ	0.37 U	0.44 U	0.40 U	0.32 U	2.50 J	0.48 U	0.41 U	0.6	10
CALCIUM	NA	NA	NA	NA	NA	NA	NA	NA	NCA	NCA
CHROMIUM	9.60 J	3.50	8.80	10.10	11.50	44.20 J	24.20	13.10	26	110
COBALT	NA	NA	NA	NA	NA	NA	NA	NA	NCA	NCA
COPPER	324.00 J	7.20 J	9.10 J	13.20 J	14.60 J	64.70 J	77.00 J	20.30 J	16	110
IRON	NA	NA	NA	NA	NA	NA	NA	NA	20000	40000
LEAD	65.10 J	5.70 J	9.80 J	46.10 J	15.70 J	97.80 J	272.00 J	14.80 J	31	250
MAGNESIUM	NA	NA	NA	NA	NA	NA	NA	NA	NCA	NCA
MANGANESE	NA	NA	NA	NA	NA	NA	NA	NA	460	1100
MERCURY	0.13 UJ	0.07 U	0.08 U	0.07 U	0.06 U	5.13 J	0.10 U	0.09 U	0.2	2
NICKEL	7.60 J	5.00	4.10	5.80	15.00	24.90 J	9.40	9.30	16	75
POTASSIUM	NA	NA	NA	NA	NA	NA	NA	NA	NCA	NCA
SELENIUM	0.81 J	0.28	0.27 U	0.61	0.22	1.20 J	1.00	0.31	NCA	NCA
SILVER	1.10 U	0.28 U	0.90 U	1.20 U	0.74 U	21.90 J	1.40 U	2.20 U	NCA	NCA
SODIUM	NA	NA	NA	NA	NA	NA	NA	NA	NCA	NCA
THALLIUM	3.37 UJ	1.69 U	1.97 U	1.78 U	1.44 U	3.82 UJ	2.22 U	1.92 U	NCA	NCA
VANADIUM	NA	NA	NA	NA	NA	NA	NA	NA	NCA	NCA
ZINC	117.00 J	32.50 U	27.70 U	40.20 U	104.00	280.00 J	118.00	83.80	120	820
CYANIDE	NA	NA	NA	NA	NA	NA	NA	NA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-11
SUMMARY OF TNT RESULTS IN SEDIMENT
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY
ALL VALUES IN (mg/kg)

DRAINAGES	SAMPLE ID	WATER FEATURE	FRESHWATER/ ESTUARINE	2,4,6-TNT JENKINS METHOD	2,4,6-TNT METHOD 8330
Area 12 Drainage Area	SD-1201	Area 12 Ditch	Estuarine	7.800	0.250 U
	SD-1202		Estuarine	0.960 U	NA
	SD-1203		Estuarine	0.960 U	NA
Black Ditch Drainage Area	SD-0401	Area 4 Ditch	Freshwater	74.000	NA
	SD-0402		Freshwater	60.000	NA
	SD-0403		Freshwater	49.000	NA
	SD-0404		Freshwater	82.000	0.190 U
	SD-0405		Freshwater	29.000	NA
	SD-0406		Freshwater	32.000	NA
	SD-0501	Area 5 Pond	Freshwater	46.000	NA
	SD-0502		Freshwater	38.000	NA
	SD-0503		Freshwater	14.000	NA
	SD-0504		Freshwater	2.900	NA
	SD-0407	Black Ditch	Freshwater	0.960 U	NA
	SD-0408		Freshwater	3.400	NA
	SD-0505		Freshwater	0.920 U	NA
	SD-0506		Estuarine	0.980 U	NA
	SD-0507		Estuarine	0.920 U	NA
	SD-0616		Estuarine	0.940 U	NA
	SD-0617		Estuarine	0.940 U	NA
	SD-0618		Estuarine	0.980 U	NA
	SD-0619		Estuarine	0.960 U	0.250 U
	SD-0620 (1)		Estuarine	NA	0.220 U
Central Ditch Drainage Area	SD-1101	Central Ditch	Estuarine	0.920 U	NA
	SD-1102		Estuarine	0.960 U	NA
	SD-1103		Estuarine	0.980 U	NA
	SD-1104		Estuarine	0.980 U	NA
	SD-1625	Isolated Estuarine Ponds	Estuarine	15.000	NA
	SD-1622		Estuarine	0.940 U	NA
	SD-1623		Freshwater	0.980 U	NA
	SD-1626		Freshwater	NA	0.220 U
	SD-1627 (2)		Freshwater	NA	0.210 U
	SD-1621	Upgradient Contiguous Ponded Area	Freshwater	11.000	NA
	SD-1624		Estuarine	0.980 U	NA
County Park Drainage Area	SD-1006	Area 10 Southern Border Ditch	Freshwater	1.400	NA
	SD-1902		Freshwater	30.000	0.250 U
	SD-1003	Open Lawn Ditch	Freshwater	11.000	0.240 U
	SD-1004		Freshwater	1.700	NA
	SD-1005		Freshwater	NA	0.230 U
	SD-1012 (3)		Freshwater	NA	0.230 U
	SD-1007	Maintenance Area Ditch	Freshwater	2.500	0.210 U
	SD-1008		Freshwater	35.000	0.230 U
	SD-1009		Freshwater	5.400	0.220 U
	SD-1010		Freshwater	0.960 U	NA
	SD-1011		Freshwater	0.940 U	NA
	SD-1001	Western Boundary Ditch	Freshwater	0.940 U	NA
	SD-1002		Freshwater	1.500	NA
East Ditch Drainage Area	SD-1402	East Ditch	Freshwater	0.980 U	0.200 U
	SD-1403		Freshwater	18.000	0.250 U
	SD-1404		Freshwater	42.000	NA
	SD-1405		Freshwater	48.000	0.250 U
	SD-1406		Freshwater	1.000 U	NA
	SD-1407		Estuarine	0.980 U	NA
	SD-1408		Estuarine	0.980 U	NA
	SD-1410	Unnamed Tributary	Freshwater	37.000	0.240 U
	SD-1411		Estuarine	1.000 U	NA
	SD-1412		Estuarine	0.980 U	NA
	SD-1401	Upgradient Scirpus Marsh	Freshwater	4.600	NA

TABLE 4-11
SUMMARY OF TNT RESULTS IN SEDIMENT
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY
ALL VALUES IN (mg/kg)

DRAINAGES	SAMPLE ID	WATER FEATURE	FRESHWATER/ ESTUARINE	2,4,6-TNT JENKINS METHOD	2,4,6-TNT METHOD 8330
Old Red Root Creek Drainage Area	SD-1611	Assoicated Ditches - Area 16	Estuarine	3.300	NA
	SD-1612		Estuarine	NA	0.200 U
	SD-1613		Estuarine	3.400	NA
	SD-1614		Freshwater	10.000	0.230 UJ
	SD-1615		Estuarine	0.940 U	NA
	SD-1616		Estuarine	1.000 U	NA
	SD-1617		Estuarine	0.980 U	NA
	SD-1618		Estuarine	0.980 U	NA
	SD-1628 (4)		Estuarine	NA	0.220 U
	SD-1629		Estuarine	0.980 U	NA
	SD-1630		Estuarine	0.960 U	NA
	SD-1901	Area 19 Forested Wetlands	Freshwater	6.100	NA
	SD-1903		Freshwater	58.000	NA
	SD-1908	Area 19 NE Wetlands	Freshwater	0.940 U	NA
	SD-1909		Freshwater	38.000	NA
	SD-1910		Freshwater	2.500	NA
	SD-1604	Old Red Root Creek	Freshwater	1.100	NA
	SD-1605		Freshwater	0.980 U	NA
	SD-1606		Estuarine	0.940 U	NA
	SD-1607		Estuarine	9.970	NA
	SD-1608		Estuarine	19.300	NA
	SD-1609		Estuarine	NA	0.180 U
	SD-1610		Estuarine	5.880	NA
	SD-1631 (5)		Estuarine	NA	0.250 U
	SD-1904	Area 19 SW Wetlands	Freshwater	44.000	NA
	SD-1905		Freshwater	6.800	NA
	SD-1906		Estuarine	NA	0.230 U
	SD-1911 (6)		Estuarine	NA	0.250 U
	SD-1215	Southwest Ditch	Estuarine	0.960 U	NA
	SD-1216		Estuarine	0.980 U	NA
	SD-1619		Estuarine	1.700	NA
	SD-1620		Estuarine	0.940 U	NA
	SD-1801	Dry Tributary - Area 18	Freshwater	7.200	NA
	SD-1802		Freshwater	0.960 U	NA
	SD-1601	West Ditch	Estuarine	0.960 U	NA
	SD-1602		Estuarine	10.000	NA
	SD-1603		Estuarine	0.940 U	NA
	SD-1907		Estuarine	0.960 U	NA
Red Root Creek Drainage Area	SD-2001	Area 20 Ditch	Freshwater	0.980 U	NA
	SD-2002		Freshwater	0.960 U	NA
	SD-1803	Area 18B Stream	Freshwater	19.000	0.220 U
	SD-1804		Freshwater	1.400	NA
	SD-1805		Freshwater	0.960 U	NA
	SD-1806		Freshwater	0.980 U	NA
	SD-1807		Freshwater	59.000	0.230 U
	SD-1808		Freshwater	1.000 U	NA
	SD-1809		Freshwater	0.180 U	NA
	SD-1818 (7)		Freshwater	NA	0.240 U
	SD-1810	Area 18C Stream	Freshwater	1.000 U	NA
	SD-1811		Freshwater	0.940 U	NA
	SD-1812		Freshwater	0.980 U	NA
	SD-1813		Freshwater	1.000 U	NA
	SD-1814		Freshwater	0.980 U	NA
	SD-1815		Freshwater	0.940 U	NA
	SD-1816		Freshwater	0.940 U	NA
	SD-1817		Freshwater	0.940 U	NA
	SD-0101	Lower Area 18B Stream	Freshwater	0.940 U	NA
	SD-0102		Freshwater	0.960 U	NA
	SD-0103		Freshwater	0.940 U	NA
	SD-0104		Freshwater	0.940 U	NA
	SD-0801	Area 8 Pond	Freshwater	NA	0.240 U
	SD-0802		Freshwater	71.000	0.230 U
	SD-0803		Freshwater	50.000	NA
	SD-0804		Freshwater	0.940 U	NA
	SD-0805		Freshwater	0.980 U	NA
	SD-0806		Freshwater	12.000	NA
	SD-0807 (8)		Freshwater	NA	0.220 U

TABLE 4-11
SUMMARY OF TNT RESULTS IN SEDIMENT
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY
ALL VALUES IN (mg/kg)

DRAINAGES	SAMPLE ID	WATER FEATURE	FRESHWATER/ ESTUARINE	2,4,6-TNT JENKINS METHOD	2,4,6-TNT METHOD 8330
Red Root Creek Drainage Area	SD-0601	Red Root Creek	Estuarine	13.000	NA
	SD-0602		Freshwater	64.000	NA
	SD-0603		Estuarine	6.800	NA
	SD-0604		Estuarine	11.000	NA
	SD-0605		Estuarine	0.940 U	NA
	SD-0606		Estuarine	0.940 U	NA
	SD-0607		Estuarine	0.980 U	NA
	SD-0608		Estuarine	0.960 U	NA
	SD-0609		Estuarine	0.960 U	NA
	SD-0610	Sulfur Plant Ponds	Freshwater	34.000	NA
	SD-0611		Freshwater	12.000	NA
	SD-0612		Freshwater	11.000	NA
	SD-0613		Freshwater	1.100	NA
	SD-0614		Freshwater	20.000	NA
	SD-0615		Freshwater	55.000	0.240 U

Notes:
(1) Sample SD-0620 is a QC duplicate of sample SD-0619.
(2) Sample SD-1627 is a QC duplicate of sample SD-1626.
(3) Sample SD-1012 is a QC duplicate of sample SD-1005.
(4) Sample SD-1628 is a QC duplicate of sample SD-1612.
(5) Sample SD-1631 is a QC duplicate of sample SD-1609.
(6) Sample SD-1911 is a QC duplicate of sample SD-1906.
(7) Sample SD-1818 is a QC duplicate of sample SD-1809.
(8) Sample SD-0807 is a QC duplicate of sample SD-0801.

TABLE 4-12
DIOXIN/FURAN COMPOUNDS DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

BLACK DITCH DRAINAGE AREA
ESTUARINE (2)
ALL VALUES IN (mg/kg)

COMPOUND	BLACK DITCH			SEDIMENT QUALITY CRITERIA (3)	
	SD-0616	SD-0619	SD-0620 (Duplicate of SD-0619)	NOAA ER-L	NOAA ER-M
HPCDD (TOTAL)	0.00010 J	0.00020 UJ	0.00010 J	NCA	NCA
HPCDF (TOTAL)	0.00004 J	0.00020 UJ	0.00010 UJ	NCA	NCA
OCDF	0.00003 J	0.00020 UJ	0.00010 UJ	NCA	NCA
OCDD	0.00070 J	0.00130 J	0.00100 J	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52). Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).

TABLE 4-12
DIOXIN/FURAN COMPOUNDS DETECTED IN SEDIMENT (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

RED ROOT CREEK DRAINAGE AREA
ALL VALUES IN (mg/kg)

COMPOUND	ESTUARINE (2)		FRESHWATER (2)		SEDIMENT QUALITY CRITERIA (3)			
	RED ROOT CREEK		SULFUR PLANT PONDS					
	SD-0603	SD-0609	SD-0613	SD-0615	NOAA ER-L	NOAA ER-M	Ontario LEL	Ontario SEL (Based on TOC) (4)
HPCDD (TOTAL)	0.00010 UJ	0.00010 UJ	0.00010 UJ	0.00030 UJ	NCA	NCA	NCA	NCA
HPCDF (TOTAL)	0.00010 UJ	0.00010 UJ	0.00010 UJ	0.00030 UJ	NCA	NCA	NCA	NCA
OCDF	0.00010 J	0.00010 UJ	0.00010 UJ	0.00020 UJ	NCA	NCA	NCA	NCA
OCDD	0.00090 J	0.00060 J	0.00030 J	0.00220 J	NCA	NCA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) Refer to Salinity Map (Figure 3-2) and Appendix A to determine extent of freshwater and estuarine locations.
(3) Estuarine locations were compared to the NOAA Guidelines, 1990 (Technical Memorandum NOS OMA 52).
Freshwater locations were compared to the Ontario Provincial Sediment Quality Guidelines (1992).
(4) The generic Severe Effect Level (SEL) guideline is shown in the table. Actual SEL values were calculated from TOC concentrations at each location. Calculated SELs for each location are given in Appendix E.

TABLE 4-13

PHYSICAL CHARACTERISTICS OF SEDIMENT
FORMER RARITAN ARSENAL
EDISON, NEW JERSEY

SAMPLE LOCATION*	PARTICLE SIZE DISTRIBUTION (%)				TOTAL ORGANIC CARBON (mg/kg)	pH	% SOLIDS
	COARSE SAND AND GRAVEL	SAND	SILT	CLAY			
EAST DITCH DRAINAGE							
Upgradient Scirpus Marsh							
SD-1401	27.8	23.4	37.1	11.7	27700	4.4	61.8
Average	27.8	23.4	37.1	11.7	27700	4.4	61.8
Unnamed Tributary							
SW-1410	10.5	33.8	47	8.7	57000	6.9	21
SW-1411	15.4	45.4	33	6.2	44700	7	28.6
SW-1412	7.8	62.1	21.5	8.6	46800	7	46.4
Average	11.2	47.1	33.8	7.8	49500	7	32
East Ditch							
SW-1402	30.4	62.6	4.1	2.9	2450	4.5	79.8
SW-1403	0.2	1.2	57.7	40.9	19600	6.2	49.7
SW-1404	12.2	16.8	52.5	18.5	23900	6.4	29
SW-1405	1.7	4.4	54.9	39	35700	6.4	33.6
SW-1406	42.9	25	25	7.1	6410	6.8	52.1
SW-1407	37.1	35.5	18.7	8.7	87100	6.9	30.6
SW-1408	11.3	11.1	61.9	15.7	31300	7	38.2
Average	19.4	22.4	39.3	19	2949.3	6.3	44.7
BLACK DITCH DRAINAGE							
Area 4 Ditch							
SD-0401	27.7	17.3	39	16	187000	4.6	17.8
SD-0402	29.4	10.4	45.2	15	201000	4.8	21.2
SD-0403	20	23	48.9	8.1	36400	5.3	32.9
SD-0404	12	53.6	27.4	7	62100	4.9	52.2
SD-0405	11.5	57.5	25	6	39300	5.2	52.8
SD-0406	3.3	4.3	67.4	25	30600	4.3	40
Average	17.3	27.7	42.2	12.9	92733.3	4.9	36.2
Area 5 Pond							
SW-0501	7.5	47	34.5	11	75600	5.7	36.9
SW-0502	9.8	32.2	41	17	197000	5.8	23.4
SW-0503	13.6	33.4	32	21	57500	5.9	43.1
SW-0504	6.4	26.1	47.5	20	106000	5.1	31.4
Average	9.3	34.7	38.8	17.2	109025	5.6	33.7
Black Ditch							
SW-0407	41.9	55.2	1.4	1.5	2140	6.2	79.3
SW-0408	12	68.7	11.3	8	4980	6	62.6
SW-0505	48.4	48.6	1	2	188	7.4	69.2
SW-0506	32.2	54.3	10	3.5	1520	6	68.2
SW-0507	74.1	22.9	0.7	2.3	549	5.9	74.5
SW-0616	5.2	54.8	34	6	43800	6.7	46.7
SW-0617	11.2	30.8	50.7	7.3	39900	7.1	33.6
SW-0618	4.2	16.8	67.5	11.5	40100	7.3	28.1
SW-0619	7.4	47.6	37	8	20100	6.2	31.8
Average	26.3	44.4	23.7	5.6	17030.8	6.5	54.9

TABLE 4-13 (CONTINUED)

PHYSICAL CHARACTERISTICS OF SEDIMENT
FORMER RARITAN ARSENAL
EDISON, NEW JERSEY

SAMPLE LOCATION*	PARTICLE SIZE DISTRIBUTION (%)				TOTAL ORGANIC CARBON (mg/kg)	pH	% SOLIDS
	COARSE SAND AND GRAVEL	SAND	SILT	CLAY			
EAST DITCH DRAINAGE							
Upgradient Scirpus Marsh							
SD-1401	27.8	23.4	37.1	11.7	27700	4.4	61.8
Average	27.8	23.4	37.1	11.7	27700	4.4	61.8
Unnamed Tributary							
SW-1410	10.5	33.8	47	8.7	57000	6.9	21
SW-1411	15.4	45.4	33	6.2	44700	7	28.6
SW-1412	7.8	62.1	21.5	8.6	46800	7	46.4
Average	11.2	47.1	33.8	7.8	49500	7	32
East Ditch							
SW-1402	30.4	62.6	4.1	2.9	2450	4.5	79.8
SW-1403	0.2	1.2	57.7	40.9	19600	6.2	49.7
SW-1404	12.2	16.8	52.5	18.5	23900	6.4	29
SW-1405	1.7	4.4	54.9	39	35700	6.4	33.6
SW-1406	42.9	25	25	7.1	6410	6.8	52.1
SW-1407	37.1	35.5	18.7	8.7	87100	6.9	30.6
SW-1408	11.3	11.1	61.9	15.7	31300	7	38.2
Average	19.4	22.4	39.3	19	2949.3	6.3	44.7
BLACK DITCH DRAINAGE							
Area 4 Ditch							
SD-0401	27.7	17.3	39	16	187000	4.6	17.8
SD-0402	29.4	10.4	45.2	15	201000	4.8	21.2
SD-0403	20	23	48.9	8.1	36400	5.3	32.9
SD-0404	12	53.6	27.4	7	62100	4.9	52.2
SD-0405	11.5	57.5	25	6	38300	5.2	52.8
SD-0406	3.3	4.3	67.4	25	30600	4.3	40
Average	17.3	27.7	42.2	12.9	92733.3	4.9	36.2
Area 5 Pond							
SW-0501	7.5	47	34.5	11	75600	5.7	36.9
SW-0502	9.8	32.2	41	17	197000	5.8	23.4
SW-0503	13.6	33.4	32	21	57500	5.9	43.1
SW-0504	6.4	26.1	47.5	20	106000	5.1	31.4
Average	9.3	34.7	38.8	17.2	109025	5.6	33.7
Black Ditch							
SW-0407	41.9	55.2	1.4	1.5	2140	6.2	79.3
SW-0408	12	68.7	11.3	8	4980	6	62.6
SW-0505	48.4	48.6	1	2	188	7.4	69.2
SW-0506	32.2	54.3	10	3.5	1520	6	68.2
SW-0507	74.1	22.9	0.7	2.3	549	5.9	74.5
SW-0616	5.2	54.8	34	6	43800	6.7	46.7
SW-0617	11.2	30.8	50.7	7.3	39900	7.1	33.6
SW-0618	4.2	16.8	67.5	11.5	40100	7.3	28.1
SW-0619	7.4	47.6	37	8	20100	6.2	31.8
Average	26.3	44.4	23.7	5.6	17030.8	6.5	54.9

TABLE 4-13 (CONTINUED)

PHYSICAL CHARACTERISTICS OF SEDIMENT
FORMER RARITAN ARSENAL
EDISON, NEW JERSEY

SAMPLE LOCATION*	PARTICLE SIZE DISTRIBUTION (%)				TOTAL ORGANIC CARBON (mg/kg)	pH	% SOLIDS
	COARSE SAND AND GRAVEL	SAND	SILT	CLAY			
RED ROOT CREEK DRAINAGE							
18C Stream							
SW-1812	2.7	90.1	5.6	1.6	2000	6.5	81.4
SW-1816	37.8	59.4	1.2	1.6	218	5.3	82.9
SW-1817	48.7	45.3	2.1	3.9	275	5.2	82.8
SW-1815	23.4	74	1	1.6	2660	6.3	76.2
SW-1813	3.6	67.4	27.2	1.8	5890	6.3	60.2
SW-1814	27.9	69.2	0.6	2.3	1090	6.2	77.8
SW-1810	22.6	71.1	4.1	2.2	2000	6.8	82.4
SW-1811	27.1	62.4	9	1.5	1670	6.5	70.1
Average	23.8	68.1	6	2.1	2019	6.1	77.7
18B Stream							
SW-1803	45.9	48.8	2.3	3	9060	6.2	60
SW-1804	40.1	53.9	3	3	578	5.9	69.8
SW-1805	28.2	68.8	2.1	0.9	725	6.3	71.6
[illegible]-1806	14.4	82.6	2.1	0.9	93700	6	72
[illegible]-1807	19.3	77.2	2.4	1.1	21200	5.7	24.4
SW-1808	57.2	40.2	1.9	0.7	304	4.7	79.9
SW-1809	67.6	30.6	1.1	0.7	119	5.2	81.3
Average	39	57.4	2.1	1.5	17955.1	5.7	65.6
Lower 18B Stream							
SW-0101	21	68.5	8	2.5	136	4.5	76.5
SW-0102	59.9	36.9	1.8	1.4	629	5	80.4
SW-0103	16.5	79.9	1.7	1.9	561	4.8	78.4
SW-0104	43	53.1	2.3	1.6	132	5	82.7
Average	35.1	59.6	3.45	1.85	364.5	4.825	79.5
Area 20 Ditch							
SW-2001	3.9	40.1	37.5	18.5	8420	6.3	68.5
SD-2002	7.7	65.3	13.3	13.7	2160	6.4	71.1
Average	5.8	52.7	25.4	16.1	5290	6.4	69.8
Area 8 Pond							
SW-0801	10.8	19.2	52	18	59200	6.6	20.1
SW-0802	34.6	27.6	29.3	8.5	20900	6.6	13.3
SW-0803	8.1	31.9	46	14	18500	6.7	29.5
SW-0804	14.3	51.5	20.3	13.9	16400	6.4	67
SW-0805	10.6	76.4	8.6	4.4	11400	6.6	67.2
SW-0806	2.1	3.9	54	40	24900	6.5	37.6
Average	13.4	35.1	35	16.5	25216.7	6.6	39.1

TABLE 4-13 (CONTINUED)

PHYSICAL CHARACTERISTICS OF SEDIMENT
FORMER RARITAN ARSENAL
EDISON, NEW JERSEY

SAMPLE LOCATION*	PARTICLE SIZE DISTRIBUTION (%)				TOTAL ORGANIC CARBON (mg/kg)	pH	% SOLIDS
	COARSE SAND AND GRAVEL	SAND	SILT	CLAY			
Red Root Creek							
SW-0601	17	28	40	15	58400	5.7	20.5
SW-0602	44.3	23	24.2	8.5	96700	5.8	11.9
SW-0603	15.4	34.6	40	10	49400	6.8	39
SW-0604	21.5	20.5	45.5	12.5	50100	6.8	16.4
SW-0605	5.1	28.2	50.7	16	42600	7.2	31.4
SW-0606	7.3	28.7	48	16	23200	6.6	31.2
SW-0607	10	30	46.7	13.3	76500	6.1	24.4
SW-0608	28.4	28.6	36.8	6.2	76900	7	39.3
SW-0609	13.5	41.5	37	8	25000	7.6	32.6
Average	18.1	29.2	41	11.7	55422.2	6.2	27.4
Sulfur Plant Ponds							
SD-0611	9	44	44.5	2.5	33200	4.6	51.9
SD-0612	19.8	77.2	1.2	1.8	2100	5.7	36.3
SW-0613	25.5	53.5	17	4	14200	4.5	66.4
SW-0614	28.3	55.7	14.6	1.4	5700	4.8	47.8
SW-0610	13.4	60.6	25.8	0.2	18000	3.6	36.3
SW-0615	2	22	56	20	21100	3.4	41.4
Average	16.3	52.2	26.5	5	15716.7	4.4	46.7
CENTRAL DITCH DRAINAGE							
Central Ditch							
SW-1101	2.4	5.2	70	22.4	7580	7.6	51.1
SW-1102	7.9	80.6	7.4	4.1	10800	7.7	63.8
SW-1103	47	48.4	2.8	1.8	13400	7.5	77.4
SW-1104	42.3	40.8	12.1	4.8	56400	7.6	57.2
Average	24.9	43.8	23.1	8.3	22045	7.6	62.4
Upgradient Contiguous Ponded Area							
SW-1621	9.5	68.5	11.9	10.1	12500	6.9	50.5
SW-1624	16.7	64.4	15.3	3.6	9420	7.4	55.8
Average	13.1	66.5	13.6	6.9	10960	7.2	53.2
Isolated Freshwater Pond							
SW-1622	9.4	37.3	37.2	16.1	15800	7	51.2
SW-1626	18	72.6	4.7	4.7	5420	6.7	70.2
SW-1623	28.6	54.4	12.5	4.5	5560	7	71.3
Average	18.7	54.8	18.1	8.4	8926.7	6.9	64.2
Isolated Estuarine Ponds							
SW-1625	18.5	21.6	40	19.9	147000	7.2	17
Average	18.5	21.6	40	19.9	147000	7.2	17

TABLE 4-13 (CONTINUED)

PHYSICAL CHARACTERISTICS OF SEDIMENT
FORMER RARITAN ARSENAL
EDISON, NEW JERSEY

SAMPLE LOCATION*	PARTICLE SIZE DISTRIBUTION (%)				TOTAL ORGANIC CARBON (mg/kg)	pH	% SOLIDS
	COARSE SAND AND GRAVEL	SAND	SILT	CLAY			
AREA 12 DRAINAGE							
Area 12 Ditch							
SW-1201	4.2	20.8	57	18	43300	7	41.7
SW-1202	10.6	62.5	20.1	6.8	21200	7.2	44.6
SW-1203	26.3	45.7	18.5	9.5	104000	7.3	13.2
Average	13.7	43	31.9	11.4	56166.7	7.2	33.2
OLD RED ROOT CREEK DRAINAGE							
Dry Tributary - Area 18							
SD-1801	7.5	39.3	39	14.2	22000	6.2	74.6
SD-1802	7	41	31.7	20.3	18500	5.4	50.8
Average	7.3	40.2	35.4	17.3	20250	5.8	62.7
Area 19 NE Wetlands							
SW-1908	30.8	57	9.1	3.1	32900	6.5	58.5
SW-1909	12.5	27.5	50	10	63900	6.6	20.4
SW-1910	5.7	31.3	43	20	8230	6.3	34.1
erage	16.3	38.6	34	11	35010	6.5	37.7
Area 19 Forested Wetlands							
SD-1901	5.8	29.8	49.7	14.7	16400	5.1	50.2
SW-1903	11.3	53.7	28.9	6.1	42500	6.2	25.8
Average	8.6	41.8	39.3	10.4	29450	5.7	38
Area 19 SW Wetlands							
SW-1904	7.7	42.3	41.9	8.1	61900	6	37.3
SW-1905	40.8	51.9	5	2.3	5770	7.4	63.1
SW-1906	15.1	46.9	29	9	65300	6.4	38.6
Average	21.2	47	25.3	6.5	44323.3	6.6	46.3
Old Red Root Creek							
SW-1604	2.4	41.6	34	22	23200	6.5	70
SW-1605	21.5	48.5	20	10	3560	6.1	79.2
SW-1606	14.6	22.4	52.2	10.8	74300	6.9	25.1
SW-1607	38.6	21.4	29.1	10.9	42100	7	20
SW-1608	27.4	24.6	35.5	12.5	152000	6.9	19
SW-1609	14.5	44.5	30.2	10.8	48700	6.7	37.3
SW-1610	13.8	16.2	47.5	22.5	28400	6.8	18.5
Average	19	31.3	35.5	14.2	53180	6.7	38.4
West Ditch							
SW-1907	32.9	22.6	28.3	16.2	35400	6.8	18.6
SW-1601	31.6	25.4	34	9	188000	6.9	24
W-1602	14.1	33.9	36	16	9700	6.9	21.8
W-1603	33.6	45.2	16.3	4.9	8610	6.8	54.4
Average	28.1	31.8	28.7	11.5	60427.5	6.9	29.7

TABLE 4-13 (CONTINUED)

PHYSICAL CHARACTERISTICS OF SEDIMENT
FORMER RARITAN ARSENAL
EDISON, NEW JERSEY

SAMPLE LOCATION*	PARTICLE SIZE DISTRIBUTION (%)				TOTAL ORGANIC CARBON (mg/kg)	pH	% SOLIDS
	COARSE SAND AND GRAVEL	SAND	SILT	CLAY			
Associated Ditches - Area 16							
SW-1611	7.8	42.2	39	11	60700	6.9	20.4
SW-1612	7.5	32.5	48	12	218000	6.7	16.9
SW-1629	45.8	20	20.8	13.4	34200	7.2	8.3
SW-1613	28.1	48.9	18.4	4.6	6770	6.8	37.7
SW-1630	19.9	65.9	9.9	4.3	5900	6.9	48
SW-1614	10.3	53.2	31.5	5	152000	6.8	26.4
SW-1615	13.4	53.8	25.6	7.4	160000	7.4	35.3
SW-1616	4.6	29.6	54.8	11	39200	7.2	23.5
SW-1617	6.2	33.8	48	12	10700	7.3	18.1
SW-1618	8.3	31.6	48.1	12	5970	7.2	33
Average	15.2	41.1	34.4	9.3	69344	7	26.8
Southwest Ditch							
SW-1619	29.3	34.2	26	10.5	32500	7.1	15.1
SW-1620	6	21	57	16	25900	7	29.2
SW-1215	28.5	18.5	38.5	14.5	22700	7	30.9
SW-1216	12.8	28.2	46	13	26800	7	37.8
Average	19.15	25.475	41.875	13.5	26975	7.025	28.25
COUNTY PARK DRAINAGE AREA							
Western Boundary Ditch							
SW-1001	25.9	71.8	0.7	1.6	8840	6.1	69.1
SW-1002	17.2	81.3	0.7	0.8	7960	6.2	63.9
Average	21.55	76.55	0.7	1.2	8400	6.15	66.5
Maintenance Area Ditch							
SD-1009	22.5	54.9	21.2	1.4	55400	4.9	52.3
SD-1010	35.5	51.6	9.8	3.1	27700	5.1	58.6
SD-1011	33	64.3	1.8	0.9	1020	6	95.7
SD-1007	19.6	66.7	11.3	2.4	1420	5.8	80.7
SD-1008	9.2	28.2	54.3	8.3	71500	5.4	30.4
Average	23.96	53.14	19.68	3.22	31408	5.44	63.54
Open Lawn Ditch							
SD-1003	25.8	60.8	11.8	1.6	16700	6.1	33.6
SW-1004	36.5	47.2	12.2	4.1	15500	6.1	68.8
SW-1005	29.5	64.5	5.2	0.8	2370	4.4	58.9
Average	30.6	57.5	9.7	2.2	11523.3	5.5	53.8
Area 10 Southern Border Ditch							
SW-1902	15.9	46.1	31.8	8.2	48600	5.9	21.8
SW-1006	17.8	80	1.3	0.9	2000	5.6	74.5
Average	16.9	63.1	16.6	3.6	25300	5.8	48.2

NOTES:

* Sample locations with an "SD" prefix were dry during the August sampling event, and hence were sampled only for sediment. SW locations were sampled for both water and sediment.

TABLE 4-14
VOCs DETECTED IN AREA 10 SOIL (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

ALL VALUES IN (mg/kg)

Sample ID: Date Collected: Depth (feet):	SS-1054A 8/16/94 0.0 - 0.5	SS-1055A 8/16/94 0.0 - 0.5	SS-1056A 8/16/94 0.0 - 0.5	SS-1057A 8/16/94 0.0 - 0.5	SS-1058A 8/16/94 0.0 - 0.5	SS-1059A 8/16/94 0.0 - 0.5	SS-1060A 8/16/94 0.0 - 0.5	SS-1061A 8/16/94 0.0 - 0.5	NJDEPE RDCSCC (2)	NJDEPE NRDCSCC (3)	NJDEPE IGWSCC (4)
STYRENE	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.002 J	23	97	100

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) NJDEPE Residential Direct Contact Soil Cleanup Criteria.
(3) NJDEPE Non-Residential Direct Contact Soil Cleanup Criteria.
(4) NJDEPE Impact to Groundwater Soil Cleanup Criteria.

TABLE 4-14
METALS AND CYANIDE DETECTED IN AREA 10 SOIL (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

ALL VALUES IN (mg/kg)

Sample ID:	SS-1054A	SS-1055A	SS-1056A	SS-1057A	SS-1058A	SS-1059A	SS-1060A	SS-1061A	NJDEPE	NJDEPE	NJDEPE
Date Collected:	34562	34562	34562	34562	34562	34562	34562	34562	RDCSCC (2)	NRDCSCC (3)	IGWSCC (4)
Depth (feet):	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5			
ALUMINUM	4880	NA	NA	NA	NA	NA	NA	8660	NCA	NCA	NCA
ANTIMONY	2.3	1.27 U	1.27 U	1.26 U	1.2	1.3 U	1.14 U	9	14	340	NCA
ARSENIC	6.8 J-	3.8 J-	5.3 J-	3.5 J-	3.4 J-	12.8 J-	2.2 J-	56.6 J-	20	20	20
BARIUM	16.5	10	33.9	391	24.4	52.1	9.4	34.6	700	47000	NCA
BERYLLIUM	0.46	0.27	0.58	0.3	0.52	0.63	0.23	0.66	1	1	NCA
CALCIUM	85.3 J	NA	NA	NA	NA	NA	NA	175 J	NCA	NCA	NCA
CHROMIUM	19.3 J-	10.9	16.4	8.9	20.2	14.1	12.2	29.5 J-	500	500	NCA
COBALT	2.6	NA	NA	NA	NA	NA	NA	4.4	NCA	NCA	NCA
COPPER	24.9	16.1	23.4	38.5	48.8	9.8	15.6	71.8	600	600	NCA
IRON	11800 J	NA	NA	NA	NA	NA	NA	19400 J	NCA	NCA	NCA
LEAD	40.7 U	13.1	39.7	69.6	51.4	21.8	20.4	133 J-	400	600	2000
MAGNESIUM	449 J	NA	NA	NA	NA	NA	NA	664 J	NCA	NCA	NCA
MANGANESE	17.4	NA	NA	NA	NA	NA	NA	55	NCA	NCA	NCA
MERCURY	0.06 U	0.06 U	0.06 U	2.4	0.05 U	0.06 U	0.06 U	0.12	14	270	NCA
NICKEL	5.7	2.6	9.9	14.8	8.7	8.7	2.8	8.6	250	2400	NCA
POTASSIUM	323	NA	NA	NA	NA	NA	NA UJ	499	NCA	NCA	NCA
SILVER	0.25 UJ	0.24 UJ	0.24 UJ	0.25 J-	0.22 UJ	0.25 UJ	0.22	0.25 UJ	110	4100	NCA
VANADIUM	23.4	NA	NA	NA	NA	NA	NA	44.3	370	7100	NCA
ZINC	20.4	7.3	49.4	73.8	38.2	28.7	17.7	39.1	1500	1500	NCA
CYANIDE	0.64 U	NA	NA	NA	NA	NA	NA	0.65 U	1100	21000	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) NJDEPE Residential Direct Contact Soil Cleanup Criteria.
(3) NJDEPE Non-Residential Direct Contact Soil Cleanup Criteria.
(4) NJDEPE Impact to Groundwater Soil Cleanup Criteria.

TABLE 4-14
PESTICIDE/POLYCHLORINATED BIPHENYL COMPOUNDS DETECTED IN AREA 10 SOIL (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

ALL VALUES IN (mg/kg)

Sample ID: Date Collected: Depth (feet):	SS-1054A 8/16/94 0.0 - 0.5	SS-1055A 8/16/94 0.0 - 0.5	SS-1056A 8/16/94 0.0 - 0.5	SS-1057A 8/16/94 0.0 - 0.5	SS-1058A 8/16/94 0.0 - 0.5	SS-1059A 8/16/94 0.0 - 0.5	SS-1060A 8/16/94 0.0 - 0.5	SS-1061A 8/16/94 0.0 - 0.5	NJDEPE RDCSCC (2)	NJDEPE NRDCSCC (3)	NJDEPE IGWSCC (4)
4,4'-DDE	0.010 U	0.010 U	0.019 U	0.010 U	0.006 J	0.010 U	0.045 U	0.021 J	2	9	50
4,4'-DDT	0.005 J	0.010 U	0.019 U	0.010 U	0.011	0.010 U	0.045 U	0.016 J	2	9	500
BETA ENDOSULFAN	0.010	0.015	0.019 U	0.010 U	0.011	0.010 U	0.045 U	0.017	NCA	NCA	NCA
DIELDRIN	0.010 U	0.010 U	0.019 U	0.010 U	0.008 U	0.010 U	0.023 J	0.022 U	0.042	0.18	50

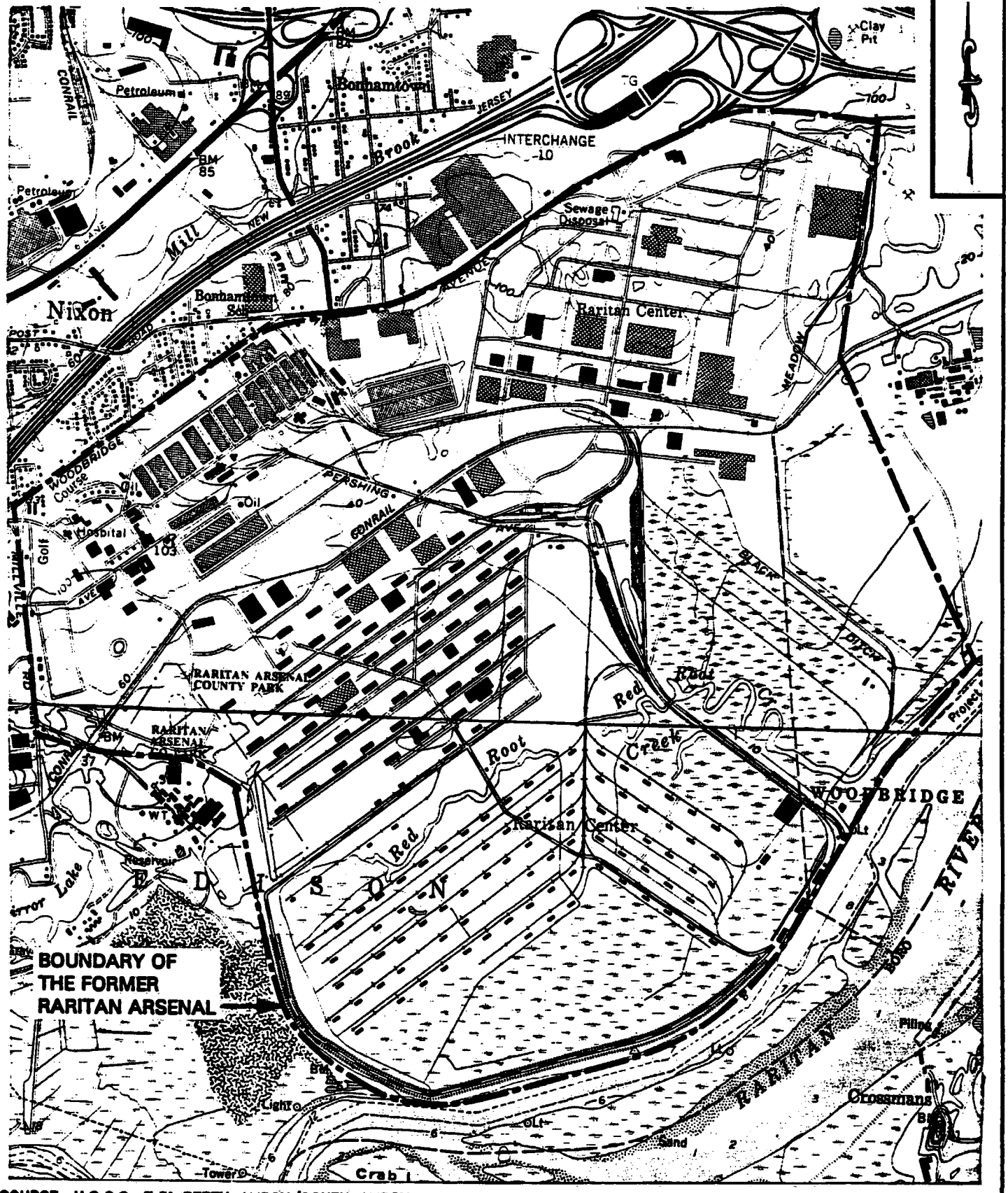
NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results are in Appendix C.
(2) NJDEPE Residential Direct Contact Soil Cleanup Criteria.
(3) NJDEPE Non-Residential Direct Contact Soil Cleanup Criteria.
(4) NJDEPE Impact to Groundwater Soil Cleanup Criteria.

TABLE 4-14
SVOCs DETECTED IN AREA 10 SOIL (1)
FORMER RARITAN ARSENAL - EDISON, NEW JERSEY

ALL VALUES IN (mg/kg)

Sample ID: Date Collected: Depth (feet):	SS-1054A 8/16/94 0.0 - 0.5	SS-1055A 8/16/94 0.0 - 0.5	SS-1056A 8/16/94 0.0 - 0.5	SS-1057A 8/16/94 0.0 - 0.5	SS-1058A 8/16/94 0.0 - 0.5	SS-1059A 8/16/94 0.0 - 0.5	SS-1060A 8/16/94 0.0 - 0.5	SS-1061A 8/16/94 0.0 - 0.5	NJDEPE RDCSCC (2)	NJDEPE NRDCSCC (3)	NJDEPE IGWSCC (4)
ACENAPHTHENE	0.420 U	0.400 U	0.100 J	0.410 U	0.350 U	0.400 U	0.760 U	0.460 U	3400	10000	100
ACENAPTHYLENE	0.420 U	0.400 U	0.390 U	0.410 U	0.350 U	0.400 U	0.450 J	0.460 U	NCA	NCA	NCA
ANTHRACENE	0.420 U	0.400 U	0.220 J	0.410 U	0.350 U	0.400 U	0.550 J	0.460 U	10000	10000	100
BENZO(A)ANTHRACENE	0.420 U	0.400 U	1.300	0.051 J	0.068 J	0.400 U	3.200	0.120 J	0.9	4	500
BENZO(A)PYRENE	0.420 U	0.400 U	1.300	0.410 U	0.076 J	0.400 U	1.700	0.130 J	0.66	0.66	100
BENZO(B)FLUORANTHRENE	0.420 U	0.400 U	1.400	0.410 U	0.210 J	0.400 U	3.900	0.180 J	0.9	4	50
BENZO(GHI)PERYLENE	0.420 U	0.400 U	0.670	0.410 U	0.350 U	0.400 U	0.870	0.460 U	NCA	NCA	NCA
BENZO(K)FLUORANTHRENE	0.420 U	0.400 U	1.500	0.410 U	0.120 J	0.400 U	3.900	0.180 J	0.9	4	500
BIS(2-ETHYLHEXYL) PHTHALATE	0.059 J	0.400 U	0.085 J	0.410 U	0.036 J	0.400 U	0.760 U	0.120 J	49	210	100
CARBAZOLE	0.420 U	0.400 U	0.068 J	0.410 U	0.350 U	0.400 U	0.089 J	0.460 U	NCA	NCA	NCA
CHRYSENE	0.057 J	0.400 U	1.400	0.054 J	0.120 J	0.400 U	4.300	0.180 J	9	40	500
DIBENZO(A,H)ANTHRACENE	0.420 U	0.400 U	0.260 J	0.410 U	0.350 U	0.400 U	0.400 J	0.460 U	0.66	0.66	100
FLUORANTHRENE	0.110 J	0.400 U	2.600	0.081 J	0.150 J	0.400 U	5.700	0.340 J	2300	10000	100
FLUORENE	0.420 U	0.400 U	0.120 J	0.410 U	0.350 U	0.400 U	0.760 U	0.460 U	2300	10000	100
INDENO(1,2,3-C,D)PYRENE	0.420 U	0.400 U	0.540	0.410 U	0.350 U	0.400 U	0.970	0.460 U	0.9	4	500
PHENANTHRENE	0.043 J	0.400 U	1.200	0.410 U	0.350 U	0.400 U	0.280 J	0.150 J	NCA	NCA	NCA
PYRENE	0.091 J	0.400 U	3.500	0.077 J	0.160 J	0.400 U	8.600	0.380 J	1700	10000	100
TOTAL BNAs	0.360	ND	16.263	0.263	0.940	ND	34.909	1.780	NCA	NCA	NCA

NOTES:
(1) Only compounds exceeding their MDL for at least one location are included. Complete results, including TICs, are in Appendix C.
(2) NJDEPE Residential Direct Contact Soil Cleanup Criteria.
(3) NJDEPE Non-Residential Direct Contact Soil Cleanup Criteria.
(4) NJDEPE Impact to Groundwater Soil Cleanup Criteria.



SOURCE: U.S.G.S. 7.5' PERTH AMBOY/SOUTH AMBOY QUADS. P.R. 1981

SCALE: 1" = 2000'

WESTON MANAGERS DESIGNERS/CONSULTANTS	PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION EDISON, NEW JERSEY	SITE LOCATION MAP	
	CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS	DATE: 03/15/95	FIGURE #: FIGURE 1-1

LEGEND

- INDIVIDUAL STUDY AREA
- SW1614 ▲ SEDIMENT/ SURFACE WATER SAMPLE
- SW1625 ◉ BOTH HIGH & LOW TIDE SURFACE WATER SAMPLES TAKEN
- SD SEDIMENT SAMPLES ONLY; NO SURFACE WATER WAS PRESENT IN AUGUST 1994
- SW SURFACE WATER & SEDIMENT SAMPLE LOCATION

GRAPHIC SCALE

500 0 250 500 1000 2000

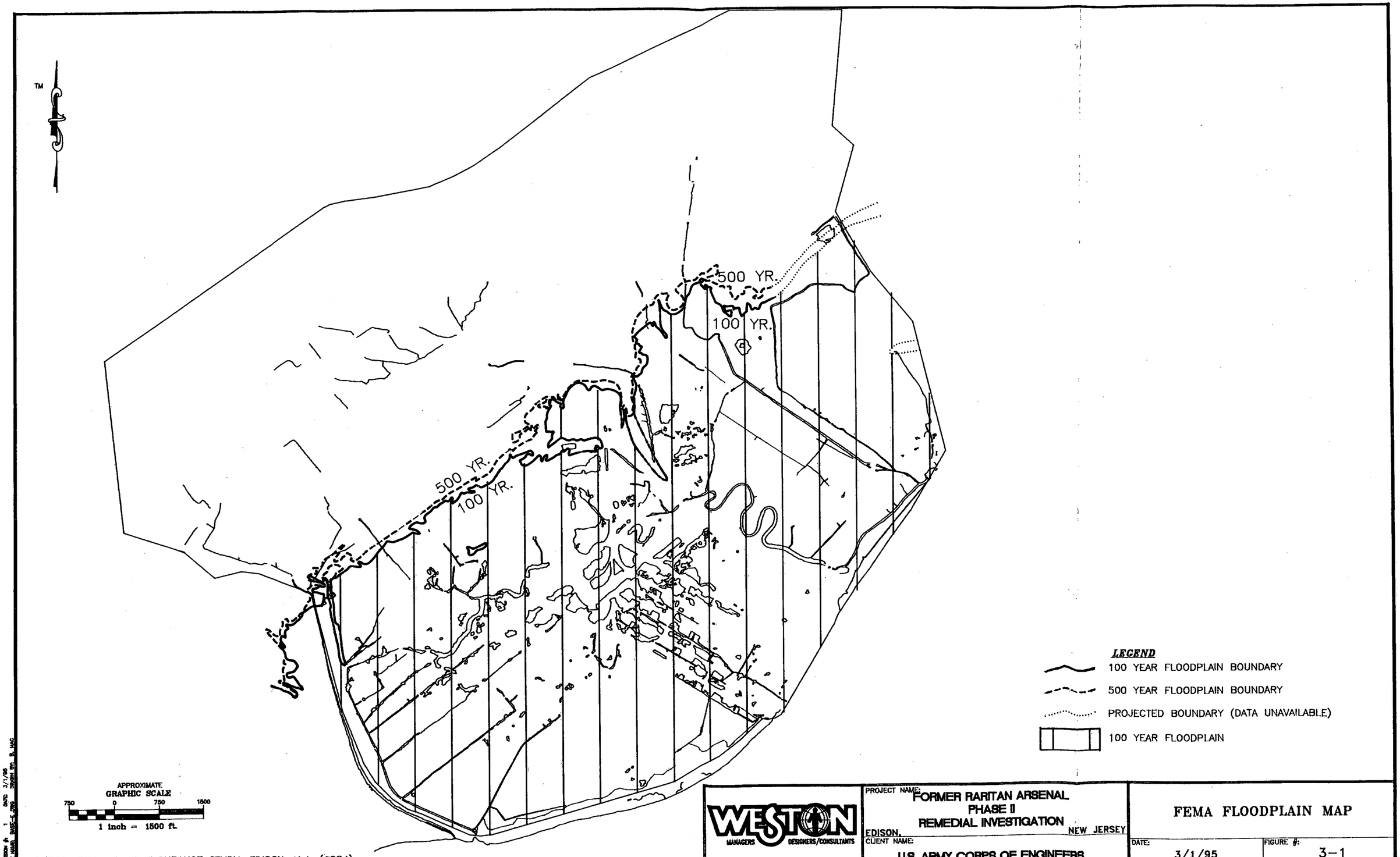
(IN FEET)
1 inch = 500 ft

NOTE:

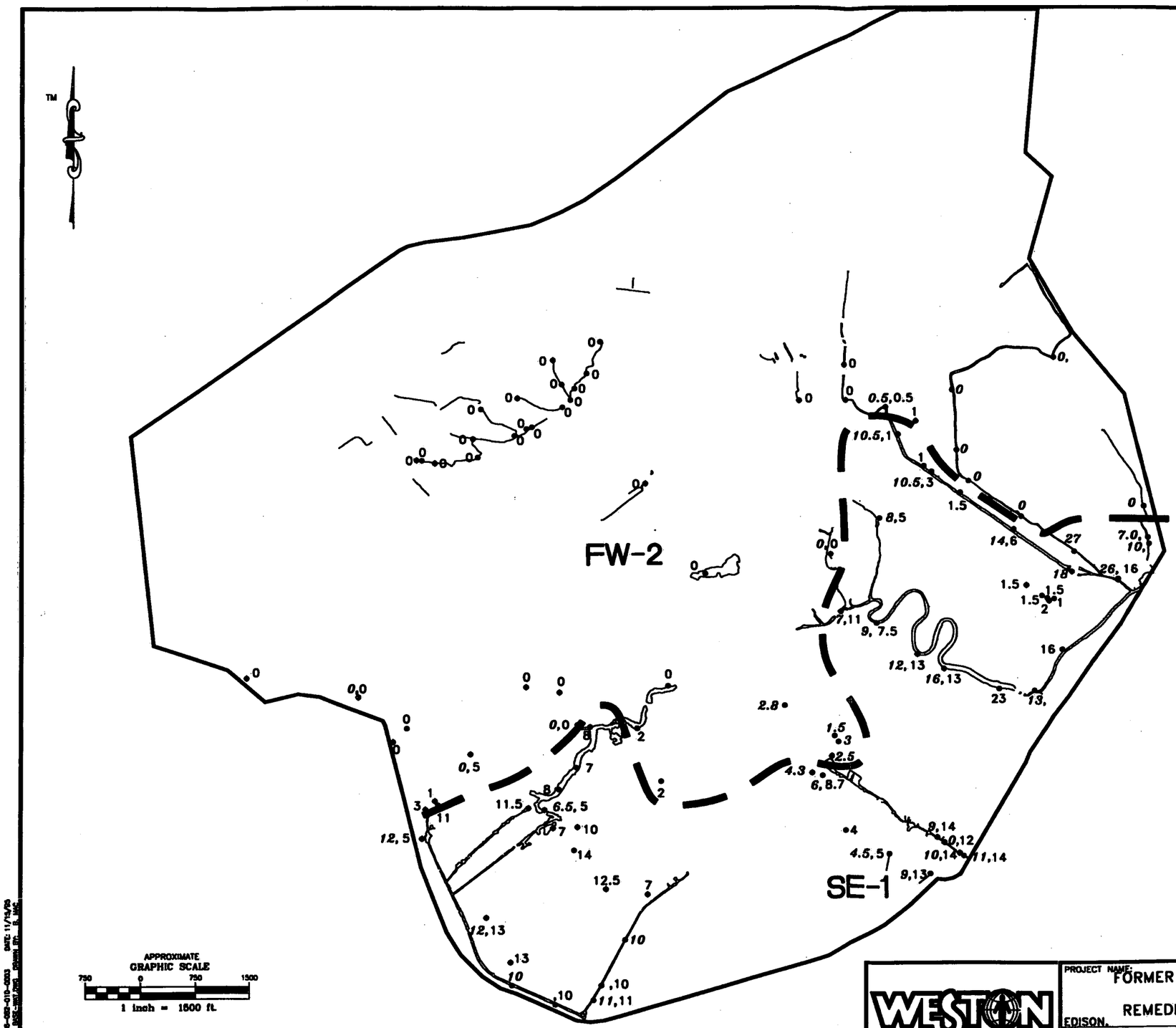
– THIS SITE MAP HAS BEEN ADAPTED FROM A PHOTOGRAMMETRIC BASE MAP OF THE FORMER RARITAN ARSENAL PREPARED BY GEOD CORPORATION (12/22/92 OVERFLIGHT PHOTOGRAPHY) UNDER SUBCONTRACT TO WESTON.

WESTON MANAGERS DESIGNERS/CONSULTANTS	PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION	CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS	SEDIMENT/SURFACE WATER SAMPLING LOCATIONS
	LOCATION: NEW JERSEY	CONTRACT No. DACA41-92-D-8002 / DELIVERY ORDER No. 0006	REVISION No. 1 / FIGURE #: 2-1
		WESTON ORDER No. 03886-082-010-0006 / DATE: 5/31/96	

REVISION #: 1 DATE: 5/31/96
FILE NAME: BASE-SED.DWG DRAWN BY: B. MAC



SOURCE: FEMA FLOOD INSURANCE STUDY, EDISON, N.J. (1984)



LEGEND

▬ ▬	BOUNDARY BETWEEN FW-2 AND SE-1 WATERS (1,2)
4.5, 5 •	SALINITY MEASUREMENTS IN PARTS PER THOUSAND (*HIGH TIDE*, LOW TIDE)
FW-2	FRESHWATER (≤ 3.5 PPT)
SE-1	ESTUARINE (> 3.5 PPT)

(1) BOUNDARY DETERMINED ON THE BASIS OF INCIDENTAL FIELD MEASUREMENTS TAKEN IN AUGUST 1994. REFER TO TEXT, AND APPENDIX A OF SITE-WIDE SURFACE WATER/SEDIMENT REPORT.

(2) REGULATORY DEFINITION OF SE-1 AND FW-2 FROM N.J.A.C. 7:9B

WESTON MANAGERS DESIGNERS/CONSULTANTS

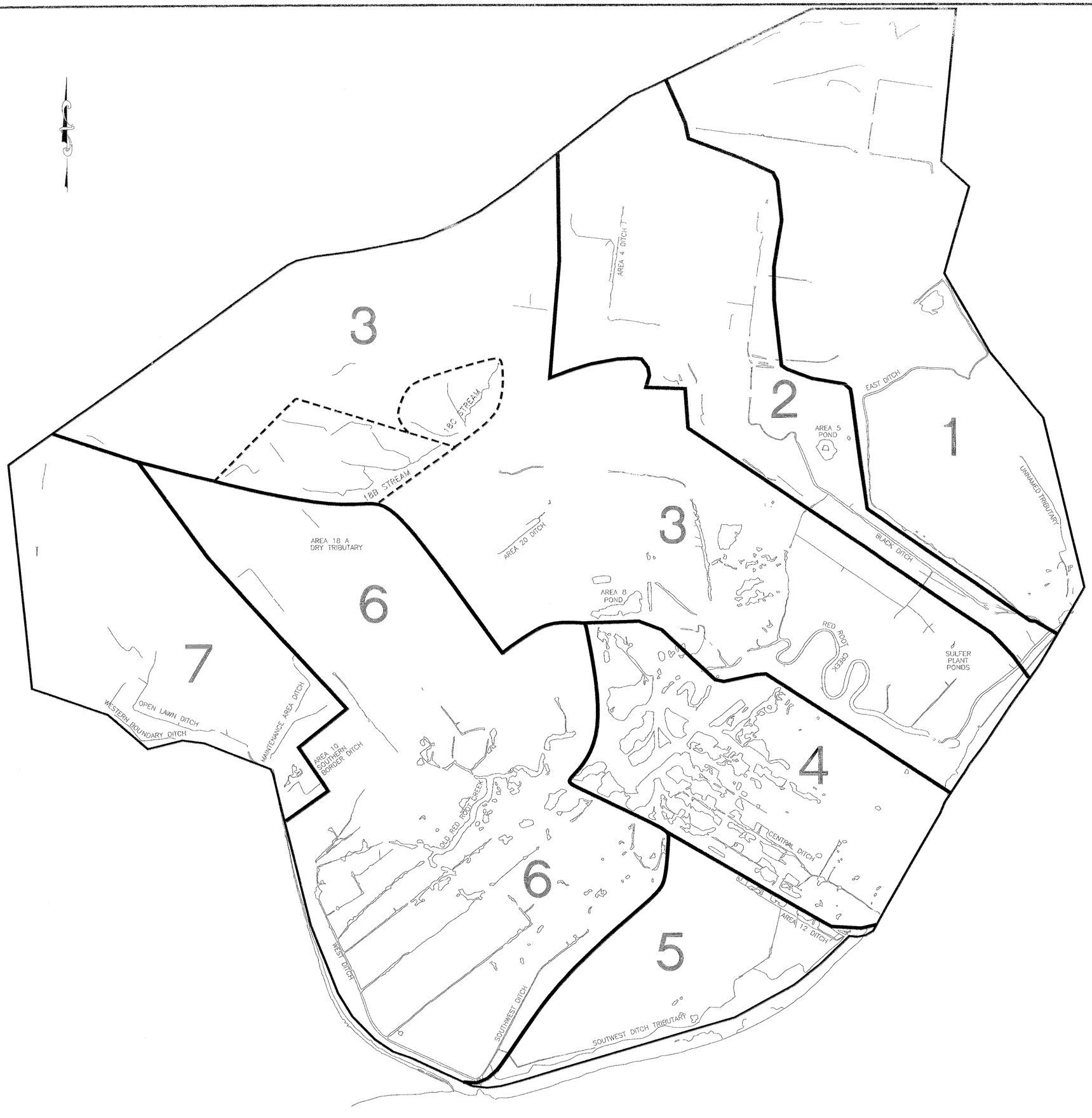
PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

APPROXIMATE EXTENT OF NJDEP FW-2 AND SE-1 WATERS

DATE: 3/8/95

FIGURE #: 3-2



▬▬▬	DRAINAGE BOUNDARY
- - - -	SUBDRAINAGE BOUNDARY
1	EAST DITCH DRAINAGE AREA
2	BLACK DITCH DRAINAGE AREA
3	RED ROOT CREEK DRAINAGE AREA
4	CENTRAL DITCH DRAINAGE AREA
5	AREA 12 DRAINAGE AREA
6	OLD RED ROOT CREEK DRAINAGE AREA
7	COUNTY PARK DRAINAGE AREA

GRAPHIC SCALE

500 0 250 500 1000 2000

(IN FEET)
1 inch = 500 ft

APPROXIMATE
GRAPHIC SCALE

250 0 250 500

1 inch = 500 ft.

NOTES:

- UPGRADIENT SCIRPUS MARSH LOCATION NOT SURVEYED. IT IS A MARSHY AREA LESS THAN 1 ACRE.
- THIS SITE MAP HAS BEEN ADAPTED FROM A PHOTOGRAMMETRIC BASEMAP OF THE FORMER RARITAN ARSENAL PREPARED BY GEOD CORPORATION (12/22/92 OVERFLIGHT PHOTOGRAPHY) UNDER SUBCONTRACT TO WESTON.

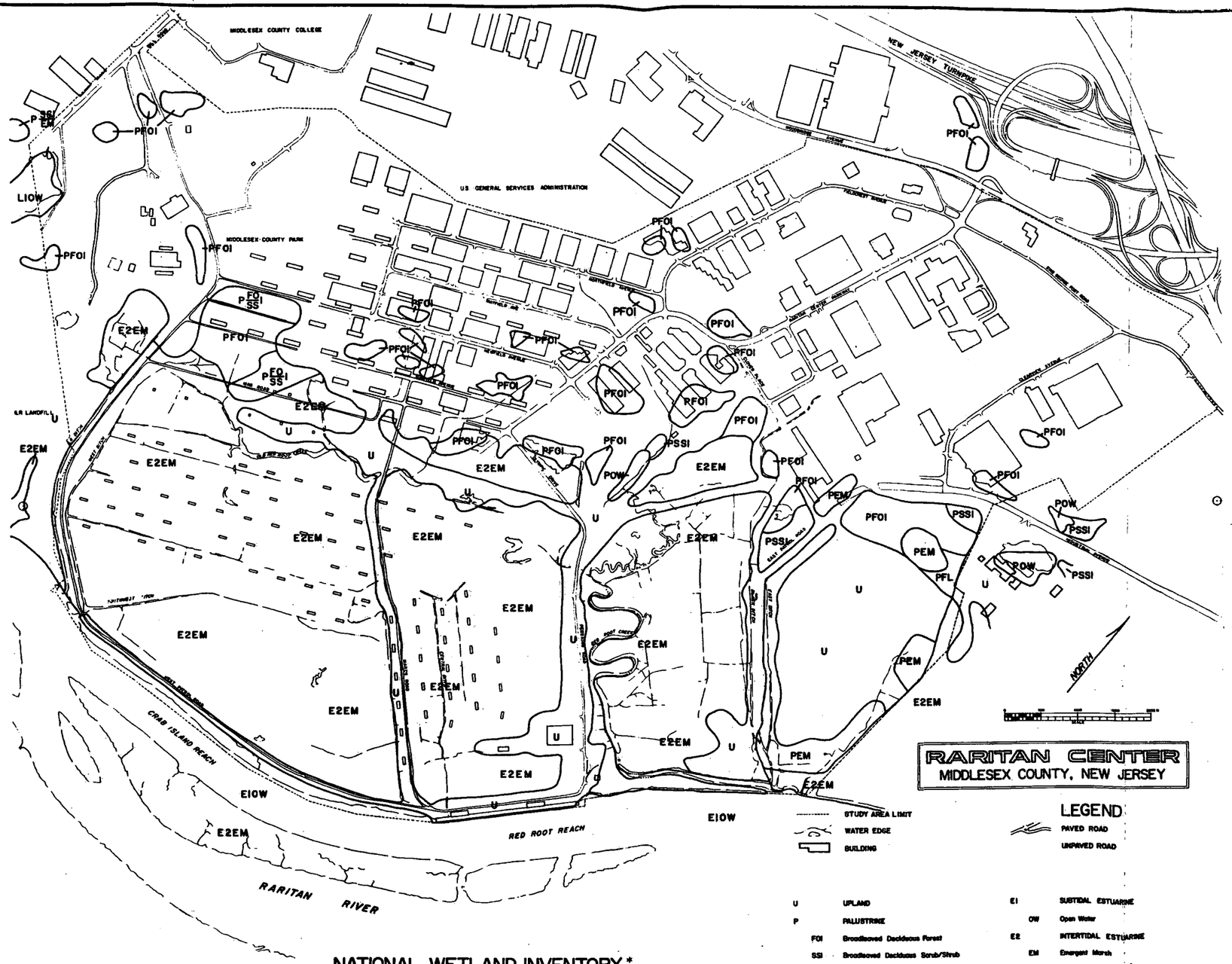
REVISION # 1 DATE: 5/21/99
FILE NAME: 0WA4C2.DWG DRAWN BY: B. MAC

WESTON MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS
CONTRACT No. DACA41-92-D-8002
DELIVERY ORDER No. 0008
WORK ORDER No. 03886-082-010-0005
DATE: 5/31/96

SURFACE WATER FEATURES/ DRAINAGE AREAS
REVISION No.
FIGURE #: 3-3



NATIONAL WETLAND INVENTORY *

SOURCE: Schmidt et. al. Resource Inventory

WESTON
MANAGERS DESIGNERS/CONSULTANTS

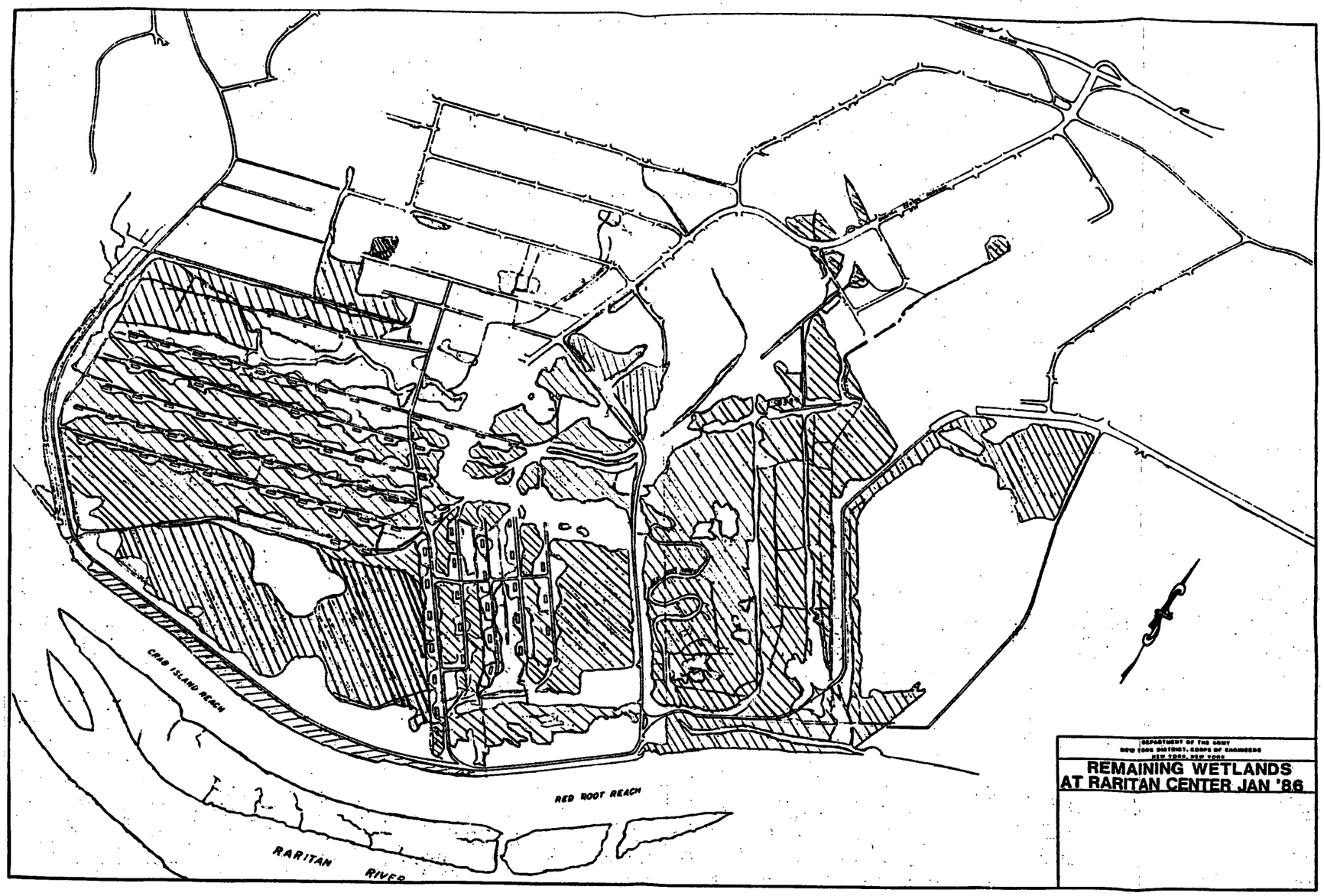
PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

NATIONAL WETLANDS INVENTORY MAP

DATE: 3/15/95

FIGURE #: 3-4

REVISION # 1 DATE: 3/1/95
FILE NAME: BASE-F.DWG ORIGINAL BY: B. MAC



SOURCE: Schmidt et. al. Resource Inventory

WESTON
MANAGERS DESIGNERS/CONSULTANTS

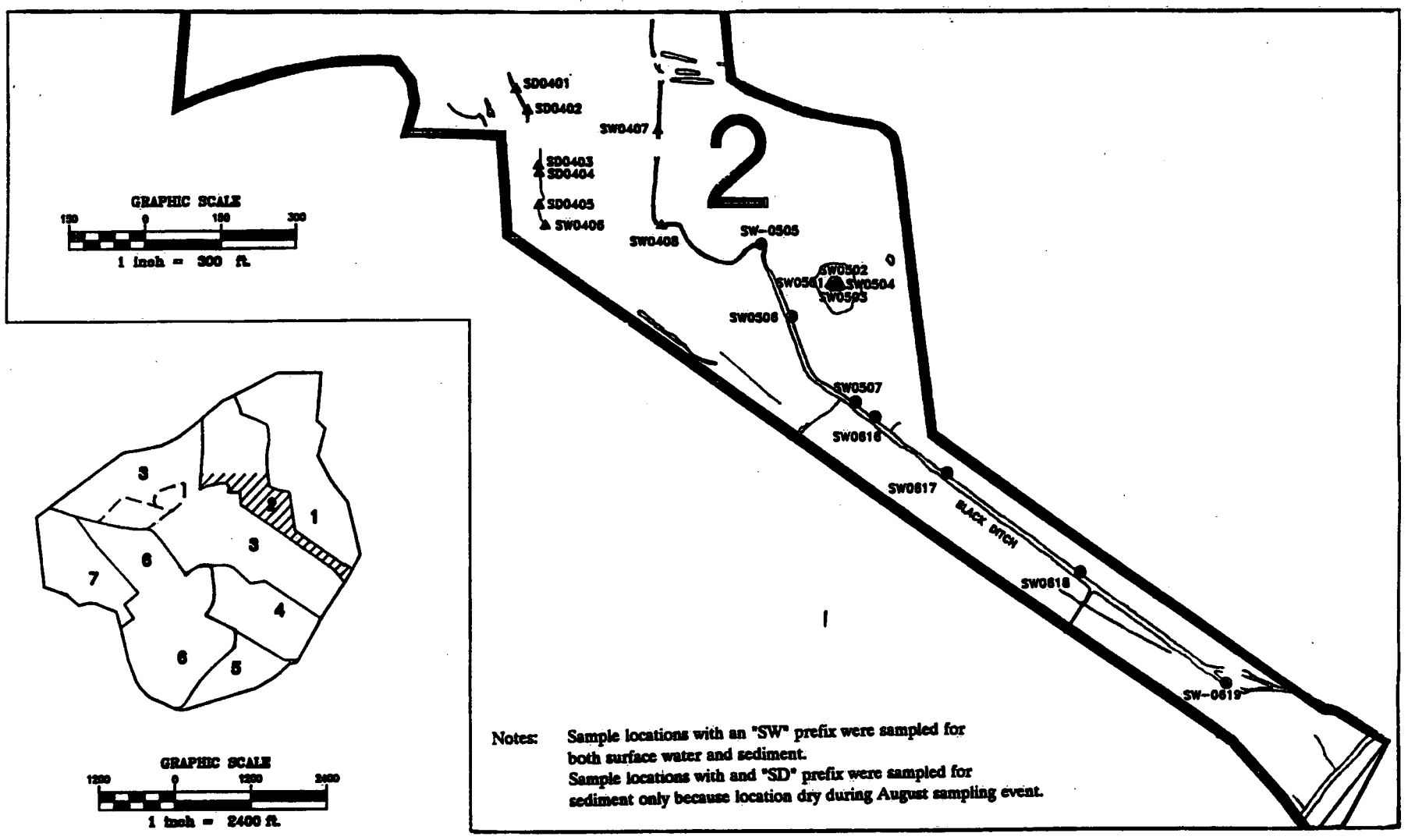
PROJECT NAME: FORMER RARITAN ARSENAL
PHASE II
REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

US ACE SITE
WETLANDS MAP

DATE: 3/15/95

FIGURE #: 3-5



Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

ANALYTICAL VOC RESULTS (UG/L) - SURFACE WATER
BLACK DITCH DRAINAGE AREA
FRESHWATER

COMPOUND	AREA 4 DITCH	AREA 5 POND				BLACK DITCH			
	SW-0406	SW-0501	SW-0502	SW-0503	SW-0504	SW-0407	SW-0408	SW-0505H	SW-0505L
TRICHLOROETHYLENE (TCE)	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	6.00	4.00	9.00	2.00

ANALYTICAL VOC RESULTS (UG/L) - SURFACE WATER
BLACK DITCH DRAINAGE AREA
ESTUARINE

COMPOUND	BLACK DITCH					
	SW-0506H	SW-0506L	SW-0507H	SW-0507L	SW-0616H	SW-0616L
TRICHLOROETHYLENE (TCE)	1.00	2.00	0.90 J	0.70 J	0.90 J	0.50 J

COMPOUND	BLACK DITCH						
	SW-0617H	SW-0617L	SW-0618H	SW-0618L	SW-0619H	SW-0619L	SW-0620*
TRICHLOROETHYLENE (TCE)	0.30 J	0.50 J	1.00 U	0.30 J	1.00 U	0.40 J	0.50 J

* SW -0620 is a duplicate of SW-0619L.

COMPOUND	FRESHWATER			ESTUARINE	
	WATER QUALITY CRITERIA			WATER QUALITY CRITERIA	
	NJDEP FW-2	USEPA FW ACUTE	USEPA FW CHRONIC	NJDEP SE-1	USEPA MARINE ACUTE
TRICHLOROETHYLENE (TCE)	1.09	45000	21900	81	2000

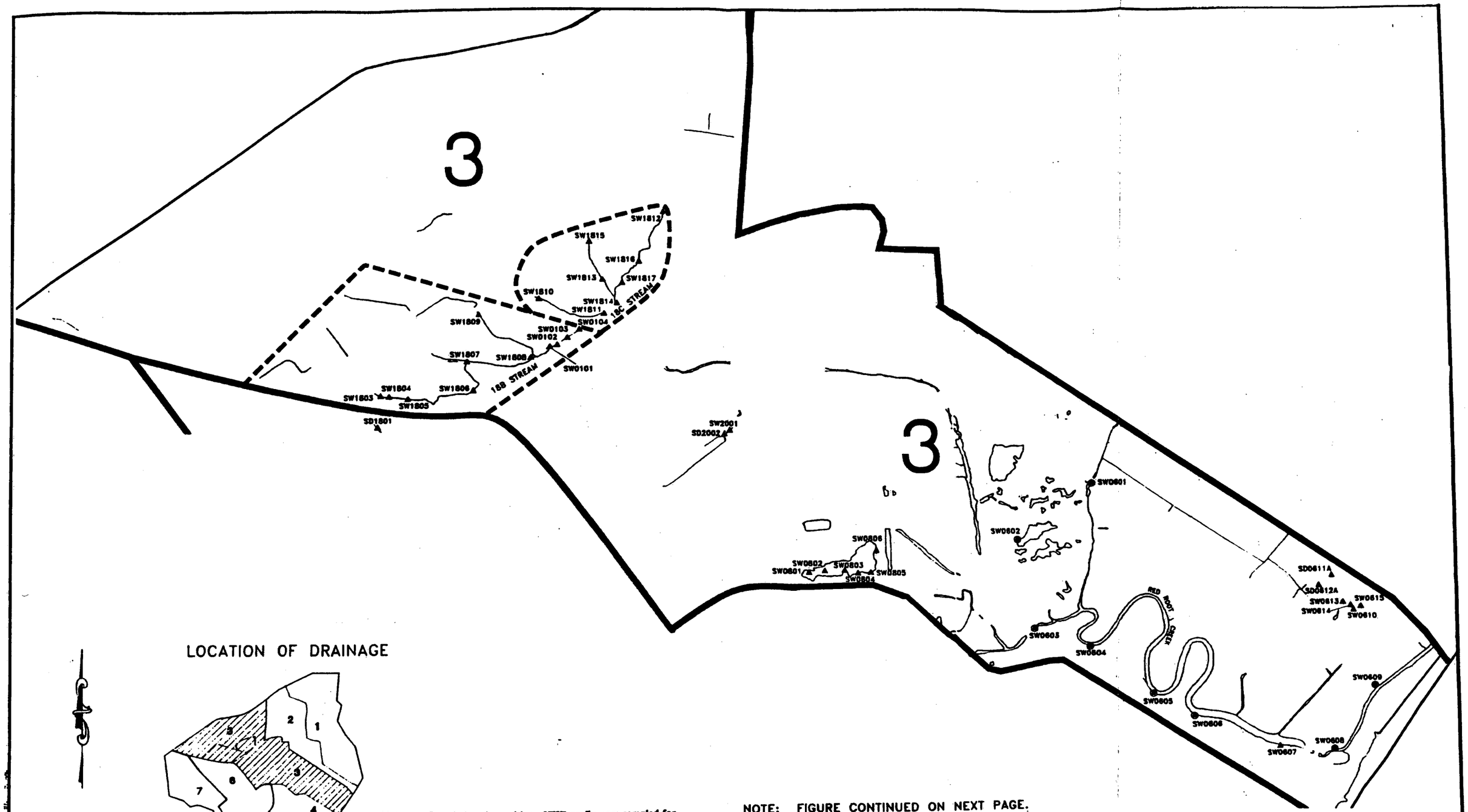
WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

BLACK DITCH DRAINAGE

DATE: 4/7/95
FIGURE #: 4-1

REVISION #: 1 DATE: 4/7/95
FILE NAME: BASE-STUDIED DRAWN BY: B. MAC



Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
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- THIS SITE MAP HAS BEEN ADAPTED FROM A PHOTOGRAMMETRIC BASEMAP OF THE FORMER RARITAN ARSENAL PREPARED BY GEOD CORPORATION (12/22/92 OVERFLIGHT PHOTOGRAPHY) UNDER SUBCONTRACT TO WESTON.

NOTE: FIGURE CONTINUED ON NEXT PAGE.

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

RED ROOT CREEK DRAINAGE

DATE: 4/6/95
FIGURE #: 4-2

ANALYTICAL VOC RESULTS (UG/L) - SURFACE WATER
RED ROOT CREEK DRAINAGE AREA
FRESHWATER

COMPOUND	AREA 20 DITCH	AREA 18B STREAM								AREA 18C STREAM		
	SW-2001	SW-1803	SW-1804	SW-1805	SW-1806	SW-1807	SW-1808	SW-1609	SW-1818*	SW-1810	SW-1811	SW-1812
TRICHLOROETHYLENE (TCE)	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	18.00	14.00 U	12.00	8.00	4.00	1.00 U
1,1-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U

* SW-1818 is a duplicate of SW-1809.

COMPOUND	AREA 18C STREAM					AREA 18B LOWER STREAM				AREA 8 POND		
	SW-1813	SW-1814	SW-1815	SW-1816	SW-1817	SW-0101	SW-0102	SW-0103	SW-0104	SW-0801	SW-0802	SW-0803
TRICHLOROETHYLENE (TCE)	1.00 U	1.00 U	6.00	1.00 U	1.00 U	20.00	18.00	16.00	15.00	1.00 U	1.00 U	1.00 U
1,1-DICHLOROETHENE	2.00 J	1.00 U	14.00 J	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U

COMPOUND	AREA 8 POND				RED ROOT CREEK		SULFUR PLANT PONDS			
	SW-0804	SW-0805	SW-0806	SW-0807*	SW-0602H	SW-0602L	SW-0610	SW-0613	SW-0614	SW-0615
TRICHLOROETHYLENE (TCE)	1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1-DICHLOROETHENE	1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U

* SW-0807 is a duplicate of SW-0801.

ANALYTICAL VOC RESULTS (UG/L) - SURFACE WATER
RED ROOT CREEK DRAINAGE AREA
ESTUARINE

COMPOUND	RED ROOT CREEK							
	SW-0601H	SW-0601L	SW-0603H	SW-0603L	SW-0604H	SW-0604L	SW-0605H	SW-0605L
TRICHLOROETHYLENE (TCE)	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U

COMPOUND	RED ROOT CREEK						
	SW-0606H	SW-0606L	SW-0607	SW-0608H	SW-0608L	SW-0609H	SW-0609L
TRICHLOROETHYLENE (TCE)	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1-DICHLOROETHENE	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U

COMPOUND	FRESHWATER			ESTUARINE	
	WATER QUALITY CRITERIA			WATER QUALITY CRITERIA	
	NJDEP FW-2	USEPA FW ACUTE	USEPA FW CHRONIC	NJDEP SE-1	USEPA MARINE ACUTE
TRICHLOROETHYLENE (TCE)	1.09	45000	21900	81	2000
1,1-DICHLOROETHENE	4.81	NCA	NCA	NCA	NCA

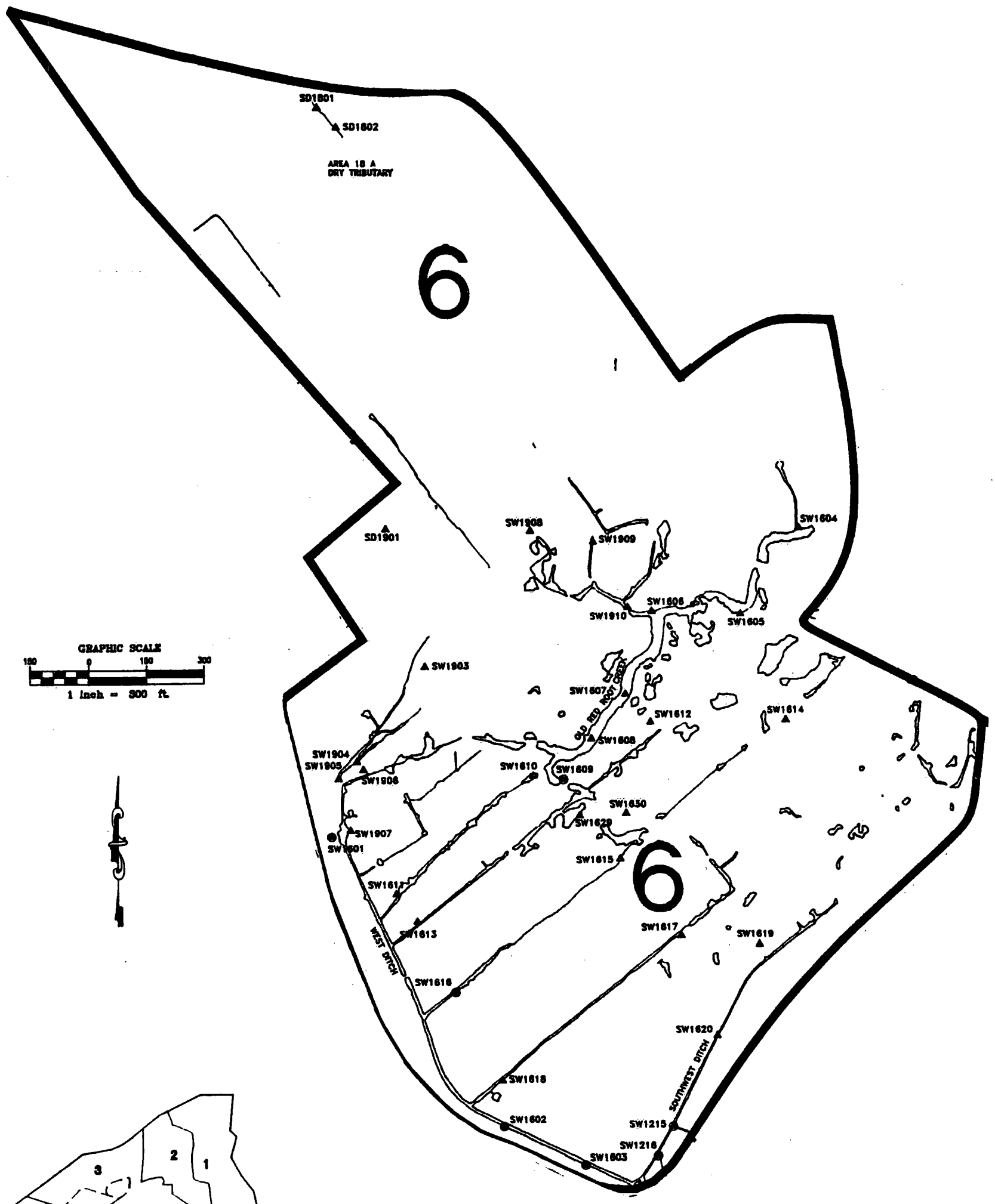
ANALYTICAL PESTICIDE/PCB RESULTS (UG/L) - SURFACE WATER
RED ROOT CREEK DRAINAGE AREA
FRESHWATER

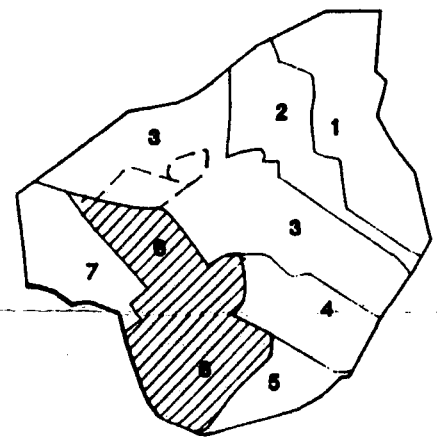
SAMPLE ID	WATER FEATURE	FRESHWATER/ ESTUARINE	HEPTACHLOR EPOXIDE	NJDEP SURFACE WATER CRITERIA	
				FW-2	SE-1
SW-2001	Area 20 Ditch	Freshwater	0.05 U	0.0038	NA
SW-1803	Area 18B Stream	Freshwater	0.031	0.0038	NA
SW-1804	Area 18B Stream	Freshwater	0.061	0.0038	NA
SW-1805	Area 18B Stream	Freshwater	0.05 U	0.0038	NA
SW-1806	Area 18B Stream	Freshwater	0.05 U	0.0038	NA
SW-1807	Area 18B Stream	Freshwater	0.05 U	0.0038	NA
SW-1808	Area 18B Stream	Freshwater	0.056 U	0.0038	NA
SW-1809	Area 18B Stream	Freshwater	0.051 U	0.0038	NA
SW-1818*	Area 18B Stream	Freshwater	0.05 U	0.0038	NA
SW-1810	Area 18C Stream	Freshwater	0.05 U	0.0038	NA
SW-1811	Area 18C Stream	Freshwater	0.05 U	0.0038	NA
SW-1812	Area 18C Stream	Freshwater	0.05 U	0.0038	NA
SW-1813	Area 18C Stream	Freshwater	0.05 U	0.0038	NA
SW-1814	Area 18C Stream	Freshwater	0.05 U	0.0038	NA
SW-1815	Area 18C Stream	Freshwater	0.05 U	0.0038	NA
SW-1816	Area 18C Stream	Freshwater	0.054 U	0.0038	NA
SW-1817	Area 18C Stream	Freshwater	0.05 U	0.0038	NA
SW-0101	Lower Area 18B Stream	Freshwater	0.05 U	0.0038	NA
SW-0102	Lower Area 18B Stream	Freshwater	0.054 U	0.0038	NA
SW-0103	Lower Area 18B Stream	Freshwater	0.05 U	0.0038	NA
SW-0104	Lower Area 18B Stream	Freshwater	0.058 U	0.0038	NA
SW-0801	Area 8 Pond	Freshwater	0.05 U	0.0038	NA
SW-0802	Area 8 Pond	Freshwater	0.052 U	0.0038	NA
SW-0803	Area 8 Pond	Freshwater	0.051 U	0.0038	NA
SW-0804	Area 8 Pond	Freshwater	0.052 U	0.0038	NA
SW-0805	Area 8 Pond	Freshwater	0.052 U	0.0038	NA
SW-0806	Area 8 Pond	Freshwater	0.052 U	0.0038	NA
SW-0807**	Area 8 Pond	Freshwater	0.051 U	0.0038	NA
SW-0601H	Red Root Creek	Estuarine	0.05 U	NA	0.0036
SW-0601L	Red Root Creek	Estuarine	0.051 U	NA	0.0036
SW-0602H	Red Root Creek	Freshwater	0.088 U	0.0038	0.0036
SW-0602L	Red Root Creek	Freshwater	0.051 UJ	0.0038	0.0036
SW-0603H	Red Root Creek	Estuarine	0.05 U	NA	0.0036
SW-0603L	Red Root Creek	Estuarine	0.054 U	NA	0.0038
SW-0604H	Red Root Creek	Estuarine	0.051 U	NA	0.0036
SW-0604L	Red Root Creek	Estuarine	0.05 U	NA	0.0036
SW-0605H	Red Root Creek	Estuarine	0.05 U	NA	0.0036
SW-0605L	Red Root Creek	Estuarine	0.051 U	NA	0.0036
SW-0606H	Red Root Creek	Estuarine	0.05 U	NA	0.0036
SW-0606L	Red Root Creek	Estuarine	0.05 U	NA	0.0036
SW-0607	Red Root Creek	Estuarine	0.052 U	NA	0.0036
SW-0608H	Red Root Creek	Estuarine	0.05 U	NA	0.0038
SW-0608L	Red Root Creek	Estuarine	0.05 U	NA	0.0036
SW-0609H	Red Root Creek	Estuarine	0.05 U	NA	0.0036
SW-0609L	Red Root Creek	Estuarine	0.051 U	NA	0.0036
SW-0610	Sulfur Plant Ponds	Freshwater	0.051 U	0.0038	NA
SW-0613	Sulfur Plant Ponds	Freshwater	0.051 U	0.0038	NA
SW-0614	Sulfur Plant Ponds	Freshwater	0.051 U	0.0038	NA
SW-0615	Sulfur Plant Ponds	Freshwater	0.05 U	0.0038	NA

* SW-1818 is a duplicate of SW-1809.
** SW-0807 is a duplicate of SW-0801.

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS
DATE: 4/6/95
FIGURE #: 4-2A





GRAPHIC SCALE
1200 0 1200 2400
1 inch = 2400 ft.

Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

NOTE: FIGURE CONTINUED ON NEXT PAGE.

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

OLD RED ROOT CREEK DRAINAGE

DATE: 4/7/95

FIGURE #: 4-3

REVISION #: 1 DATE: 4/7/95
FILE NAME: BASE-HTR.DWG DRAWN BY: B. MAC

ANALYTICAL VOC RESULTS (UG/L) - SURFACE WATER
OLD RED ROOT CREEK DRAINAGE AREA
FRESHWATER

COMPOUND	ASSOCIATED DITCHES	AREA 19 FORESTED	AREA 19 NE WETLANDS			OLD RED ROOT CREEK		AREA 19 SW WETLANDS		
	SW-1614	SW-1903	SW-1908	SW-1909	SW-1910	SW-1604	SW-1605	SW-1904	SW-1905	SW-1912*
TRICHLOROETHYLENE (TCE)	1.00 U	1.00 U	20.00	3.00	7.00	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U

* SW-1912 is a duplicate of SW-1904.

ESTUARINE

COMPOUND	AREA 16 ASSOCIATED DITCHES									
	SW-1611	SW-1612	SW-1613	SW-1615	SW-1616H	SW-1616L	SW-1617	SW-1618*	SW-1628	SW-1629
TRICHLOROETHYLENE (TCE)	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U

* SW-1618 is a duplicate of SW-1612.

COMPOUND	ASSOCIATED DITCHES	OLD RED ROOT CREEK							AREA 19 SOUTHWEST WETLANDS	
	SW-1630	SW-1606	SW-1607	SW-1608	SW-1609H	SW-1609L	SW-1610	SW-1631*	SW-1906	SW-1911**
TRICHLOROETHYLENE (TCE)	2.00 U	4.00	2.00	1.00	1.00 U	1.00	1.00 U	1.00	1.00 U	1.00 U

* SW-1631 is a duplicate of SW-1609.
** SW-1911 is a duplicate of SW-1906.

COMPOUND	SOUTHWEST DITCH						WESTERN BOUNDARY DITCH			
	SW-1215H	SW-1216L	SW-1216H	SW-1216L	SW-1619	SW-1620	SW-1601H	SW-1601L	SW-1602H	SW-1602L
TRICHLOROETHYLENE (TCE)	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U

COMPOUND	WESTERN BOUNDARY DITCH		
	SW-1603H	SW-1603L	SW-1907
TRICHLOROETHYLENE (TCE)	1.00 U	1.00 U	1.00 U

COMPOUND	FRESHWATER			ESTUARINE	
	WATER QUALITY CRITERIA			WATER QUALITY CRITERIA	
	NJDEP FW-2	USEPA FW ACUTE	USEPA FW CHRONIC	NJDEP SE-1	USEPA MARINE ACUTE
TRICHLOROETHYLENE (TCE)	1.09	45000	21900	81	2000

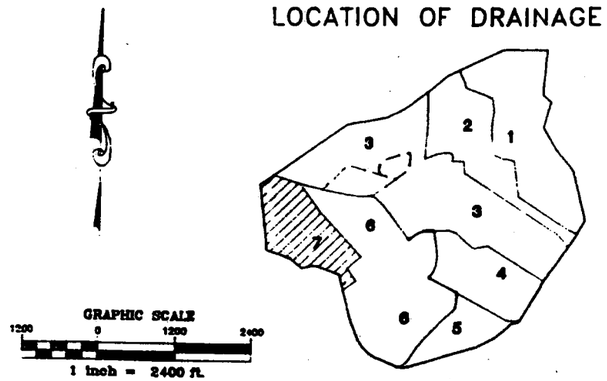
WESTON
MANAGERS DESIGNERS/CONSULTANTS

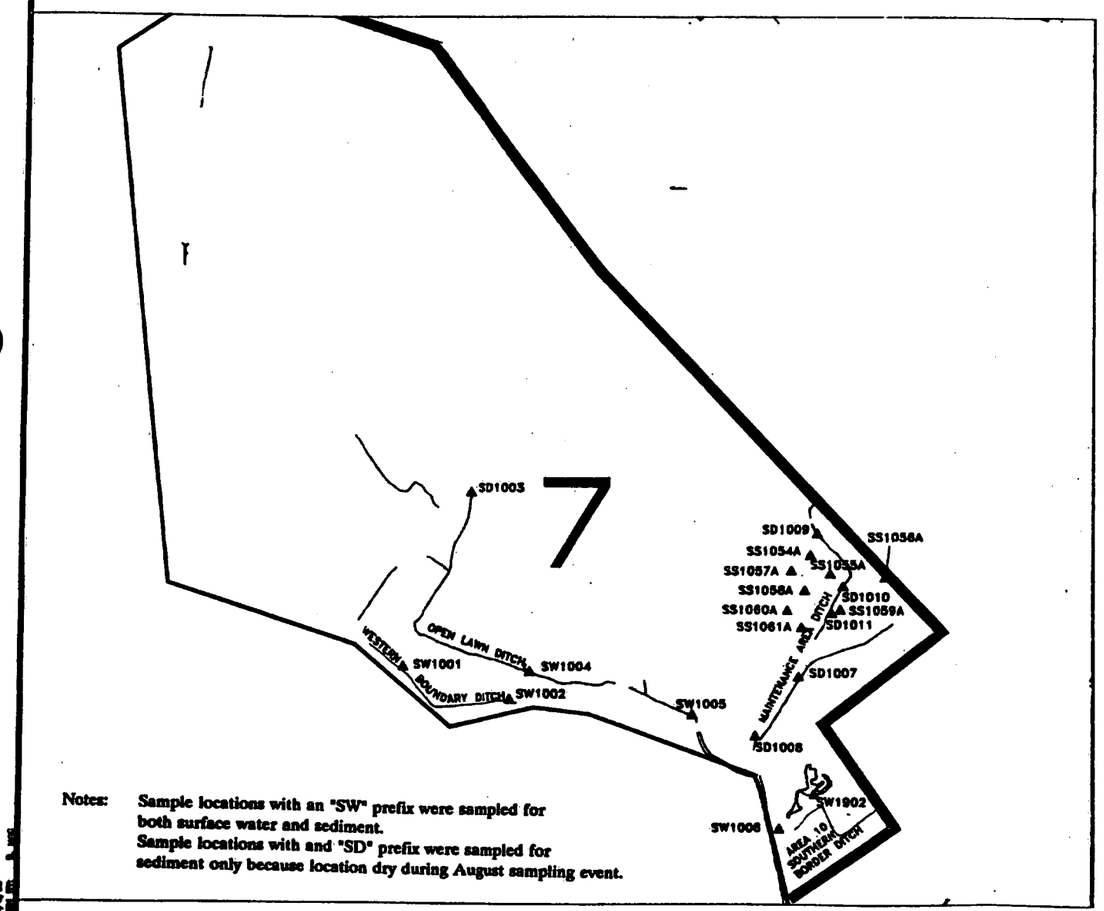
PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

DATE: 4/6/95

FIGURE #: 4-3A

LOCATION OF DRAINAGE





Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
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NOTE:
- THIS SITE MAP HAS BEEN ADAPTED FROM A PHOTOGRAMMETRIC BASEMAP OF THE FORMER RARITAN ARSENAL PREPARED BY GEOD CORPORATION (12/22/92 OVERFLIGHT PHOTOGRAPHY) UNDER SUBCONTRACT TO WESTON.

ANALYTICAL VOC RESULTS (UG/L) - SURFACE WATER
COUNTY PARK DRAINAGE AREA
FRESHWATER

COMPOUND	AREA 10 SOUTHERN BORDER DITCH		OPEN LAWN DITCH			WESTERN BOUNDARY DITCH	
	SW-1006	SW-1902	SW-1004	SW-1005	SW-1012*	SW-1001	SW-1002
1,2-DICHLOROETHANE	0.80 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U

* SW-1012 is a duplicate of SW-1005.

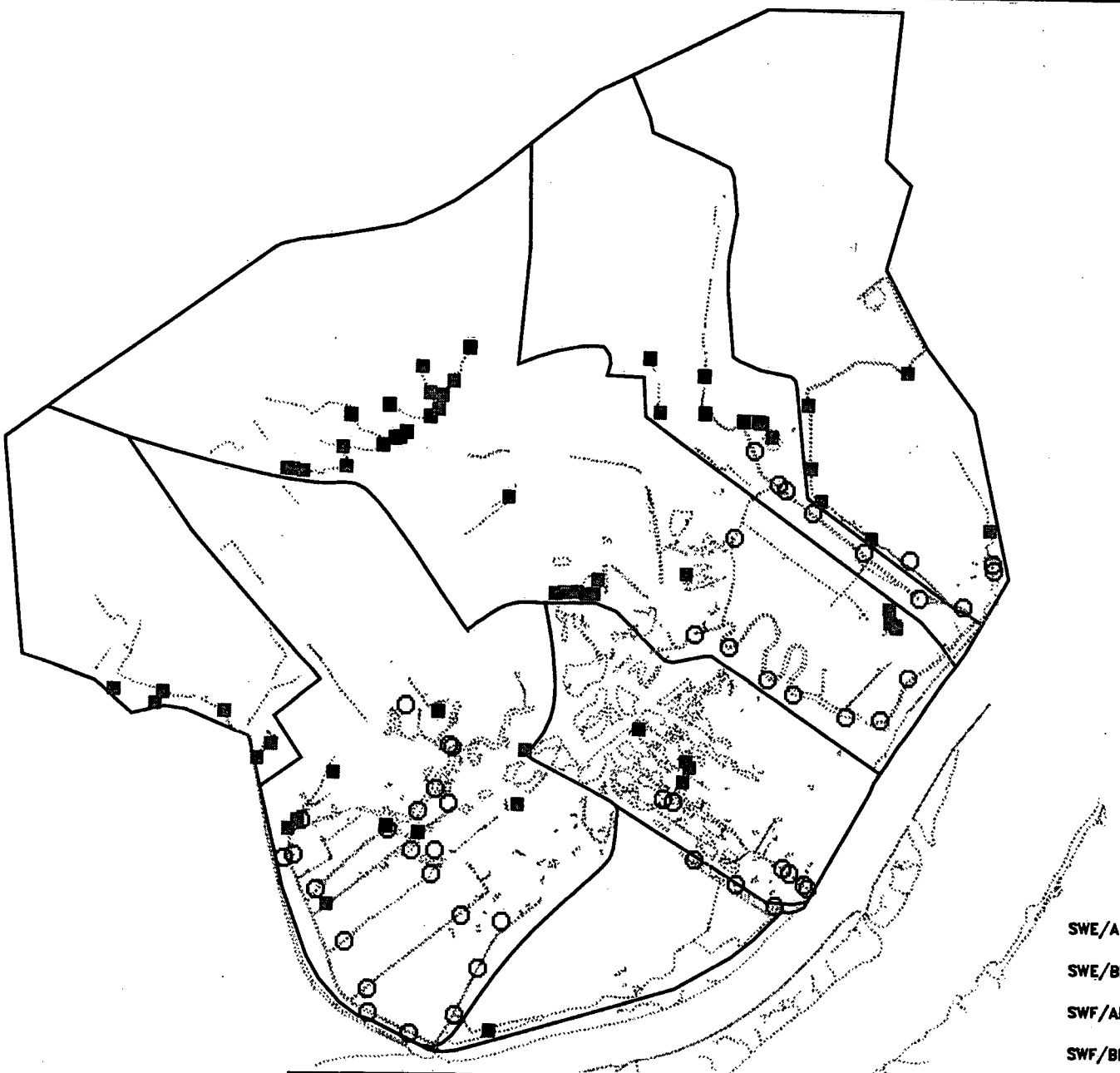
COMPOUND	FRESHWATER WATER QUALITY CRITERIA		
	NJDEP FW-2	USEPA FW ACUTE	USEPA FW CHRONIC
1,2-DICHLOROETHANE	0.291	NCA	NCA

WESTON MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

COUNTY PARK DRAINAGE

DATE: 4/6/95
FIGURE #: 4-4



TCE

- ○ SWE/BELOW
- ■ SWF/ABOVE
- ■ SWF/BELOW
- Surface Water
- Drainage Areas

SWE/ABOVE = ESTUARINE LOCATIONS EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

SWE/BELOW = ESTUARINE LOCATIONS NOT EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

SWF/ABOVE = FRESHWATER LOCATIONS EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

SWF/BELOW = FRESHWATER LOCATIONS NOT EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

NOTE:

DUE TO OVERLAPPING SYMBOLS, NOT ALL SAMPLING LOCATIONS MAY BE EVIDENT.

- NOT TO SCALE -

WESTON MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION

EDISON, NEW JERSEY

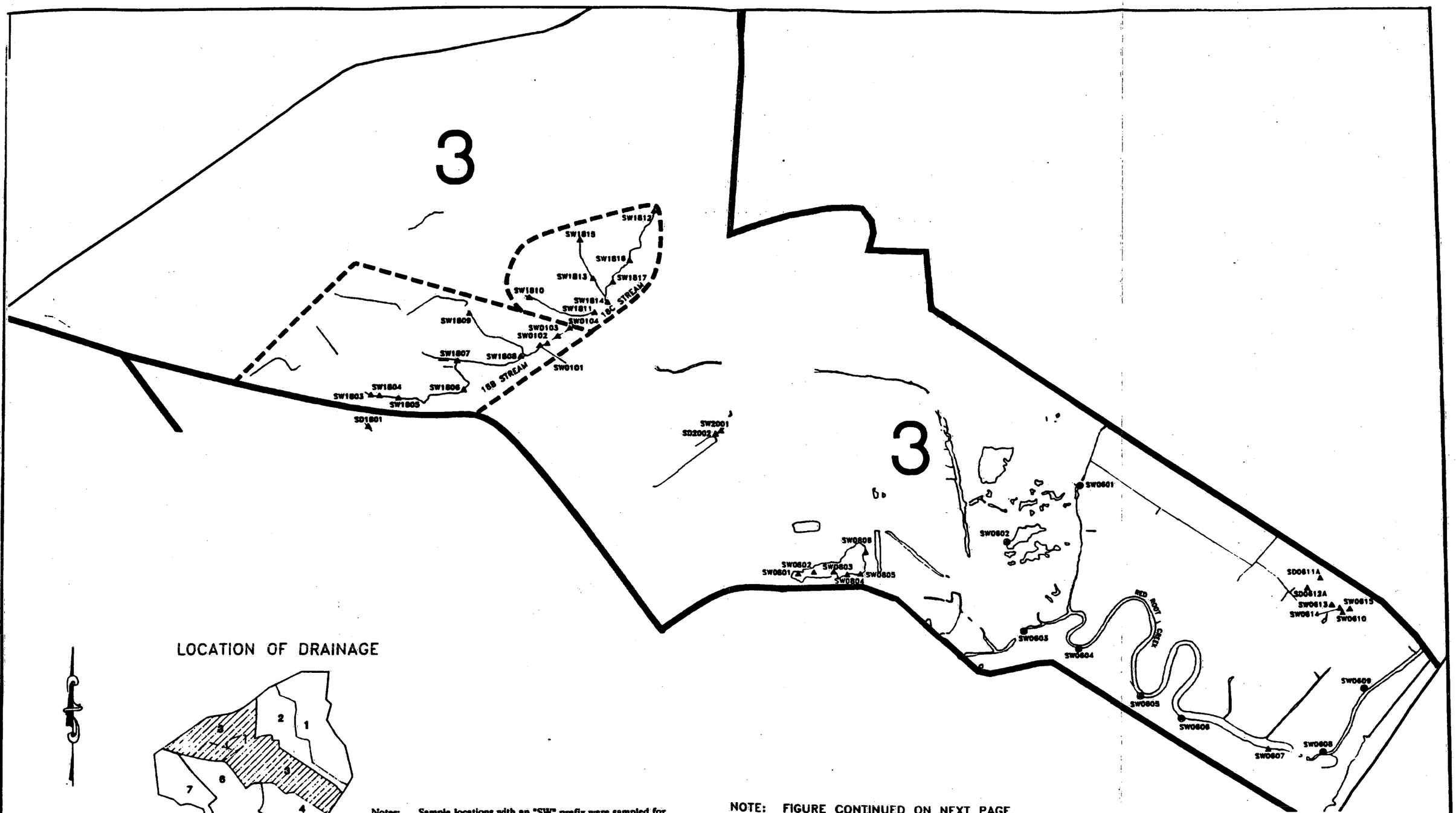
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

REGULATORY EXCEEDANCES OF TCE IN SURFACE WATER

DATE: 04/12/95

FIGURE #: 4-5

REVISION #: 0000 DATED 4/12/95
FILE NAME: SED-SW.DWG DRAWN BY: B. MAC



Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

- THIS SITE MAP HAS BEEN ADAPTED FROM A PHOTOGRAMMETRIC BASEMAP OF THE FORMER RARITAN ARSENAL PREPARED BY GEOD CORPORATION (12/22/92 OVERFLIGHT PHOTOGRAPHY) UNDER SUBCONTRACT TO WESTON.

NOTE: FIGURE CONTINUED ON NEXT PAGE.

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

RED ROOT CREEK DRAINAGE

DATE: 4/6/95

FIGURE #: 4-6

ANALYTICAL SVOC RESULTS (UG/L) - SURFACE WATER
RED ROOT CREEK DRAINAGE AREA
FRESHWATER

COMPOUND	AREA 18B STREAM							
	SW-1803	SW-1804	SW-1805	SW-1806	SW-1807	SW-1808	SW-1809	SW-1818*
BIS(2-ETHYLHEXYL) PHTHALATE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U

* SW-1818 is a duplicate of SW-1809.

COMPOUND	AREA 18C STREAM							
	SW-1810	SW-1811	SW-1812	SW-1813	SW-1814	SW-1815	SW-1816	SW-1817
BIS(2-ETHYLHEXYL) PHTHALATE	10 U	10 U	10 U	10 U	10 U	11 U	10 U	10 U

COMPOUND	AREA 8 POND							AREA 20
	SW-0801	SW-0802	SW-0803	SW-0804	SW-0805	SW-0806	SW-0807*	SW-2001
BIS(2-ETHYLHEXYL) PHTHALATE	10 U	10 U	10 U	11 U	11 U	10 U	11 U	10 U

* SW-0807 is a duplicate of SW-0801.

COMPOUND	RED ROOT CREEK								
	SW-0602H	SW-0602L	SW-0603H	SW-0603L	SW-0604H	SW-0604L	SW-0605H	SW-0605L	SW-0610
BIS(2-ETHYLHEXYL) PHTHALATE	11 U	4 J	10 U	11 U	10 U	10 U	11 U	10 U	10 U

COMPOUND	RED ROOT CREEK		LOWER 18B STREAM				SULFUR PLANT PONDS		
	SW-0606H	SW-0606L	SW-0101	SW-0102	SW-0103	SW-0104	SW-0613	SW-0614	SW-0615
BIS(2-ETHYLHEXYL) PHTHALATE	10 U	10 U	10 U	11 U	10 U	12 U	10 U	61	10 U

COMPOUND	FRESHWATER WATER QUALITY CRITERIA			ESTUARINE WATER QUALITY CRITERIA		
	NJDEP FW-2	USEPA FRESH ACUTE	USEPA FRESH CHRONIC	NJDEP SE-1	USEPA MARINE ACUTE	USEPA MARINE CHRONIC
BIS(2-ETHYLHEXYL) PHTHALATE	1.76	NCA	NCA	5.92	NCA	NCA

ANALYTICAL SVOC RESULTS (UG/L) - SURFACE WATER
RED ROOT CREEK DRAINAGE AREA
ESTUARINE

COMPOUND	RED ROOT CREEK						
	SW-0601H	SW-0601L	SW-0607	SW-0608H	SW-0608L	SW-0609H	SW-0609L
BIS(2-ETHYLHEXYL) PHTHALATE	1 J	11 U	10 U	10 U	10 U	10 U	10 U

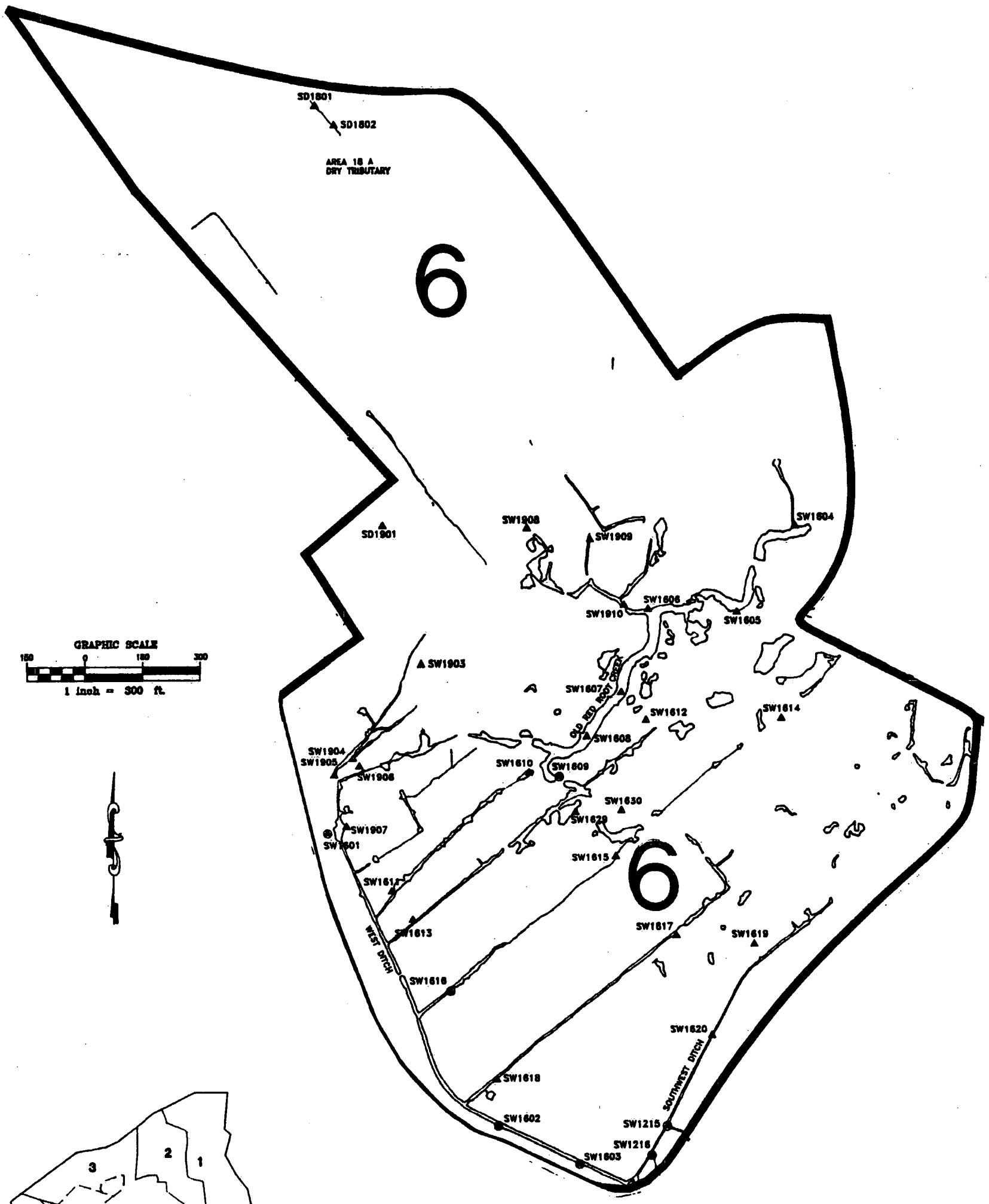
WESTON MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION EDISON, NEW JERSEY

CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

DATE: 4/6/95

FIGURE #: 4-6A



Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

NOTE: FIGURE CONTINUED ON NEXT PAGE.

WESTON MANAGERS DESIGNERS/CONSULTANTS	PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION EDISON, NEW JERSEY	OLD RED ROOT CREEK DRAINAGE
	CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS	DATE: 4/7/95 FIGURE #: 4-7

REVISION #: 1 DATE: 4/7/95
FILE NAME: BASE-WTR.DWG DRAWN BY: B. MAC

ANALYTICAL SVOC RESULTS (UG/L) - SURFACE WATER
OLD RED ROOT CREEK DRAINAGE AREA
FRESHWATER

COMPOUND	OLD RED ROOT CREEK		AREA 19 SW WETLANDS		
	SW-1604	SW-1605	SW-1904	SW-1905	SW-1912*
BENZO(A)ANTHRACENE	10 U	11 U	10 U	10 U	10 U
BENZO(A)PYRENE	10 U	11 U	10 U	10 U	10 U
BENZO(B)FLUORANTHRENE	10 U	11 U	10 U	10 U	10 U
BENZO(K)FLUORANTHRENE	10 U	11 U	10 U	10 U	10 U
BIS(2-ETHYLHEXYL) PHTHALATE	10 U	11 U	10 U	10 U	10 U
CHRYSENE	10 U	11 U	10 U	10 U	10 U
INDENO(1,2,3-C;D)PYRENE	10 U	11 U	10 U	10 U	10 U

* SW-1912 is a duplicate of SW-1904.

COMPOUND	ASSOCIATED DITCHES	AREA 19 FOR. WETL.	AREA 19 NE WETLANDS		
	SW-1614	SW-1903	SW-1908	SW-1909	SW-1910
BENZO(A)ANTHRACENE	10 U	10 U	10 U	10 U	10 U
BENZO(A)PYRENE	10 U	10 U	10 U	10 U	10 U
BENZO(B)FLUORANTHRENE	10 U	10 U	10 U	10 U	10 U
BENZO(K)FLUORANTHRENE	10 U	10 U	10 U	10 U	10 U
BIS(2-ETHYLHEXYL) PHTHALATE	10 U	10 U	10 U	10 U	10 U
CHRYSENE	10 U	10 U	10 U	10 U	10 U
INDENO(1,2,3-C,D)PYRENE	10 U	10 U	10 U	10 U	10 U

ESTUARINE

COMPOUND	ASSOCIATED DITCHES - AREA 16									AREA 19 SW WETLANDS	
	SW-1611	SW-1612	SW-1613	SW-1615	SW-1616H	SW-1616L	SW-1617	SW-1618*	SW-1628	SW-1906	SW-1911**
BENZO(A)ANTHRACENE	10 U	10 U	10 U	10 U	11 U	12 U	10 U	10 U	10 U	10 U	10 U
BENZO(A)PYRENE	10 U	10 U	10 U	10 U	11 U	12 U	10 U	10 U	10 U	10 U	10 U
BENZO(B)FLUORANTHRENE	10 U	10 U	10 U	10 U	11 U	12 U	10 U	10 U	10 U	10 U	10 U
BENZO(K)FLUORANTHRENE	10 U	10 U	10 U	10 U	11 U	12 U	10 U	10 U	10 U	10 U	10 U
BIS(2-ETHYLHEXYL) PHTHALATE	2 J	10 U	10 U	10 U	11 U	12 U	2 J	10 U	10 U	10 U	10 U
CHRYSENE	10 U	10 U	10 U	10 U	11 U	12 U	10 U	10 U	10 U	10 U	10 U
INDENO(1,2;3-C;D)PYRENE	10 U	10 U	10 U	10 U	11 U	12 U	10 U	10 U	10 U	10 U	10 U

* SW-1618 is a duplicate of SW-1612.
** SW-1911 is a duplicate of SW-1906.

COMPOUND	SOUTHWEST DITCH						AREA 16 ASSOCIATED DITCHES		OLD RED ROOT CREEK		
	SW-1215H	SW-1215L	SW-1216H	SW-1216L	SW-1619	SW-1620	SW-1629	SW-1630	SW-1606	SW-1607	SW-1608
BENZO(A)ANTHRACENE	10 U	10 U	10 U	10 U		10 U	10 U	11 U	10 U	10 U	10 U
BENZO(A)PYRENE	10 U	10 U	10 U	10 U		10 U	10 U	11 U	10 U	10 U	10 U
BENZO(B)FLUORANTHRENE	10 U	10 U	10 U	10 U		10 U	10 U	11 U	10 U	10 U	10 U
BENZO(K)FLUORANTHRENE	10 U	10 U	10 U	10 U		10 U	10 U	11 U	10 U	10 U	10 U
BIS(2-ETHYLHEXYL) PHTHALATE	3 J	10 U	1 J	10 U	10 U	10 U	10 U	11 U	10 U	1 J	1 J
CHRYSENE	10 U	10 U	10 U	10 U		10 U	10 U	11 U	10 U	10 U	10 U
INDENO(1,2,3-C,D)PYRENE	10 U	10 U	10 U	10 U		10 U	10 U	11 U	10 U	10 U	10 U

COMPOUND	OLD RED ROOT CREEK				WEST DITCH						
	SW-1609H	SW-1609L	SW-1610	SW-1631*	SW-1601H	SW-1601L	SW-1602H	SW-1602L	SW-1603H	SW-1603L	SW-1907
BENZO(A)ANTHRACENE	11 U	11 U	10 UJ	11 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U
BENZO(A)PYRENE	11 U	11 U	10 UJ	11 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U
BENZO(B)FLUORANTHRENE	11 U	11 U	10 UJ	11 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U
BENZO(K)FLUORANTHRENE	11 U	11 U	10 UJ	11 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U
BIS(2-ETHYLHEXYL) PHTHALATE	11 U	11 U	10 UJ	2 J	10 U	11 U	10 U	10 U		2 J	10 U
CHRYSENE	11 U	11 U	10 UJ	11 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U
INDENO(1,2,3-C,D)PYRENE	11 U	11 U	10 UJ	11 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U

* SW-1631 is a duplicate of SW-1609.

COMPOUND	FRESHWATER WATER QUALITY CRITERIA			ESTUARINE WATER QUALITY CRITERIA		
	NJDEP FW-2	USEPA FRESH ACUTE	USEPA FRESH CHRONIC	NJDEP SE-1	USEPA MARINE ACUTE	USEPA MARINE CHRONIC
BENZO(A)ANTHRACENE	0.0028	NCA	NCA	0.031	NCA	NCA
BENZO(A)PYRENE	0.0028	NCA	NCA	0.031	NCA	NCA
BENZO(B)FLUORANTHRENE	0.0028	NCA	NCA	0.031	NCA	NCA
BENZO(K)FLUORANTHRENE	0.0028	NCA	NCA	0.031	NCA	NCA
BIS(2-ETHYLHEXYL) PHTHALATE	1.76	NCA	NCA	5.92	NCA	NCA
CHRYSENE	0.0028	NCA	NCA	0.031	NCA	NCA
INDENO(1,2,3-C,D)PYRENE	0.0028	NCA	NCA	0.031	NCA	NCA

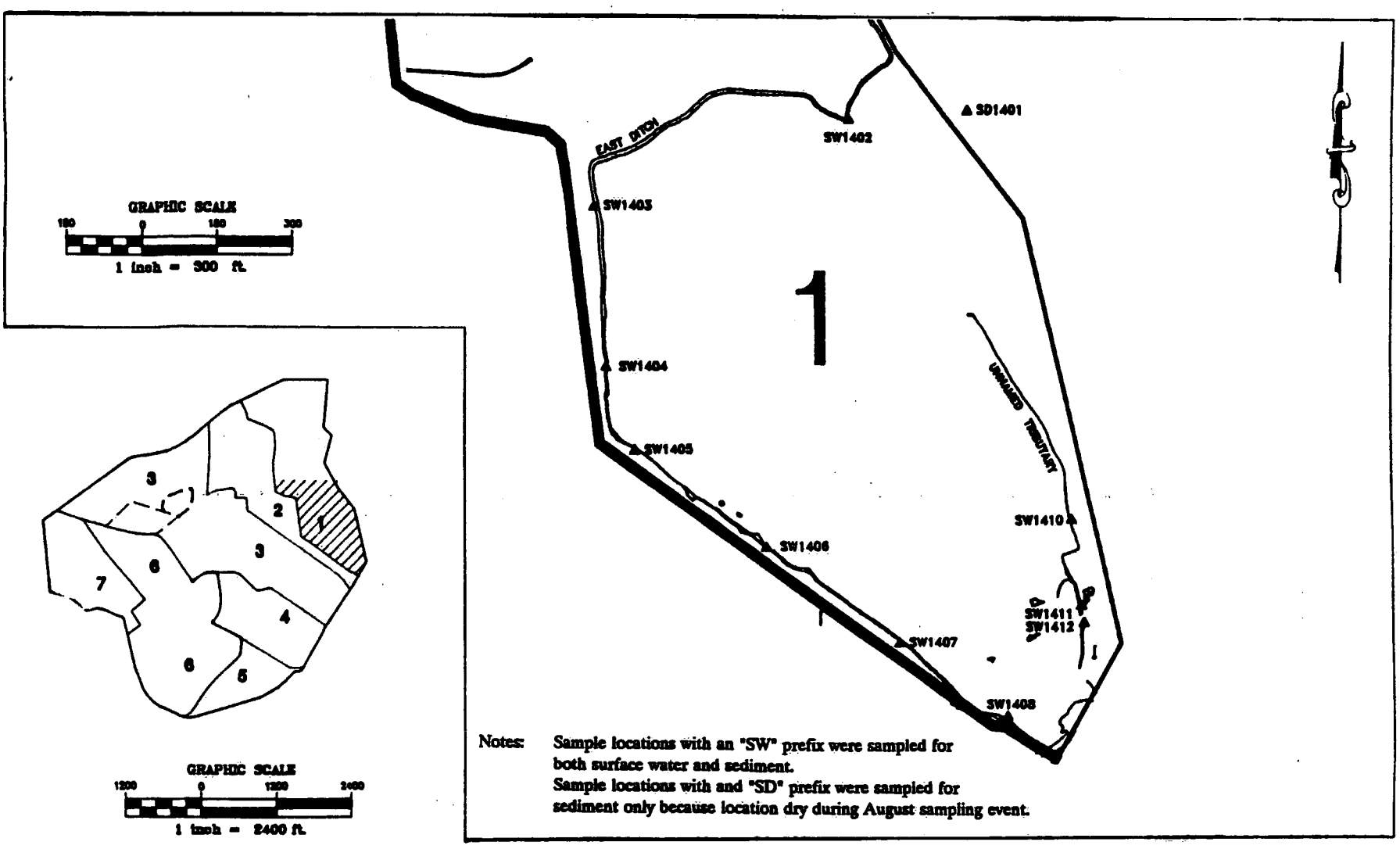
WESTON MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION EDISON, NEW JERSEY

CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

DATE: 4/6/95

FIGURE #: 4-7A



Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

ANALYTICAL METAL RESULTS (UG/L) - SURFACE WATER
EAST DITCH DRAINAGE AREA
FRESHWATER

COMPOUND	EAST DITCH					UNNAMED TRIBUTARY	WATER QUALITY CRITERIA		
	SW-1402	SW-1403	SW-1404	SW-1405	SW-1406	SW-1410	NJDEP FW-2	USEPA FW ACUTE	USEPA FW CHRONIC
ARSENIC	1.80 U	1.80 U	1.80 U	1.80 U	1.80 U	148.00	0.017	360.00	190.00
COPPER*	5.80 U	6.40 U	5.40 U	6.80 U	6.80 U		NCA	16.26	10.93
						608.00	NCA	289.50	148.90
IRON	NA	2020.00	NA	NA	NA	NA	NCA	NCA	1000.00
MANGANESE	NA	772.00	NA	NA	NA	NA	NCA	NCA	NCA
MERCURY	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.24	0.144	2.40	0.012
NICKEL*	27.30	34.90	30.80	29.40	28.20		516.00	1312.29	145.89
						7.10 U	516.00	17416.04	1936.13
ZINC*	121.00 J	134.00 J	133.00 J	133.00 J	130.00 J		NCA	108.27	98.06
						239.00 J	NCA	1442.58	1306.60

NOTES: *Cadmium, chromium, copper, lead, nickel and zinc USEPA Freshwater Acute and Chronic Surface Water Quality Criteria are based on the surface water hardness at that location.

ANALYTICAL METAL RESULTS (UG/L) - SURFACE WATER
EAST DITCH DRAINAGE AREA
ESTUARINE

COMPOUND	EAST DITCH			UNNAMED TRIBUTARY		WATER QUALITY CRITERIA		
	SW-1407	SW-1408H	SW-1408L	SW-1411	SW-1412	NJDEP SE-1	USEPA MARINE ACUTE	USEPA MARINE CHRONIC
ARSENIC	1.80 U	1.80 U	1.80 U	15.30	16.00	0.136	69.00	36.00
COPPER	5.70 U	1.90 U	1.90 U	12.90 U	1.90 U	NCA	2.90	2.90
MANGANESE	625.00	NA	NA	NA	510.00	100.00	NCA	NCA
MERCURY	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.146	2.10	0.025
NICKEL	21.80	7.10 U	7.10 U	7.10 U	7.10 U	3900.00	75.00	8.30
ZINC	115.00 J	47.90 J	77.50 J	42.20 J	50.40 U	NCA	95.00	86.00

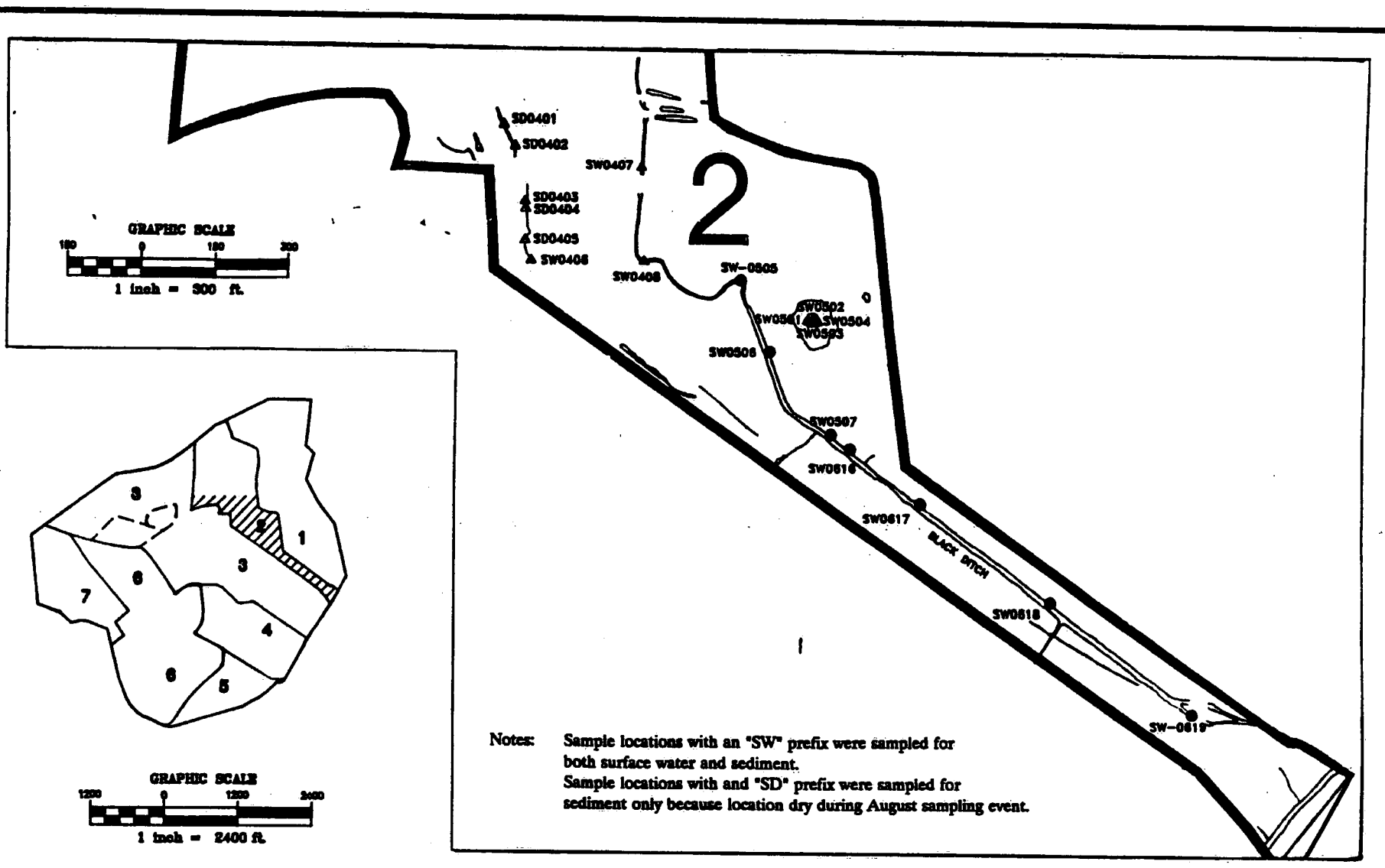
WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

EAST DITCH DRAINAGE

DATE: 4/7/95
FIGURE #: 4-8

REVISION #: 1 DATE: 4/7/95
FILE NAME: BASE-RTA.DWG DRAWN BY: B. MAC



Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

ANALYTICAL METAL RESULTS (UG/L) - SURFACE WATER
BLACK DITCH DRAINAGE AREA
FRESHWATER

COMPOUND	AREA 4 DITCH	AREA 5 POND				BLACK DITCH				WATER QUALITY CRITERIA		
	SW-0406	SW-0501L	SW-0502	SW-0503	SW-0504	SW-0407	SW-0408	SW-0505H	SW-0505L	NJDEP FW-2	USEPA FRESH ACUTE	USEPA FRESH CHRONIC
ARSENIC	5.10 J-	2.60 J-	3.40	2.30 U	2.30 U	13.70 J-	2.30 U	2.30 U	2.30 UJ	0.017	360.00	190.00
CADMIUM*	1.90 U	2.40	1.90 U	1.90 U	1.90 U	1.90	1.90 U	1.90 U	1.90 U	NCA NCA	3.91 2.62	1.13 0.86
CHROMIUM*	20.10 J-	5.30	4.50 J-	5.60 J-	7.70 J-	4.40 U	4.40	4.40 UJ	4.40 U	160.00 160.00	1732.10 1296.92	8.10 6.81
COPPER*	53.10	35.50	27.00 J-	24.20 J-	38.90 J-	3.00	3.90 U	9.70 U	1.60 U	NCA NCA	17.67 12.67	11.79 8.72
LEAD*	22.70	35.80 J	16.30	15.10	28.30	1.30	2.40 U	2.40 U	2.40 UJ	5.00 5.00	81.32 51.87	3.17 2.02
MANGANESE	NA	1730.00 J	NA	NA	NA	223.00 J	NA	NA	209.00 J	NCA	NCA	NCA
MERCURY	0.32 U	0.12	0.13	0.10 U	0.15	0.12 U	0.10 U	0.10 U	0.10 U	0.144	2.40	0.012
NICKEL*	14.10 J-	28.90 J-	20.60 J-	18.70 J-	17.00 J-	25.90	16.70	23.60 J-	13.20 J-	516.00 516.00	1049.07 1414.53	157.25 116.62
SILVER**	2.30 UJ	3.70 J-	2.30 UJ	2.30 UJ	2.30 UJ	2.30 U	2.30 U	2.30 UJ	2.30 UJ	164.00 164.00	4.04 2.20	0.120 0.120
ZINC**	183.00 J-	376.00 J-	164.00 U	102.00 U	140.00 U	82.70 J	97.40 U	92.10 U	55.10 J-	NCA NCA	116.72 86.52	105.71 78.37

NOTES:
*Cadmium, chromium, copper, lead and nickel USEPA Freshwater Acute and Chronic Surface Water Quality Criteria are based on the surface water hardness at that location.
** Silver and Zinc USEPA Freshwater Acute Surface Water Quality Criteria are based on the surface water hardness at that location.

ANALYTICAL METAL RESULTS (UG/L) - SURFACE WATER
BLACK DITCH DRAINAGE AREA
ESTUARINE

COMPOUND	BLACK DITCH							
	SW-0506H	SW-0506L	SW-0507H	SW-0507L	SW-0616H	SW-0616L	SW-0617H	SW-0617L
ARSENIC	2.30 U	2.30 U	2.30 U	2.30 U	2.30 UJ	4.00	2.30 UJ	2.30 UJ
CADMIUM	1.90 U	2.10	1.90 U	1.90 U	1.90 U	1.90 U	1.90 U	1.90 U
CHROMIUM	4.40 UJ	4.40 UJ	4.40 UJ	4.40 UJ	4.40 U	5.60 J-	4.40 U	4.40 U
COPPER	6.30 U	6.80 U	8.00 U	5.70 U	3.20 U	10.90 U	6.40 U	11.00 U
LEAD	2.40 U	2.50	2.40 U	2.40 U	2.40 U	16.70 J-	1.80 U	2.90 U
MANGANESE	NA	NA	NA	NA	NA	1380.00 J-	NA	NA
MERCURY	0.10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.11	0.10 U
NICKEL	24.30 J-	25.90 J-	28.20 J-	27.90 J-	11.60	22.40 J-	10.30	21.90
SILVER	2.30 UJ	2.30 UJ	2.30 UJ	2.30 UJ	2.30 U	2.30 UJ	2.30 U	2.30 U
ZINC	99.90 U	110.00 U	110.00 U	110.00 U	115.00 U	140.00 U	115.00 U	146.00 U

COMPOUND	BLACK DITCH				
	SW-0618H	SW-0618L	SW-0619H	SW-0619L	SW-0620
ARSENIC	23.00 UJ	7.80 J-	23.00 UJ	23.00 U	23.00 U
CADMIUM	1.90 U	1.90 U	1.90 U	1.90 U	1.90 U
CHROMIUM	4.40 U	4.40 U	4.40 U	4.40 UJ	4.40 UJ
COPPER	7.30 U	11.90 U	3.50 U	5.50 U	6.30 U
LEAD	2.40 U	7.80 U	2.40 U	2.40 UJ	2.40 UJ
MANGANESE	NA	NA	NA	376.00 J-	341.00 J-
MERCURY	0.11	0.10 U	0.10 U	0.10 U	0.32
NICKEL	8.10 U	11.60	8.10 U	12.10 J-	8.10 UJ
SILVER	2.30 U	2.30 U	2.30 U	2.30 UJ	2.30 UJ
ZINC	24.10 U	68.40 U	8.60 U	45.10 U	82.50 U

* SW-0620 is a duplicate of SW-0619L.

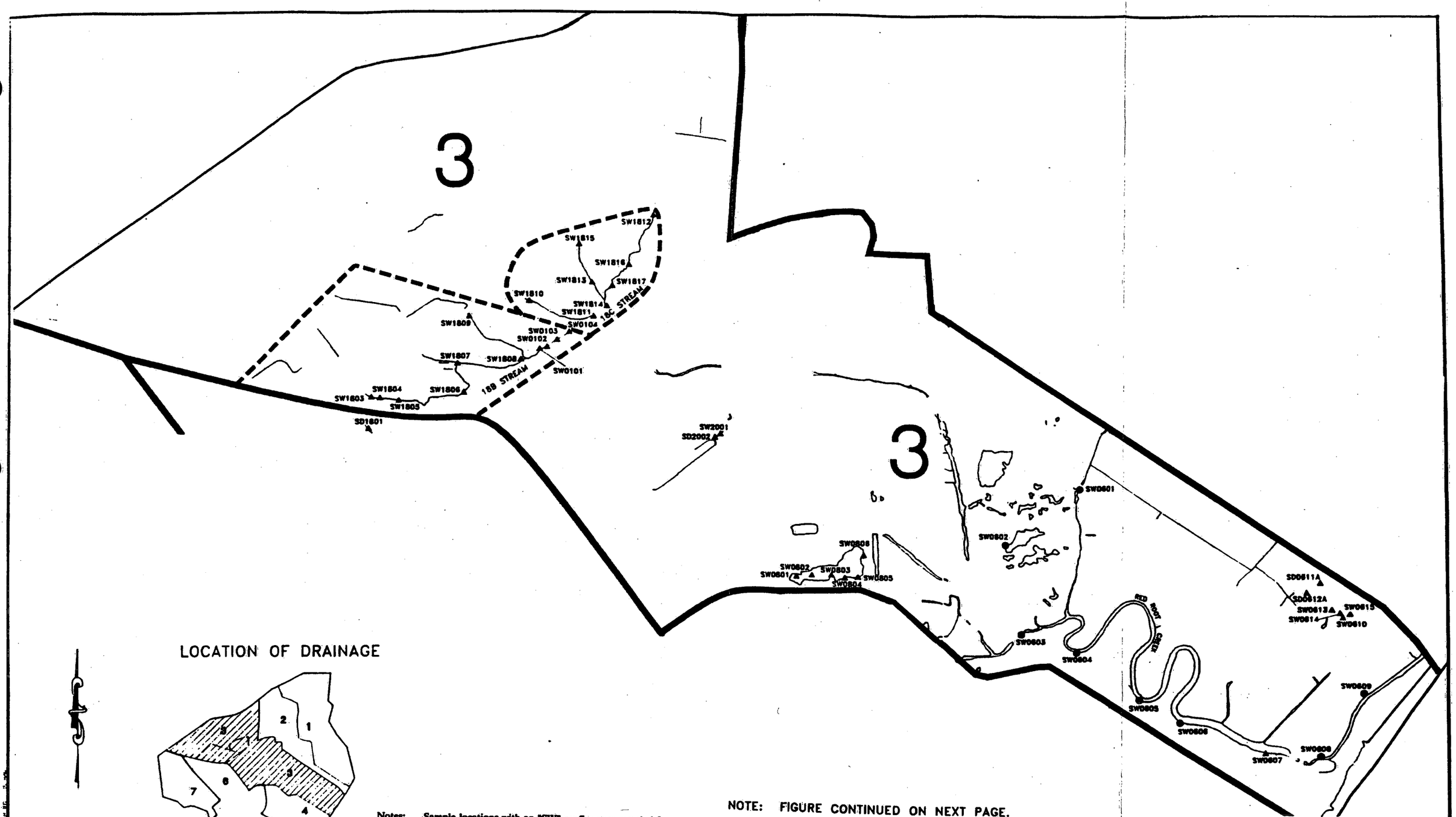
COMPOUND	ESTUARINE WATER QUALITY CRITERIA		
	NJDEP SE-1	USEPA MARINE ACUTE	USEPA MARINE CHRONIC
ARSENIC	0.136	69.00	36.00
CADMIUM	NCA	43.00	9.30
CHROMIUM	3230.00	10300.00	NCA
COPPER	NCA	2.90	2.90
LEAD	NCA	220.00	8.50
MANGANESE	100.00	NCA	NCA
MERCURY	0.146	2.10	0.025
NICKEL	3900.00	75.00	8.30
SILVER	NCA	2.30	NCA
ZINC	NCA	95.00	86.00

WESTON
MANAGERS DESIGNERS/CONSULTANTS

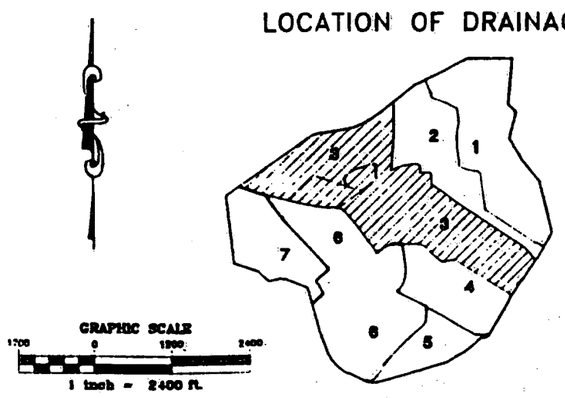
PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

BLACK DITCH DRAINAGE

DATE: 4/7/95
FIGURE #: 4-9



LOCATION OF DRAINAGE



Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

- THIS SITE MAP HAS BEEN ADAPTED FROM A PHOTOGRAMMETRIC BASEMAP OF THE FORMER RARITAN ARSENAL PREPARED BY DEDD CORPORATION (12/22/92 OVERFLIGHT PHOTOGRAPHY) UNDER SUBCONTRACT TO WESTON.

NOTE: FIGURE CONTINUED ON NEXT PAGE.

WESTON MANAGERS DESIGNERS/CONSULTANTS	PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION EDISON, NEW JERSEY CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS	RED ROOT CREEK DRAINAGE DATE: 4/6/95 FIGURE #: 4-10

ANALYTICAL METAL RESULTS (UG/L) - SURFACE WATER
RED ROOT CREEK DRAINAGE AREA
FRESHWATER

COMPOUND	AREA 20 DITCH	AREA 18B STREAM					WATER QUALITY CRITERIA		
	SW-2001	SW-1803	SW-1804	SW-1805	SW-1806	SW-1807	NJDEP FW-2	USEPA FW ACUTE	USEPA FW CHRONIC
ARSENIC	4.30 J	1.80 U	1.80 U	1.80 U	1.80 U	1.80 U	0.017	360.00	190.00
BERYLLIUM	1.00	0.50 U	0.50 U	0.50 U	0.63 U	0.50 U	NCA	130.00	5.30
CADMIUM*	1.90 U						NCA	1.03	0.45
		0.31	0.24	0.20			NCA	1.75	0.65
					0.24	0.10 U	NCA	0.48	0.26
CHROMIUM*	27.00						160.00	659.56	3.46
		3.80 U	3.80 U	3.80 U			160.00	967.52	5.08
					3.80 U	3.80 U	160.00	378.24	1.99
COPPER*	38.70						NCA	5.82	4.31
		2.30 U	5.30 U	5.00 U			NCA	9.04	6.42
					7.20 U	4.50 U	NCA	3.07	2.41
IRON	NA	17.60	NA	NA	284.00	NA	NCA	NCA	1000.00
LEAD*	25.30 J-						5.00	18.13	0.71
		0.90 U	1.80 U	0.60 U			5.00	32.89	1.28
					0.82 U	0.90 U	5.00	7.64	0.30
MANGANESE	NA	46.70	NA	NA	25.20	NA	NCA	NCA	NCA
MERCURY	0.22	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.144	2.40	0.012
NICKEL*	11.50 J						516.00	521.76	58.00
		7.10 U	7.10 U	7.10 U			516.00	775.10	86.17
					7.10 U	7.10 U	516.00	293.78	32.66
SELENIUM	2.00 J-	1.60 U	1.60 U	1.60 U	1.60 U	1.60 U	10.00	20.00	5.00
SILVER**	2.00 U						164.00	0.53	0.120
		2.30 U	2.30 U	2.30 U			164.00	1.19	0.120
					2.30 U	2.30 U	164.00	0.17	0.120
THALLIUM	2.90 UJ	1.70	1.60 U	1.60 U	1.60 U	1.60 U	1.70	1400.00	40.00
ZINC*	148.00						NCA	42.99	39.93
		39.10 J	31.50 J	30.60 J			NCA	63.90	57.87
					45.40 J	37.80 J	NCA	24.18	21.90

NOTES:
*Cadmium, chromium, copper, lead, nickel and zinc USEPA Freshwater Acute and Chronic Surface Water Quality Criteria are based on the surface water hardness at that location.
** Silver USEPA Freshwater Acute Surface Water Quality Criteria is based on the surface water hardness at that location.

COMPOUND	AREA 18B STREAM			AREA 18C STREAM		WATER QUALITY CRITERIA (ug/L)		
	SW-1808	SW-1809	SW-1818*	SW-1810	SW-1811	NJDEP FW-2	USEPA FW ACUTE	USEPA FW CHRONIC
ARSENIC	1.80 U	1.80 U	1.80 U	1.80 U	1.80 U	0.02	360.00	190.00
BERYLLIUM	0.50 U	0.50 U	0.50 U	1.40 U	2.20	NCA	130.00	5.30
CADMIUM**	0.16	0.14	0.50 U			NCA	1.10	0.47
				0.17	0.15	NCA	1.83	0.67
CHROMIUM**	4.00	3.80 U	3.80 U			160.00	690.78	3.63
				3.60 U	3.80 U	160.00	998.55	5.25
COPPER**	5.40 U	3.80 U	4.20 U			NCA	6.14	4.52
				2.80	2.70	NCA	9.38	6.84
IRON	NA	NA	NA	NA	NA	NCA	NCA	NCA
LEAD**	0.88 U	1.10 U	2.10 U			5.00	19.48	0.76
				2.10 U	1.50 U	5.00	34.55	1.35
MANGANESE	NA	NA	NA	NA	NA	NCA	NCA	NCA
MERCURY	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.144	2.40	0.012
NICKEL**	7.10 U	7.10 U	7.10 U			516.00	547.28	60.84
				11.70 U	11.70 U	516.00	800.79	89.02
SELENIUM	1.60 U	1.60 U	1.60 U	8.00 U	1.60 U	10.00	20.00	5.00
SILVER***	2.30 U	2.30 U	2.30 U			164.00	0.59	0.120
				2.10 U	2.10 U	164.00	1.27	0.120
THALLIUM	1.70	1.60 U	1.60 U	2.00 U	2.00 U	1.70	1400.00	40.00
ZINC**	34.30 J	21.90 J	30.60 J			NCA	45.09	40.84
				16.00 U	26.20 U	NCA	66.02	59.79

* SW-1818 is a duplicate of SW-1809.

NOTE: FIGURE CONTINUED ON NEXT PAGE.

COMPOUND	AREA 18C STREAM						WATER QUALITY CRITERIA (ug/L)		
	SW-1812	SW-1813	SW-1814	SW-1815	SW-1816	SW-1817	NJDEP FW-2	USEPA FRESH ACUTE	USEPA FRESH CHRONIC
ARSENIC	1.80 U	1.80 U	1.80 U	1.80 U	2.30	1.80 U	0.017	360.00	190.00
BERYLLIUM	1.40 U	1.40 U	1.40 U	1.90	1.40 U	1.40 U	NCA	130.00	5.30
CADMIUM*		0.96	0.14	0.31			NCA	1.83	0.67
	0.34				0.18	0.21	NCA	3.92	1.13
CHROMIUM*		3.60 U	3.60 U	3.60 U			160.00	998.55	5.25
	3.60 U				3.60 U	3.60 U	160.00	1734.57	9.11
COPPER*		2.70	2.40	5.40			NCA	9.38	6.64
	12.80				3.70	4.30	NCA	17.70	11.88
IRON	271.00	NA	2260.00	NA	NA	NA	NCA	NCA	1000.00
LEAD*		15.30 U	0.60 U	5.80 U			5.00	34.55	1.35
	3.10 U				0.77 U	1.60 U	5.00	81.50	3.18
MANGANESE	11.00	NA	70.90	NA	NA	NA	NCA	NCA	NCA
MERCURY	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.144	2.40	0.012
NICKEL*		11.70 U	12.60	11.70 U			516.00	800.79	89.02
	11.70 U				11.70 U	11.70 U	516.00	1416.60	157.48
SELENIUM	1.60 U	1.60 U	1.60 U	1.60 U	1.60 U	1.60 U	10.00	20.00	5.00
SILVER**		2.10 U	2.10 U	2.10 U			164.00	1.270	0.120
	2.10 U				2.10 U	2.10 U	164.00	4.050	0.120
THALLIUM	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	1.70	1400.00	40.00
ZINC*		38.40	41.30 U	42.10			NCA	66.02	59.79
	34.30 U				41.60	53.60	NCA	116.89	105.87

COMPOUND	RED ROOT CREEK		SULFUR PLANT PONDS				WATER QUALITY CRITERIA (ug/L)		
	SW-0602H	SW-0602L	SW-0610	SW-0613	SW-0614	SW-0615	NJDEP FW-2	USEPA FRESH ACUTE	USEPA FRESH CHRONIC
ARSENIC	17.50 J-	59.00 J-	19.50	10.00 U	15.50	10.00 UJ	0.017	360.00	190.00
BERYLLIUM	0.60 U	2.10	12.40 J-	8.50 J-	12.40 J-	2.70	NCA	130.00	5.30
CADMIUM*			2.8	8	1.9 U	18.1	NCA	16.43	3.07
	1.90 U						NCA	86.62	9.78
		2.20					NCA	63.19	7.85
CHROMIUM*			111 J-	92.5 J-	111 J-	264 J-	160.00	4912.32	25.80
	13.30 J-						160.00	16428.16	86.29
		48.20 J-					160.00	13066.14	68.63
COPPER*			431 J	381 J	438 J	671	NCA	58.60	34.99
	67.00 J						NCA	235.13	123.30
		253.00 J					NCA	180.68	97.10
IRON	NA	NA	NA	NA	NA	55900.00 J	NCA	NCA	1000.00
LEAD*			6.1 J	3 UJ	13 J	17.5	5.00	411.04	16.02
	100.00 U						5.00	2684.25	104.60
		460.00 J					5.00	1880.43	73.28
MANGANESE	NA	NA	NA	NA	NA	1370.00 J	NCA	NCA	NCA
MERCURY	0.50 U	0.18 U	0.10 U	0.10 U	0.10 U	0.10 U	0.144	2.40	0.012
NICKEL*			221 J-	221 J-	224 J-	98.8 J-	516.00	4151.90	461.56
	28.80 J-						516.00	14448.89	1606.27
		69.50 J-					516.00	11405.50	1267.94
SELENIUM	1.60 UJ	5.10 J	4.00 R	4.00 R	4.00 R	8.00 U	10.00	20.00	5.00
SILVER**			8.9 J-	5.7 J-	9.9 J-	2.3 UJ	164.00	36.04	0.120
	2.30 UJ						164.00	454.92	0.120
		2.30 UJ					164.00	281.25	0.120
THALLIUM	1.90 UJ	1.90 UJ	7.00 R	7.00 R	6.40 J-	9.50 UJ	1.70	1400.00	40.00
ZINC*			3280 J-	2900 J-	3280 J-	6940 J-	NCA	343.15	310.80
	299.00 J						NCA	1196.46	1083.69
		809.00 J					NCA	944.11	855.12

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS
DATE: 4/6/95
FIGURE #: 4-10A

ANALYTICAL METAL RESULTS (UG/L) - SURFACE WATER
RED ROOT CREEK DRAINAGE AREA
FRESHWATER

COMPOUND	AREA 8 POND							WATER QUALITY CRITERIA		
	SW-0801	SW-0802	SW-0803	SW-0804	SW-0805	SW-0806	SW-0807*	NJDEP FW-2	USEPA FRESH ACUTE	USEPA FRESH CHRONIC
ARSENIC	8.20	3.10	2.50	2.00	3.00	5.00	3.70	0.017	360.00	190.00
BERYLLIUM	1.40 U	1.40 U	1.40 U	1.40 U	1.40 U	1.40 U	1.40 U	NCA	130.00	5.30
CADMIUM**	0.10	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	NCA NCA NCA	1.03 1.63 1.16	0.45 0.62 0.49
CHROMIUM**	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U	160.00 160.00 160.00	659.56 917.71 718.16	3.46 4.82 3.77
COPPER**	7.90 U	5.60 U	4.00 U	5.30 U	7.00 U	9.00 U	5.70 U	NCA NCA NCA	5.82 8.51 6.42	4.31 6.08 4.71
IRON	4490.00	NA	NA	2950.00	NA	NA	4300.00	NCA	NCA	1000.00
LEAD**	7.80 J	4.70 U	2.10 U	2.00 U	5.10 U	8.00 J	5.20 U	5.00 5.00 5.00	18.13 30.30 20.70	0.71 1.18 0.81
MANGANESE	225.00	NA	NA	134.00	NA	NA	255.00	NCA	NCA	NCA
MERCURY	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.144	2.40	0.012
NICKEL**	11.70 U	11.70 U	11.70 U	11.70 U	11.70 U	11.70 U	14.90	516.00 516.00	521.76 733.92	58.00 81.59
SELENIUM	1.60 U	1.60 U	1.60 U	1.60 U	1.60 U	1.60 U	1.60 U	10.00	20.00	5.00
SILVER***	2.10 U	2.10 U	2.10 U	2.10 U	2.10 U	2.10 U	2.10 U	164.00 164.00 164.00	0.53 0.64 454.92	0.12 0.120 0.120
THALLIUM	7.50 U	7.50 U	7.50 U	7.50 U	7.50 U	7.50 U	7.50 U	1.70	1400.00	40.00
ZINC**	15.60 J	9.60 J	5.90 J	6.80 J	12.40 J	5.70 J	14.30 J	NCA NCA NCA	120.45 168.34 131.30	47.00 47.00 47.00

* SW-0807 is a duplicate of SW-0801.
** Cadmium, chromium, copper, lead, nickel, and zinc USEPA Freshwater Acute and Chronic Surface Water Quality Criteria are based on the surface water hardness at that location.
*** Silver USEPA Freshwater Acute Surface Water Quality Criteria is based on the surface water hardness at that location.

COMPOUND	LOWER AREA 18B STREAM				WATER QUALITY CRITERIA		
	SW-0101	SW-0102	SW-0103	SW-0104	NJDEP FW-2	USEPA FRESH ACUTE	USEPA FRESH CHRONIC
ARSENIC	2.30 U	2.30 U	2.30 U	2.30 U	0.017	360.00	190.00
BERYLLIUM	1.60 U	1.60 U	1.60 U	0.90 U	NCA	130.00	5.30
CADMIUM*	1.90 U	1.90 U	1.90 U	1.90 U	NCA	1.10	0.47
CHROMIUM*	4.40 U	4.40 U	4.40 U	4.40 U	160.00	690.78	3.63
COPPER*	3.40 U	3.40 U	3.40 U	3.00 U	NCA	6.14	4.52
IRON	NA	NA	NA	1370.00	NCA	NCA	1000.00
LEAD*	2.40 U	2.40 U	2.40 U	2.40 U	5.00	19.48	0.76
MANGANESE	NA	NA	NA	68.20	NCA	NCA	NCA
MERCURY	0.16 U	0.14 U	0.15 U	0.10 U	0.144	2.40	0.012
NICKEL*	8.90	8.10 U	8.10 U	13.50	516.00	547.28	60.84
SELENIUM	2.10	1.60	1.30	1.30 U	10.00	20.00	5.00
SILVER**	2.30 U	2.30 U	2.30 U	2.30 U	164.00	0.59	0.120
THALLIUM	1.80 UJ	1.80 UJ	1.80 UJ	1.80	1.70	1400.00	40.00
ZINC*	26.50 U	34.90 U	34.20 U	37.90 U	NCA	45.09	40.84

ANALYTICAL METAL RESULTS (UG/L) - SURFACE WATER
RED ROOT CREEK DRAINAGE AREA
ESTUARINE

COMPOUND	RED ROOT CREEK							
	SW-0601H	SW-0601L	SW-0603H	SW-0603L	SW-0604H	SW-0604L	SW-0605H	SW-0605L
ARSENIC	8.20 J-	36.00 J-	10.00 U	10.00 UJ	10.00 U	10.00 U	6.50 U	10.00 U
BERYLLIUM	0.60 U	0.60 U	0.60 U	0.60 U	0.60 UJ	0.60 UJ	0.60 UJ	0.60 UJ
CADMIUM	1.90 U	1.90 U	1.90 U	1.90 U	1.90 U	1.90 U	1.90 U	1.90 U
CHROMIUM	5.00 J-	5.80 J-	4.40 UJ	4.40 U	4.40 UJ	4.40 UJ	4.40 UJ	4.40 UJ
COPPER	5.40 J	14.90 J	4.40	2.20	8.60 U	5.00 U	16.90 J	7.50 U
LEAD	2.90 U	16.20 J	3.00 U	18.40	3.00 UJ	3.00 UJ	3.00 UJ	3.00 UJ
MANGANESE	NA	NA	236.00 J	256.00	NA	NA	NA	NA
MERCURY	0.19 U	0.19 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
NICKEL	8.80 J-	8.10 UJ	13.00 J-	10.40	8.10 UJ	8.10 UJ	8.10 UJ	8.10 UJ
SELENIUM	1.60 UJ	1.60 UJ	8.00 U	8.00 U	8.30 J	4.00 R	4.00 R	4.00 R
SILVER	2.30 UJ	2.30 UJ	2.30 UJ	2.30 U	2.30 UJ	2.30 UJ	2.30 UJ	2.30 UJ
THALLIUM	1.90 UJ	1.90 UJ	9.50 UJ	9.50 UJ	7.00 R	7.00 R	7.00 R	7.00 R
ZINC	39.60 J	41.10 J	8.10 J-	5.80	25.60 U	18.30 U	50.00 U	13.50 U

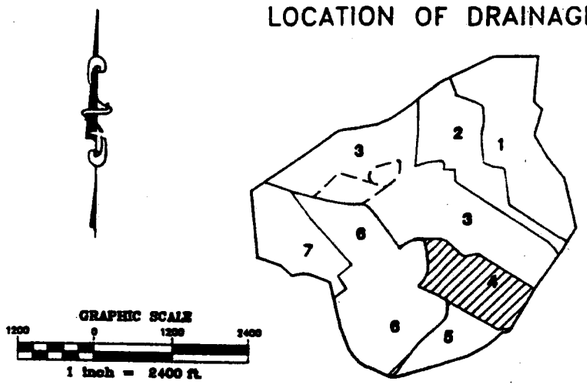
COMPOUND	RED ROOT CREEK						
	SW-0606H	SW-0606L	SW-0607	SW-0608H	SW-0608L	SW-0609H	SW-0609L
ARSENIC	10.00 U	10.00 U	20.00 UJ	10.00 U	20.00 U	12.50	20.00 U
BERYLLIUM	0.60 UJ	0.60 J-	0.80 U	0.60 UJ	0.60 UJ	0.60 UJ	0.60 UJ
CADMIUM	1.90 U	1.90 U	1.90 U	1.90 U	1.90 U	1.90 U	1.90 U
CHROMIUM	4.40 UJ	4.40 UJ	4.40 UJ	4.40 UJ	4.40 UJ	4.40 UJ	4.40 UJ
COPPER	13.10 J	9.10 U	2.20	6.70 U	5.80 U	12.30 J	8.20 U
LEAD	3.00 UJ	3.00 UJ	3.70	3.30 J	3.00 UJ	3.40 J	3.00 UJ
MANGANESE	NA	NA	129.00 J	NA	NA	NA	NA
MERCURY	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
NICKEL	8.10 UJ	8.10 UJ	12.10 J-	8.10 UJ	8.10 UJ	8.10 UJ	8.10 UJ
SELENIUM	4.00 R	4.00 R	12.00	26.70 J	8.00 R	4.00 R	4.00 J
SILVER	2.30 UJ	3.70 J-	2.30 UJ	2.10 UJ	2.30 UJ	2.30 UJ	2.30 UJ
THALLIUM	7.00 R	7.00 R	9.50 UJ	7.00 R	7.00 R	7.00 R	7.00 R
ZINC	21.80 U	15.40 U	4.40 UJ	20.40 U	19.80 U	27.40 U	12.60 U

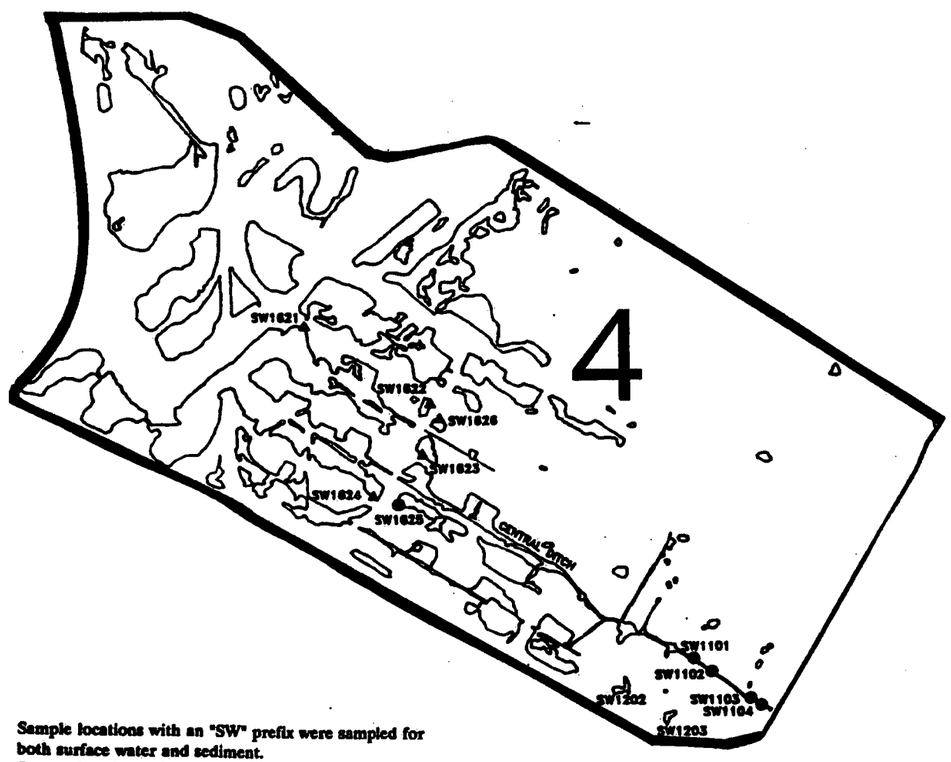
COMPOUND	ESTUARINE WATER QUALITY CRITERIA		
	NJDEP SE-1	USEPA MARINE ACUTE	USEPA MARINE CHRONIC
ARSENIC	0.136	69.00	36.00
BERYLLIUM	NCA	NCA	NCA
CADMIUM	NCA	43.00	9.30
CHROMIUM	3230.00	10300.00	NCA
COPPER	NCA	2.90	2.90
LEAD	NCA	220.00	8.50
MANGANESE	100.00	NCA	NCA
MERCURY	0.146	2.10	0.025
NICKEL	3900.00	75.00	8.30
SELENIUM	NCA	300.00	71.00
SILVER	NCA	2.30	NCA
THALLIUM	6.22	2130.00	NCA
ZINC	NCA	95.00	86.00

WESTON MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS
DATE: 4/6/95
FIGURE #: 4-10B

LOCATION OF DRAINAGE





Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

GRAPHIC SCALE
150 0 150 300
1 inch = 300 ft.

NOTE:
- THIS SITE MAP HAS BEEN ADAPTED FROM A PHOTOGRAMMETRIC BASEMAP OF THE FORMER RARITAN ARSENAL PREPARED BY GEDD CORPORATION (12/22/92 OVERFLIGHT PHOTOGRAPHY) UNDER SUBCONTRACT TO WESTON.

ANALYTICAL METAL RESULTS (UG/L) - SURFACE WATER
CENTRAL DITCH DRAINAGE AREA
FRESHWATER

COMPOUND	ISOLATED FRESHWATER POND				UPGRADIENT PONDED AREA	WATER QUALITY CRITERIA (ug/L)		
	SW-1622	SW-1623	SW-1626	SW-1627*	SW-1621	NJDEP FW-2	USEPA FW ACUTE	USEPA FW CHRONIC
ARSENIC	6.30	5.40	4.90	1.80 U	27.20	0.017	360.00	190.00
LEAD**	5.30 J	2.60 J	7.60 J	10.00 J	2.60 J	5.00	1012.29	39.45
MANGANESE	NA	NA	NA	NA	NA	NCA	NCA	NCA

NOTE: * SW-1627 is a duplicate of SW-1626.
** Lead USEPA Freshwater Acute and Chronic Surface Water Quality Criteria are based on the surface water hardness at that location.

ANALYTICAL METAL RESULTS (UG/L) - SURFACE WATER
CENTRAL DITCH DRAINAGE AREA
ESTUARINE

COMPOUND	CENTRAL DITCH				
	SW-1101L	SW-1102L	SW-1103L	SW-1104L	SW-1101H
ARSENIC	25.90	21.40	6.70	8.20	26.80
LEAD	9.30 J	4.00 J	4.00 J	8.60 J	5.40 J
MANGANESE	NA	NA	NA	201.00	NA

COMPOUND	CENTRAL DITCH			ISOLATED ESTUARINE PONDS		UPGRADIENT PONDED AREA
	SW-1102H	SW-1103H	SW-1104H	SW-1625H	SW-1625L	SW-1624
ARSENIC	29.60	16.00	10.80	58.60	62.40	12.80
LEAD	3.00 J	5.90 J	4.60 U	8.60 J	6.10 J	1.60 U
MANGANESE	NA	NA	183.00	NA	NA	325.00

COMPOUND	ESTUARINE WATER QUALITY CRITERIA		
	NJDEP SE-1	USEPA MARINE ACUTE	USEPA MARINE CHRONIC
ARSENIC	0.138	69.00	36.00
LEAD	NCA	220.00	8.50
MANGANESE	100.00	NCA	NCA

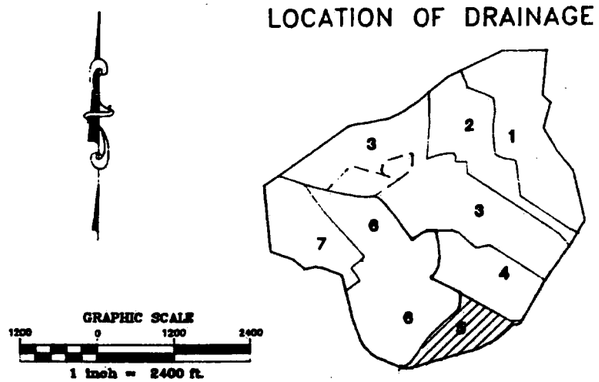
WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

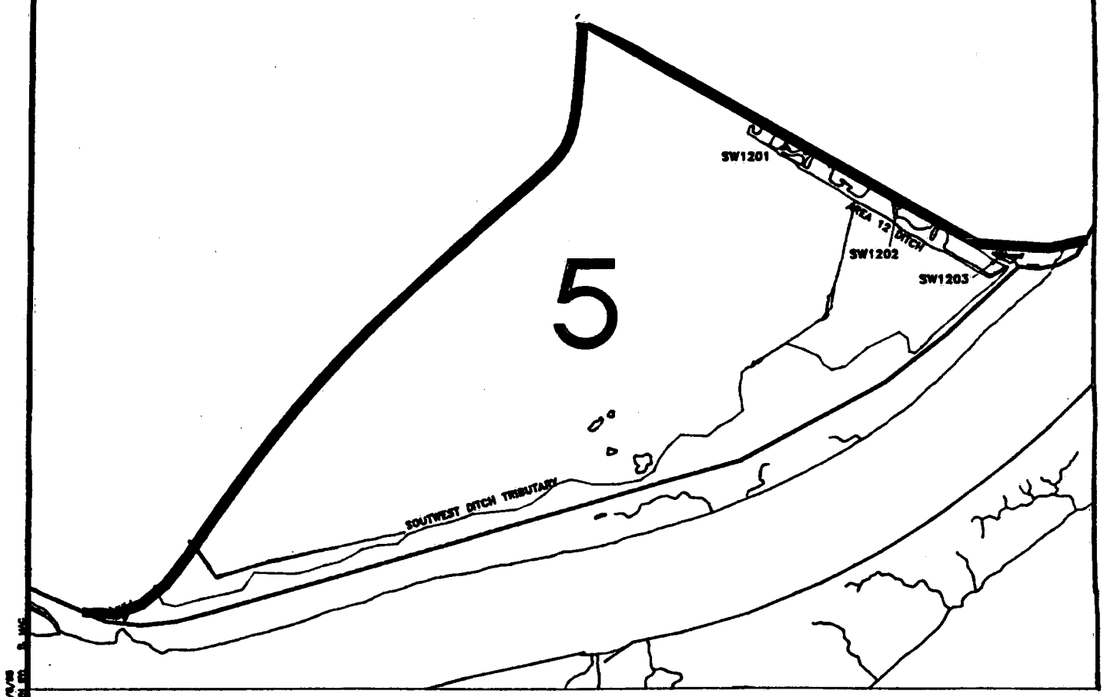
CENTRAL DITCH DRAINAGE

DATE: 4/6/95
FIGURE # 4-11

LOCATION OF DRAINAGE



Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.



NOTE:
- THIS SITE MAP HAS BEEN ADAPTED FROM A PHOTOGRAMMETRIC BASEMAP OF THE FORMER RARITAN ARSENAL PREPARED BY GEOD CORPORATION (12/22/92 OVERFLIGHT PHOTOGRAPHY) UNDER SUBCONTRACT TO WESTON.

ANALYTICAL METAL RESULTS (UG/L) - SURFACE WATER
AREA 12 DITCH DRAINAGE AREA
ESTUARINE

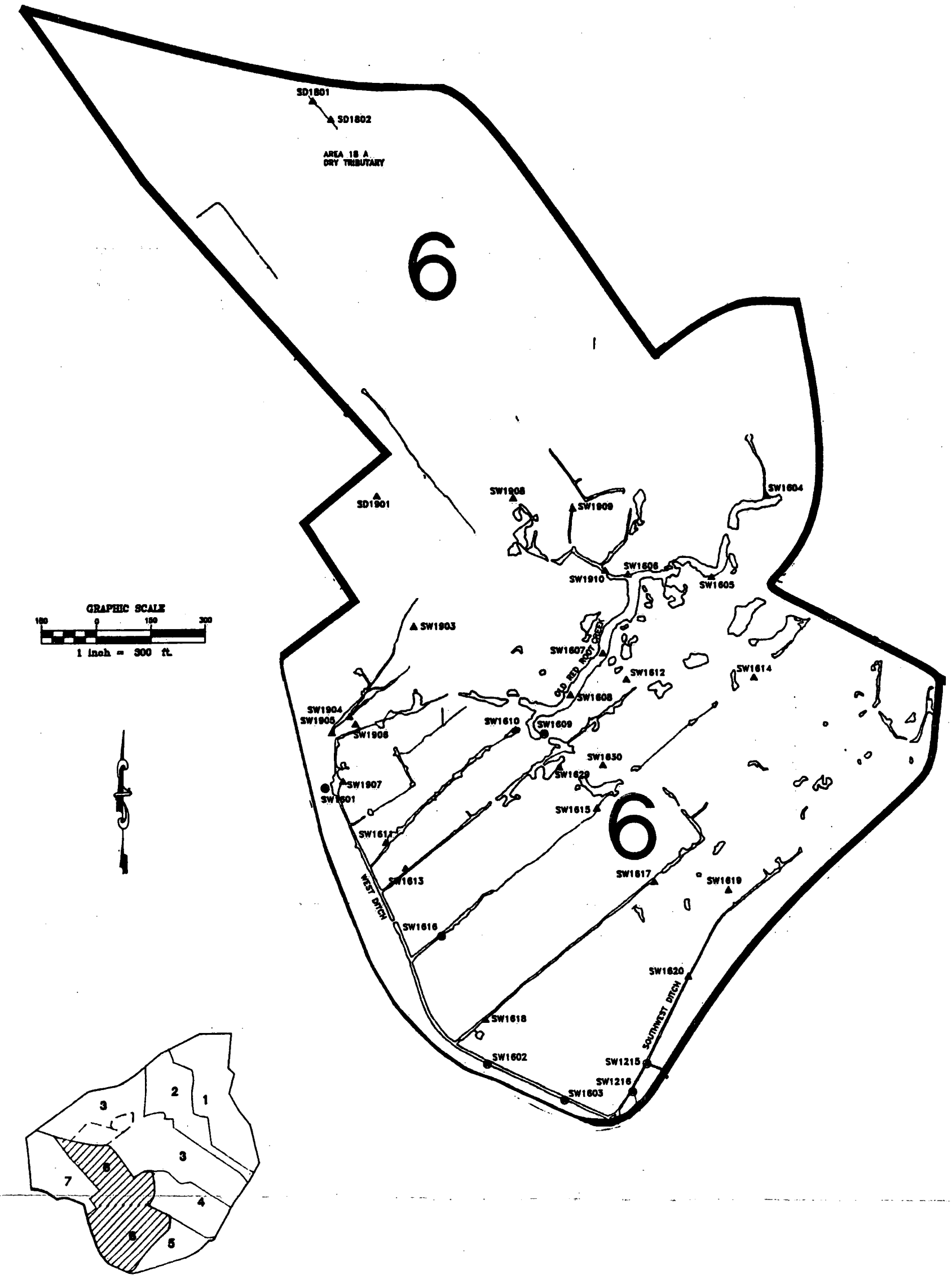
COMPOUND	AREA 12 DITCH					WATER QUALITY CRITERIA		
	SW-1201	SW-1202H	SW-1202L	SW-1203H	SW-1203L	NJDEP SE-1	USEPA MARINE ACUTE	USEPA MARINE CHRONIC
ARSENIC	16.40	34.20	20.50	11.70	9.50	0.186	69.00	36.00
COPPER	7.30 U	3.70 U	3.60 U	9.80 U	26.80	NCA	2.90	2.90
LEAD	8.80	5.40	2.50	6.10 U	26.40 U	NCA	220.00	8.50
MANGANESE	NA	NA	NA	297.00	209.00	100.00	NCA	NCA
NICKEL	11.70 U	11.70 U	11.70 U	11.70 U	24.90	3900.00	75.00	8.30
THALLIUM	7.50 U	7.50 U	7.50 U	7.50 U	8.00	6.22	2130.00	NCA
ZINC	69.10	2.50 U	4.40 U	2.40 U	21.50	NCA	95.00	88.00

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

AREA 12 DITCH DRAINAGE

DATE: 4/6/95
FIGURE #: 4-12



Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

NOTE: FIGURE CONTINUED ON NEXT PAGE.

WESTON MANAGERS DESIGNERS/CONSULTANTS	PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION EDISON, NEW JERSEY	OLD RED ROOT CREEK DRAINAGE
	CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS	DATE: 4/7/95 FIGURE: 4-13

REVISION # 1 DATE: 4/7/95
FILE NAME: BASE-WTR.DWG DRAWN BY: B. MAC

ANALYTICAL METAL RESULTS (UG/L) - SURFACE WATER
OLD RED ROOT CREEK DRAINAGE AREA
FRESHWATER

COMPOUND	ASSOCIATED DITCHES	AREA 19 FORESTED	AREA 19 NE WETLANDS			WATER QUALITY CRITERIA		
	SW-1614	SW-1903	SW-1908	SW-1909	SW-1910	NJDEP FW-2	USEPA FRESH ACUTE	USEPA FRESH CHRONIC
ARSENIC	2.80	945.00 J-	2.10 UJ	10.00 UJ	10.50 J-	0.017	360.00	190.00
COPPER*	7.80 J	28.40 J	2.10	7.20 J	5.00 J	NCA NCA	364.61 12.03	183.55 8.32
IRON	NA	NA	17800.00	NA	NA	NCA	NCA	1000.00
LEAD*	9.00 UJ	13.50 U	1.10	6.10 U	5.40 U	5.00 5.00	4855.49 48.38	189.21 1.89
MANGANESE	NA	NA	905.00	NA	NA	NCA	NCA	NCA
MERCURY	0.20 U	0.10 U	0.10 U	0.10 U	0.10 U	0.144	2.40	0.012
NICKEL*	11.70 U	8.10 UJ	8.10 U	8.10 UJ	9.00 J-	516.00 516.00	1729.47 1001.64	192.26 111.35
SILVER**	2.30 U	4.10	2.30 U	2.30 U	2.30 U	164.00 164.00	1013.28 2.00	0.120 0.120
THALLIUM	10.00 U	9.50 R	2.90 UJ	9.50 R	9.50 R	1.70	1400.00	40.00
ZINC*	27.20	70.70	40.30 J	34.10	57.60	NCA NCA	142.75 82.60	129.29 74.82

COMPOUND	OLD RED ROOT CREEK		AREA 19 SW WETLANDS			WATER QUALITY CRITERIA		
	SW-1604	SW-1605	SW-1904	SW-1905	SW-1912*	NJDEP FW-2	USEPA FRESH ACUTE	USEPA FRESH CHRONIC
ARSENIC	3.50	1.80 U	16.00 J-	4.70 J	10.00 J-	0.017	360.00	190.00
COPPER**	3.10	3.30 J	6.90 J	1.60	3.00 J	NCA NCA	12.03 22.11	8.32 14.45
IRON	NA	NA	NA	5460.00	NA	NCA	NCA	1000.00
LEAD**	11.20 J	3.60 J	3.30 U	1.20	3.30 U	5.00 5.00	48.38 110.05	1.89 4.29
MANGANESE	NA	NA	NA	315.00	NA	NCA	NCA	NCA
MERCURY	0.20 U	0.20 U	0.10 U	0.10 U	0.10 U	0.144	2.40	0.012
NICKEL**	7.10 U	11.70 U	8.10 UJ	8.10 U	8.10 UJ	516.00 516.00	1001.64 1729.47	111.35 192.26
SILVER***	2.30 U	2.30 U	2.30 U	2.30 U	2.30 U	164.00 164.00	2.00 6.08	2.000 6.080
THALLIUM	1.60 U	10.00 U	9.50 R	2.90 UJ	9.50 R	1.70	1400.00	40.00
ZINC**	5.20	15.30 U	32.90	14.30 U	9.30 U	NCA NCA	82.60 142.75	74.82 129.29

NOTES:
* SW-1912 is a duplicate of SW-1904.
* Cadmium, chromium, copper, lead, nickel and zinc USEPA Freshwater Acute and Chronic Surface Water Quality Criterion are based on the surface water hardness at that location.
*** Silver USEPA Freshwater Acute Surface Water Quality Criterion is based on the surface water hardness at that location.

COMPOUNDS	ESTUARINE WATER QUALITY CRITERIA		
	NJDEP SE-1	USEPA MARINE ACUTE	USEPA MARINE CHRONIC
ARSENIC	0.136	69.00	36.00
COPPER	NCA	2.90	2.90
LEAD	NCA	220.00	8.50
MANGANESE	100.00	NCA	NCA
MERCURY	0.146	2.10	0.025
NICKEL	3900.00	75.00	8.30
SILVER	NCA	2.30	NCA
THALLIUM	6.22	2130.00	NCA
ZINC	NCA	95.00	86.00

ANALYTICAL METAL RESULTS (UG/L) - SURFACE WATER
OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE

COMPOUNDS	AREA 16 ASSOCIATED DITCHES								
	SW-1611	SW-1612	SW-1613	SW-1615	SW-1616H	SW-1616L	SW-1617	SW-1618*	SW-1628
ARSENIC	1.80 U	30.10	1.80 U	22.60	18.70	28.40	19.70	19.80	28.00
COPPER	1.90 U	1.90 U	1.90 U	1.90 U	36.60 J	1.90 U	1.90 U	25.10 J	3.70
LEAD	17.80 J	13.80 J-	13.70 J	8.70 J-	17.80 J-	8.40 J-	5.70	16.50 J-	12.80
MANGANESE	NA	NA	NA	NA	NA	NA	197.00	NA	NA
MERCURY	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.25	0.20 U
NICKEL	11.70 U	11.70 U	11.70 U	11.70 U	11.70 U	11.70 U	11.70 U	11.70 U	11.70 U
SILVER	2.30 U	2.30 U	2.30 U	2.30 U	2.30 U	2.30 U	2.30 U	2.30 U	2.30 U
THALLIUM	14.00	10.00 U	10.00 U	10.00 U	10.00 U	10.00 U	10.00 U	10.00 U	10.00 U
ZINC	14.80	54.60	13.90	7.60 U	72.10	14.70 U	7.10 U	51.10	63.10

* SW-1618 is a duplicate of SW-1612.

COMPOUNDS	AREA 16 ASSOC. DITCHES		AREA 19 SOUTHWEST WETLANDS		WEST DITCH			
	SW-1629	SW-1630	SW-1906	SW-1911*	SW-1601H	SW-1601L	SW-1602H	SW-1602L
ARSENIC	9.10	61.20	21.50 J-	18.50 J-	1.80 U	1.80 U	9.00 U	7.20 U
COPPER	1.90 U	1.90 U	11.40 J	10.30 J	1.90 U	1.90 U	1.90 U	1.90 U
LEAD	7.30 J	5.10 J	3.90 U	14.70 U	5.90 J	7.80 J	25.00 J-	12.10 J
MANGANESE	NA	NA	NA	NA	NA	NA	NA	NA
MERCURY	0.20 U	0.20 U	0.10 U	0.15	0.20 U	0.20 U	0.20 U	0.20 U
NICKEL	11.70 U	11.70 U	8.10 UJ	8.10 UJ	7.10 U	7.10 U	11.70 U	11.70 U
SILVER	2.30 U	2.30 U	2.30 U	2.30 U	2.30 U	2.30 U	2.30 U	2.30 U
THALLIUM	10.00 U	10.00 U	9.50 R	9.50 R	8.00 U	8.00 U	11.00	10.00 U
ZINC	15.60	9.70	47.80	34.40	11.50	10.70	15.00	23.60

* SW-1911 is a duplicate of SW-1906.

COMPOUNDS	WEST DITCH			OLD RED ROOT CREEK				
	SW-1603H	SW-1603L	SW-1907	SW-1606	SW-1607	SW-1608	SW-1609H	SW-1609L
ARSENIC	9.00 U	15.40	88.00 J-	4.00	2.90	2.00	30.60	5.80
COPPER	1.90 U	39.90	26.70 U	1.90 U	1.90 U	1.90 U	4.80 J	11.20 J
LEAD	8.90 J	97.40 J	35.30 J	5.50 J	5.70 J	4.80 J	5.40	8.50
MANGANESE	129.00	471.00	NA	NA	298.00	286.00	235.00	179.00
MERCURY	0.20 U	0.24	0.10 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
NICKEL	11.70 U	11.70 U	8.10 UJ	7.10 U	7.10 U	7.10 U	11.70 U	11.70 U
SILVER	2.30 U	2.30 U	2.30 UJ	2.40	2.30 U	2.30 U	2.30 U	2.30 U
THALLIUM	10.00 U	10.00 U	2.90 R	1.60 U	8.00 U	8.00 U	10.00 U	11.50
ZINC	15.00	84.80	54.40 J-	25.40	18.30	16.00	15.90 U	33.90

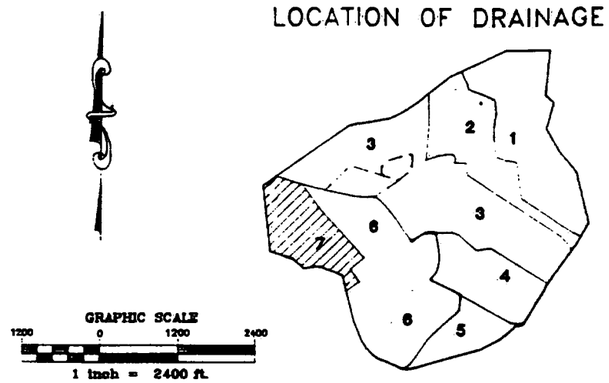
COMPOUNDS	OLD RED ROOT CREEK		SOUTHWEST DITCH					
	SW-1610	SW-1631*	SW-1215H	SW-1215L	SW-1216H	SW-1216L	SW-1619	SW-1620
ARSENIC	1.80 U	3.70	9.00 U	14.20	9.00 U	27.80	234.00	1.80
COPPER	1.90 U	4.50 J	1.90 U	23.50 J	1.90 U	27.40 J	817.00	1.90 U
LEAD	10.00 U	6.80	7.20 J-	13.80 J-	10.80 J-	14.00 J-	487.00 J	22.50 J
MANGANESE	NA	181.00	148.00	NA	NA	422.00	NA	NA
MERCURY	0.20 U	0.20 U	0.20 U	0.49	0.20 U	0.20 U	5.40	0.20 U
NICKEL	7.10 U	11.70 U	11.70 U	11.70 U	11.70 U	11.70 U	101.00	11.70 U
SILVER	2.30 U	2.30 U	2.30 U	2.30 U	2.30 U	2.30 U	2.30 U	2.30 U
THALLIUM	8.00 U	10.00 U	10.00 U	10.00 U	10.60	10.00 U	10.00 U	10.00 U
ZINC	6.20	26.80	17.80	56.70	21.20	54.20	1110.00	40.70

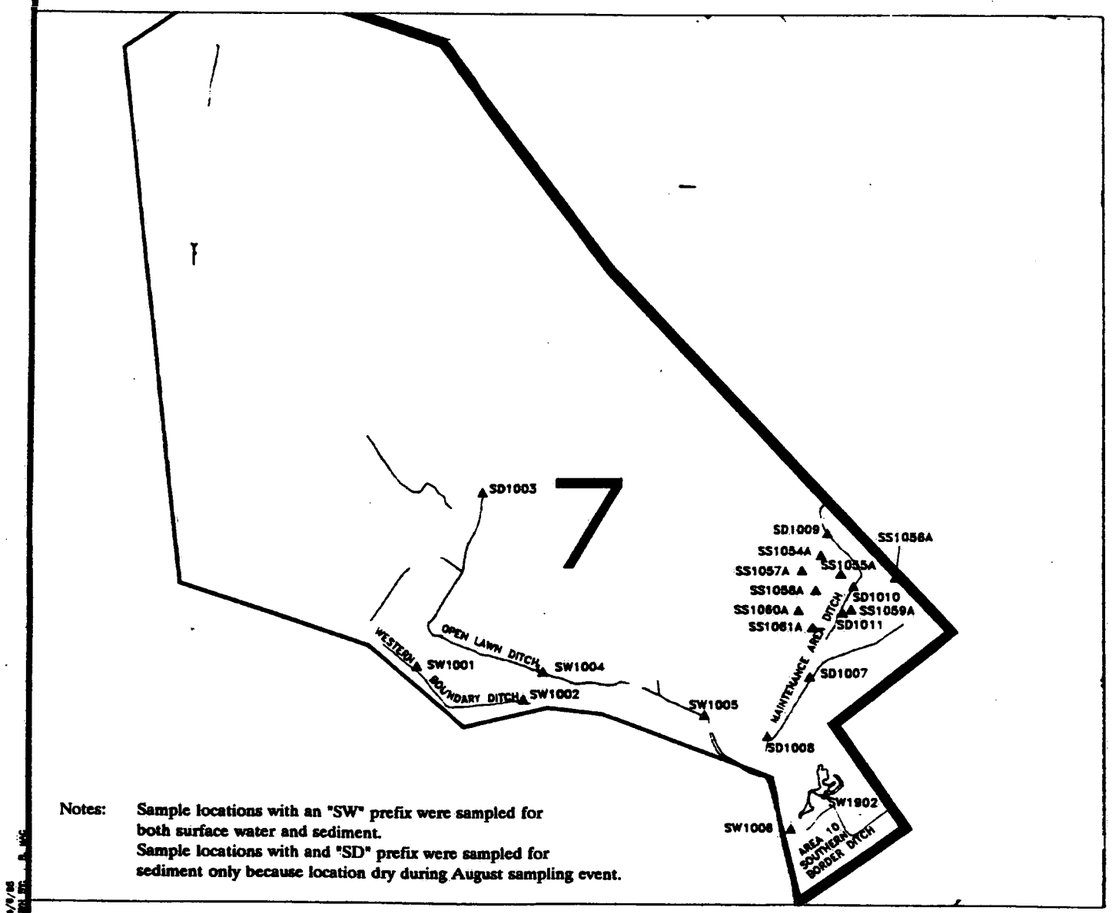
* SW-1631 is a duplicate of SW-1609.

WESTON
MANAGERS BUSINESS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS
DATE: 4/6/95
FIGURE #: 4-13A

LOCATION OF DRAINAGE





Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

GRAPHIC SCALE
150 0 150 300
1 inch = 300 ft.

NOTE:
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ANALYTICAL METAL RESULTS (UG/L) - SURFACE WATER
COUNTY PARK DRAINAGE AREA
FRESHWATER

COMPOUND	AREA 10 SOUTHERN BORDER DITCH		OPEN LAWN DITCH					WATER QUALITY CRITERIA		
	SW-1006	SW-1902	SW-1004	SW-1005	SW-1012**	SW-1001	SW-1002	NJDEP FW-2	USEPA FW ACUTE	USEPA FW CHRONIC
ARSENIC	2.10 U	2.50 J	2.10 UJ	2.10 UJ	2.10 UJ	2.10 U	2.10 UJ	0.017	360.00	190.00
CADMIUM*	2.60 UJ	2.60 UJ	3.00 UJ	3.00 UJ	3.00 UJ	3.70 J	3.00 UJ	NCA NCA	1.71 1.80	0.64 0.66
CHROMIUM*	5.80 U	6.40 J	5.80 UJ	36.80 J	5.80 UJ	5.80 U	5.80 UJ	160.00 160.00	950.58 986.64	4.99 5.18
COPPER*	3.80 J	12.80 J	5.10 J	3.90 J	2.20 J	8.40 J	6.50 J	NCA NCA	8.86 9.25	6.31 6.56
IRON	20400.00 J	NA	NA	NA	NA	1410.00 J		NCA	NCA	1000.00
LEAD*	1.70 J	1.00 U	1.00 U	1.00 U	1.40 U	2.40 J	4.90 U	5.00 5.00	32.00 33.91	1.25 1.32
NICKEL*	10.30 U	10.30 U	16.20 J	51.70 J	17.50 J	10.30 U	10.30 U	516.00 516.00	761.09 790.93	84.61 87.93

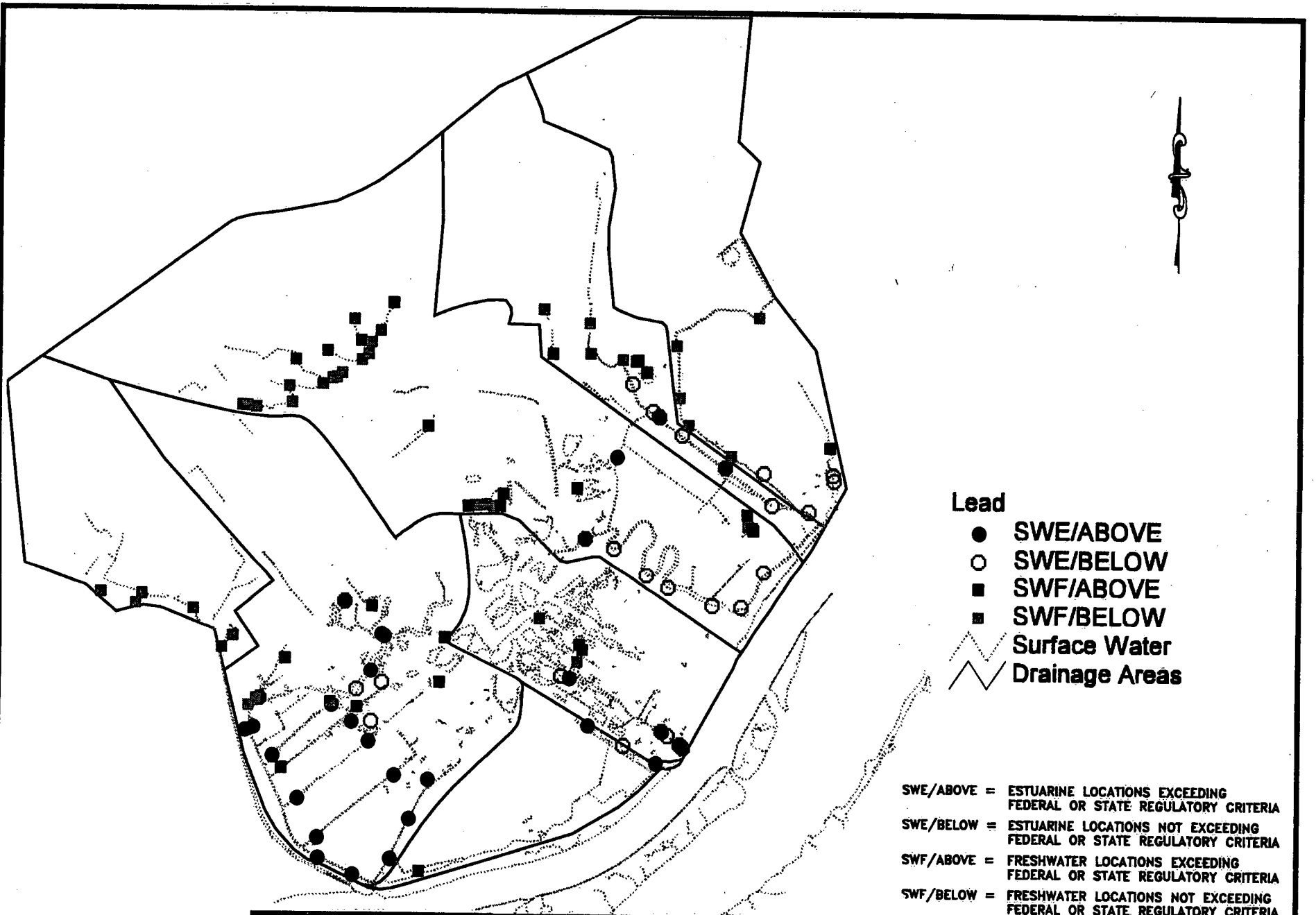
NOTE: *Cadmium, chromium, copper, lead and nickel USEPA Freshwater Acute and Chronic Surface Water Quality Criteria are based on the surface water hardness at that location.
** SW-1012 is a duplicate of SW-1005.

WESTON MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

COUNTY PARK DRAINAGE

DATE: 4/6/95
FIGURE #: 4-14



SWE/ABOVE = ESTUARINE LOCATIONS EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

SWE/BELOW = ESTUARINE LOCATIONS NOT EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

SWF/ABOVE = FRESHWATER LOCATIONS EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

SWF/BELOW = FRESHWATER LOCATIONS NOT EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

NOTE:

DUE TO OVERLAPPING SYMBOLS, NOT ALL SAMPLING LOCATIONS MAY BE EVIDENT.

– NOT TO SCALE –

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME:
FORMER RARITAN ARSENAL
PHASE II
REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

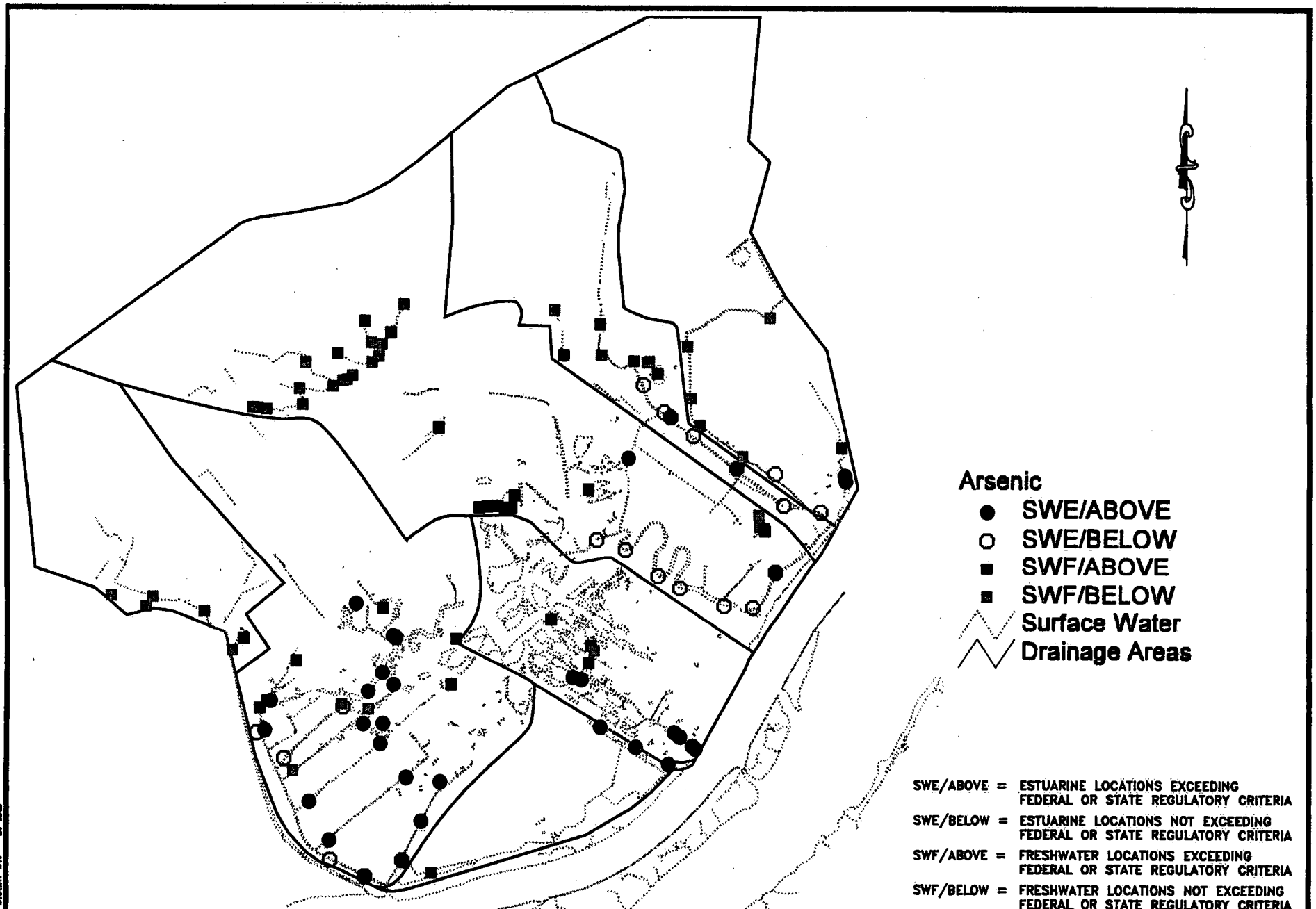
CLIENT NAME:
U.S. ARMY CORPS OF ENGINEERS

REGULATORY EXCEEDANCES OF LEAD IN SURFACE WATER

DATE: 04/12/95

FIGURE #: 4-15

REVISION #: 0000 DATE: 4/12/95
FILE NAME: SED-SW.DWG DRAWN BY: B. MAC



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– NOT TO SCALE –

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME:
FORMER RARITAN ARSENAL
PHASE II
REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

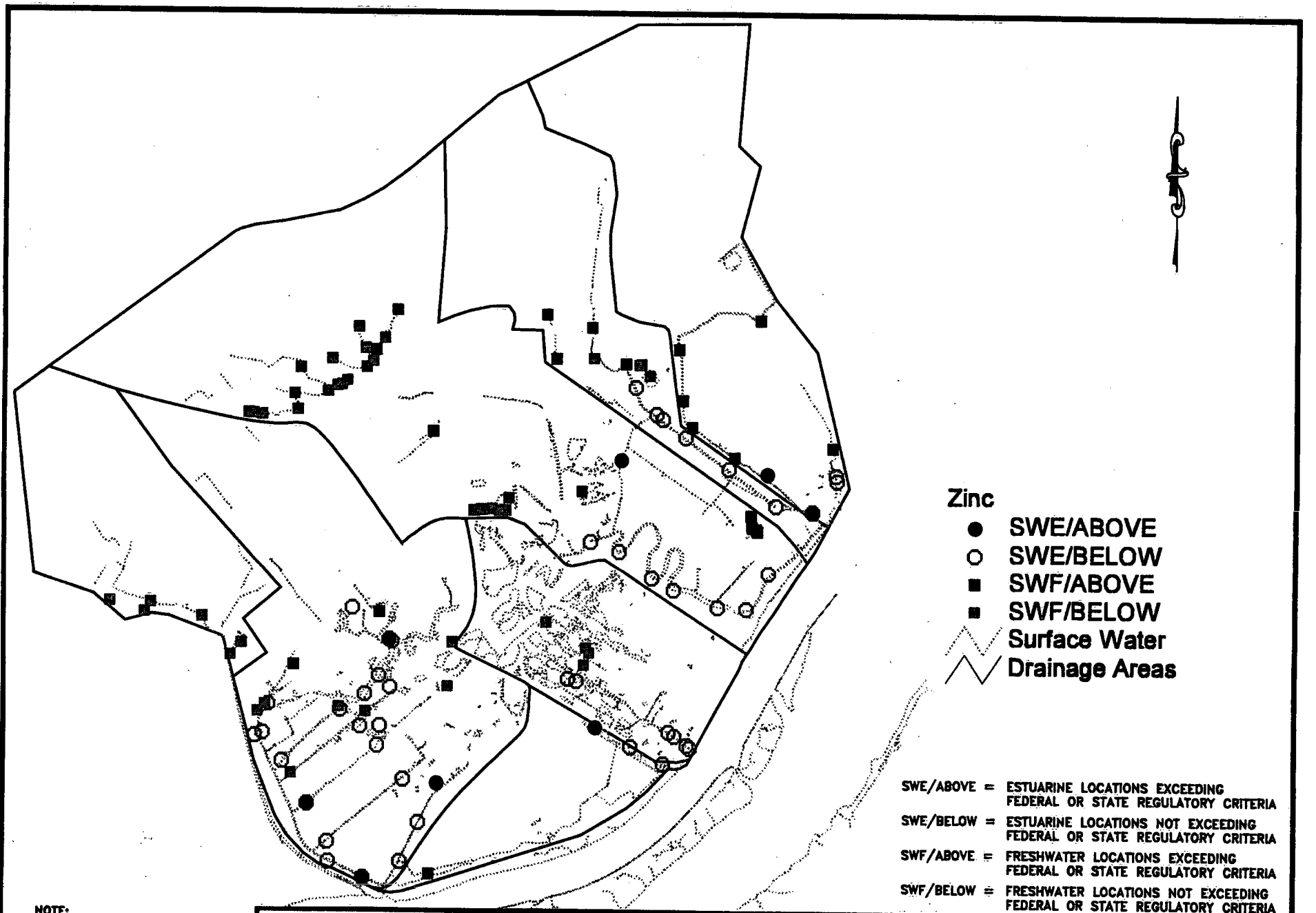
CLIENT NAME:
U.S. ARMY CORPS OF ENGINEERS

REGULATORY EXCEEDANCES OF ARSENIC IN SURFACE WATER

DATE: 04/12/95

FIGURE #: 4-16

REVISION #: 0000 DATED 4/12/95
FILE NAME: SED-SW.DWG DRAWN BY: B. MAC



NOTE:

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– NOT TO SCALE –

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME:
FORMER RARITAN ARSENAL
PHASE II
REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

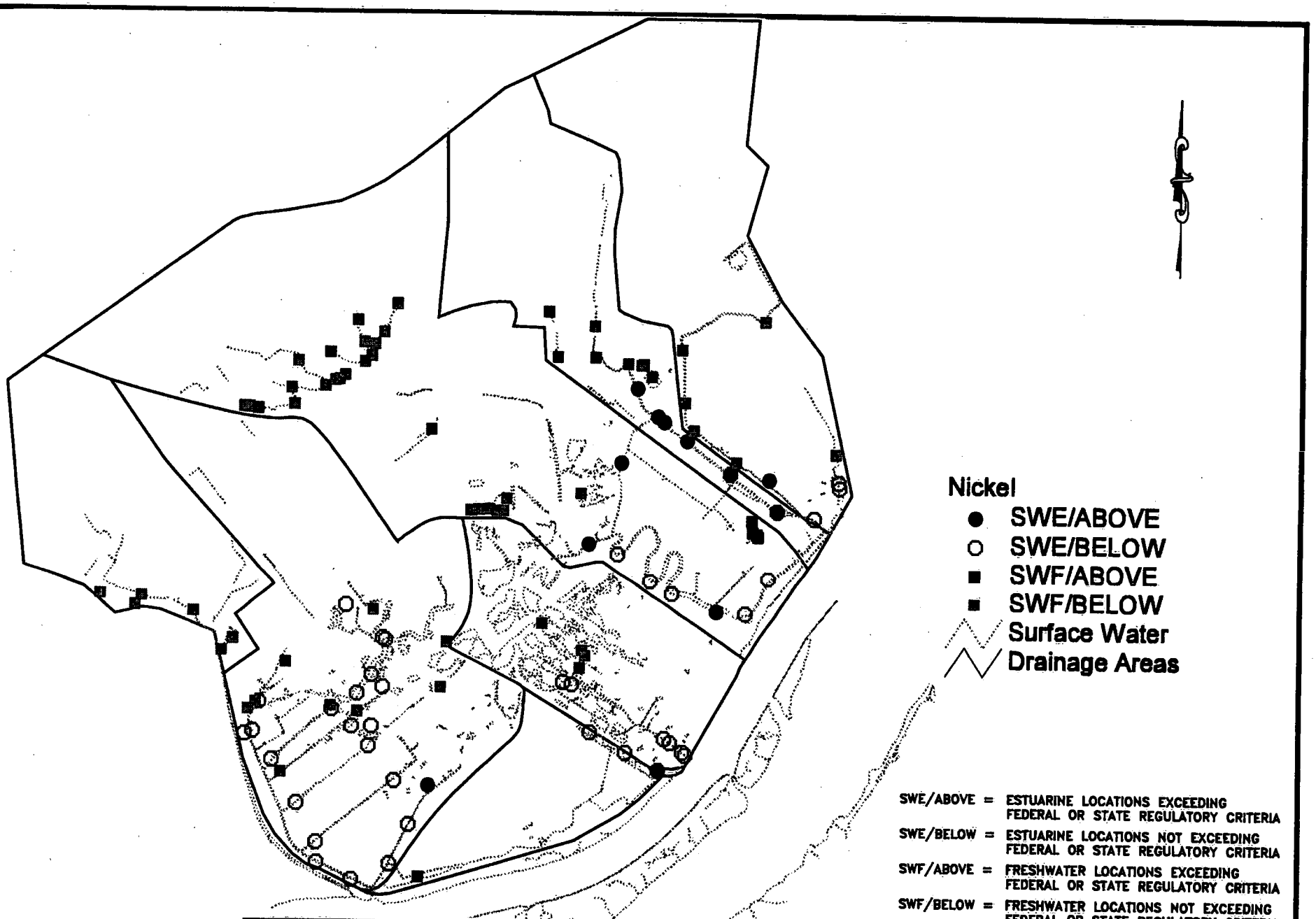
CLIENT NAME:
U.S. ARMY CORPS OF ENGINEERS

REGULATORY EXCEEDANCES OF ZINC IN SURFACE WATER

DATE: 04/12/95

FIGURE #: 4-17

REVISION #: 0000 DATE: 4/12/95
FILE NAME: SED-SW.DWG DRAWN BY: B. MAC



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NOTE:

DUE TO OVERLAPPING SYMBOLS, NOT ALL SAMPLING LOCATIONS MAY BE EVIDENT.

– NOT TO SCALE –

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME:
FORMER RARITAN ARSENAL
PHASE II
REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

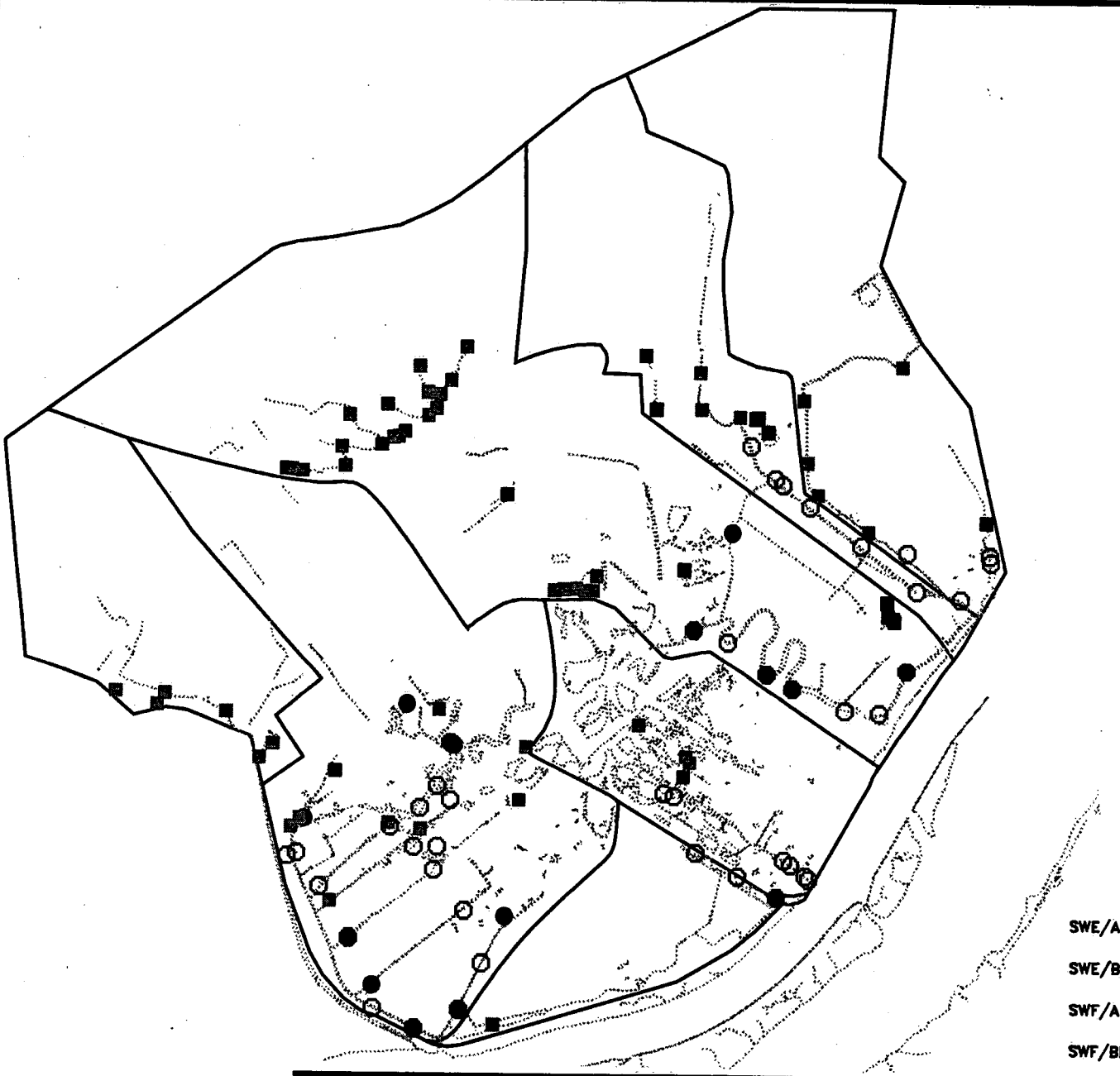
CLIENT NAME:
U.S. ARMY CORPS OF ENGINEERS

REGULATORY EXCEEDANCES OF NICKEL IN SURFACE WATER

DATE: 04/12/95

FIGURE #: 4-18

REVISION #: 0000 DATE: 4/12/95
FILE NAME: SED-SW.DWG DRAWN BY: B. MAC



Copper
- ● SWE/ABOVE
- ○ SWE/BELOW
- ■ SWF/ABOVE
- ▪ SWF/BELOW
- Surface Water
- Drainage Areas

SWE/ABOVE = ESTUARINE LOCATIONS EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

SWE/BELOW = ESTUARINE LOCATIONS NOT EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

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NOTE:

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– NOT TO SCALE –

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME:
FORMER RARITAN ARSENAL
PHASE II
REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

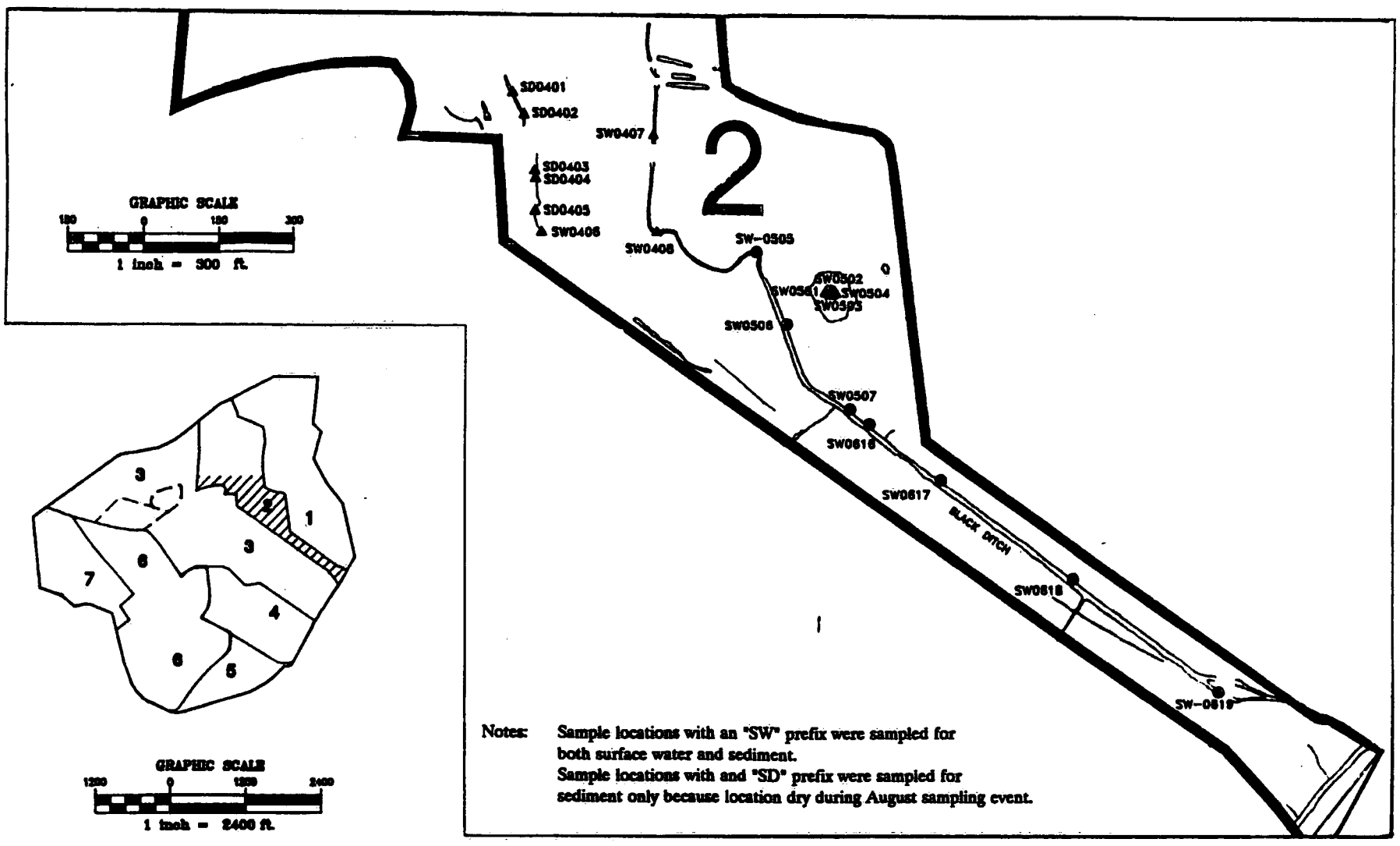
CLIENT NAME:
U.S. ARMY CORPS OF ENGINEERS

REGULATORY EXCEEDANCES OF COPPER IN SURFACE WATER

DATE: 04/12/95

FIGURE # 4-19

REVISION #: 0000 DATE: 4/12/95
FILE NAME: SED-SWJ.DWG DRAWN BY: B. MAC



ANALYTICAL EXPLOSIVE RESULTS (UG/L) - SURFACE WATER
BLACK DITCH DRAINAGE AREA
FRESHWATER

COMPOUND	AREA 4 DITCH	AREA 5 POND				BLACK DITCH			
	SW-0406	SW-0501	SW-0502	SW-0503	SW-0504	SW-0407	SW-0408	SW-0505H	SW-0505L
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 UJ	0.13 U	0.13 U
2,4,6-TRINITROTOLUENE	0.13 U	0.41	0.13 U	0.13 U	0.13 U	0.13 U	0.65 J-	0.13 U	0.13 U
AMINO-DNT'S	0.12 U	0.98	0.12 U	0.12 U	0.12 U	0.12 U	1.40 J-	0.86	0.12 U

ESTUARINE

COMPOUND	BLACK DITCH					
	SW-0506H	SW-0506L	SW-0507H	SW-0507L	SW-0616H	SW-0616L
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
AMINO-DNT'S	0.85	0.47	0.77	0.54	0.79	0.56

COMPOUND	BLACK DITCH						
	SW-0617H	SW-0617L	SW-0618H	SW-0618L	SW-0619H	SW-0619L	SW-0620*
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
AMINO-DNT'S	0.37	0.57	0.12 U	0.25	0.12 U	0.12 U	0.12 U

* SW -0620 is a duplicate of SW-0619L.

BLACK DITCH DRAINAGE AREA
ALL VALUES IN (ug/L)

COMPOUND	FRESHWATER WATER QUALITY CRITERIA			ESTUARINE WATER QUALITY CRITERIA		
	NJDEP FW-2	USEPA FW ACUTE	USEPA FW CHRONIC	NJDEP SE-1	USEPA MARINE ACUTE	USEPA MARINE CHRONIC
1,3,5-TRINITROBENZENE	NCA	NCA	NCA	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	NCA	NCA	NCA	NCA	NCA	NCA
AMINO-DNT'S	NCA	NCA	NCA	NCA	NCA	NCA

REVISION #: 1 DATE: 4/7/95
FILE NAME: BASE-RVB.DWG DRAWN BY: B. MAC

WESTON
MANAGERS DESIGNERS/CONSULTANTS

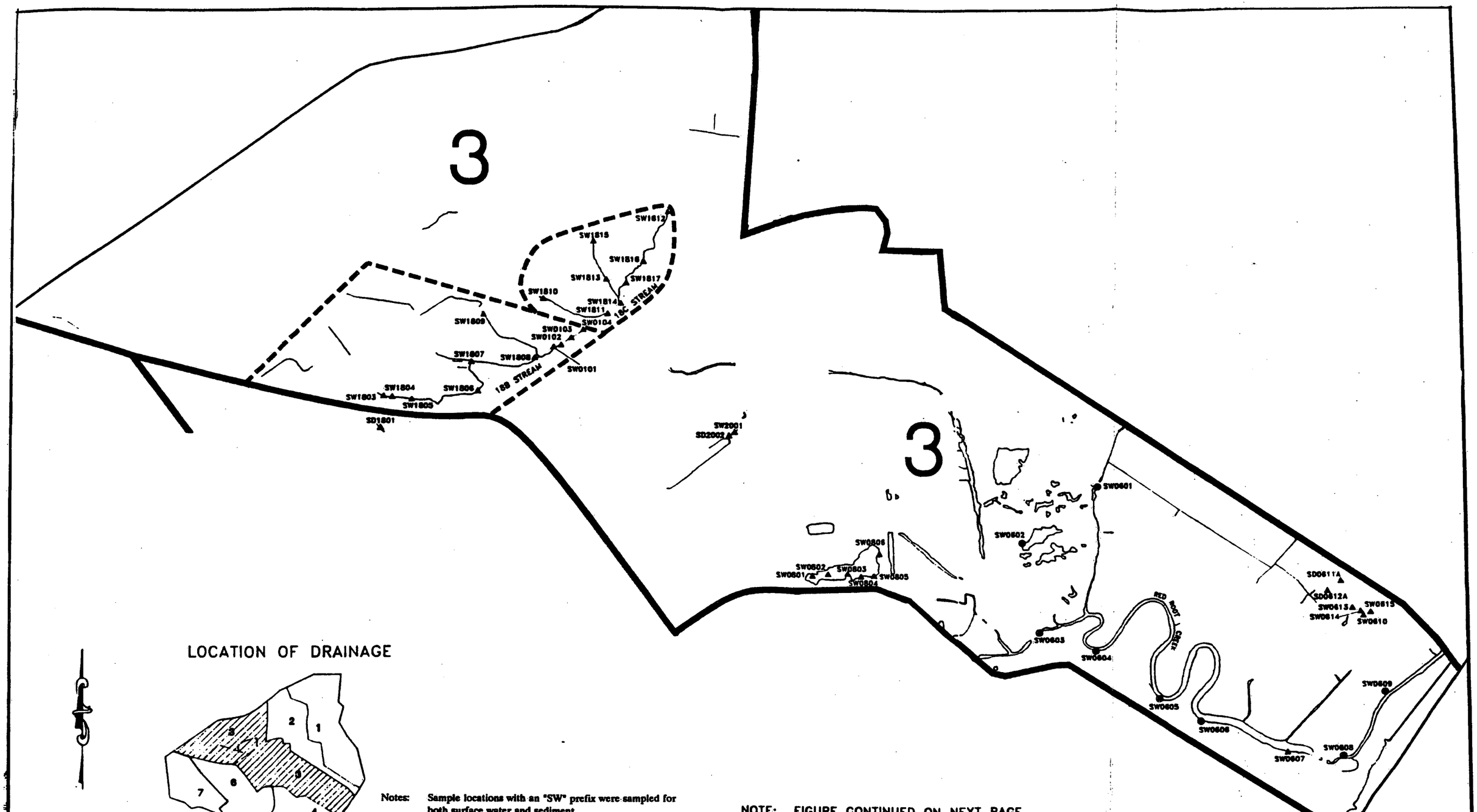
PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

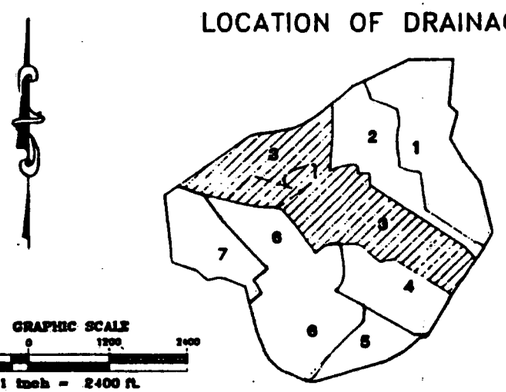
BLACK DITCH DRAINAGE

DATE: 4/7/95

FIGURE #: 4-20



LOCATION OF DRAINAGE



GRAPHIC SCALE

1200 0 1200 2400

1 inch = 2400 ft.

Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

NOTE:
- THIS SITE MAP HAS BEEN ADAPTED FROM A PHOTOGRAMMETRIC BASEMAP OF THE FORMER RARITAN ARSENAL PREPARED BY GEOD CORPORATION (12/22/92 OVERFLIGHT PHOTOGRAPHY) UNDER SUBCONTRACT TO WESTON.

NOTE: FIGURE CONTINUED ON NEXT PAGE.

WESTON MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

RED ROOT CREEK DRAINAGE

DATE: 4/6/95

FIGURE #: 4-21

ANALYTICAL EXPLOSIVE RESULTS (UG/L) - SURFACE WATER
RED ROOT CREEK DRAINAGE AREA
FRESHWATER

COMPOUND	AREA 20 DITCH	AREA 18B STREAM							
	SW-2001	SW-1803	SW-1804	SW-1805	SW-1806	SW-1807	SW-1808	SW-1809	SW-1818*
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.15	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
2,4,6-TRINITROTOLUENE	0.13 U	0.14	2.80	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
AMINO-DNT'S	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U

* SW-1818 is a duplicate of SW-1809.

COMPOUND	AREA 18C STREAM								LOWER 18B STREAM
	SW-1810	SW-1811	SW-1812	SW-1813	SW-1814	SW-1815	SW-1816	SW-1817	SW-0101
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
AMINO-DNT'S	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U

COMPOUND	LOWER AREA 18B STREAM			AREA 8 POND					
	SW-0102	SW-0103	SW-0104	SW-0801	SW-0802	SW-0803	SW-0804	SW-0805	SW-0806
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
AMINO-DNT'S	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U

COMPOUND	AREA 8 POND	RED ROOT CREEK		SULFUR PLANT PONDS			
	SW-0807*	SW-0602H	SW-0602L	SW-0810	SW-0613	SW-0614	SW-0615
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
AMINO-DNT'S	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U

* SW-0807 is a duplicate of SW-0801.

ANALYTICAL EXPLOSIVE RESULTS (UG/L) - SURFACE WATER
RED ROOT CREEK DRAINAGE AREA
ESTUARINE

COMPOUND	RED ROOT CREEK						
	SW-0601H	SW-0601L	SW-0603H	SW-0603L	SW-0604H	SW-0604L	SW-0605H
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
AMINO-DNT'S	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U

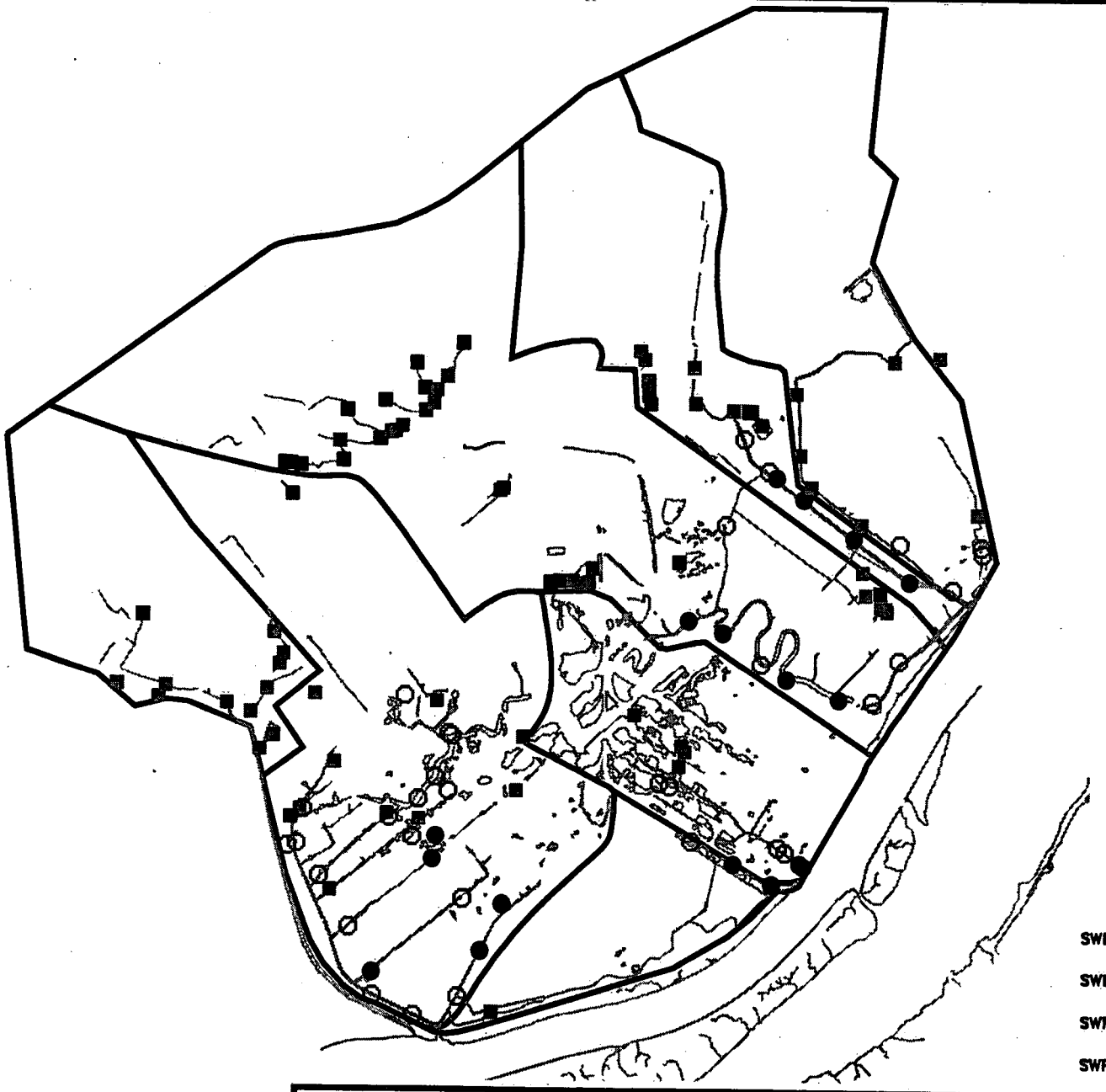
COMPOUND	RED ROOT CREEK							
	SW-0605L	SW-0606H	SW-0606L	SW-0607	SW-0608H	SW-0608L	SW-0609H	SW-0609L
1,3,5-TRINITROBENZENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
2,4,6-TRINITROTOLUENE	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
AMINO-DNT'S	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U

RED ROOT CREEK DRAINAGE AREA
ALL VALUES IN (ug/L)

COMPOUND	FRESHWATER			ESTUARINE		
	WATER QUALITY CRITERIA			WATER QUALITY CRITERIA		
	NJDEP FW-2	USEPA FW ACUTE	USEPA FW CHRONIC	NJDEP SE-1	USEPA MARINE ACUTE	USEPA MARINE CHRONIC
1,3,5-TRINITROBENZENE	NCA	NCA	NCA	NCA	NCA	NCA
2,4,6-TRINITROTOLUENE	NCA	NCA	NCA	NCA	NCA	NCA
AMINO-DNT'S	NCA	NCA	NCA	NCA	NCA	NCA

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS
DATE: 4/6/95
FIGURE #: 4-21A



Total PAHs

- ● SWE/ABOVE
- ○ SWE/BELOW
- ■ SWF/ABOVE
- ■ SWF/BELOW
- Surface Water
- Drainage Area

SWE/ABOVE = ESTUARINE LOCATIONS EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

SWE/BELOW = ESTUARINE LOCATIONS NOT EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

SWF/ABOVE = FRESHWATER LOCATIONS EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

SWF/BELOW = FRESHWATER LOCATIONS NOT EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

NOTE:

DUE TO OVERLAPPING SYMBOLS, NOT ALL SAMPLING LOCATIONS MAY BE EVIDENT.

– NOT TO SCALE –

WESTON MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION

EDISON, NEW JERSEY

CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

LOCATIONS EXCEEDING TOTAL PAH GUIDELINES IN SEDIMENT

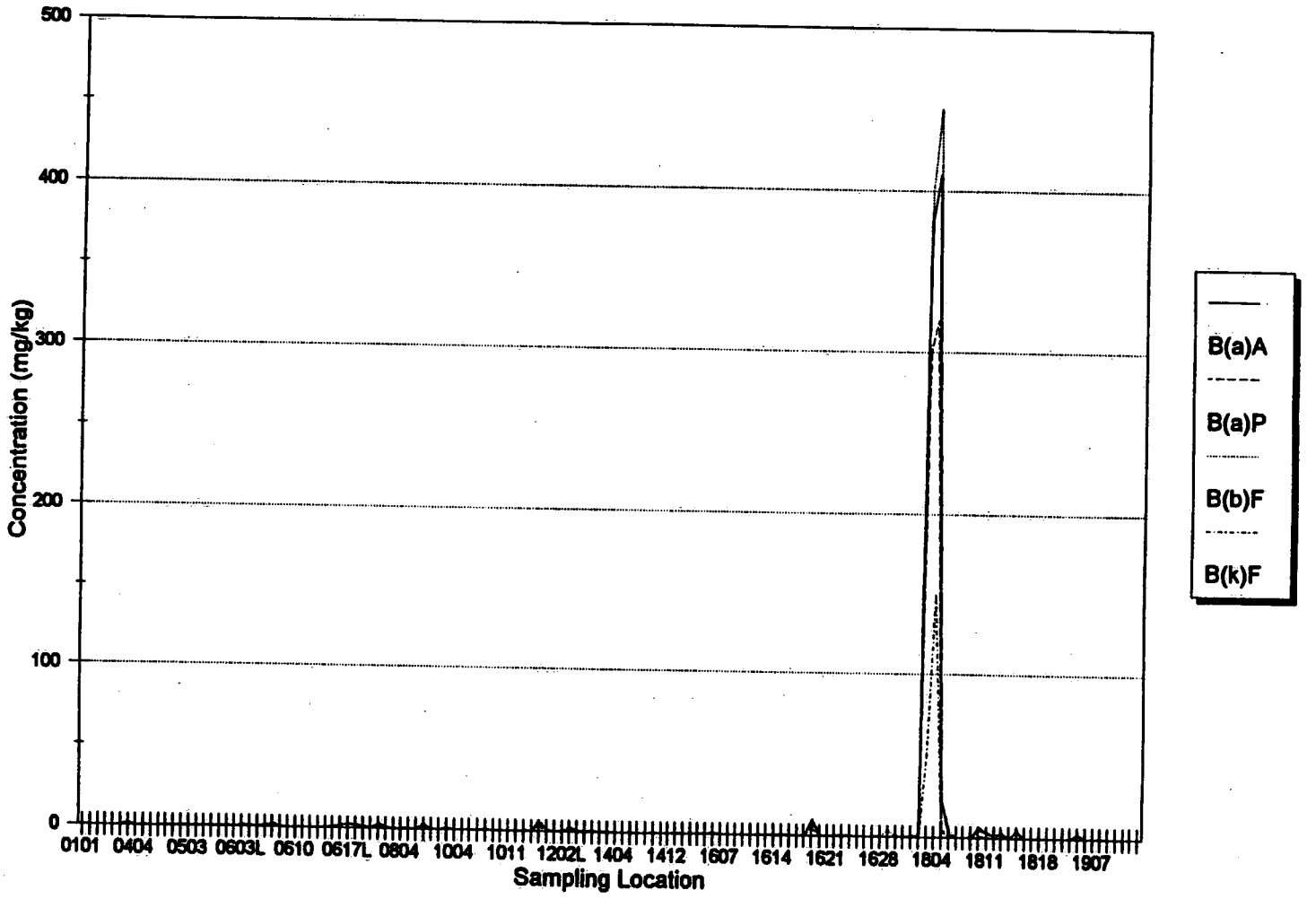
DATE: 04/12/95

FIGURE #: 4-22

REVISION #: 0000 DATE: 5/16/95
FILE NAME: TBLCONS.DWG DRAWN BY: B. MAC

PAH Concentrations in Sediment

Former Raritan Arsenal



Note: Sampling locations are listed minus the prefix "SD".

- NOT TO SCALE -

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME:
FORMER RARITAN ARSENAL
PHASE II
REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

CLIENT NAME:
U.S. ARMY CORPS OF ENGINEERS

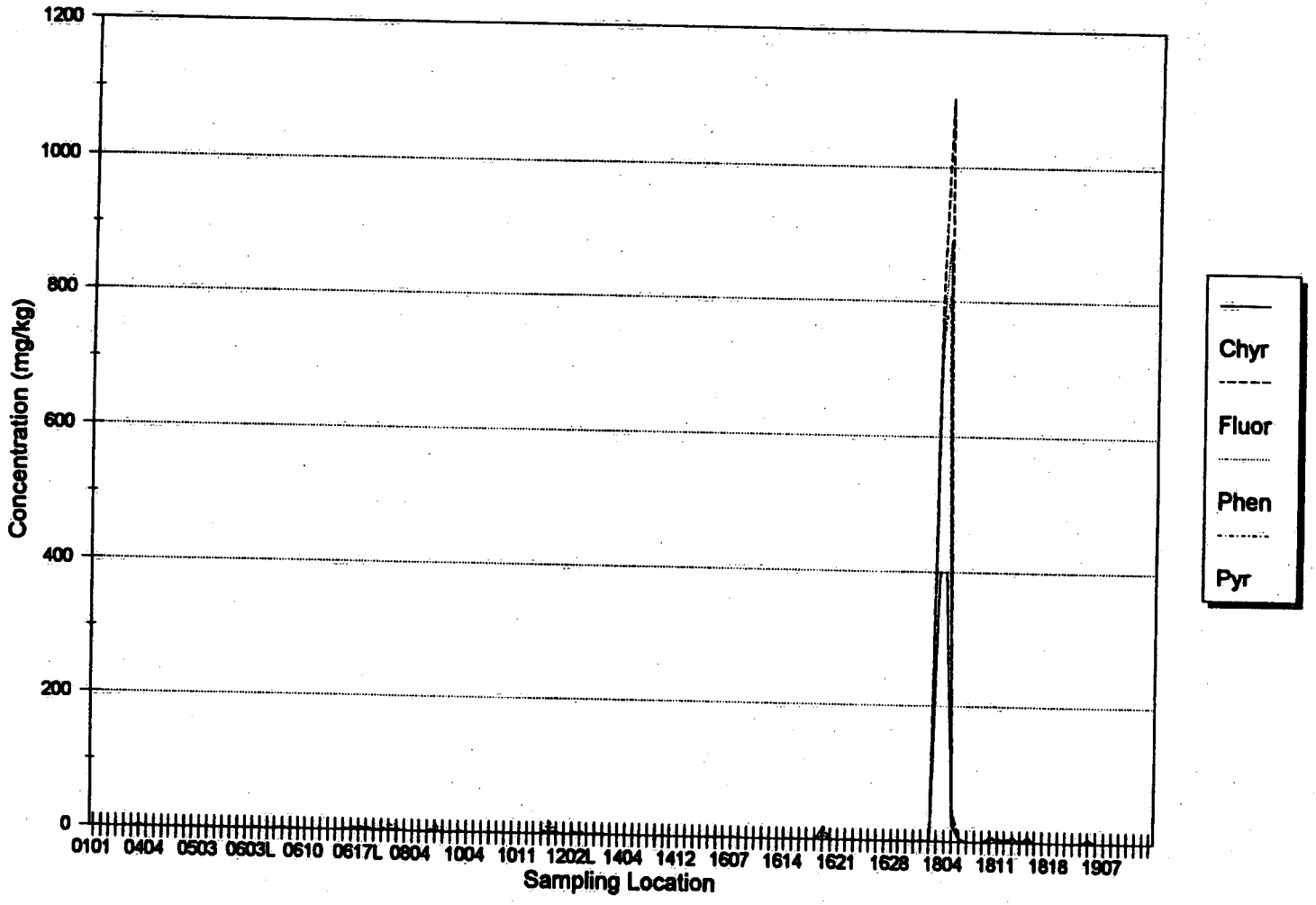
COLLOCATION OF PAHs
IN SEDIMENT

DATE: 04/12/95

FIGURE #: 4-22A

PAH Concentrations In Sediment

Former Raritan Arsenal



Note: Sampling locations are listed minus the prefix "SD".

- NOT TO SCALE -

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME:
FORMER RARITAN ARSENAL
PHASE II
REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

CLIENT NAME:
U.S. ARMY CORPS OF ENGINEERS

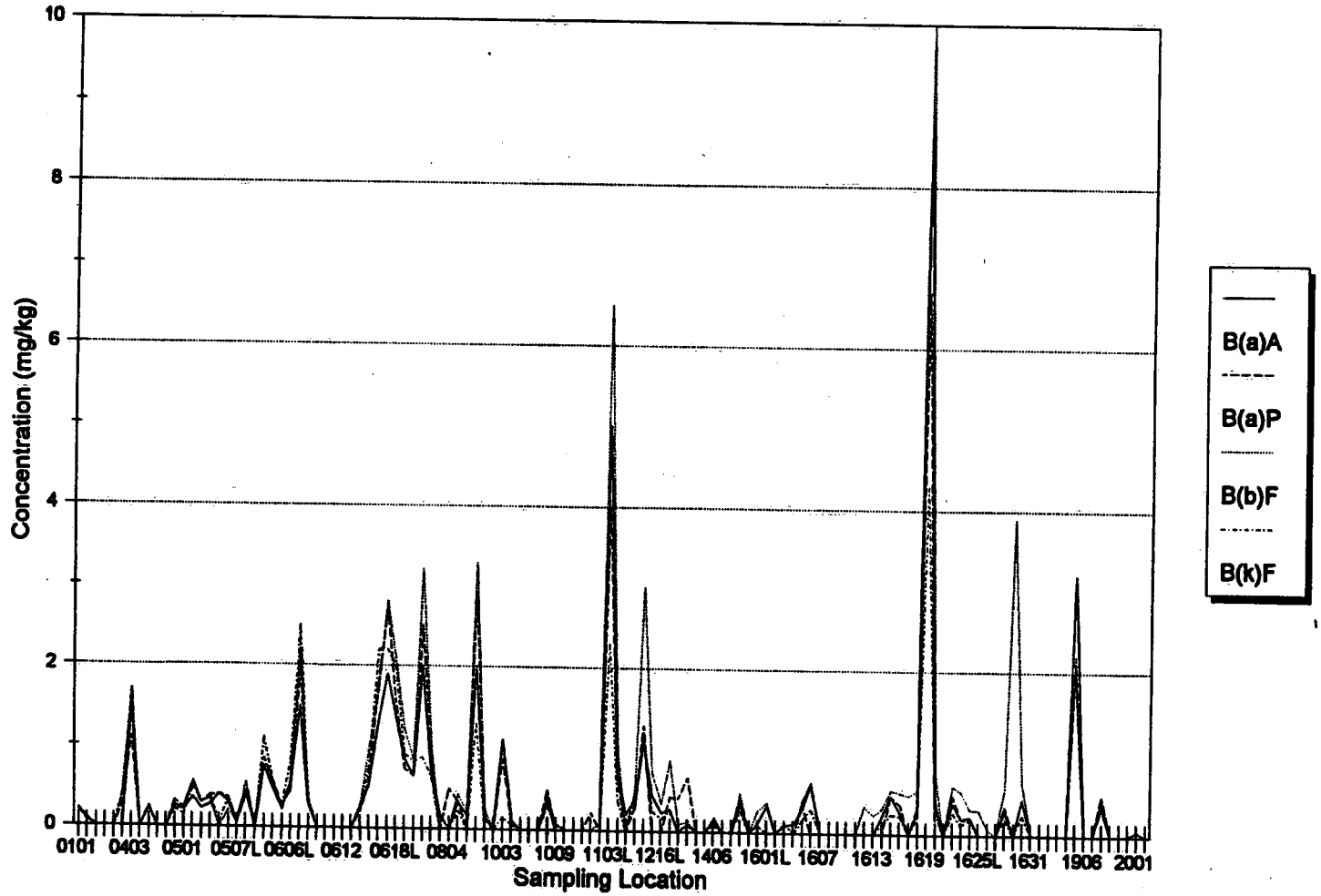
COLLOCATION OF PAHs
IN SEDIMENT

DATE: 04/12/95

FIGURE #: 4-22B

PAH Concentrations in Sediment

Former Raritan Arsenal Minus Area 18



Note: Sampling locations are listed minus the prefix "SD".

- NOT TO SCALE -

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME:
FORMER RARITAN ARSENAL
PHASE II
REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

CLIENT NAME:
U.S. ARMY CORPS OF ENGINEERS

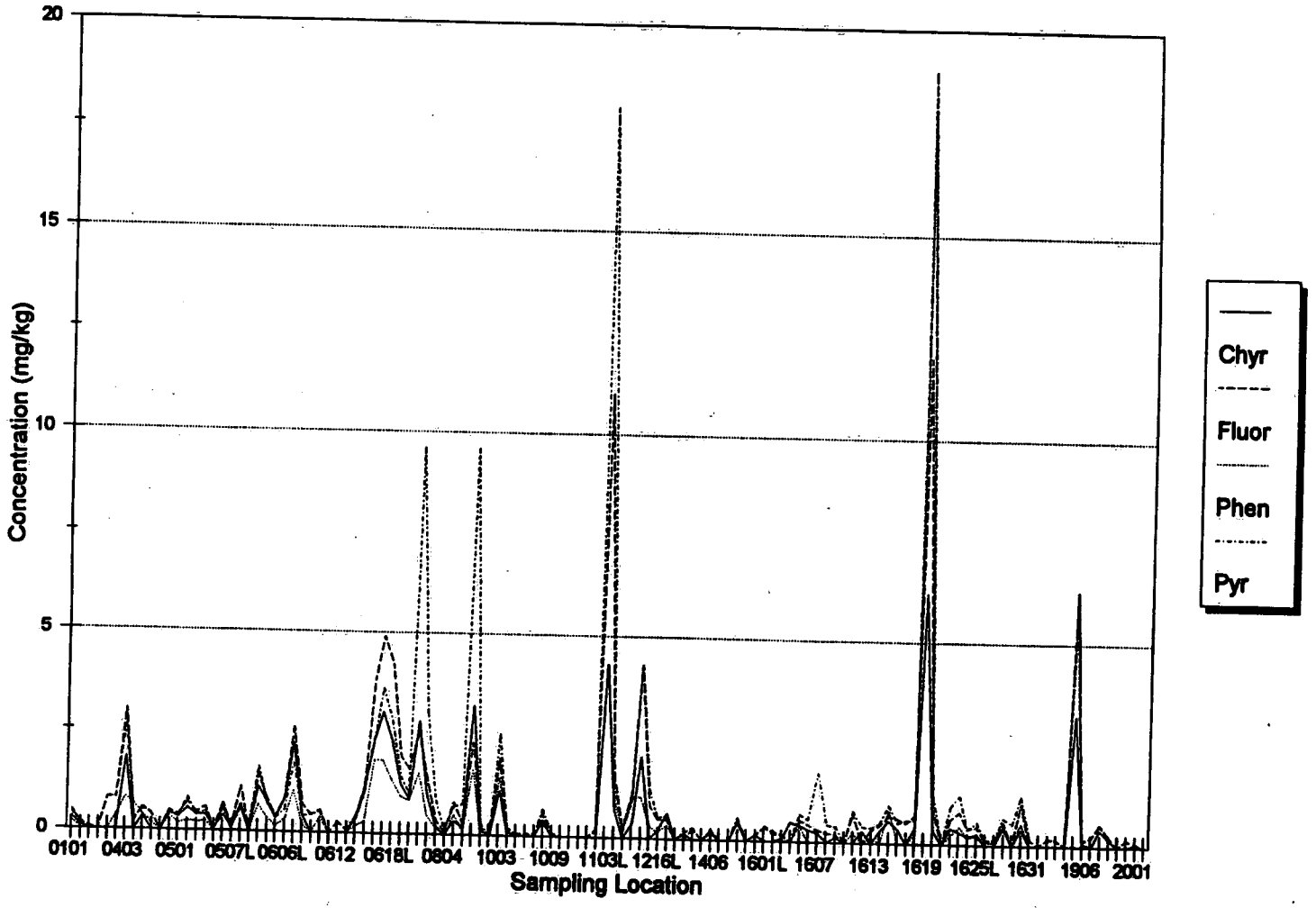
COLLOCATION OF PAHs
IN SEDIMENT

DATE: 04/12/95

FIGURE #: 4-22C

PAH Concentrations in Sediment

Former Raritan Arsenal Minus Area 18



Note: Sampling locations are listed minus the prefix "SD".

- NOT TO SCALE -

WESTON
MANAGERS DESIGNERS/CONSULTANTS

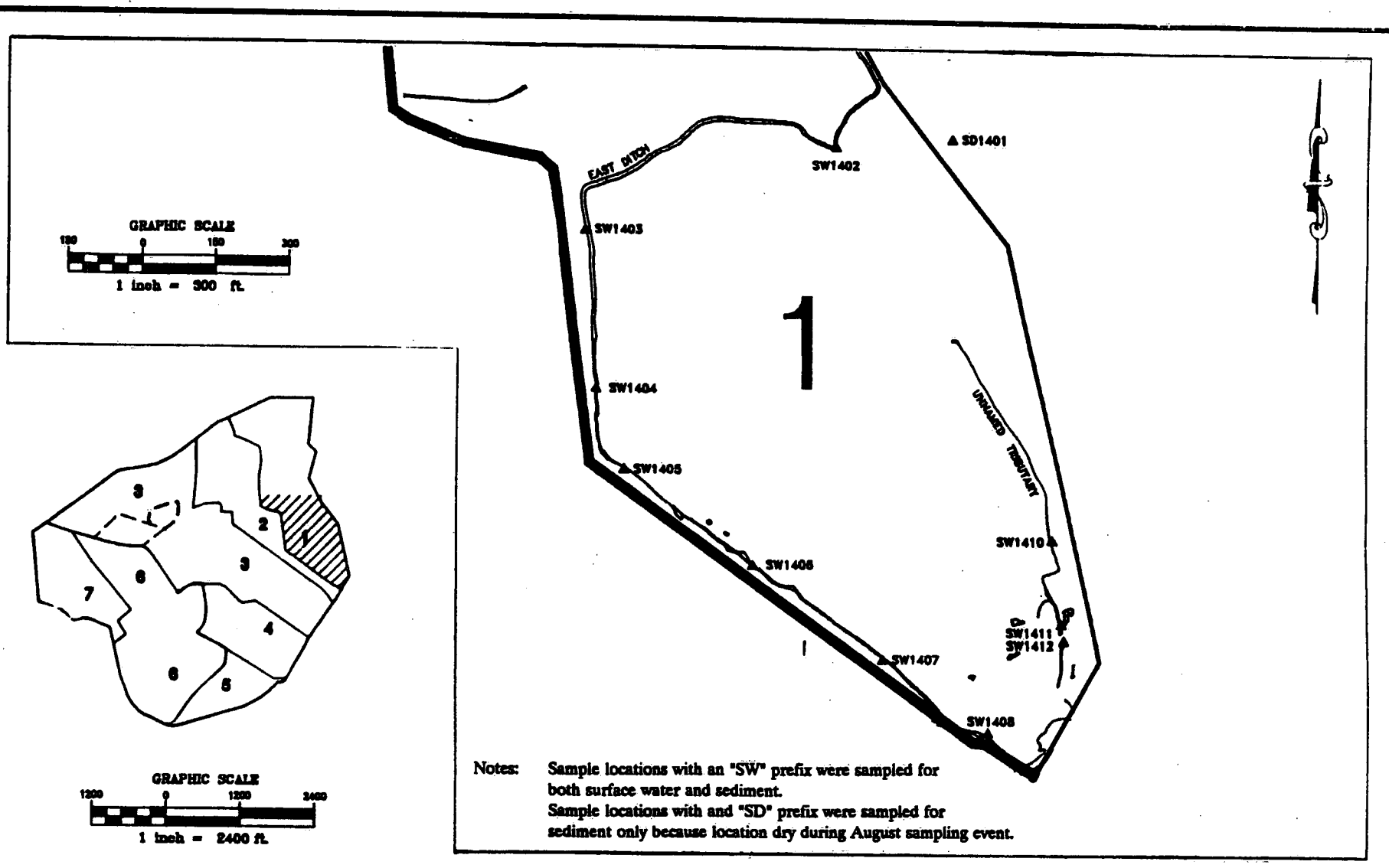
PROJECT NAME:
FORMER RARITAN ARSENAL
PHASE II
REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

CLIENT NAME:
U.S. ARMY CORPS OF ENGINEERS

COLLOCATION OF PAHs
IN SEDIMENT

DATE: 04/12/95

FIGURE #: 4-22D



Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

ANALYTICAL SVOC RESULTS (MG/KG) - SEDIMENT
EAST DITCH DRAINAGE AREA
FRESHWATER

COMPOUND	EAST DITCH					UNNAMED TRIBUTARY	UPGRADIENT SCIRPUS MARSH
	SD-1402	SD-1403	SD-1404	SD-1405	SD-1406	SD-1410	SD-1401
TARGETED SVOCs							
BENZO(A)ANTHRACENE	0.400 U	0.084 J	1.100 UJ	5.300 UJ	0.130 J	0.340 J	0.270 J
BENZO(A)PYRENE	0.400 U	0.650 U	1.100 UJ	5.300 UJ	0.120 J	0.390 J	0.410 J
BENZO(GHI)PERYLENE	0.400 U	0.650 U	1.100 UJ	5.300 UJ	0.570 U	1.600 UJ	0.400 J
BENZO(K)FLUORANTHRENE	0.400 U	0.078 J	1.100 UJ	5.300 UJ	0.092 J	0.280 J	0.250 J
CHRYSENE	0.400 U	0.140 J	1.100 UJ	5.300 UJ	0.210 J	0.440 J	0.620
PYRENE	0.400 U	0.180 J	0.290 J	5.300 UJ	0.250 J	0.550 J	0.570
TOTAL PAHs (Ontario)	ND	0.482	0.540	ND	1.182	2.480	3.850

ANALTICAL SVOC RESULTS (MG/KG) - SEDIMENT
EAST DITCH DRAINAGE AREA
ESTUARINE

COMPOUND	EAST DITCH		UNNAMED TRIBUTARY	
	SD-1407	SD-1408	SD-1411	SD-1412
TARGETED SVOCs				
BENZO(A)ANTHRACENE	57.000 UJ	0.770 UJ	11.000 UJ	0.100 J
BENZO(A)PYRENE	57.000 UJ	0.770 UJ	11.000 UJ	0.700 UJ
BENZO(GHI)PERYLENE	57.000 UJ	0.770 UJ	11.000 UJ	0.700 UJ
BENZO(K)FLUORANTHRENE	57.000 UJ	0.770 UJ	11.000 UJ	0.083 J
CHRYSENE	57.000 UJ	0.770 UJ	11.000 UJ	0.150 J
PYRENE	57.000 UJ	0.770 UJ	11.000 UJ	0.140 J
TOTAL PAHs (NOAA)	ND	ND	ND	0.883

COMPOUND	FRESHWATER SEDIMENT QUALITY CRITERIA		ESTUARINE SEDIMENT QUALITY CRITERIA	
	Ontario LEL	Ontario SEL (Based on TOC)	NOAA ER-L	NOAA ER-M
TARGETED SVOCs				
BENZO(A)ANTHRACENE	0.320	1480	0.23	1.6
BENZO(A)PYRENE	0.370	1440	0.4	2.5
BENZO(GHI)PERYLENE	0.170	320	NCA	NCA
BENZO(K)FLUORANTHRENE	0.240	1340	NCA	NCA
CHRYSENE	0.340	460	0.4	2.8
PYRENE	0.490	850	0.35	2.2
TOTAL PAHs (Ontario/NOAA)	4	10000	4	35

ANALYTICAL PESTICIDE RESULTS (MG/KG) - SEDIMENT
EAST DITCH DRAINAGE AREA
FRESHWATER

COMPOUND	UPGRADIENT SCIRPUS MARSH	EAST DITCH					UNNAMED TRIBUTARY
	SD-1401	SD-1402	SD-1403	SD-1404	SD-1405	SD-1406	SD-1410
4,4'-DDD	0.130 U	0.049 U	0.160 U	1.300 UJ	1.300 UJ	0.140 U	0.130 J
ALDRIN	0.022	0.024 U	0.080 U	0.630 UJ	0.650 UJ	0.068 U	0.200 UJ
BETA BHC	0.065 U	0.006	0.027	0.630 UJ	0.650 UJ	0.068 U	0.200 UJ

ANALYTICAL PESTICIDE RESULTS (MG/KG) - SEDIMENT
EAST DITCH DRAINAGE AREA
ESTUARINE

COMPOUND	EAST DITCH		UNNAMED TRIBUTARY	
	SD-1407	SD-1406	SD-1411	SD-1412
4,4'-DDD	2.800 UJ	0.190 UJ	1.400 UJ	0.850 UJ
ALDRIN	1.400 UJ	0.094 UJ	0.690 UJ	0.430 UJ
BETA BHC	1.400 UJ	0.094 UJ	0.690 UJ	0.430 UJ

COMPOUND	FRESHWATER SEDIMENT QUALITY CRITERIA		ESTUARINE SEDIMENT QUALITY CRITERIA	
	Ontario LEL	Ontario SEL (Based on TOC)	NOAA ER-L	NOAA ER-M
4,4'-DDD	0.008	6.00	0.002	0.02
ALDRIN	0.002	8.00	NCA	NCA
BETA BHC	0.005	21.00	NCA	NCA

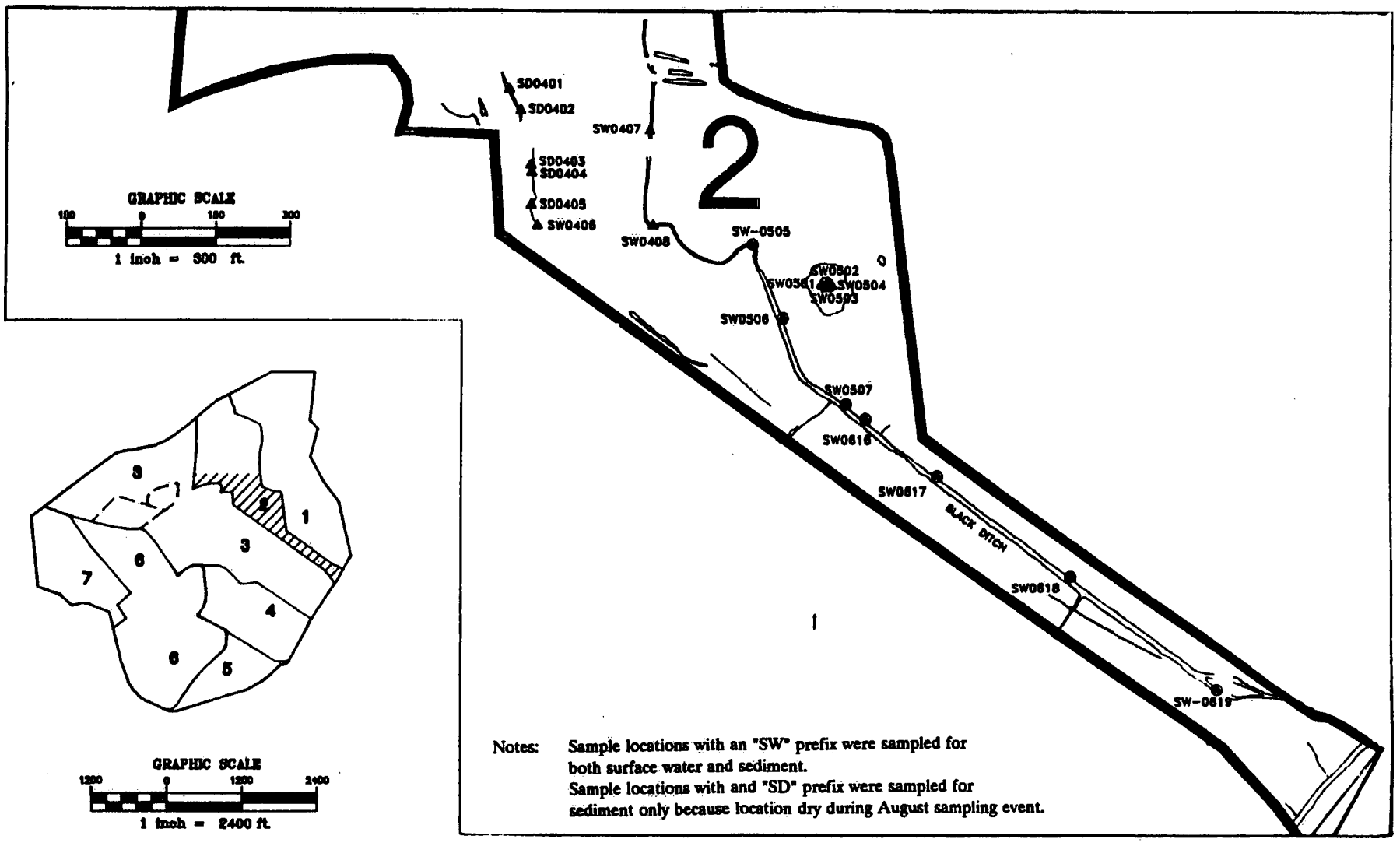
WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

EAST DITCH DRAINAGE

DATE: 4/7/95
FIGURE #: 4-23

REVISION #: 1 DATE: 4/7/95
FILE NAME: BASE-RTN.DWG DRAWN BY: B. MAC



Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

ANALITCAL SVOC RESULTS (MG/KG) - SEDIMENT
BLACK DITCH DRAINAGE AREA
FRESHWATER

COMPOUND	AREA 4 DITCH						AREA 5 POND				BLACK DITCH		
	SD-0401	SD-0402	SD-0403	SD-0404	SD-0405	SD-0406	SD-0501	SD-0502	SD-0503	SD-0504	SD-0407	SD-0408	SD-0505
TARGETED SVOCs													
ACENAPHTHENE	1.900 UJ	1.600 UJ	1.000 UJ	0.640 U	0.630 U	0.820 UJ	0.760 UJ	1.300 UJ	0.760 UJ	0.980 UJ	0.410 U	0.480 U	0.390 U
ANTHRACENE	1.900 UJ	1.600 UJ	0.420 J	0.640 U	0.096 J	0.820 UJ	0.760 UJ	1.300 UJ	0.760 UJ	0.980 UJ	0.410 U	0.067 J	0.390 U
BENZO(A)ANTHRACENE	1.900 UJ	1.600 UJ	1.500 J	0.640 U	0.230 J	0.820 UJ	0.200 J	0.350 J	0.220 J	0.270 J	0.410 U	0.260 J	0.390 U
BENZO(A)PYRENE	1.900 UJ	0.260 J	1.100 J	0.640 U	0.220 J	0.820 UJ	0.230 J	0.530 J	0.280 J	0.370 J	0.410 U	0.310 J	0.390 U
BENZO(GHI)PERYLENE	1.900 UJ	1.600 UJ	0.770 J	0.640 U	0.150 J	0.820 UJ	0.760 UJ	1.300 UJ	0.760 UJ	0.980 UJ	0.410 U	0.480 U	0.390 U
BENZO(K)FLUORANTHRENE	1.900 UJ	0.370 J	1.600 J	0.640 U	0.240 J	0.820 UJ	0.140 J	0.480 J	0.280 J	0.380 J	0.410 U	0.210 J	0.044 J
CHRYSENE	1.900 UJ	1.600 UJ	1.800 J	0.640 U	0.320 J	0.820 UJ	0.320 J	0.560 J	0.400 J	0.390 J	0.410 U	0.420 J	0.059 J
DIBENZO(A,H)ANTHRACENE	1.900 UJ	1.600 UJ	0.270 J	0.640 U	0.630 U	0.820 UJ	0.760 UJ	1.300 UJ	0.760 UJ	0.980 UJ	0.410 U	0.480 U	0.390 U
FLUORANTHRENE	0.790 J	0.770 J	3.000 J	0.230 J	0.560 J	0.390 J	0.390 J	0.700 J	0.450 J	0.580 J	0.410 U	0.460 J	0.046 J
FLUORENE	1.900 UJ	1.600 UJ	1.000 UJ	0.640 U	0.630 U	0.820 UJ	0.760 UJ	1.300 UJ	0.760 UJ	0.980 UJ	0.410 U	0.480 U	0.390 U
INDENO(1,2,3-C,D)PYRENE	1.900 UJ	1.600 UJ	0.760 J	0.640 U	0.130 J	0.820 UJ	0.760 UJ	1.300 UJ	0.760 UJ	0.980 UJ	0.410 U	0.480 U	0.390 U
PHENANTHRENE	1.900 UJ	0.350 J	0.790 J	0.640 U	0.370 J	0.160 J	0.170 J	0.230 J	0.200 J	0.230 J	0.410 U	0.350 J	0.390 U
PYRENE	0.780 J	0.790 J	2.600 J	0.220 J	0.520 J	0.400 J	0.330 J	0.800 J	0.380 J	0.480 J	0.410 U	0.490	0.051 J
TOTAL PAHs (Ontario)	1.570	2.540	14.830	0.450	2.836	0.950	1.780	3.650	2.210	2.700	ND	2.567	0.200

ANALITCAL SVOC RESULTS (MG/KG) - SEDIMENT
BLACK DITCH DRAINAGE AREA
ESTUARINE

COMPOUND	BLACK DITCH						
	SD-0506	SD-0507	SD-0616	SD-0617	SD-0618	SD-0619	SD-0620
TARGETED SVOCs							
ACENAPHTHENE	0.470 U	0.430 U	1.400 UJ	0.220 J	0.120 J	0.940 UJ	0.820 UJ
ANTHRACENE	0.150 J	0.430 U	0.420 J	0.420 J	0.470 J	0.230 J	0.090 J
BENZO(A)ANTHRACENE	0.300 J	0.052 J	1.300 J	1.900 J	1.400 J	0.840 J	0.630 J
BENZO(A)PYRENE	0.350 J	0.047 J	1.800 J	2.700 J	1.600 J	0.720 J	0.640 J
BENZO(GHI)PERYLENE	0.470 U	0.430 U	0.620 J	0.780 J	0.900 J	0.430 J	0.820 UJ
BENZO(K)FLUORANTHRENE	0.350 J	0.053 J	2.200 J	2.200 J	2.000 J	0.910 J	0.810 J
CHRYSENE	0.400 J	0.081 J	2.300 J	3.000 J	2.300 J	1.200 J	0.860 J
DIBENZO(A,H)ANTHRACENE	0.470 U	0.430 U	0.130 J	1.800 UJ	0.620 J	0.940 UJ	0.820 UJ
FLUORANTHRENE	0.680	0.095 J	3.800 J	4.900 J	4.200 J	1.900 J	1.600 J
FLUORENE	0.054 J	0.430 U	1.400 UJ	0.310 J	0.270 J	0.110 J	0.096 J
INDENO(1,2,3-C,D)PYRENE	0.470 U	0.430 U	0.950 J	0.760 J	0.940 J	0.410 J	0.820 UJ
PHENANTHRENE	0.550	0.054 J	1.800 J	1.800 J	1.300 J	0.900 J	0.810 J
PYRENE	0.610	0.085 J	2.300 J	3.600 J	2.800 J	1.400 J	0.980 J
TOTAL PAHs (NOAA)	1.904	0.525	19.320	28.190	21.020	10.349	7.356

COMPOUND	FRESHWATER SEDIMENT QUALITY CRITERIA		ESTUARINE SEDIMENT QUALITY CRITERIA	
	Ontario LEL	Ontario SEL (Based on TOC)	NOAA ER-L	NOAA ER-M
TARGETED SVOCs				
ACENAPHTHENE	NCA	NCA	0.15	0.65
ANTHRACENE	0.220	370	0.085	0.96
BENZO(A)ANTHRACENE	0.320	1480	0.23	1.6
BENZO(A)PYRENE	0.370	1440	0.4	2.5
BENZO(GHI)PERYLENE	0.170	320	NCA	NCA
BENZO(K)FLUORANTHRENE	0.240	1340	NCA	NCA
CHRYSENE	0.340	460	0.4	2.8
DIBENZO(A,H)ANTHRACENE	0.060	130	0.06	0.26
FLUORANTHRENE	0.750	1020	0.6	3.6
FLUORENE	0.190	160	0.035	0.64
INDENO(1,2,3-C,D)PYRENE	0.200	320	NCA	NCA
PHENANTHRENE	0.560	950	0.225	1.38
PYRENE	0.490	850	0.35	2.2
TOTAL PAHs (Ontario/NOAA)	4	10000	4	35

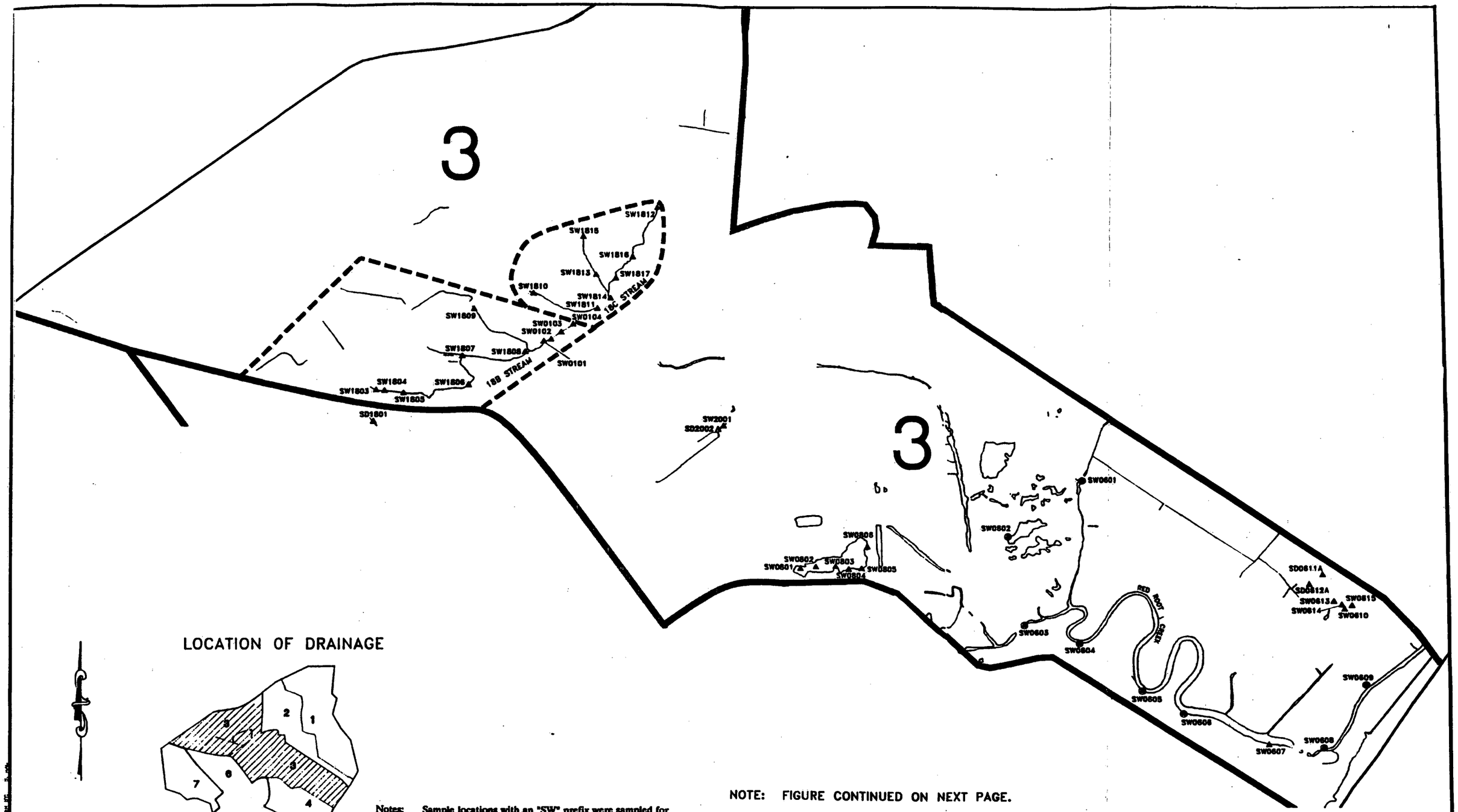
WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

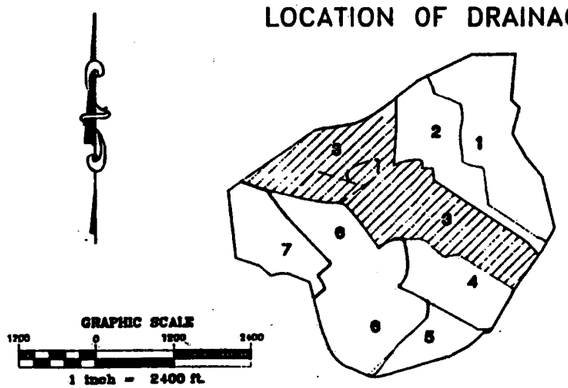
BLACK DITCH DRAINAGE

DATE: 4/7/95
FIGURE #: 4-24

REVISION #: 1 DATE: 4/7/95
FILE NAME: BASE-RTLRED DRAWN BY: B. MAC



LOCATION OF DRAINAGE



GRAPHIC SCALE

1700 0 1200 2400

1 inch = 2400 ft.

Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

- THIS SITE MAP HAS BEEN ADAPTED FROM A PHOTOGRAMMETRIC BASEMAP OF THE FORMER RARITAN ARSENAL PREPARED BY GEOD CORPORATION (12/22/92 OVERFLIGHT PHOTOGRAPHY) UNDER SUBCONTRACT TO WESTON.

NOTE: FIGURE CONTINUED ON NEXT PAGE.

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

RED ROOT CREEK DRAINAGE

DATE: 4/6/95

FIGURE #: 4-25

ANALYTICAL SVOC RESULTS (MG/KG) - SEDIMENT
RED ROOT CREEK DRAINAGE AREA
FRESHWATER

COMPOUND	AREA 20 DITCH		AREA 18B STREAM								AREA 18C STREAM	
	SD-2001	SD-2002	SD-1803	SD-1804	SD-1805	SD-1806	SD-1807	SD-1808	SD-1809	SD-1818*	SD-1810	SD-1811
TARGETED SVOCs												
ACENAPHTHENE	0.490 U	0.470 U	110.000	110.000	3.000	0.120 J	1.400 UJ	0.410 U	0.410 U	0.400 U	1.100	0.420 J
ANTHRACENE	0.490 U	0.470 U	280.000	230.000	6.100	0.330 J	1.400 UJ	0.410 U	0.410 U	0.400 U	2.800	1.300
BENZO(A)ANTHRACENE	0.049 J	0.470 U	380.000	410.000	22.000	2.200	1.400 UJ	0.410 U	0.170 J	0.076 J	6.400	2.700
BENZO(A)PYRENE	0.490 U	0.470 U	300.000	320.000	4.900	2.200	1.400 UJ	0.410 U	0.170 J	0.096 J	4.700	2.600
BENZO(GHI)PERYLENE	0.490 U	0.470 U	240.000	150.000	10.000	0.810	1.400 UJ	0.410 U	0.130 J	0.140 J	2.500	1.300
BENZO(K)FLUORANTHRENE	0.055 J	0.470 U	49.000	150.000	3.700	0.730	1.400 UJ	0.410 U	0.090 J	0.056 J	0.920	0.480
CHRYSENE	0.069 J	0.470 U	400.000	400.000	23.000	2.800	1.400 UJ	0.087 J	0.180 J	0.100 J	5.000	2.700
DIBENZO(A,H)ANTHRACENE	0.490 U	0.470 U	29.000	10.000 J	3.400	0.170 J	1.400 UJ	0.410 U	0.410 U	0.400 U	0.580	0.290 J
FLUORANTHRENE	0.095 J	0.470 U	820.000	1100.000	46.000	4.500	1.400 UJ	0.130 J	0.290 J	0.140 J	8.200	5.800
FLUORENE	0.490 U	0.470 U	97.000	98.000	2.900	0.120 J	1.400 UJ	0.410 U	0.410 U	0.400 U	1.300	0.470
INDENO(1,2,3-C,D)PYRENE	0.490 U	0.470 U	220.000	150.000	11.000	0.930	1.400 UJ	0.410 U	0.130 J	0.400 U	2.500	1.300
PHENANTHRENE	0.051 J	0.470 U	760.000	890.000	30.000	1.900	1.400 UJ	0.410 U	0.140 J	0.400 U	6.800	4.500
PYRENE	0.096 J	0.470 U	740.000	810.000	84.000	3.900	1.400 UJ	0.120 J	0.280 J	0.140 J	6.500	4.400
TOTAL PAHs (Ontario)	0.415	ND	4510.400	4909.000	201.300	29.710	ND	0.337	1.580	0.748	50.840	28.970

* SD-1818 is a duplicate of SD-1809.

COMPOUND	AREA 18C STREAM						LOWER AREA 18B STREAM				AREA 8 POND	
	SD-1812	SD-1813	SD-1814	SD-1815	SD-1818	SD-1817	SD-0101	SD-0102	SD-0103	SD-0104	SD-0801	SD-0802
TARGETED SVOCs												
ACENAPHTHENE	0.330 J	0.780	0.430 U	1.200	0.400 U	0.400 U	0.380 U	0.380 U	0.390 U	0.400 U	1.600 UJ	2.400 UJ
ANTHRACENE	0.430	1.500	0.430 U	2.100	0.400 U	0.400 U	0.380 U	0.380 U	0.390 U	0.400 U	0.210 J	2.400 UJ
BENZO(A)ANTHRACENE	1.200	2.500	0.430 U	4.500	0.400 U	0.400 U	0.190 J	0.064 J	0.390 U	0.400 U	2.000 J	0.660 J
BENZO(A)PYRENE	1.100	2.100	0.430 U	3.400	0.400 U	0.400 U	0.190 J	0.070 J	0.390 U	0.400 U	2.500 J	0.880 J
BENZO(GHI)PERYLENE	0.500	0.920	0.430 U	1.600	0.400 U	0.400 U	0.160 J	0.055 J	0.390 U	0.400 U	3.200 J	2.400 UJ
BENZO(K)FLUORANTHRENE	0.160 J	0.350 J	0.430 U	0.550	0.400 U	0.400 U	0.210 J	0.082 J	0.390 U	0.400 U	0.870 J	0.610 J
CHRYSENE	1.200	2.900	0.430 U	4.200	0.400 U	0.400 U	0.280 J	0.097 J	0.390 U	0.400 U	2.800 J	0.990 J
DIBENZO(A,H)ANTHRACENE	0.094 J	0.210 J	0.430 U	0.410 J	0.400 U	0.400 U	0.044 J	0.380 U	0.390 U	0.400 U	1.600 UJ	2.400 UJ
FLUORANTHRENE	3.100	6.700	0.430 U	7.800	0.400 U	0.400 U	0.460	0.160 J	0.056 J	0.400 U	2.500 J	1.400 J
FLUORENE	0.290 J	0.980	0.430 U	1.200	0.400 U	0.400 U	0.380 U	0.380 U	0.390 U	0.400 U	1.600 UJ	2.400 UJ
INDENO(1,2,3-C,D)PYRENE	0.500	0.890	0.430 U	1.600	0.400 U	0.400 U	0.150 J	0.055 J	0.390 U	0.400 U	3.200 J	0.980 J
PHENANTHRENE	2.900	8.000	0.430 U	9.100	0.400 U	0.400 U	0.190 J	0.059 J	0.390 U	0.400 U	1.500 J	0.460 J
PYRENE	2.200	4.700	0.430 U	5.600	0.400 U	0.400 U	0.410	0.140 J	0.051 J	0.400 U	9.800 J	3.000 J
TOTAL PAHs (Ontario)	14.174	33.070	ND	44.690	ND	ND	2.284	0.782	0.107	ND	28.380	8.980

COMPOUND	AREA 8 POND					RED ROOT CREEK	SULFUR PLANT PONDS					
	SD-0803	SD-0804	SD-0805	SD-0806	SD-0807	SD-0602	SD-0610	SD-0611	SD-0612	SD-0613	SD-0614	SD-0615
TARGETED SVOCs												
ACENAPHTHENE	1.100 UJ	0.490 U	0.049 J	0.870 UJ	1.700 UJ	2.700 UJ	0.910 UJ	0.620 U	0.920 UJ	0.480 U	0.700 UJ	0.770 UJ
ANTHRACENE	1.100 UJ	0.490 U	0.130 J	0.870 UJ	0.180 J	2.700 UJ	0.910 UJ	0.620 U	0.920 UJ	0.480 U	0.700 UJ	0.770 UJ
BENZO(A)ANTHRACENE	0.170 J	0.490 U	0.320 J	0.160 J	2.000 J	2.700 UJ	0.910 UJ	0.620 U	0.920 UJ	0.480 U	0.240 J	0.510 J
BENZO(A)PYRENE	1.100 UJ	0.490 U	0.330 J	0.870 UJ	2.900 J	2.700 UJ	0.910 UJ	0.620 U	0.920 UJ	0.480 U	0.190 J	0.560 J
BENZO(GHI)PERYLENE	1.100 UJ	0.490 U	0.490 U	0.870 UJ	4.300 J	2.700 UJ	0.910 UJ	0.620 U	0.920 UJ	0.480 U	0.190 J	0.400 J
BENZO(K)FLUORANTHRENE	1.100 UJ	0.490 U	0.220 J	0.870 UJ	1.300 J	2.700 UJ	0.910 UJ	0.620 U	0.920 UJ	0.480 U	0.260 J	0.710 J
CHRYSENE	0.210 J	0.490 U	0.330 J	0.190 J	3.200 J	2.700 UJ	0.910 UJ	0.620 U	0.920 UJ	0.480 U	0.360 J	1.100 J
DIBENZO(A,H)ANTHRACENE	1.100 UJ	0.490 U	0.490 U	0.870 UJ	1.700 UJ	2.700 UJ	0.910 UJ	0.620 U	0.920 UJ	0.480 U	0.700 UJ	0.770 UJ
FLUORANTHRENE	0.340 J	0.058 J	0.790	0.290 J	2.300 J	2.700 UJ	0.560 J	0.620 U	0.240 J	0.069 J	0.340 J	0.990 J
FLUORENE	1.100 UJ	0.490 U	0.490 U	0.870 UJ	1.700 UJ	2.700 UJ	0.910 UJ	0.620 U	0.920 UJ	0.480 U	0.700 UJ	0.770 UJ
INDENO(1,2,3-C,D)PYRENE	1.100 UJ	0.490 U	0.490 U	0.870 UJ	4.300 J	2.700 UJ	0.910 UJ	0.620 U	0.920 UJ	0.480 U	0.170 J	0.360 J
PHENANTHRENE	0.150 J	0.490 U	0.470 J	0.097 J	1.600 J	2.700 UJ	0.370 J	0.620 U	0.920 UJ	0.480 U	0.190 J	0.270 J
PYRENE	0.830 J	0.110 J	0.890	0.750 J	9.600 J	2.700 UJ	0.520 J	0.620 U	0.240 J	0.083 J	0.410 J	1.000 J
TOTAL PAHs (Ontario)	1.700	0.168	3.329	1.487	31.680	ND	1.450	ND	0.770	0.152	2.350	8.900

ANALYTICAL SVOC RESULTS (MG/KG) - SEDIMENT
RED ROOT CREEK DRAINAGE AREA
ESTUARINE

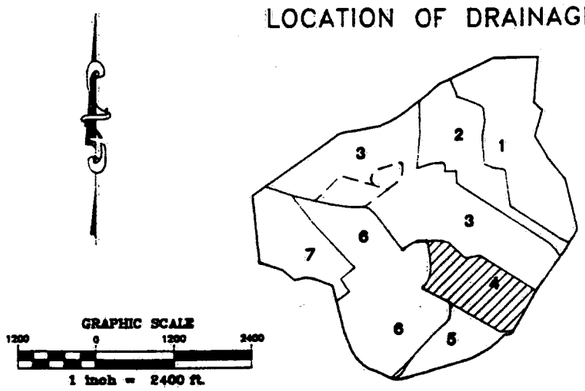
COMPOUND	RED ROOT CREEK							
	SD-0601	SD-0603	SD-0604	SD-0605	SD-0606	SD-0607	SD-0608	SD-0609
TARGETED SVOCs								
ACENAPHTHENE	1.600 UJ	0.180 J	1.900 UJ	1.000 UJ	1.100 UJ	0.260 J	0.830 UJ	1.000 UJ
ANTHRACENE	1.600 UJ	0.250 J	1.900 UJ	1.000 UJ	0.130 J	0.420 J	0.830 UJ	1.000 UJ
BENZO(A)ANTHRACENE	0.410 J	0.740 J	0.470 J	0.230 J	0.520 J	1.500 J	0.290 J	1.000 UJ
BENZO(A)PYRENE	0.400 J	0.840 J	0.540 J	0.270 J	0.440 J	2.000 J	0.280 J	1.000 UJ
BENZO(GHI)PERYLENE	1.600 UJ	0.190 J	0.560 J	0.190 J	0.290 J	0.610 J	0.830 UJ	1.000 UJ
BENZO(K)FLUORANTHRENE	0.440 J	1.100 J	0.560 J	0.260 J	0.810 J	2.500 J	0.350 J	1.000 UJ
CHRYSENE	0.650 J	1.100 J	0.730 J	0.340 J	0.800 J	2.200 J	0.390 J	1.000 UJ
DIBENZO(A,H)ANTHRACENE	1.600 UJ	0.820 UJ	0.220 J	1.000 UJ	1.100 UJ	0.250 J	0.830 UJ	1.000 UJ
FLUORANTHRENE	1.100 J	1.400 J	0.800 J	0.360 J	0.820 J	2.600 J	0.680 J	0.420 J
FLUORENE	1.600 UJ	0.200 J	1.900 UJ	1.000 UJ	1.100 UJ	0.560 J	0.830 UJ	1.000 UJ
INDENO(1,2,3-C,D)PYRENE	1.600 UJ	0.280 J	0.510 J	0.180 J	0.300 J	0.750 J	0.830 UJ	1.000 UJ
PHENANTHRENE	0.540 J	0.650 J	0.330 J	0.150 J	0.310 J	1.000 J	0.160 J	1.000 UJ
PYRENE	1.100 J	1.600 J	0.710 J	0.320 J	0.540 J	1.700 J	0.400 J	0.440 J
TOTAL PAHs (NOAA)	5.180	9.430	5.950	2.510	5.660	18.550	2.900	0.860

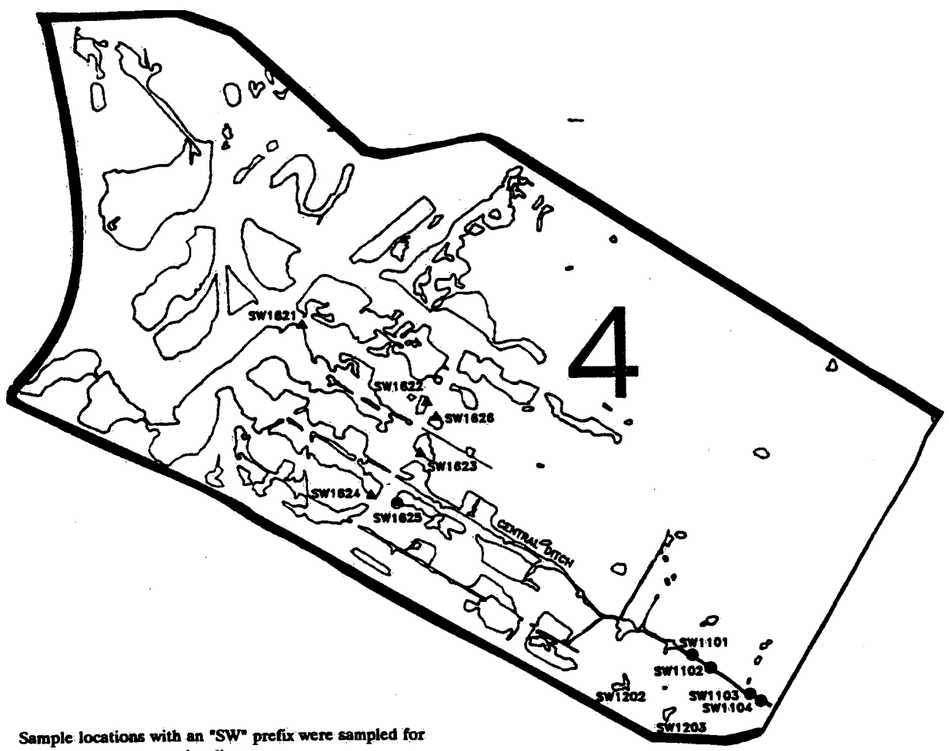
COMPOUND	FRESHWATER SEDIMENT QUALITY CRITERIA		ESTUARINE SEDIMENT QUALITY CRITERIA	
	Ontario LEL	Ontario SEL (Based on TOC)	NOAA ER-L	NOAA ER-M
TARGETED SVOCs				
ACENAPHTHENE	NCA	NCA	0.15	0.65
ANTHRACENE	0.220	370	0.085	0.96
BENZO(A)ANTHRACENE	0.320	1480	0.23	1.6
BENZO(A)PYRENE	0.370	1440	0.4	2.5
BENZO(GHI)PERYLENE	0.170	320	NCA	NCA
BENZO(K)FLUORANTHRENE	0.240	1340	NCA	NCA
CHRYSENE	0.340	460	0.4	2.8
DIBENZO(A,H)ANTHRACENE	0.060	130	0.06	0.26
FLUORANTHRENE	0.750	1020	0.6	3.6
FLUORENE	0.190	160	0.035	0.64
INDENO(1,2,3-C,D)PYRENE	0.200	320	NCA	NCA
PHENANTHRENE	0.560	950	0.225	1.38
PYRENE	0.490	850	0.35	2.2
TOTAL PAHs (Ontario/NOAA)	4	10000	4	35

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS
DATE: 4/6/95
FIGURE #: 4-25A

LOCATION OF DRAINAGE





Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

GRAPHIC SCALE
150 0 150 300
1 inch = 300 ft.

NOTE:
- THIS SITE MAP HAS BEEN ADAPTED FROM A PHOTOGRAMMETRIC BASEMAP OF THE FORMER RARITAN ARSENAL PREPARED BY GEDD CORPORATION (12/22/92 OVERFLIGHT PHOTOGRAPHY) UNDER SUBCONTRACT TO WESTON.

ANALYTICAL SVOC RESULTS (MG/KG) - SEDIMENT
CENTRAL DITCH DRAINAGE AREA
ESTUARINE

COMPOUND	CENTRAL DITCH				ESTUARINE PONDS	UPGRADIENT PONDED AREA
	SD-1101	SD-1102	SD-1103	SD-1104	SD-1625	SD-1624
TARGETED SVOCs						
ACENAPHTHENE	0.640 U	0.650 U	0.500	0.120 J	2.100 UJ	0.580 U
ANTHRACENE	0.640 U	0.650 U	1.900	0.320 J	2.100 UJ	0.580 U
BENZO(A)ANTHRACENE	0.640 U	0.650 U	5.000	0.680	2.100 UJ	0.210 J
BENZO(A)PYRENE	0.210 J	0.650 U	4.000	0.650	2.100 UJ	0.180 J
BENZO(GHI)PERYLENE	0.640 U	0.650 U	1.400	0.210 J	2.100 UJ	0.580 U
BENZO(K)FLUORANTHRENE	0.640 U	0.650 U	2.300	0.350 J	2.100 UJ	0.190 J
CHRYSENE	0.640 U	0.650 U	4.300	0.690	0.230 J	0.210 J
DIBENZO(A,H)ANTHRACENE	0.640 U	0.650 U	0.240 J	0.490 U	2.100 UJ	0.580 U
FLUORANTHRENE	0.640 U	0.200 J	11.000	1.500	0.440 J	0.390 J
FLUORENE	0.640 U	0.650 U	0.590	0.160 J	2.100 UJ	0.580 U
INDENO(1,2,3-C,D)PYRENE	0.640 U	0.650 U	1.700	0.270 J	2.100 UJ	0.580 U
PHENANTHRENE	0.640 U	0.650 U	4.200	0.930	0.270 J	0.200 J
PYRENE	0.640 U	0.160 J	18.000	1.300	0.560 J	0.370 J
TOTAL PAHs (NOAA)	0.210	0.445	62.030	8.367	1.790	2.050

COMPOUND	ISOLATED FRESHWATER POND				UPGRADIENT PONDED AREA
	SD-1622	SD-1623	SD-1626	SD-1627	SD-1621
TARGETED SVOCs					
ACENAPHTHENE	0.700 UJ	0.510 U	0.520 U	0.690 UJ	0.730 UJ
ANTHRACENE	0.700 UJ	0.060 J	0.520 U	0.690 UJ	0.730 UJ
BENZO(A)ANTHRACENE	0.380 J	0.200 J	0.520 U	0.690 UJ	0.730 UJ
BENZO(A)PYRENE	0.470 J	0.190 J	0.520 U	0.690 UJ	0.730 UJ
BENZO(GHI)PERYLENE	0.700 UJ	0.230 J	0.520 U	0.690 UJ	0.730 UJ
BENZO(K)FLUORANTHRENE	0.270 J	0.120 J	0.520 U	0.690 UJ	0.730 UJ
CHRYSENE	0.400 J	0.300 J	0.520 U	0.690 UJ	0.730 UJ
DIBENZO(A,H)ANTHRACENE	0.700 UJ	0.510 U	0.520 U	0.690 UJ	0.730 UJ
FLUORANTHRENE	0.610 J	0.790	0.110 J	0.100 J	0.730 UJ
FLUORENE	0.700 UJ	0.054 J	0.520 U	0.690 UJ	0.730 UJ
INDENO(1,2,3-C,D)PYRENE	0.260 J	0.250 J	0.520 U	0.690 UJ	0.730 UJ
PHENANTHRENE	0.220 J	0.430 J	0.053 J	0.085 J	0.730 UJ
PYRENE	0.910 J	1.200	0.120 J	0.150 J	0.730 UJ
TOTAL PAHs (NOAA)	3.520	3.824	0.283	0.335	ND

COMPOUND	FRESHWATER SEDIMENT QUALITY CRITERIA		ESTUARINE SEDIMENT QUALITY CRITERIA	
	Ontario LEL	Ontario SEL (Based on TOC)	NOAA ER-L	NOAA ER-M
TARGETED SVOCs				
ACENAPHTHENE	NCA	NCA	0.15	0.65
ANTHRACENE	0.220	370	0.085	0.96
BENZO(A)ANTHRACENE	0.320	1480	0.23	1.6
BENZO(A)PYRENE	0.370	1440	0.4	2.5
BENZO(GHI)PERYLENE	0.170	320	NCA	NCA
BENZO(K)FLUORANTHRENE	0.240	1340	NCA	NCA
CHRYSENE	0.340	460	0.4	2.8
DIBENZO(A,H)ANTHRACENE	0.060	130	0.06	0.26
FLUORANTHRENE	0.750	1020	0.6	3.6
FLUORENE	0.190	160	0.035	0.64
INDENO(1,2,3-C,D)PYRENE	0.200	320	NCA	NCA
PHENANTHRENE	0.560	950	0.225	1.38
PYRENE	0.490	850	0.35	2.2
TOTAL PAHs (Ontario/NOAA)	4	10000	4	35

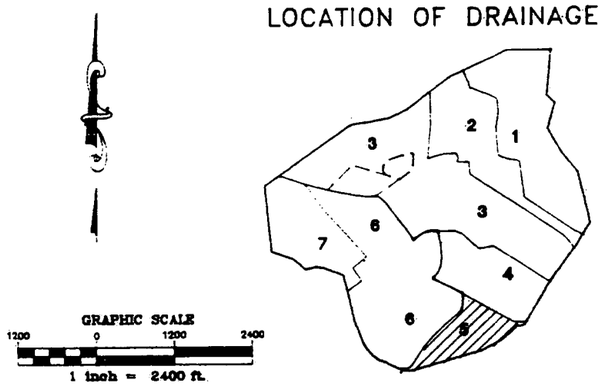
WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

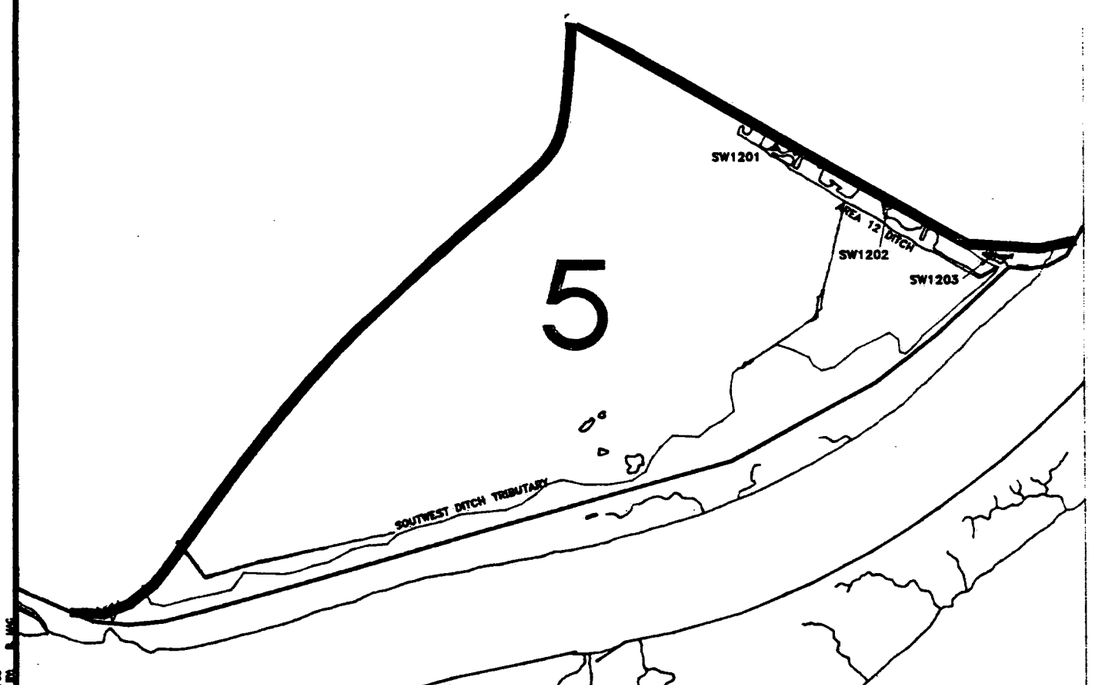
CENTRAL DITCH DRAINAGE

DATE: 4/6/95
FIGURE #: 4-26

LOCATION OF DRAINAGE



Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.



NOTE:
- THIS SITE MAP HAS BEEN ADAPTED FROM A PHOTOGRAMMETRIC BASEMAP OF THE FORMER RARITAN ARSENAL PREPARED BY GEOD CORPORATION (12/22/92 OVERFLIGHT PHOTOGRAPHY) UNDER SUBCONTRACT TO WESTON.

AREA 12 DRAINAGE AREA
ANALYTICAL SVOC, PESTICIDE, AND METAL RESULTS - SEDIMENT
ESTUARINE

COMPOUND	AREA 12 DITCH			SEDIMENT QUALITY CRITERIA	
	SD-1201	SD-1202	SD-1203	NOAA ER-L	NOAA ER-M
TARGETED SVOC COMPOUNDS					
ANTHRACENE	0.710 UJ	0.240 J	0.330 J	0.085	0.96
BENZO(A)ANTHRACENE	0.190 J	0.380 J	1.100 J	0.23	1.6
BENZO(A)PYRENE	0.710 UJ	0.280 J	1.800 J	0.4	2.5
CHRYSENE	0.710 UJ	0.350 J	2.000 J	0.4	2.8
FLUORANTHRENE	0.230 J	1.100 J	4.300 J	0.6	3.6
PHENANTHRENE	0.170 J	1.000 J	1.000 J	0.225	1.38
PYRENE	0.190 J	0.940 J	4.300 J	0.35	2.2
TOTAL PAHs (NOAA)	0.780	5.100	19.360	4	35
PESTICIDES					
4,4'-DDD	0.0055 J	0.190 UJ	0.400 J	0.002	0.02
4,4'-DDE	0.0021 J	0.190 UJ	0.110 J	0.002	0.015
4,4'-DDT	0.017 UJ	0.190 UJ	0.410 J	0.001	0.007
METALS					
ANTIMONY	NA	NA	3.4 J	2	25
COPPER	64.9 J	9.4 J	187 J	70	390
LEAD	61.1 J	10.2 J	333 J	35	110
MERCURY	0.42 J	0.17 UJ	0.68 J	0.15	1.3
SILVER	1.0 J	0.38 UJ	1.6 J	1	2.2
ZINC	86.6 J	20.6 J	280 J	120	270

WESTON MANAGERS DESIGNERS/CONSULTANTS

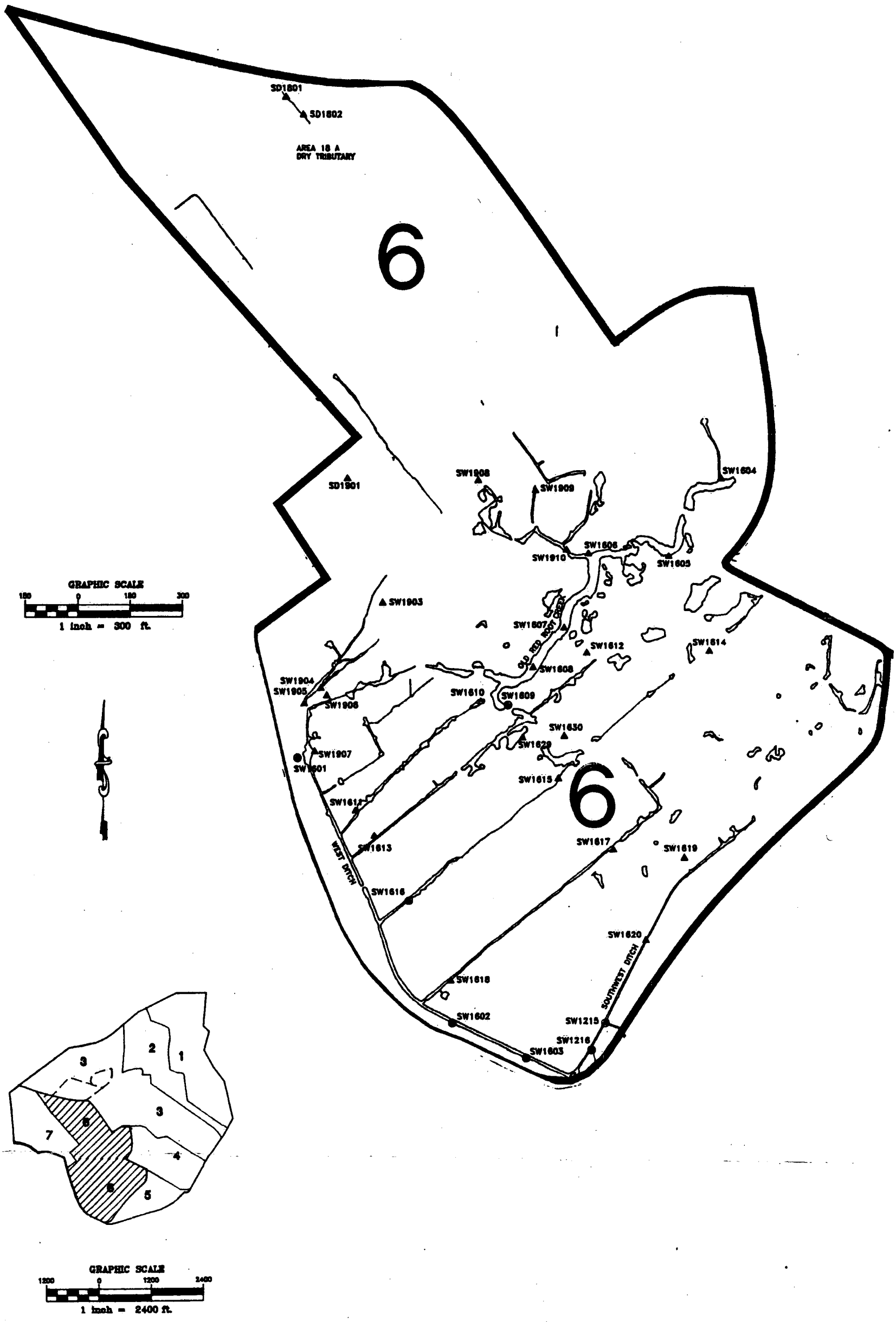
PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

AREA 12 DITCH DRAINAGE

DATE: 4/6/95

FIGURE #: 4-27



Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

NOTE: FIGURE CONTINUED ON NEXT PAGE.

WESTON MANAGERS DESIGNERS/CONSULTANTS	PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION EDISON, NEW JERSEY CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS	OLD RED ROOT CREEK DRAINAGE DATE: 4/7/95 FIGURE #: 4-28

REVISION #: 1 DATE: 4/7/95
FILE NAME: BASE-FTR.DWG DRAWN BY: B. MAC

ANALYTICAL SVOC RESULTS (MG/KG) - SEDIMENT
OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE

COMPOUND	ASSOCIATED DITCHES - AREA 16								
	SD-1611	SD-1612	SD-1615	SD-1616	SD-1617	SD-1618	SD-1628*	SD-1629	SD-1630
TARGETED SVOCs									
2-METHYLNAPHTHALENE	8.000 UJ	9.600 UJ	0.930 UJ	1.400 UJ	1.800 UJ	0.980 UJ	1.700 UJ	3.900 U	0.680 UJ
ACENAPHTHENE	1.600 UJ	1.900 UJ	0.930 UJ	1.400 UJ	1.800 UJ	0.980 UJ	1.700 UJ	3.900 U	0.680 UJ
ANTHRACENE	1.600 UJ	1.900 UJ	0.190 J	1.400 UJ	1.800 UJ	0.160 J	1.700 UJ	3.900 U	0.099 J
BENZO(A)ANTHRACENE	1.600 UJ	1.900 UJ	0.460 J	0.260 J	1.800 UJ	0.290 J	0.290 J	3.900 U	0.430 J
BENZO(A)PYRENE	1.600 UJ	1.900 UJ	0.460 J	0.350 J	1.800 UJ	0.320 J	0.340 J	3.900 U	0.430 J
BENZO(GHI)PERYLENE	1.600 UJ	1.900 UJ	0.230 J	1.400 UJ	1.800 UJ	0.270 J	1.700 UJ	3.900 U	0.680 UJ
BENZO(K)FLUORANTHRENE	1.600 UJ	1.900 UJ	0.240 J	0.220 J	1.800 UJ	0.220 J	0.190 J	3.900 U	0.240 J
CHRYSENE	1.600 UJ	0.290 J	0.560 J	0.330 J	1.800 UJ	0.390 J	0.470 J	3.900 U	0.400 J
DIBENZO(A,H)ANTHRACENE	1.600 UJ	1.900 UJ	0.930 UJ	1.400 UJ	1.800 UJ	0.980 UJ	1.700 UJ	3.900 U	0.680 UJ
FLUORANTHRENE	0.710 J	1.900 UJ	0.670 J	0.600 J	0.500 J	0.700 J	0.560 J	3.900 U	1.000 J
FLUORENE	1.600 UJ	1.900 UJ	0.930 UJ	1.400 UJ	1.800 UJ	0.980 UJ	1.700 UJ	3.900 U	0.680 UJ
INDENO(1,2,3-C,D)PYRENE	1.600 UJ	1.900 UJ	0.220 J	1.400 UJ	1.800 UJ	0.300 J	1.700 UJ	3.900 U	0.110 J
NAPHTHALENE	1.600 UJ	1.900 UJ	0.930 UJ	1.400 UJ	1.800 UJ	0.980 UJ	1.700 UJ	3.900 U	0.680 UJ
PHENANTHRENE	0.230 J	1.900 UJ	0.790 J	1.400 UJ	1.800 UJ	0.230 J	0.390 J	3.900 U	0.530 J
PYRENE	0.770 J	0.400 J	0.920 J	0.500 J	0.570 J	0.590 J	0.670 J	0.510 J	1.200 J
TOTAL PAHs (NOAA)	1.710	1.020	5.270	2.760	1.540	4.000	3.470	0.510	5.079

* SD-1628 is a duplicate of SD-1612.

COMPOUND		OLD RED ROOT CREEK						AREA 19 SW WETLANDS	
	SD-1613	SD-1606	SD-1607	SD-1608	SD-1609	SD-1610	SD-1631*	SD-1906	SD-1911**
TARGETED SVOCs									
2-METHYLNAPHTHALENE	4.400 UJ	1.300 UJ	1.600 UJ	8.700 UJ	4.500 UJ	9.000 UJ	0.990 UJ	0.840 UJ	1.400 UJ
ACENAPHTHENE	0.880 UJ	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ
ANTHRACENE	0.880 UJ	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ
BENZO(A)ANTHRACENE	0.880 UJ	0.580 J	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ
BENZO(A)PYRENE	0.880 UJ	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ
BENZO(GHI)PERYLENE	0.880 UJ	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ
BENZO(K)FLUORANTHRENE	0.880 UJ	0.280 J	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ
CHRYSENE	0.880 UJ	0.290 J	0.220 J	1.700 UJ	0.120 J	1.800 UJ	0.990 UJ	0.086 J	1.400 UJ
DIBENZO(A,H)ANTHRACENE	0.880 UJ	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ
FLUORANTHRENE	0.300 J	0.420 J	0.290 J	0.220 J	0.200 J	1.800 UJ	0.990 UJ	0.130 J	0.180 J
FLUORENE	0.880 UJ	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ
INDENO(1,2,3-C,D)PYRENE	0.880 UJ	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ
NAPHTHALENE	0.880 UJ	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ
PHENANTHRENE	0.130 J	1.300 UJ	1.600 UJ	1.700 UJ	0.890 UJ	1.800 UJ	0.990 UJ	0.840 UJ	1.400 UJ
PYRENE	0.370 J	0.540 J	0.560 J	0.420 J	0.400 J	1.800 UJ	0.150 J	0.130 J	0.180 J
TOTAL PAHs (NOAA)	0.800	2.720	0.510	0.640	0.720	ND	0.150	0.346	0.360

* SD-1631 is a duplicate of SD-1609.
** SD-1911 is a duplicate of SD-1906.

COMPOUND	SOUTHWEST DITCH				WEST DITCH			
	SD-1215	SD-1216	SD-1619	SD-1620	SD-1601	SD-1602	SD-1603	SD-1907
TARGETED SVOCs								
2-METHYLNAPHTHALENE	1.100 UJ	0.870 UJ	0.770 J	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ
ACENAPHTHENE	1.100 UJ	0.870 UJ	2.100 J	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ
ANTHRACENE	1.100 UJ	0.870 UJ	5.000 J	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ
BENZO(A)ANTHRACENE	0.430 J	0.220 J	8.800 J	0.390 J	0.320 J	1.500 UJ	0.084 J	1.800 UJ
BENZO(A)PYRENE	1.100 UJ	0.870 UJ	6.700 J	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ
BENZO(GHI)PERYLENE	1.100 UJ	0.170 J	1.300 J	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ
BENZO(K)FLUORANTHRENE	0.240 J	0.150 J	4.300 J	0.290 J	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ
CHRYSENE	1.100 UJ	0.210 J	6.200 J	0.350 J	1.400 UJ	1.500 UJ	0.085 J	1.800 UJ
DIBENZO(A,H)ANTHRACENE	1.100 UJ	0.870 UJ	2.200 UJ	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ
FLUORANTHRENE	0.790 J	0.480 J	12.000 J	0.840 J	0.320 J	0.200 J	0.150 J	0.220 J
FLUORENE	1.100 UJ	0.870 UJ	2.900 J	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ
INDENO(1,2,3-C,D)PYRENE	1.100 UJ	0.870 UJ	1.900 J	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ
NAPHTHALENE	1.100 UJ	0.870 UJ	1.100 J	1.100 UJ	1.400 UJ	1.500 UJ	0.600 U	1.800 UJ
PHENANTHRENE	0.290 J	0.170 J	18.000 J	0.300 J	1.400 UJ	1.500 UJ	0.061 J	1.800 UJ
PYRENE	1.200 J	0.520 J	19.000 J	1.200 J	0.370 J	0.230 J	0.180 J	0.230 J
TOTAL PAHs (NOAA)	3.660	2.250	102.500	4.140	1.370	0.430	0.670	0.450

FRESHWATER

COMPOUND	ASSOCIATED DITCHES	AREA 19 FORESTED WETLANDS		AREA 19 NE WETLANDS			OLD RED ROOT CREEK	
	SD-1614	SD-1901	SD-1903	SD-1908	SD-1909	SD-1910	SD-1604	SD-1605
TARGETED SVOCs								
2-METHYLNAPHTHALENE	1.200 UJ	0.640 U	1.300 UJ	2.800 U	1.600 UJ	0.960 UJ	0.480 U	0.410 U
ACENAPHTHENE	1.200 UJ	0.640 U	1.300 UJ	2.800 U	1.600 UJ	0.960 UJ	0.480 U	0.410 U
ANTHRACENE	1.200 UJ	0.640 U	1.300 UJ	2.800 U	1.600 UJ	0.960 UJ	0.480 U	0.130 J
BENZO(A)ANTHRACENE	0.210 J	0.640 U	1.300 UJ	0.350 J	1.600 UJ	0.960 UJ	0.110 J	0.290 J
BENZO(A)PYRENE	1.200 UJ	0.640 U	1.300 UJ	0.480 J	1.600 UJ	0.960 UJ	0.480 U	0.340 J
BENZO(GHI)PERYLENE	1.200 UJ	0.640 U	1.300 UJ	0.350 J	1.600 UJ	0.960 UJ	0.480 U	0.190 J
BENZO(K)FLUORANTHRENE	0.120 J	0.640 U	1.300 UJ	0.400 J	1.600 UJ	0.960 UJ	0.480 U	0.160 J
CHRYSENE	0.300 J	0.640 U	1.300 UJ	0.410 J	0.170 J	0.960 UJ	0.480 U	0.390 J
DIBENZO(A,H)ANTHRACENE	1.200 UJ	0.640 U	1.300 UJ	2.800 U	1.600 UJ	0.960 UJ	0.480 U	0.410 U
FLUORANTHRENE	0.440 J	0.640 U	0.160 J	0.520 J	0.230 J	0.960 UJ	0.480 U	0.520
FLUORENE	1.200 UJ	0.640 U	1.300 UJ	2.800 U	1.600 UJ	0.960 UJ	0.480 U	0.410 U
INDENO(1,2,3-C,D)PYRENE	1.200 UJ	0.640 U	1.300 UJ	0.290 J	1.600 UJ	0.960 UJ	0.480 U	0.190 J
NAPHTHALENE	1.200 UJ	0.640 U	1.300 UJ	2.800 U	1.600 UJ	0.960 UJ	0.480 U	0.410 U
PHENANTHRENE	1.200 UJ	0.640 U	1.300 UJ	2.800 U	1.600 UJ	0.960 UJ	0.480 U	0.380 J
PYRENE	0.490 J	0.640 U	0.150 J	0.540 J	0.230 J	0.960 UJ	0.480 U	0.880
TOTAL PAHs (Ontario)	1.560	ND	0.310	3.340	0.630	ND	0.110	2.845

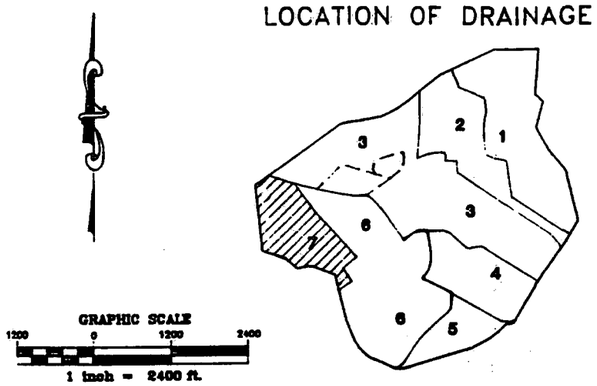
COMPOUND	AREA 19 SW WETLANDS		DRY TRIBUTARY AREA 16	
	SD-1904	SD-1905	SD-1801	SD-1802
TARGETED SVOCs				
2-METHYLNAPHTHALENE	0.870 UJ	0.069 J	0.440 U	0.650 U
ACENAPHTHENE	0.870 UJ	0.590	0.440 U	0.650 U
ANTHRACENE	0.870 UJ	1.400	0.110 J	0.071 J
BENZO(A)ANTHRACENE	0.870 UJ	3.200	0.750	0.340 J
BENZO(A)PYRENE	0.870 UJ	2.200	0.710	0.350 J
BENZO(GHI)PERYLENE	0.870 UJ	1.200	0.560	0.280 J
BENZO(K)FLUORANTHRENE	0.870 UJ	2.000	0.400 J	0.200 J
CHRYSENE	0.870 UJ	3.200	0.930	0.410 J
DIBENZO(A,H)ANTHRACENE	0.870 UJ	0.470 J	0.110 J	0.650 U
FLUORANTHRENE	0.870 UJ	6.300	1.500	0.740
FLUORENE	0.870 UJ	0.680	0.440 U	0.650 U
INDENO(1,2,3-C,D)PYRENE	0.870 UJ	1.200	0.570	0.290 J
NAPHTHALENE	0.870 UJ	0.087 J	0.440 U	0.650 U
PHENANTHRENE	0.870 UJ	6.200	0.710	0.340 J
PYRENE	0.870 UJ	5.600	1.500	0.670
TOTAL PAHs (Ontario)	ND	34.327	7.850	3.701

COMPOUND	FRESHWATER SEDIMENT QUALITY CRITERIA		ESTUARINE SEDIMENT QUALITY CRITERIA	
	Ontario LEL	Ontario SEL (Based on TOC)	NOAA ER-L	NOAA ER-M
TARGETED SVOCs				
2-METHYLNAPHTHALENE	NCA	NCA	0.065	0.67
ACENAPHTHENE	NCA	NCA	0.15	0.65
ANTHRACENE	0.220	370	0.085	0.96
BENZO(A)ANTHRACENE	0.320	1480	0.23	1.6
BENZO(A)PYRENE	0.370	1440	0.4	2.5
BENZO(GHI)PERYLENE	0.170	320	NCA	NCA
BENZO(K)FLUORANTHRENE	0.240	1340	NCA	NCA
CHRYSENE	0.340	460	0.4	2.8
DIBENZO(A,H)ANTHRACENE	0.060	130	0.06	0.26
FLUORANTHRENE	0.750	1020	0.6	3.6
FLUORENE	0.190	160	0.035	0.64
INDENO(1,2,3-C,D)PYRENE	0.200	320	NCA	NCA
NAPHTHALENE	NCA	NCA	0.34	2.1
PHENANTHRENE	0.560	950	0.225	1.38
PYRENE	0.490	850	0.35	2.2
TOTAL PAHs (Ontario/NOAA)	4	10000	4	35

WESTON MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS
DATE: 4/6/95
FIGURE #: 4-28A

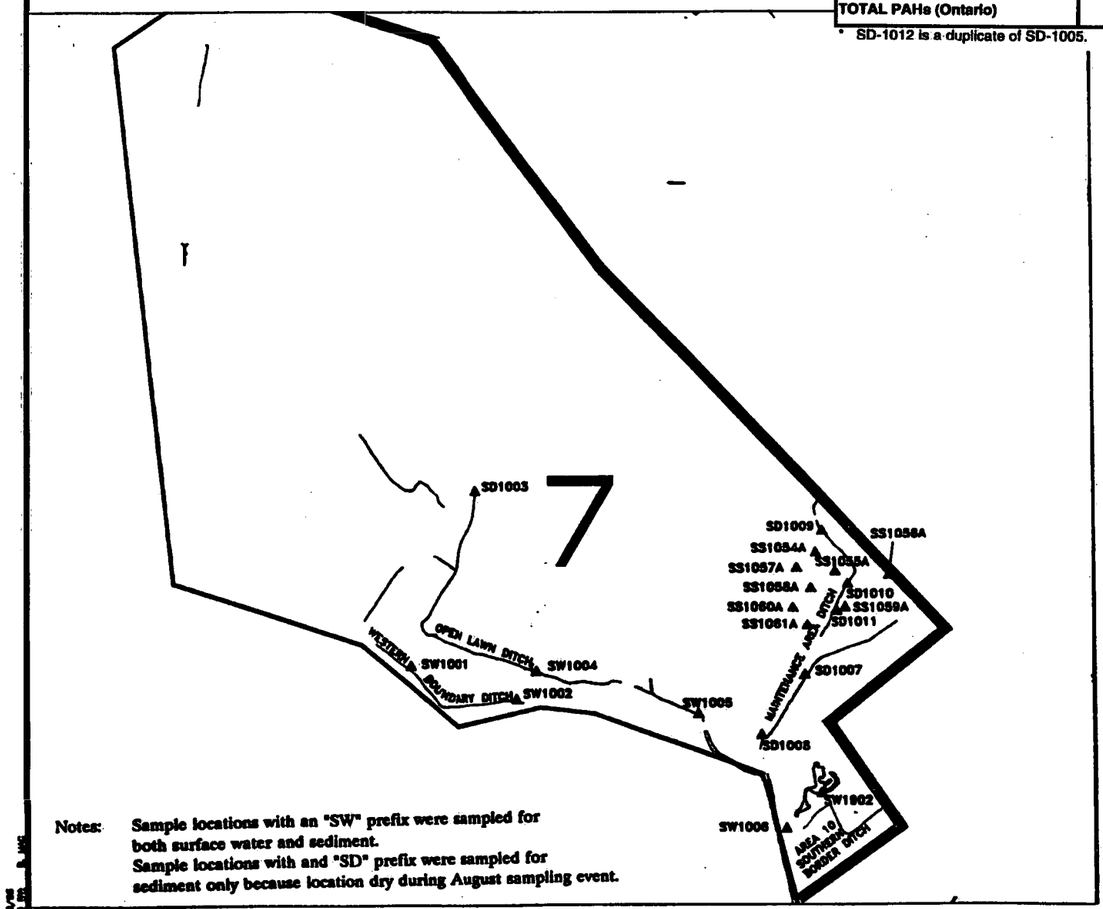
LOCATION OF DRAINAGE



ANALYTICAL SVOC RESULTS (MG/KG) - SEDIMENT
COUNTY PARK DRAINAGE AREA
FRESHWATER

COMPOUND	AREA 10 SOUTHERN BORDER DITCH		OPEN LAWN DITCH				MAINTENANCE AREA DITCH					WESTERN BOUNDARY DITCH	
	SD-1006	SD-1902	SD-1003	SD-1004	SD-1005	SD-1012*	SD-1007	SD-1008	SD-1009	SD-1010	SD-1011	SD-1001	SD-1002
TARGETED SVOCs													
ANTHRACENE	0.450 U	1.500 UJ	0.270 J	0.480 U	0.540 U	0.520 U	0.400 U	1.100 UJ	0.610 U	0.560 U	0.340 U	0.480 U	0.510 U
BENZO(A)ANTHRACENE	0.450 U	1.500 UJ	1.100 J	0.100 J	0.540 U	0.520 U	0.400 U	0.850 J	0.610 U	0.560 U	0.340 U	0.150 J	0.510 U
BENZO(A)PYRENE	0.450 U	1.500 UJ	0.850 J	0.058 J	0.540 U	0.520 U	0.400 U	0.480 J	0.610 U	0.560 U	0.340 U	0.110 J	0.510 U
BENZO(GHI)PERYLENE	0.450 U	1.500 UJ	0.690 J	0.480 U	0.540 U	0.520 U	0.400 U	1.100 UJ	0.610 U	0.560 U	0.340 U	0.480 U	0.510 U
BENZO(K)FLUORANTHRENE	0.450 U	1.500 UJ	0.140 J	0.050 J	0.540 U	0.520 U	0.400 U	0.280 J	0.056 J	0.560 U	0.340 U	0.480 U	0.510 U
CHRYSENE	0.450 U	1.500 UJ	1.100 J	0.096 J	0.540 U	0.520 U	0.400 U	0.390 J	0.610 U	0.560 U	0.340 U	0.140 J	0.510 U
DIBENZO(A,H)ANTHRACENE	0.450 U	1.500 UJ	0.350 J	0.480 U	0.540 U	0.520 U	0.400 U	1.100 UJ	0.610 U	0.560 U	0.340 U	0.480 U	0.510 U
FLUORANTHRENE	0.047 J	0.170 J	1.900 J	0.190 J	0.540 U	0.520 U	0.048 J	0.560 J	0.070 J	0.560 U	0.340 U	0.200 J	0.510 U
INDENO(1,2,3-C,D)PYRENE	0.450 U	1.500 UJ	0.630 J	0.480 U	0.540 U	0.520 U	0.400 U	1.100 UJ	0.610 U	0.560 U	0.340 U	0.480 U	0.510 U
PHENANTHRENE	0.450 U	1.500 UJ	1.400 J	0.088 J	0.540 U	0.520 U	0.400 U	0.330 J	0.610 U	0.560 U	0.340 U	0.110 J	0.510 U
PYRENE	0.055 J	0.180 J	2.000 J	0.190 J	0.055 J	0.520 U	0.053 J	0.670 J	0.079 J	0.560 U	0.340 U	0.280 J	0.510 U
TOTAL PAHs (Ontario)	0.102	0.350	10.930	0.772	0.055	ND	0.101	3.060	0.205	ND	ND	0.990	ND

* SD-1012 is a duplicate of SD-1005.



Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

COMPOUND	FRESHWATER SEDIMENT QUALITY CRITERIA	
	Ontario LEL	Ontario SEL (Based on TOC)
TARGETED SVOC COMPOUNDS		
ANTHRACENE	0.220	370
BENZO(A)ANTHRACENE	0.320	1480
BENZO(A)PYRENE	0.370	1440
BENZO(GHI)PERYLENE	0.170	320
BENZO(K)FLUORANTHRENE	0.240	1340
CHRYSENE	0.340	480
DIBENZO(A,H)ANTHRACENE	0.060	130
FLUORANTHRENE	0.750	1020
INDENO(1,2,3-C,D)PYRENE	0.200	320
PHENANTHRENE	0.560	950
PYRENE	0.490	850
TOTAL PAHs (Ontario)	4	10000

GRAPHIC SCALE
100 0 100 300
1 inch = 300 ft.

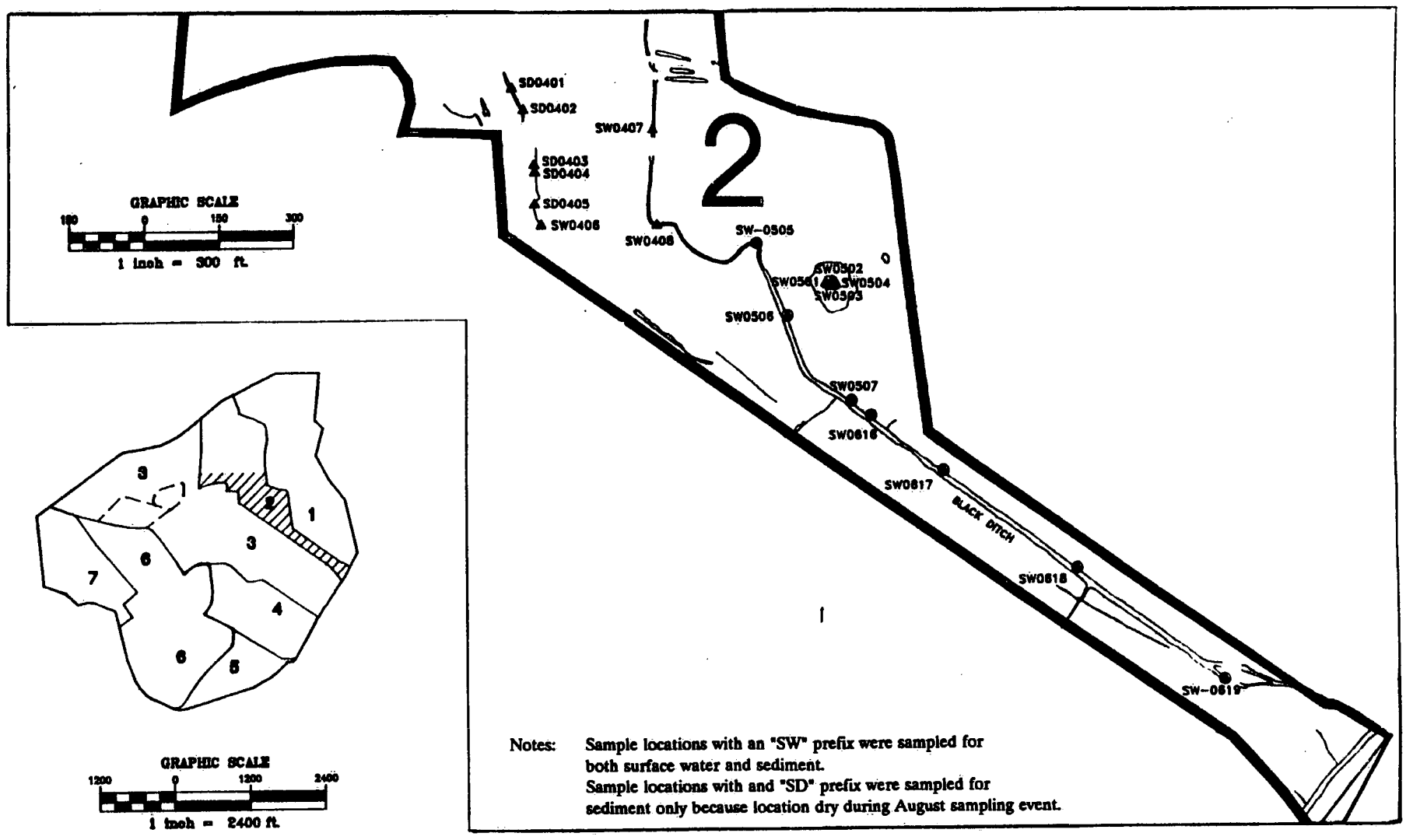
NOTE:
- THIS SITE MAP HAS BEEN ADAPTED FROM A PHOTOGRAMMETRIC BASEMAP OF THE FORMER RARITAN ARSENAL PREPARED BY GEOD CORPORATION (12/22/92 OVERFLIGHT PHOTOGRAPHY) UNDER SUBCONTRACT TO WESTON.

WESTON MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

COUNTY PARK DRAINAGE

DATE: 4/6/95
FIGURE #: 4-29



Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

ANALYTICAL PESTICIDE RESULTS (MG/KG) - SEDIMENT
BLACK DITCH DRAINAGE AREA
FRESHWATER

COMPOUND	AREA 4 DITCH					
	SD-0401	SD-0402	SD-0403	SD-0404	SD-0405	SD-0406
4,4'-DDD	0.034 J	0.038 UJ	0.020 J	0.015 U	0.015 U	0.020 UJ
4,4'-DDE	0.045 UJ	0.038 UJ	0.031 J	0.009 J	0.015 U	0.020 UJ
4,4'-DDT	0.045 UJ	0.038 UJ	0.019 J	0.008 J	0.015 U	0.020 UJ

COMPOUND	AREA 5 POND				BLACK DITCH DRAINAGE		
	SD-0501	SD-0502	SD-0503	SD-0504	SD-0407	SD-0408	SD-0505
4,4'-DDD	0.070 J	0.032 UJ	0.082 J	0.056 J	0.010 U	0.011 U	0.011 U
4,4'-DDE	0.015 J	0.016 J	0.012 J	0.015 J	0.010 U	0.011 U	0.011 U
4,4'-DDT	0.036 J	0.032 UJ	0.018 UJ	0.034 J	0.010 U	0.011 U	0.011 U

COMPOUND	BLACK DITCH DRAINAGE						
	SD-0506	SD-0507	SD-0616	SD-0617	SD-0618	SD-0619	SD-0620
4,4'-DDD	0.011 U	0.010 U	0.016 UJ	0.023 UJ	0.018 J	0.025 UJ	0.022 UJ
4,4'-DDE	0.011 U	0.010 U	0.016 UJ	0.013 J	0.018 J	0.017 J	0.015 J
4,4'-DDT	0.011 U	0.010 U	0.016 UJ	0.023 UJ	0.028 UJ	0.025 UJ	0.022 UJ

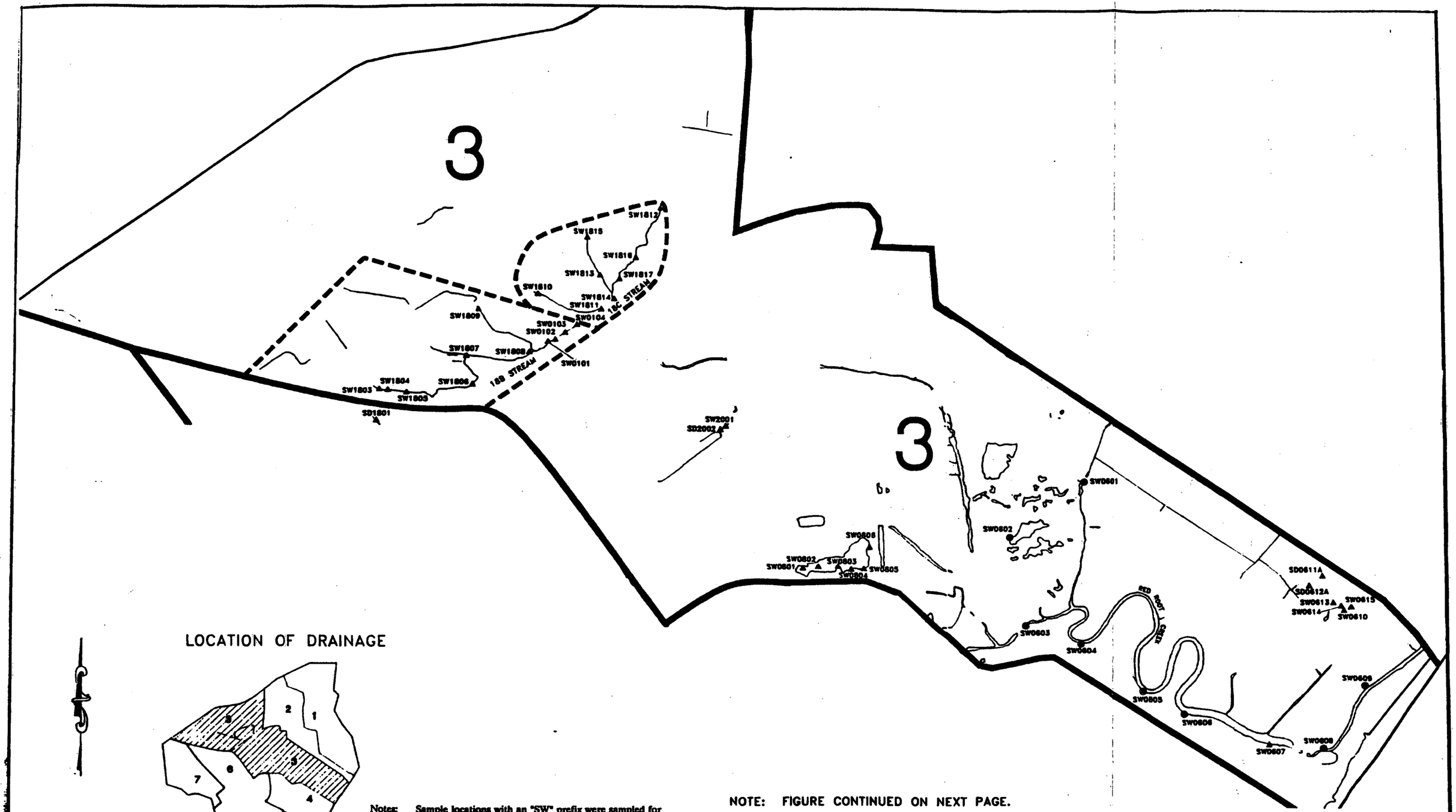
COMPOUND	FRESHWATER SEDIMENT QUALITY CRITERIA		ESTUARINE SEDIMENT QUALITY CRITERIA	
	Ontario LEL	Ontario SEL (Based on TOC)	NOAA ER-L	NOAA ER-M
4,4'-DDD	0.008	6.00	0.002	0.02
4,4'-DDE	0.005	19.00	0.002	0.015
4,4'-DDT	0.007	12.00	0.001	0.007

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

BLACK DITCH DRAINAGE

DATE: 4/7/95
FIGURE #: 4-30



Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

- THIS SITE MAP HAS BEEN ADAPTED FROM A PHOTOGRAMMETRIC BASEMAP OF THE FORMER RARITAN ARSENAL PREPARED BY DEGO CORPORATION (12/22/92 OVERFLIGHT PHOTOGRAPHY) UNDER SUBCONTRACT TO WESTON.

NOTE: FIGURE CONTINUED ON NEXT PAGE.

WESTON MANAGERS DESIGNERS/CONSULTANTS	PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION EDISON, NEW JERSEY CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS	RED ROOT CREEK DRAINAGE DATE: 4/6/95 FIGURE #: 4-31

ANALYTICAL PCB/PESTICIDE RESULTS (MG/KG) - SEDIMENT
RED ROOT CREEK DRAINAGE AREA
FRESHWATER

COMPOUND	AREA 18B STREAM								AREA 18C STREAM	
	SD-1803	SD-1804	SD-1805	SD-1806	SD-1807	SD-1808	SD-1809	SD-1818	SD-1810	SD-1811
4,4'-DDD	0.510 U	0.560 U	0.550 U	0.110 U	0.012 J	0.010 U	0.001 J	0.047 U	0.032	0.086
4,4'-DDE	0.160 J	0.130	0.550 U	0.110 U	0.033 UJ	0.010 U	0.010 U	0.047 U	0.037	0.031
4,4'-DDT	0.510 U	0.560 U	0.550 U	0.110 U	0.033 UJ	0.010 U	0.002 J	0.047 U	0.110	0.220
ALDRIN	0.690 J	0.350 J	0.320 J	0.055 U	0.016 UJ	0.005 U	0.005 U	0.024 U	0.048 U	0.056 U
ALPHA ENDOSULFAN	0.250 U	0.280 U	0.280 U	0.055 U	0.016 UJ	0.005 U	0.005 U	0.024 U	0.048 U	0.056 U
AROCLOR-1260	5.100 U	5.600 U	5.500 U	1.100 U	0.330 UJ	0.099 U	0.097 U	0.470 U	0.960 U	1.100 U
HEPTACHLOR EPOXIDE	3.600	2.000	1.800	0.065	0.016 UJ	0.001	0.002 J	0.024 U	0.087	0.036

COMPOUND	AREA 18C STREAM						AREA 20 DITCH		LOWER AREA 18B STREAM	
	SD-1812	SD-1813	SD-1814	SD-1815	SD-1816	SD-1817	SD-2001	SD-2002	SD-0101	SD-0102
4,4'-DDD	0.098 U	0.130 U	0.010 U	0.100 U	0.096 U	0.010 U	0.011 U	0.011 U	0.010 U	0.010 U
4,4'-DDE	0.098 U	0.130 U	0.010 U	0.100 U	0.096 U	0.010 U	0.011 U	0.011 U	0.010 U	0.010 U
4,4'-DDT	0.098 U	0.031	0.010 U	0.100 U	0.096 U	0.010 U	0.011 U	0.011 U	0.010 U	0.010 U
ALDRIN	0.049 U	0.066 U	0.005 U	0.052 U	0.048 U	0.005 U	0.006 U	0.006 U	0.005 U	0.005 U
ALPHA ENDOSULFAN	0.049 U	0.066 U	0.005 U	0.052 U	0.048 U	0.005 U	0.006 U	0.006 U	0.005 U	0.005 U
AROCLOR-1260	0.980 U	1.300 U	0.100 U	1.000 U	0.960 U	0.096 U	0.110 U	0.180 J	0.100 U	0.096 U
HEPTACHLOR EPOXIDE	0.038	0.035	0.003 J	0.084	0.067	0.005 U	0.006 U	0.006 U	0.005 U	0.005 U

COMPOUND	LOWER AREA 18B STREAM		AREA 8 POND							RED ROOT CREEK
	SD-0103	SD-0104	SD-0801	SD-0802	SD-0803	SD-0804	SD-0805	SD-0806	SD-0807	SD-0602
4,4'-DDD	0.010 U	0.009 U	0.390 UJ	0.590 UJ	0.260 UJ	0.120 U	0.120 U	0.210 UJ	0.410 UJ	0.065 UJ
4,4'-DDE	0.010 U	0.009 U	0.390 UJ	0.590 UJ	0.260 UJ	0.120 U	0.120 U	0.210 UJ	0.410 UJ	0.065 UJ
4,4'-DDT	0.010 U	0.009 U	0.390 UJ	0.590 UJ	0.260 UJ	0.120 U	0.120 U	0.210 UJ	0.410 UJ	0.065 UJ
ALDRIN	0.005 U	0.005 U	0.190 UJ	0.300 UJ	0.130 UJ	0.058 U	0.059 U	0.100 UJ	0.200 UJ	0.033 UJ
ALPHA ENDOSULFAN	0.005 U	0.005 U	0.190 UJ	0.300 UJ	0.130 UJ	0.058 U	0.059 U	0.100 UJ	0.200 UJ	0.033 UJ
AROCLOR-1260	0.098 U	0.094 U	3.900 UJ	5.900 UJ	2.600 UJ	1.200 U	1.200 U	2.100 UJ	4.100 UJ	0.650 UJ
HEPTACHLOR EPOXIDE	0.005 U	0.005 U	0.038 J	0.300 UJ	0.130 UJ	0.058 U	0.059 U	0.100 UJ	0.038 J	0.033 UJ

COMPOUND	SULFUR PLANT PONDS					
	SD-0610	SD-0611	SD-0612	SD-0613	SD-0614	SD-0615
4,4'-DDD	0.022 UJ	0.015 U	0.017 J	0.009 J	0.017 UJ	0.011 J
4,4'-DDE	0.022 UJ	0.015 U	0.020 J	0.011 U	0.017 UJ	0.024 J
4,4'-DDT	0.022 UJ	0.008 J	0.021 UJ	0.011 U	0.017 UJ	0.010 J
ALDRIN	0.011 UJ	0.007 U	0.011 UJ	0.006 U	0.008 UJ	0.010 UJ
ALPHA ENDOSULFAN	0.011 UJ	0.007 U	0.011 UJ	0.006 U	0.008 UJ	0.010 UJ
AROCLOR-1260	0.220 UJ	0.150 U	0.210 UJ	0.110 U	0.170 UJ	0.200 UJ
HEPTACHLOR EPOXIDE	0.011 UJ	0.007 U	0.011 UJ	0.006 U	0.008 UJ	0.010 UJ

ESTUARINE

COMPOUND	RED ROOT CREEK			
	SD-0601	SD-0603	SD-0604	SD-0605
4,4'-DDD	0.027 J	0.190 J	0.250 UJ	0.015 J
4,4'-DDE	0.038 UJ	0.200 UJ	0.250 UJ	0.013 J
4,4'-DDT	0.038 UJ	0.200 UJ	0.250 UJ	0.024 UJ
ALDRIN	0.019 UJ	0.099 UJ	0.120 UJ	0.012 UJ
ALPHA ENDOSULFAN	0.019 UJ	0.099 UJ	0.120 UJ	0.012 UJ
AROCLOR-1260	0.380 UJ	4.200 J	3.600 J	0.240 UJ
HEPTACHLOR EPOXIDE	0.019 UJ	0.099 UJ	0.120 UJ	0.012 UJ

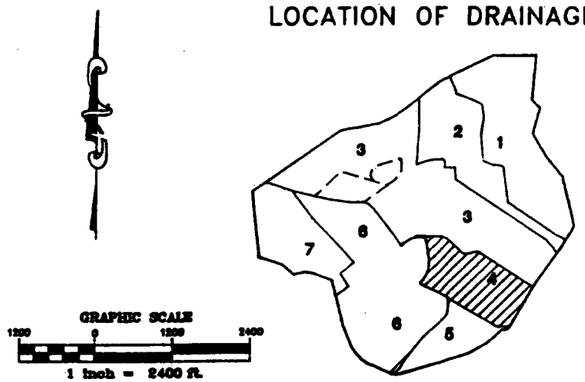
COMPOUND	RED ROOT CREEK			
	SD-0606	SD-0607	SD-0608	SD-0609
4,4'-DDD	0.087 J	0.033 UJ	0.039 J	0.014 J
4,4'-DDE	0.031 J	0.033 UJ	0.032 J	0.013 J
4,4'-DDT	0.025 UJ	0.033 UJ	0.020 UJ	0.024 UJ
ALDRIN	0.013 UJ	0.017 UJ	0.010 UJ	0.012 UJ
ALPHA ENDOSULFAN	0.013 UJ	0.017 UJ	0.010 UJ	0.012 UJ
AROCLOR-1260	0.250 UJ	0.330 UJ	0.200 UJ	0.240 UJ
HEPTACHLOR EPOXIDE	0.013 UJ	0.017 UJ	0.010 UJ	0.012 UJ

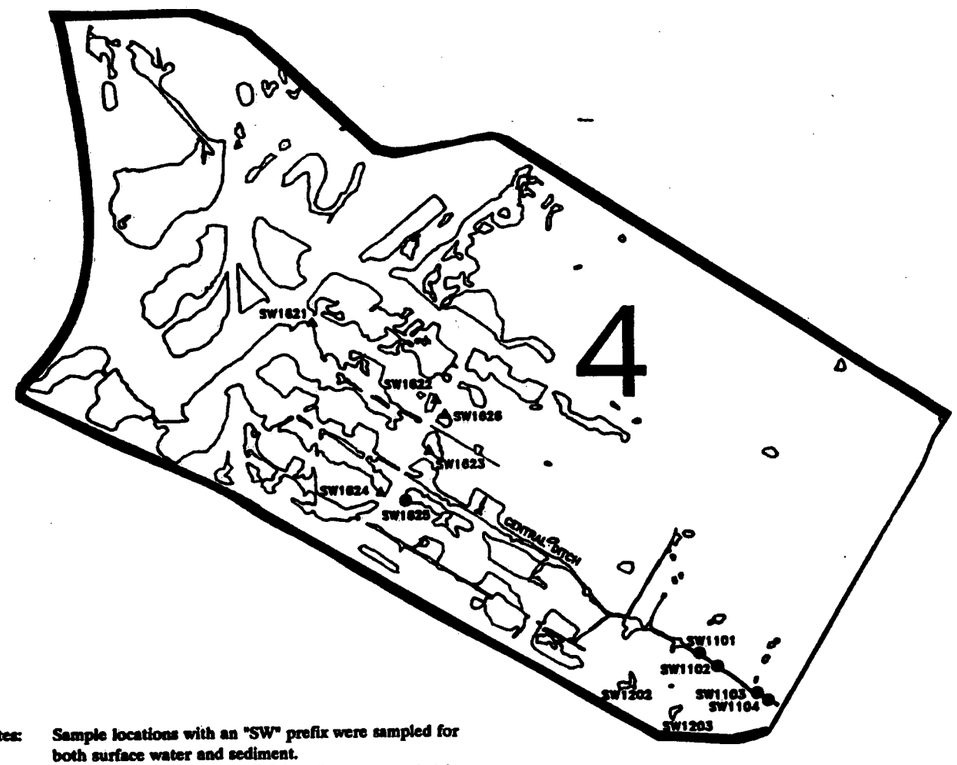
COMPOUND	FRESHWATER		ESTUARINE	
	SEDIMENT QUALITY CRITERIA		SEDIMENT QUALITY CRITERIA	
	Ontario LEL	Ontario SEL (Based on TOC)	NOAA ER-L	NOAA ER-M
4,4'-DDD	0.008	6.00	0.002	0.02
4,4'-DDE	0.005	19.00	0.002	0.015
4,4'-DDT	0.007	12.00	0.001	0.007
ALDRIN	0.002	8.00	NCA	NCA
ALPHA ENDOSULFAN	NCA	NCA	NCA	NCA
AROCLOR-1260	0.005	24.00	0.05	0.40
HEPTACHLOR EPOXIDE	0.005	5.00	NCA	NCA

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS
DATE: 4/6/95
FIGURE #: 4-31A

LOCATION OF DRAINAGE





Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

GRAPHIC SCALE
100 0 100 200
1 inch = 200 ft.

NOTE:
- THIS SITE MAP HAS BEEN ADAPTED FROM A PHOTOGRAMMETRIC BASEMAP OF THE FORMER RARITAN ARSENAL PREPARED BY GEDD CORPORATION (12/22/92 OVERFLIGHT PHOTOGRAPHY) UNDER SUBCONTRACT TO WESTON.

ANALYTICAL PESTICIDE RESULTS (MG/KG) - SEDIMENT
CENTRAL DITCH DRAINAGE AREA
FRESHWATER

COMPOUND	UPGRADIENT PONDED AREA	ISOLATED FRESHWATER POND			
	SD-1621	SD-1622	SD-1623	SD-1626	SD-1627
4,4'-DDD	0.170 UJ	0.170 UJ	0.120 U	0.013 U	0.017 UJ
4,4'-DDE	0.170 UJ	0.170 UJ	0.120 U	0.013 U	0.017 UJ
ALDRIN	0.086 UJ	0.017 J	0.019 J	0.002 J	0.003 J

ESTUARINE

COMPOUND	CENTRAL DITCH				ESTUARINE PONDS	UPGRADIENT PONDED AREA
	SD-1101	SD-1102	SD-1103	SD-1104	SD-1625	SD-1624
4,4'-DDD	0.016 U	0.007	0.050 U	0.600 U	0.500 UJ	0.140 U
4,4'-DDE	0.016 U	0.006	0.050 U	0.600 U	0.500 UJ	0.140 U
ALDRIN	0.008 U	0.008 U	0.025 U	0.300 U	0.250 UJ	0.069 U

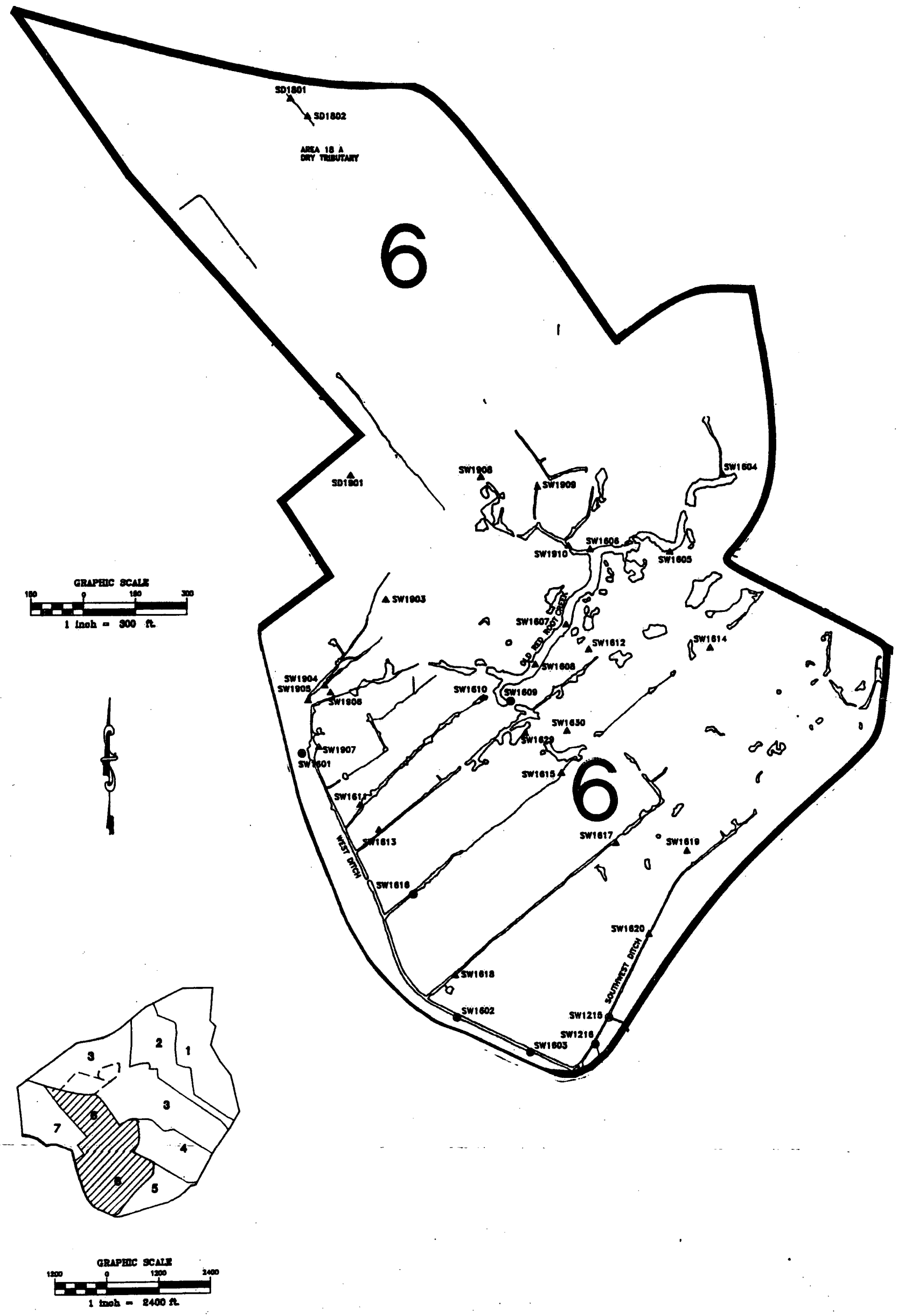
COMPOUND	FRESHWATER SEDIMENT QUALITY CRITERIA		ESTUARINE SEDIMENT QUALITY CRITERIA	
	Ontario LEL	Ontario SEL (Based on TOC)	NOAA ER-L	NOAA ER-M
4,4'-DDD	0.008	6.00	0.002	0.02
4,4'-DDE	0.005	19.00	0.002	0.015
ALDRIN	0.002	8.00	NCA	NCA

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

CENTRAL DITCH DRAINAGE

DATE: 4/6/95
FIGURE #: 4-32



Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

NOTE: FIGURE CONTINUED ON NEXT PAGE.

WESTON MANAGERS DESIGNERS/CONSULTANTS	PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION EDISON, NEW JERSEY	OLD RED ROOT CREEK DRAINAGE
	CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS	DATE: 4/7/95 FIGURE #: 4-33

REVISION #: 1 DATE: 4/7/95
FILE NAME: BASE-RTA.DWG DRAWN BY: B. MAC

ANALYTICAL PESTICIDE RESULTS (MG/KG) - SEDIMENT
OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE

COMPOUND	SOUTHWEST DITCH				WEST DITCH			
	SD-1215	SD-1216	SD-1619	SD-1620	SD-1601	SD-1602	SD-1603	SD-1907
4,4'-DDD	0.260 UJ	0.210 UJ	0.240 J	1.400 UJ	0.330 UJ	0.180 UJ	0.073 U	0.043 UJ
4,4'-DDE	0.260 UJ	0.210 UJ	0.098 J	1.400 UJ	0.330 UJ	0.180 UJ	0.073 U	0.023 J
4,4'-DDT	0.260 UJ	0.210 UJ	0.220 J	1.400 UJ	0.330 UJ	0.180 UJ	0.073 U	0.043 UJ
DIELDRIN	0.260 UJ	0.210 UJ	0.520 UJ	1.400 UJ	0.330 UJ	0.180 UJ	0.073 U	0.043 UJ
HEPTACHLOR EPOXIDE	0.130 UJ	0.110 UJ	0.150 J	0.680 UJ	0.160 UJ	0.089 UJ	0.036 U	0.021 UJ

COMPOUND	OLD RED ROOT CREEK						ASSOCIATED DITCHES AREA 16	
	SD-1606	SD-1607	SD-1608	SD-1609	SD-1610	SD-1631	SD-1611	SD-1612
4,4'-DDD	0.320 UJ	0.390 UJ	0.410 UJ	0.053 J	0.430 UJ	0.088 J	0.390 UJ	0.530 J
4,4'-DDE	0.320 UJ	0.390 UJ	0.410 UJ	0.210 UJ	0.430 UJ	0.230 UJ	0.390 UJ	0.470 UJ
4,4'-DDT	0.320 UJ	0.082 J	0.410 UJ	0.210 UJ	0.430 UJ	0.230 UJ	0.390 UJ	0.180 J
DIELDRIN	0.320 UJ	0.390 UJ	0.410 UJ	0.210 UJ	0.430 UJ	0.230 UJ	0.390 UJ	0.470 UJ
HEPTACHLOR EPOXIDE	0.160 UJ	0.200 UJ	0.200 UJ	0.110 UJ	0.210 UJ	0.120 UJ	0.190 UJ	0.230 UJ

COMPOUND	ASSOCIATED DITCHES - AREA 16							AREA 19 SW WETLANDS	
	SD-1615	SD-1616	SD-1617	SD-1618	SD-1628	SD-1629	SD-1630	SD-1906	SD-1911
4,4'-DDD	0.230 UJ	0.340 UJ	0.430 UJ	0.240 UJ	0.820 J	0.960 U	1.700 UJ	0.018 J	0.040 J
4,4'-DDE	0.230 UJ	0.340 UJ	0.430 UJ	0.240 UJ	0.400 UJ	0.960 U	1.700 UJ	0.030 J	0.060 J
4,4'-DDT	0.230 UJ	0.340 UJ	0.430 UJ	0.240 UJ	0.210 J	0.960 U	1.700 UJ	0.011 J	0.029 J
DIELDRIN	0.230 UJ	0.340 UJ	0.430 UJ	0.240 UJ	0.400 UJ	0.960 U	1.700 UJ	0.023 J	0.049 J
HEPTACHLOR EPOXIDE	0.110 UJ	0.170 UJ	0.220 UJ	0.120 UJ	0.200 UJ	0.480 U	0.830 UJ	0.010 UJ	0.016 UJ

COMPOUND	DRY TRIBUTARY AREA 18		AREA 19 FORESTED WETLANDS		AREA 19 NE WETLANDS		
	SD-1801	SD-1802	SD-1901	SD-1903	SD-1908	SD-1909	SD-1910
4,4'-DDD	0.052 U	0.015	0.016 U	0.310 J	0.013 U	0.039 UJ	0.023 UJ
4,4'-DDE	0.052 U	0.025	0.016 U	0.120 J	0.013 U	0.039 UJ	0.023 UJ
4,4'-DDT	0.052 U	0.053	0.016 U	0.160 UJ	0.013 U	0.039 UJ	0.023 UJ
DIELDRIN	0.052 U	0.077 U	0.016 U	0.160 UJ	0.013 U	0.039 UJ	0.023 UJ
HEPTACHLOR EPOXIDE	0.018	0.039 U	0.008 U	0.078 UJ	0.007 U	0.020 UJ	0.012 UJ

COMPOUND	AREA 19 SW WETLANDS		OLD RED ROOT CREEK		ASSOCIATED DITCHES AREA 16	
	SD-1904	SD-1905	SD-1604	SD-1605	SD-1613	SD-1614
4,4'-DDD	0.021 UJ	0.013 U	0.011 U	0.100 U	0.100 UJ	0.300 UJ
4,4'-DDE	0.021 UJ	0.006 J	0.011 U	0.100 U	0.100 UJ	0.300 UJ
4,4'-DDT	0.021 UJ	0.007 J	0.011 U	0.100 U	0.100 UJ	0.300 UJ
DIELDRIN	0.021 UJ	0.013 U	0.011 U	0.100 U	0.100 UJ	0.300 UJ
HEPTACHLOR EPOXIDE	0.010 UJ	0.008 U	0.006 U	0.050 U	0.052 UJ	0.150 UJ

COMPOUND	FRESHWATER SEDIMENT QUALITY CRITERIA		ESTUARINE SEDIMENT QUALITY CRITERIA	
	Ontario LEL	Ontario SEL (Based on TOC)	NOAA ER-L	NOAA ER-M
4,4'-DDD	0.008	6.00	0.002	0.02
4,4'-DDE	0.005	19.00	0.002	0.015
4,4'-DDT	0.007	12.00	0.001	0.007
DIELDRIN	0.002	91.00	0.00002	0.008
HEPTACHLOR EPOXIDE	0.005	5.00	NCA	NCA

WESTON
MANAGERS DESIGNERS/CONSULTANTS

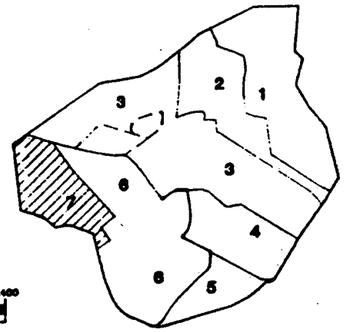
PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

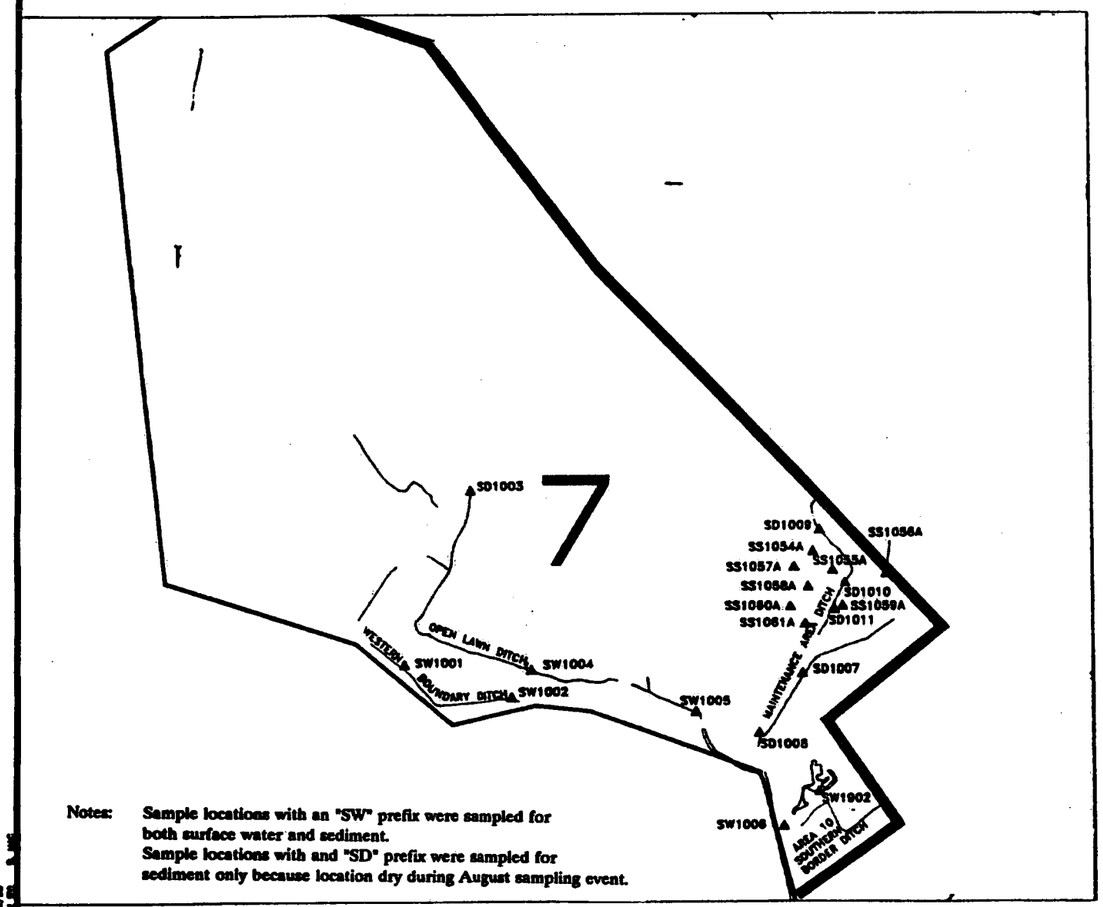
DATE: 4/6/95

FIGURE #: 4-33A

LOCATION OF DRAINAGE



GRAPHIC SCALE
1200 0 1200 2400
1 inch = 2400 ft.



Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

GRAPHIC SCALE
100 0 100 200
1 inch = 300 ft.

NOTE:
- THIS SITE MAP HAS BEEN ADAPTED FROM A PHOTOGRAMMETRIC BASEMAP OF THE FORMER RARITAN ARSENAL PREPARED BY GEGD CORPORATION (12/22/92 OVERFLIGHT PHOTOGRAPHY) UNDER SUBCONTRACT TO WESTON.

ANALYTICAL PESTICIDE RESULTS (MG/KG) - SEDIMENT
COUNTY PARK DRAINAGE AREA
FRESHWATER

COMPOUND	OPEN LAWN DITCH				MAINTENANCE AREA DITCH	
	SD-1003	SD-1004	SD-1005	SD-1012*	SD-1007	SD-1008
4,4'-DDD	0.046 UJ	0.011 U	0.027 U	0.025 U	0.010 U	0.610 J
4,4'-DDE	0.046 UJ	0.011 U	0.027 U	0.025 U	0.010 U	0.110 J
4,4'-DDT	0.046 UJ	0.011 U	0.027 U	0.025 U	0.006 J	1.300 J

* SD-1012 is a duplicate of SD-1005.

COMPOUND	MAINTENANCE AREA DITCH			WESTERN BOUNDARY DITCH		AREA 10 SOUTHERN BORDER DITCH	
	SD-1009	SD-1010	SD-1011	SD-1001	SD-1002	SD-1006	SD-1902
4,4'-DDD	0.015 U	0.014 U	0.008 U	0.023 U	0.025 U	0.011 U	0.072 UJ
4,4'-DDE	0.015 U	0.014 U	0.008 U	0.023 U	0.025 U	0.011 U	0.072 UJ
4,4'-DDT	0.010 U	0.014 U	0.008 U	0.023 U	0.025 U	0.011 U	0.072 UJ

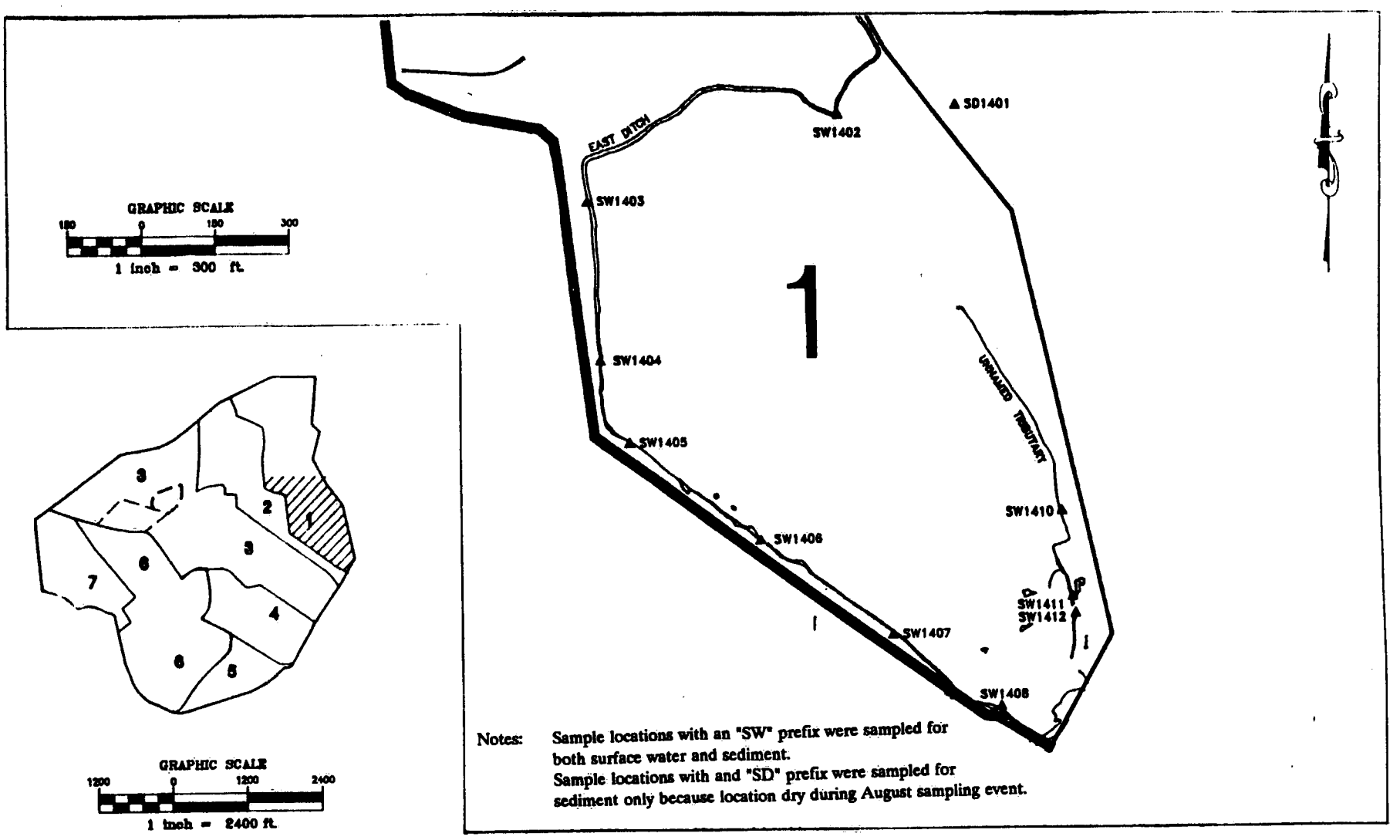
COMPOUND	FRESHWATER SEDIMENT QUALITY CRITERIA	
	Ontario LEL	Ontario SEL (Based on TOC)
4,4'-DDD	0.008	6.00
4,4'-DDE	0.005	19.00
4,4'-DDT	0.007	12.00

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

COUNTY PARK DRAINAGE

DATE: 4/6/95
FIGURE #: 4-34



Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

ANALYTICAL METAL RESULTS (MG/KG) - SEDIMENT
EAST DITCH DRAINAGE AREA
FRESHWATER

COMPOUND	UPGRADIENT SCIRPUS MARSH	EAST DITCH					UNNAMED TRIBUTARY
	SD-1401	SD-1402	SD-1403	SD-1404	SD-1405	SD-1406	SD-1410
ANTIMONY	NA	NA	0.32 J-	NA	NA	NA	NA
ARSENIC	186.00	3.20 J-	6.10 J-	10.20 J	9.30 J	30.20	176.00 J
CADMIUM	1.30	0.01 U	0.12	0.70 J	0.66 J	0.38	9.90 J
CHROMIUM	209.00	7.10	28.80	44.70 J	36.70 J	35.80	155.00 J
COPPER	294.00	8.00	29.10	83.60 J	90.80 J	78.80	2850.00 J
LEAD	316.00	9.60 J	44.70	62.80 J	56.70 J	50.90	203.00 J
MERCURY	5.50	0.09 U	0.20 U	0.28 UJ	0.31 UJ	0.49	3.20 J
NICKEL	28.00	1.20 U	5.10	44.30 J	19.50 J	14.10	43.00 J
SILVER	8.10	0.21 U	0.38	0.57 UJ	0.55 UJ	1.70	7.00 J
ZINC	127.00 J	11.90 J	45.80	238.00 J	156.00 J	105.00 J	1120.00 J

ESTUARINE

COMPOUND	EAST DITCH		UNNAMED TRIBUTARY	
	SD-1407	SD-1408	SD-1411	SD-1412
ANTIMONY	9.80 J	NA	NA	2.20 J
ARSENIC	59.60 J	14.10 J	54.80 J	19.60 J
CADMIUM	5.30 J	0.06 J	10.20 J	1.70 J
CHROMIUM	40.60 J	43.70 J	74.10 J	33.20 J
COPPER	148.00 J	25.60 J	712.00 J	166.00 J
LEAD	57.30 J	27.70 J	111.00 J	44.10 J
MERCURY	1.50 J	0.18 UJ	1.30 J	0.43 J
NICKEL	22.70 J	31.80 J	42.70 J	16.10 J
SILVER	1.70 J	0.66 J	4.10 J	1.80 J
ZINC	271.00 J	89.30 J	1110.00 J	273.00 J

COMPOUND	FRESHWATER SEDIMENT QUALITY CRITERIA		ESTUARINE SEDIMENT QUALITY CRITERIA	
	Ontario LEL	Ontario SEL	NOAA ER-L	NOAA ER-M
ANTIMONY	NCA	NCA	2.00	25.00
ARSENIC	6	33	33.00	85.00
CADMIUM	0.6	10	5.00	9.00
CHROMIUM	26	110	80.00	145.00
COPPER	16	110	70.00	390.00
LEAD	31	250	35.00	110.00
MERCURY	0.2	2	0.15	1.30
NICKEL	16	75	30.00	50.00
SILVER	NCA	NCA	1.00	2.20
ZINC	120	820	120.00	270.00

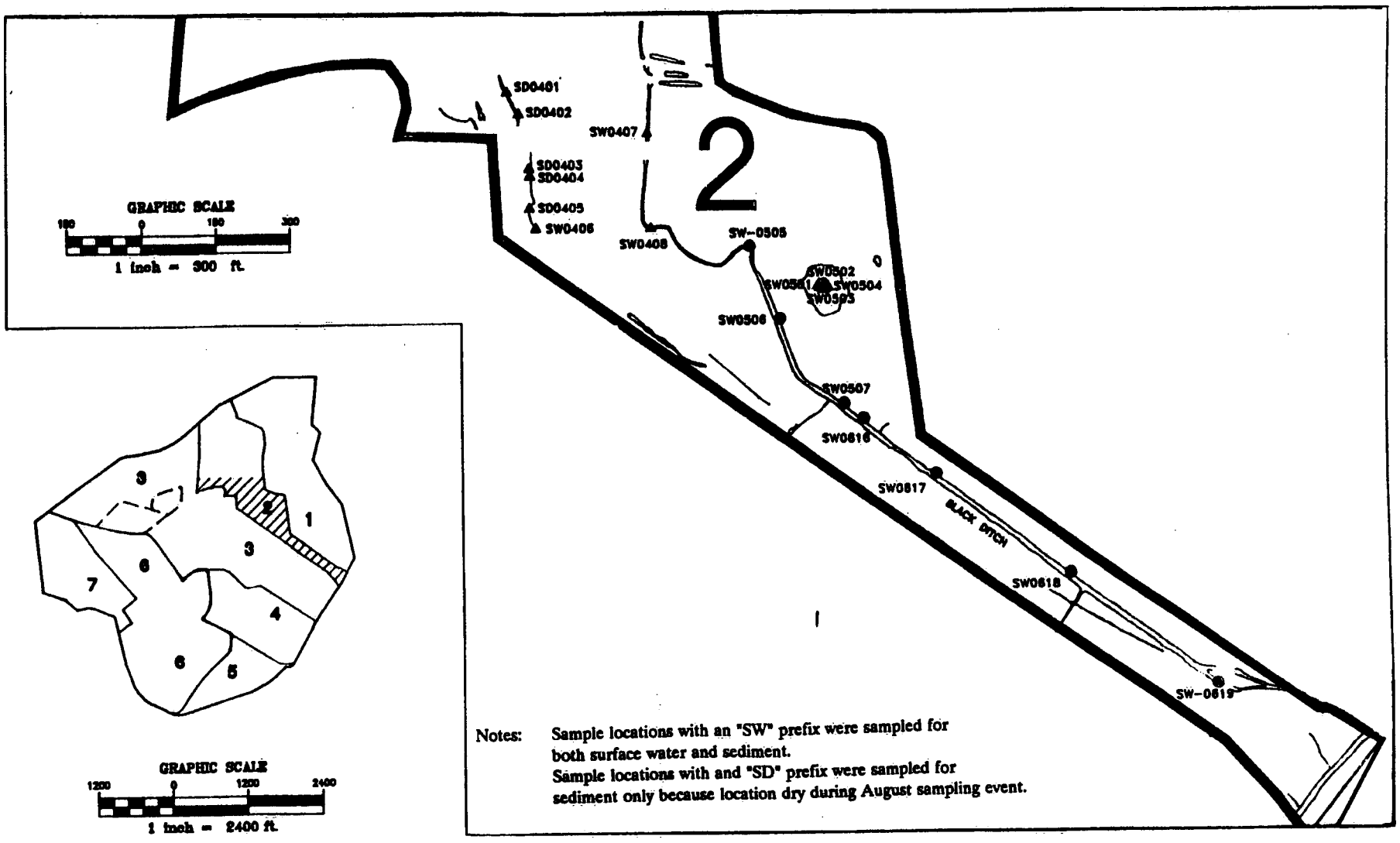
WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

EAST DITCH DRAINAGE

DATE: 4/7/95
FIGURE #: 4-35

REVISION #: 1 DATE: 4/7/95
FILE NAME: BASE-RTB.DWG DRAWN BY: B. MAC



ANALTICAL METAL RESULTS (MG/KG) - SEDIMENT
BLACK DITCH DRAINAGE AREA
FRESHWATER

COMPOUND	AREA 4 DITCH						BLACK DITCH			AREA 5 POND			
	SD-0401	SD-0402	SD-0403	SD-0404	SD-0405	SD-0406	SD-0408	SD-0505	SD-0407	SD-0501	SD-0502	SD-0503	SD-0504
ANTIMONY	NA	NA	14.20 U	NA	NA	NA	NA	2.06 UJ	1.70 U	4.57 UJ	NA	NA	NA
ARSENIC	9.40 J	13.00 J	8.10 U	6.80	3.90	6.30 J	2.40 J-	1.90	1.10 U	15.90 J	8.20 U	6.60 U	15.30 U
CADMIUM	3.10 J	1.30 J	1.00 J	1.10	0.51	0.70 J	0.30 U	0.30	0.25 U	0.58 UJ	0.81 UJ	0.49 J	0.59 UJ
CHROMIUM	10.50 J	19.20 J	20.70 J	13.90	25.50	30.10 J	7.60 J	3.10	4.90 J-	21.30 J	17.00 J	14.80 J	9.20 J
COPPER	112.00 J	163.00 J	207.00 J	140.00 J	110.00 J	76.90 J	12.00 J	4.80	10.70 J	107.00 J	86.60 J	58.70 J	59.00 J
LEAD	130.00 J	309.00 J	327.00 J	162.00	115.00	72.70 J	9.20 J	4.60	12.40 J	132.00 J	166.00 J	95.20 J	205.00 J
MERCURY	0.91 J	0.70 J	0.81 J	0.39	0.07 U	0.10 UJ	0.08 U	0.07 U	0.05 U	0.25 J	0.44 J	0.16 J	0.38 J
NICKEL	13.70 J	20.40 J	20.10 J	4.80	8.90	10.70 J	2.80 J	2.40	1.50 J-	7.70 J	7.80 J	7.50 J	3.70 J
SILVER	1.29 UJ	2.90 J	1.90 J	1.00	0.78	1.60 J	0.46	0.73 J-	0.30 UJ	0.70 UJ	1.30 J	0.53 UJ	0.72 UJ
ZINC	507.00 J	117.00 J	197.00 J	34.00 J	70.10 J	99.00 J	16.90 U	11.70 U	21.70	53.70 J	61.60 U	67.70 J	22.20 U

ESTUARINE

COMPOUND	BLACK DITCH						
	SD-0506	SD-0507	SD-0616	SD-0617	SD-0618	SD-0619	SD-0620
ANTIMONY	2.50	NA	NA	NA	NA	5.45 UJ	4.80 J
ARSENIC	UJ	1.20 UJ	9.20 J	16.30 J	8.00 J	29.50 J	16.90 J
CADMIUM	0.28 U	0.24 U	0.41 UJ	0.57 UJ	1.50 J	0.69 UJ	0.75 J
CHROMIUM	9.40	2.40	26.90 J	35.70 J	50.20 J	35.60 J	38.50 J
COPPER	14.40 J	3.40 J	75.70 J	98.80 J	150.00 J	96.40 J	99.70 J
LEAD	15.70 J	10.10 J	96.30 J	109.00 J	47.30 J	120.00 J	73.60 J
MERCURY	0.06 U	0.07 U	0.33 J	0.67 J	1.10 J	0.74 J	0.60 J
NICKEL	2.90	1.00 U	17.30 J	17.40 J	27.60 J	15.60 J	16.20 J
SILVER	0.34 UJ	0.29 UJ	0.71 J	1.90 J	0.82 UJ	1.80 J	1.40 J
ZINC	32.90 J	13.20 U	225.80 J	274.00 J	334.00 J	204.00 J	247.00 J

COMPOUND	FRESHWATER SEDIMENT QUALITY CRITERIA		ESTUARINE SEDIMENT QUALITY CRITERIA	
	Ontario LEL	Ontario SEL	NOAA ER-L	NOAA ER-M
ANTIMONY	NCA	NCA	2.00	25.00
ARSENIC	6	33	33.00	85.00
CADMIUM	0.6	10	5.00	9.00
CHROMIUM	26	110	80.00	145.00
COPPER	16	110	70.00	390.00
LEAD	31	250	35.00	110.00
MERCURY	0.2	2	0.15	1.30
NICKEL	16	75	30.00	50.00
SILVER	NCA	NCA	1.00	2.20
ZINC	120	820	120.00	270.00

WESTON
MANAGERS DESIGNERS/CONSULTANTS

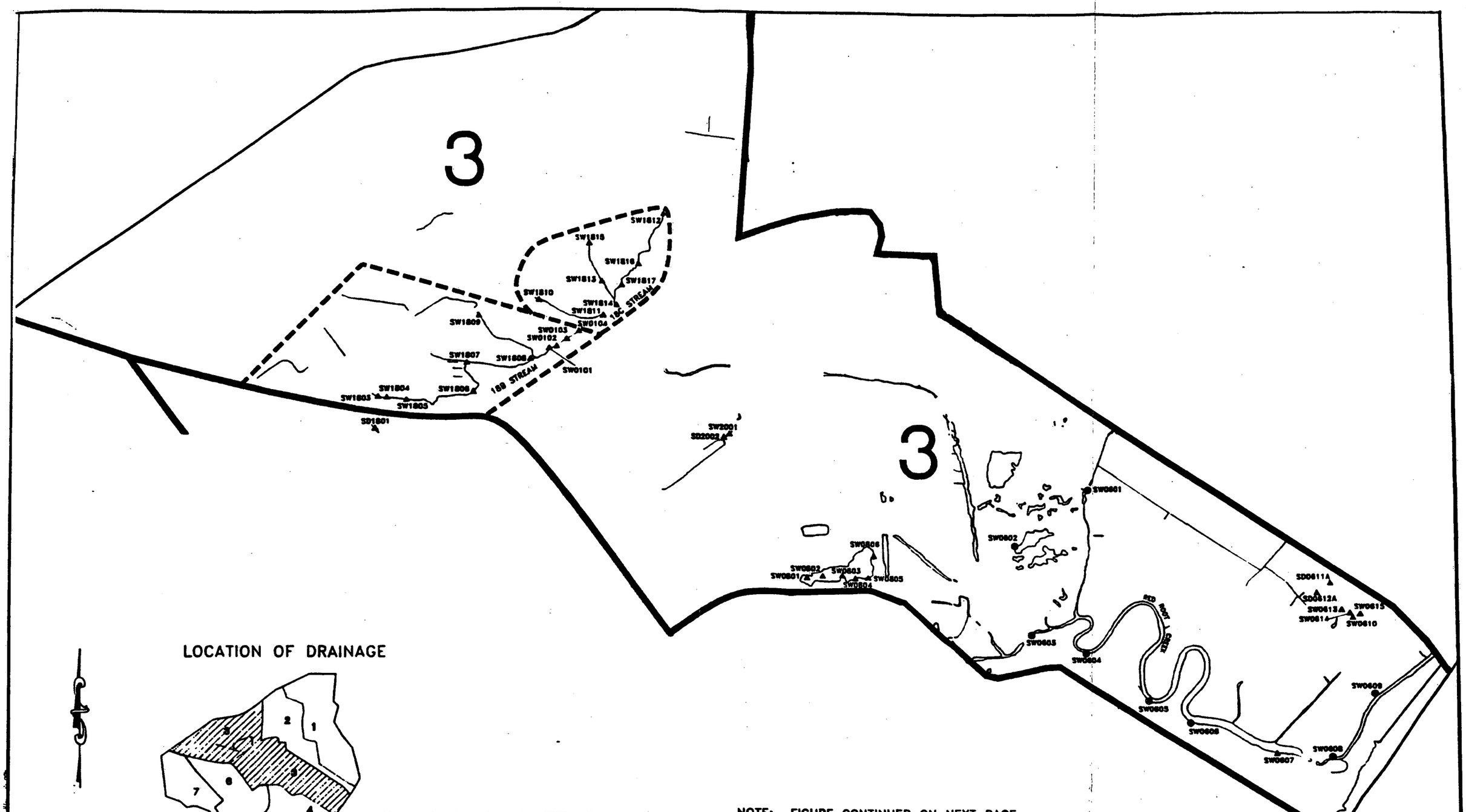
PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

BLACK DITCH DRAINAGE

DATE: 4/7/95

FIGURE #: 4-36



Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

- THIS SITE MAP HAS BEEN ADAPTED FROM A PHOTOGRAMMETRIC BASEMAP OF THE FORMER RARITAN ARSENAL PREPARED BY GEOD CORPORATION (12/22/92 OVERFLIGHT PHOTOGRAPHY) UNDER SUBCONTRACT TO WESTON.

NOTE: FIGURE CONTINUED ON NEXT PAGE.

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

RED ROOT CREEK DRAINAGE

DATE: 4/6/95
FIGURE #: 4-37

ANALYTICAL METAL RESULTS (MG/KG) - SEDIMENT
RED ROOT CREEK DRAINAGE AREA
FRESHWATER

COMPOUND	AREA 18B STREAM								AREA 18C STREAM	
	SD-1803	SD-1804	SD-1805	SD-1806	SD-1807	SD-1808	SD-1809	SD-1818*	SD-1810	SD-1811
ARSENIC	5.80 J-	6.30 J-	1.50	1.10 J-	7.40 J	0.79 J-	1.20 J-	2.60 J-	32.80 J-	1.90 J-
CADMIUM	0.61	0.25	0.07	0.08	0.12 J	0.01 U	0.05 U	0.05	0.07 J	0.14 J
CHROMIUM	12.70 J	10.50	10.10	3.80 J	8.70 J	3.70	5.10	9.60	20.80	7.80
COPPER	84.10	50.10	48.50	10.40	38.10 J	1.90	5.90	8.50	46.70 J	13.50 J
LEAD	127.00	88.90	63.20	13.60	40.90 J	8.10 J	4.90 J	7.40 J	111.00	39.60
MERCURY	0.09 U	0.14 U	0.09 U	0.13 U	0.94 J	0.09 U	0.10 U	0.13	0.09 U	0.14 U
NICKEL	14.00	7.50	8.00	1.60 U	4.00 UJ	1.20 U	1.20 U	1.20 U	5.80 J	1.60 J
SILVER	1.00 U	0.39	0.25 U	0.28 U	1.90 J	0.22 U	0.25	0.25	0.55 U	0.25 U
ZINC	244.00	151.00 J	194.00 J	16.40	31.10 J	1.70 U	8.90 J	11.70 J	121.00	24.30

* SD-1818 is a duplicate of SD-1809.

COMPOUND	AREA 18C STREAM						AREA 20 DITCH		LOWER AREA 18B STREAM	
	SD-1812	SD-1813	SD-1814	SD-1815	SD-1816	SD-1817	SD-2001	SD-2002	SD-0101	SD-0102
ARSENIC	1.70 J-	1.40 J-	0.62 J-	2.10 J-	0.25 J-	0.71 J-	1.24 UJ	1.10	1.50 U	1.40 U
CADMIUM	0.30 J	0.27 J	0.03 J	0.29 J	0.02 J	0.03 J	0.44 U	0.27 U	0.25 U	0.22 U
CHROMIUM	12.60	25.80	5.70	20.50	3.10	6.20	13.70	12.90	5.80 J	3.40 J
COPPER	18.20 J	28.10 J	3.20 J	25.40 J	2.40 J	5.20 J	20.80 U	10.00	5.60 J-	2.70 J-
LEAD	52.60	48.40	3.30	47.50	2.30	2.90	11.70 J	6.80 J	7.50 J-	4.60 J-
MERCURY	0.09 U	0.11 U	0.10 U	0.13	0.10 U	0.09 U	0.07 U	0.07 U	0.07 U	0.06 U
NICKEL	3.60 J	4.00 J	1.10 U	5.80 J	1.00 U	1.60 J	5.20	1.14 U	1.10 U	0.95 U
SILVER	0.35 U	0.44 U	0.20 U	0.27 U	0.18 U	0.22 U	0.68	0.32 U	0.30 U	0.27 U
ZINC	55.80	52.20	5.30	79.00	4.50	11.10	19.90 U	12.90	9.90 U	3.30 U

COMPOUND	LOWER AREA 18B STREAM		AREA 8 POND							RED ROOT CREEK
	SD-0103	SD-0104	SD-0801	SD-0802	SD-0803	SD-0804	SD-0805	SD-0806	SD-0807	SD-0602
ARSENIC	1.50 U	1.10 U	14.80 J	11.50 J	11.10 J	1.50	1.50	6.10 J	9.60 J	43.30 J
CADMIUM	0.24 U	0.23 U	3.60 J	3.00 J	1.10 J	0.05 J-	0.05 J-	0.08 J	2.80 J	1.52 UJ
CHROMIUM	2.80 J	3.70 J	59.90 J	48.30 J	33.80 J	16.70	11.80	28.70 J	58.00 J	34.60 J
COPPER	2.10 J-	4.00 J	138.00 J	125.00 J	51.30 J	10.00	14.30	35.80 J	117.00 J	195.00 J
LEAD	4.60 J-	3.30	193.00 J	148.00 J	59.30 J	11.60 J	18.80	32.70 J	135.00 J	339.00 J
MERCURY	0.06 U	0.06 U	0.51 J	0.65 UJ	0.27 UJ	0.12 U	0.10 U	0.25 UJ	0.41 UJ	0.63 J
NICKEL	1.00 U	0.97 U	30.20 J	40.90 J	18.10 J	3.30	4.80	9.70 J	27.80 J	22.80 J
SILVER	0.29 U	0.57	0.87 UJ	1.30 UJ	0.54 UJ	0.25 U	0.25 U	0.43 UJ	0.81 UJ	1.84 UJ
ZINC	3.50 U	3.40 U	480.00 J	408.00 J	171.00 J	12.50 J-	23.40 J-	27.60 J	426.00 J	224.00 J

COMPOUND	SULFUR PLANT PONDS					
	SD-0610	SD-0611	SD-0612	SD-0613	SD-0614	SD-0615
ARSENIC	22.80 J	15.60 J-	7.60 J	16.50 J-	13.90 J	3.20 J
CADMIUM	0.49 UJ	7.30	0.51 UJ	1.40	0.39 UJ	0.43 UJ
CHROMIUM	14.60 J	110.00 J	104.00 J	24.50 J	22.20 J	30.60 J
COPPER	17.20 J	144.00 J	91.20 J	107.00 J	26.60 J	54.30 J
LEAD	84.50 J	153.00 J	40.60 J	36.90 J	182.00 J	166.00 J
MERCURY	0.15 J	0.10 U	0.14 J	0.16	0.24 J	1.93 J
NICKEL	2.07 UJ	163.00 J-	6.20 J	10.20 J-	1.70 J	3.90 J
SILVER	2.30 J	4.10 J-	1.00 J	0.73 J-	2.90 J	1.90 J
ZINC	15.00 U	155.00 J	16.70 U	96.30 J	27.40 J	32.00 J

ESTUARINE

COMPOUND	RED ROOT CREEK			
	SD-0601L	SD-0603	SD-0604	SD-0605
ARSENIC	38.30 J	15.10 J	61.50 J	62.80 J
CADMIUM	0.93 UJ	0.70 UJ	1.50 J	0.61 UJ
CHROMIUM	74.80 J	25.70 J	82.80 J	55.50 J
COPPER	61.90 J	96.10 J	238.00 J	144.00 J
LEAD	155.00 J	117.00 J	170.00 J	115.00 J
MERCURY	0.62 J	0.56 J	1.18 J	1.03 J
NICKEL	21.70 J	13.40 J	31.50 J	26.00 J
SILVER	1.12 UJ	2.60 J	4.10 J	2.90 J
ZINC	81.00 J	169.00 J	435.00 J	239.00 J

COMPOUND	RED ROOT CREEK			
	SD-0606	SD-0607	SD-0608	SD-0609
ARSENIC	61.30 J	105.00 J	55.20 J	43.20 J
CADMIUM	0.56 UJ	0.56 UJ	0.72 J	0.65 J
CHROMIUM	113.00 J	74.80 J	64.90 J	37.20 J
COPPER	125.00 J	112.00 J	201.00 J	104.00 J
LEAD	205.00 J	228.00 J	114.00 J	70.90 J
MERCURY	2.64 J	2.10 J	2.00 J	0.88 J
NICKEL	12.70 J	15.30 J	24.00 J	25.00 J
SILVER	3.60 J	5.60 J	4.50 J	3.60 J
ZINC	104.00 J	104.00 J	207.00 J	137.00 J

COMPOUND	FRESHWATER SEDIMENT QUALITY CRITERIA		ESTUARINE SEDIMENT QUALITY CRITERIA	
	Ontario LEL	Ontario SEL	NOAA ER-L	NOAA ER-M
ARSENIC	6	33	33.00	85.00
CADMIUM	0.6	10	5.00	9.00
CHROMIUM	26	110	80.00	145.00
COPPER	16	110	70.00	390.00
LEAD	31	250	35.00	110.00
MERCURY	0.2	2	0.15	1.30
NICKEL	16	75	30.00	50.00
SILVER	NCA	NCA	1.00	2.20
ZINC	120	820	120.00	270.00

WESTON MANAGERS DESIGNERS/CONSULTANTS

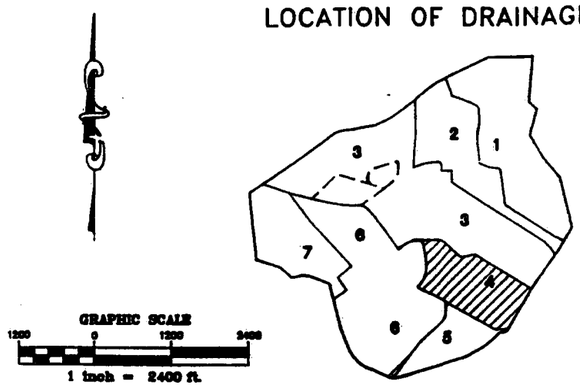
PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

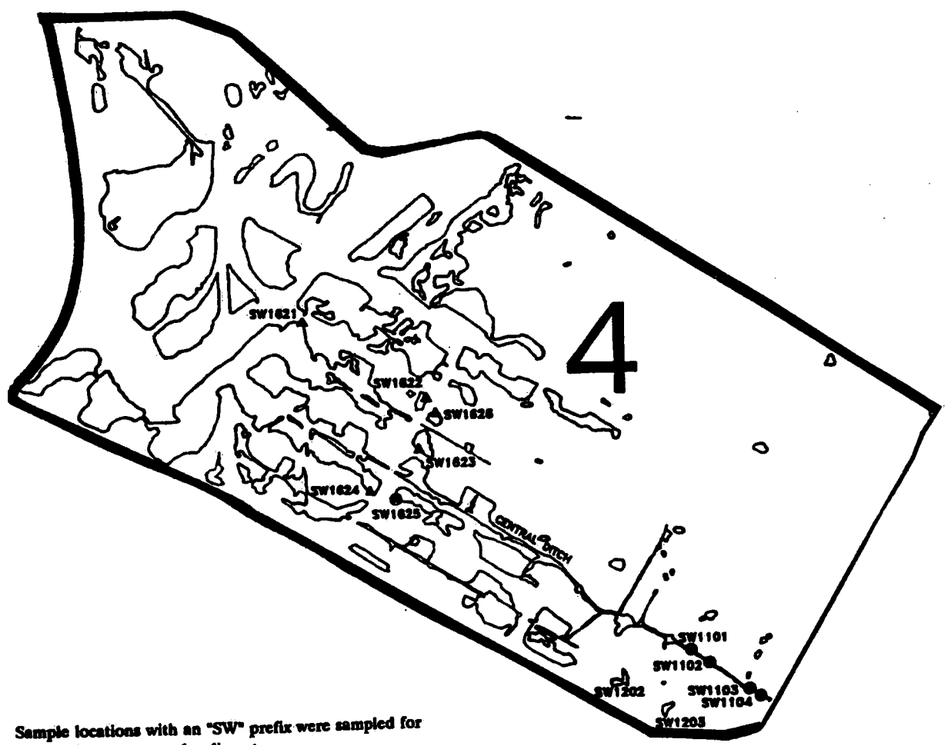
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

DATE: 4/6/95

FIGURE #: 4-37A

LOCATION OF DRAINAGE





Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

ANALYTICAL METAL RESULTS (MG/KG) - SEDIMENT
CENTRAL DITCH DRAINAGE AREA
FRESHWATER

COMPOUND	UPGRADIENT PONDED AREA	ISOLATED FRESHWATER POND			
	SD-1621	SD-1622	SD-1623	SD-1626	SD-1627
ARSENIC	15.20 J	28.40 J	3.30	3.00	9.20 UJ
COPPER	18.60 J	30.20 J	18.20	6.90	12.40 J
LEAD	19.40 J	47.60 J	23.90	5.70 J+	12.20 J
MERCURY	0.16 UJ	0.17 UJ	0.12 U	0.11 U	0.18 UJ
SILVER	0.37 UJ	0.54 J	0.31 U	0.37	0.73 J
ZINC	84.20 J	55.90 J	22.60	11.70	19.10 J

ESTUARINE

COMPOUND	CENTRAL DITCH				ESTUARINE PONDS	UPGRADIENT PONDED AREA
	SD-1101	SD-1102	SD-1103	SD-1104	SD-1625	SD-1624
ARSENIC	29.40	15.60	3.00	23.60	21.80 J	5.00
COPPER	24.80	33.90	11.70	64.50	236.00 J	12.70
LEAD	42.60	87.40	21.30	88.50	200.00 J	19.10 J+
MERCURY	0.16 U	0.16	0.10 U	0.18	0.87 J	0.14 U
SILVER	0.68	0.43	0.23 U	0.50	1.60 J	0.66
ZINC	85.80	86.00	56.10	190.00	97.80 J	32.00

COMPOUND	FRESHWATER SEDIMENT QUALITY CRITERIA		ESTUARINE SEDIMENT QUALITY CRITERIA	
	Ontario LEL	Ontario SEL	NOAA ER-L	NOAA ER-M
ARSENIC	6	33	33.00	85.00
COPPER	16	110	70.00	390.00
LEAD	31	250	35.00	110.00
MERCURY	0.2	2	0.15	1.30
SILVER	NCA	NCA	1.00	2.20
ZINC	120	820	120.00	270.00

GRAPHIC SCALE
1 inch = 300 ft.

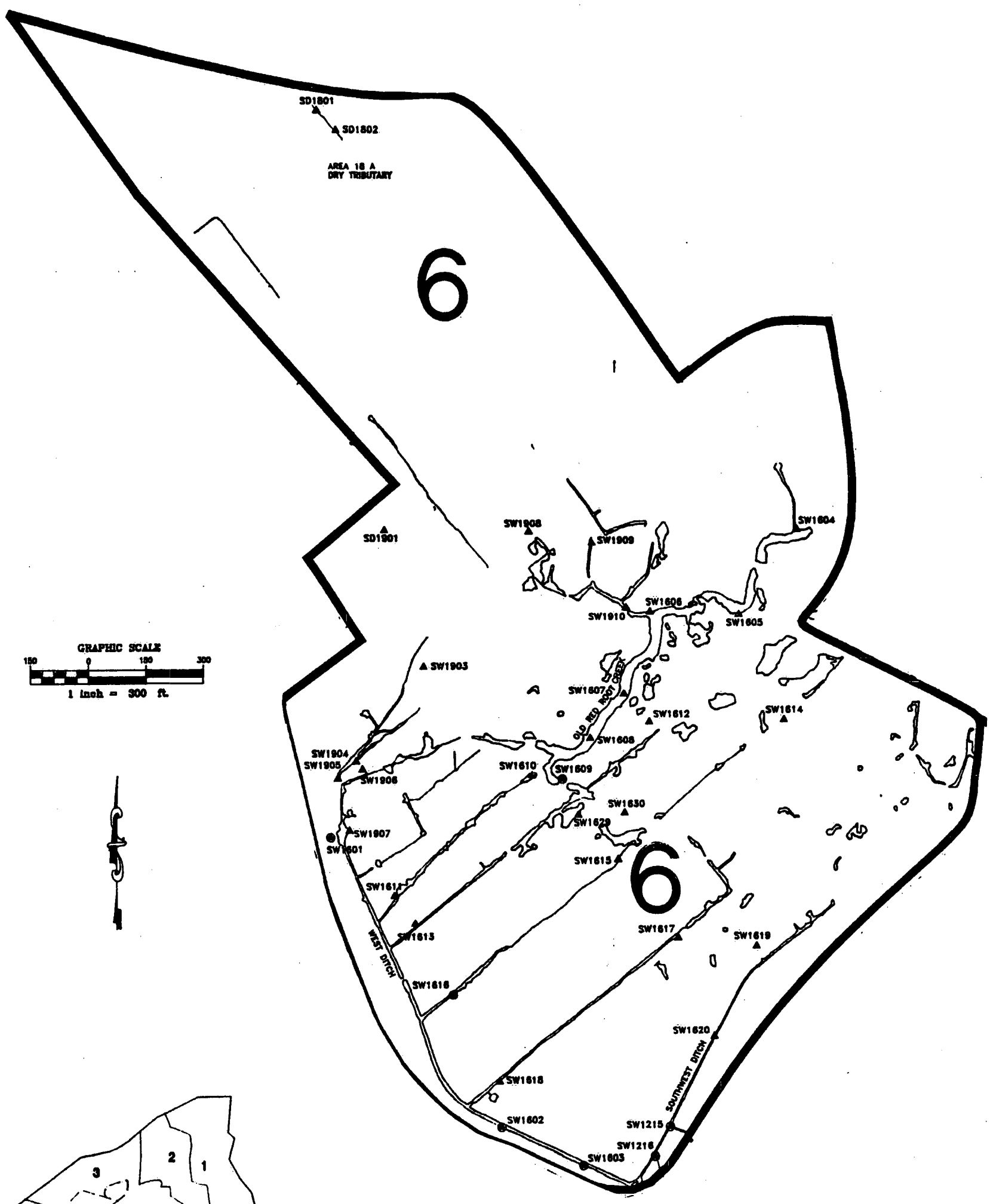
NOTE:
- THIS SITE MAP HAS BEEN ADAPTED FROM A PHOTOGRAMMETRIC BASEMAP OF THE FORMER RARITAN ARSENAL PREPARED BY GEDD CORPORATION (12/22/92 OVERFLIGHT PHOTOGRAPHY) UNDER SUBCONTRACT TO WESTON.

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

CENTRAL DITCH DRAINAGE

DATE: 4/6/95
FIGURE #: 4-38



Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

NOTE: FIGURE CONTINUED ON NEXT PAGE.

WESTON MANAGERS DESIGNERS/CONSULTANTS	PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION EDISON, NEW JERSEY	OLD RED ROOT CREEK DRAINAGE
	CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS	DATE: 4/7/95 — FIGURE #: 4-39

REVISION #: 1 DATE: 4/7/96
FILE NAME: BASE-RTR.DWG DRAWN BY: B. MAC

ANALTICAL METAL RESULTS (MG/KG) - SEDIMENT
OLD RED ROOT CREEK DRAINAGE AREA
ESTUARINE

COMPOUND	ASSOCIATED DITCHES - AREA 16									OLD RED ROOT CREEK	
	SD-1611	SD-1612	SD-1615	SD-1616L	SD-1617	SD-1618	SD-1628	SD-1629	SD-1630	SD-1606	SD-1607
ANTIMONY	NA	NA	NA	NA	4.30 UJ	NA	NA	NA	NA	NA	3.30 UJ
ARSENIC	44.40 J	46.80 J	8.70 J	36.10 J	152.00 J	40.10 J	45.70 J	25.10	42.30 J	43.00 J	43.80 J
CADMIUM	0.99 U	0.61 J	0.20 J	1.40 J	1.10 U	1.40 J	0.37 J	1.40 U	0.10 UJ	2.40 J	3.30 J
CHROMIUM	64.10 J	30.50 J	13.20 J	63.60 J	58.00 J	50.70 J	28.70 J	28.30	9.60 J	49.40 J	61.60 J
COPPER	129.00 J	171.00 J	27.60 J	152.00 J	116.00 J	118.00 J	147.00 J	63.60	11.60 J	100.00 J	131.00 J
LEAD	133.00 J	176.00 J	49.40 J	114.00 J	104.00 J	95.10 J	174.00 J	60.10	12.20 J	85.80 J	101.00 J
MERCURY	0.54 J	0.55 J	0.20 UJ	0.89 J	0.53 J	0.65 J	0.43 J	1.00 U	0.19 UJ	0.67 J	0.51 J
NICKEL	33.80 J	17.90 J	4.60 J	28.90 J	30.70 J	23.70 J	17.80 J	27.90	2.60 J	41.90 J	52.30 J
SILVER	2.40 J	1.10 UJ	0.69 U	4.30 U	2.40 J	3.50 U	1.00 U	2.10 U	0.45 UJ	0.73 UJ	1.90 J
ZINC	230.00 J	116.00 J	60.20 J	259.00 J	247.00 J	219.00 J	144.00 J	279.00	19.90 J	525.00 J	624.00 J

COMPOUND	OLD RED ROOT CREEK				AREA 19 SW WETLANDS		SOUTHWEST DITCH			
	SD-1608	SD-1609	SD-1610	SD-1631	SD-1906	SD-1911	SD-1215	SD-1216	SD-1619	SD-1620
ANTIMONY	3.50 UJ	1.70 UJ	NA	2.90 J	NA	NA	NA	2.00 UJ	NA	NA
ARSENIC	39.30 J	29.50 J	50.00 J	46.80 J	21.10 U	31.80 U	26.40 J	34.60 J	95.60 J	44.70 J
CADMIUM	2.90 J	0.89 J	0.94 J	1.30 J	0.49 UJ	0.78 UJ	1.60 J	1.20 J	0.97 U	1.30 J
CHROMIUM	57.40 J	47.80 J	39.60 J	49.00 J	14.30 J	20.50 J	70.70 J	58.10 J	39.30 J	77.00 J
COPPER	125.00 J	73.80 J	100.00 J	72.70 J	47.20 J	65.10 J	155.00 J	132.00 J	437.00 J	155.00 J
LEAD	94.80 J	89.30 J	88.20 J	69.60 J	37.10 J	54.70 J	158.00 J	103.00 J	223.00 J	123.00 J
MERCURY	0.57 J	0.29 J	0.53 J	0.31 J	0.39 J	0.41 J	0.83 J	0.65 J	0.55 UJ	0.78 J
NICKEL	48.20 J	34.90 J	41.40 J	36.20 J	6.70 J	6.20 J	32.70 J	27.20 J	29.60 J	34.90 J
SILVER	1.40 J	0.49 UJ	0.99 UJ	0.59 UJ	1.50 J	1.60 J	3.70 J	2.00 J	1.30 UJ	3.10 J
ZINC	591.00 J	201.00 J	206.00 J	183.00 J	24.90 J	25.40 J	264.00 J	233.00 J	231.00 J	268.00 J

COMPOUND	WEST DITCH			
	SD-1601	SD-1602	SD-1603	SD-1907
ANTIMONY	NA	NA	1.10 U	NA
ARSENIC	41.10 J	22.50 J	24.70	26.60 J
CADMIUM	0.81 J	0.29 U	0.28 U	1.00 UJ
CHROMIUM	47.80 J	43.00 J	21.20	32.30 J
COPPER	107.00 J	33.10 J	30.00	92.10 J
LEAD	98.30 J	42.60 J	28.90	76.30 J
MERCURY	0.65 J	0.44 UJ	0.14 U	0.60 J
NICKEL	26.30 J	16.90 J	11.90	17.80 J
SILVER	1.50 J	1.00 J	0.70	2.40 J
ZINC	164.00 J	79.40 J	73.10	141.00 J

COMPOUND	FRESHWATER SEDIMENT QUALITY CRITERIA		ESTUARINE SEDIMENT QUALITY CRITERIA	
	Ontario LEL	Ontario SEL	NOAA ER-L	NOAA ER-M
ANTIMONY	NCA	NCA	2.00	25.00
ARSENIC	6	33	33.00	85.00
CADMIUM	0.6	10	5.00	9.00
CHROMIUM	26	110	80.00	145.00
COPPER	16	110	70.00	390.00
LEAD	31	250	35.00	110.00
MERCURY	0.2	2	0.15	1.30
NICKEL	16	75	30.00	50.00
SILVER	NCA	NCA	1.00	2.20
ZINC	120	820	120.00	270.00

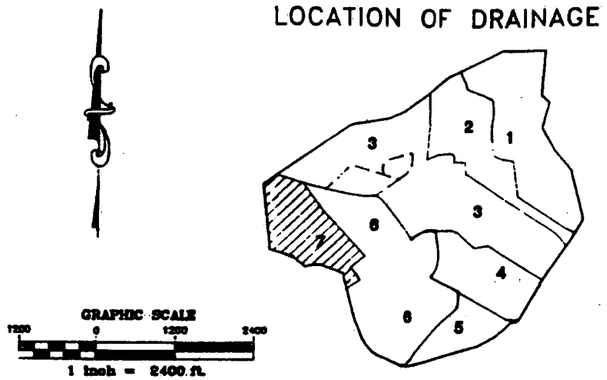
FRESHWATER

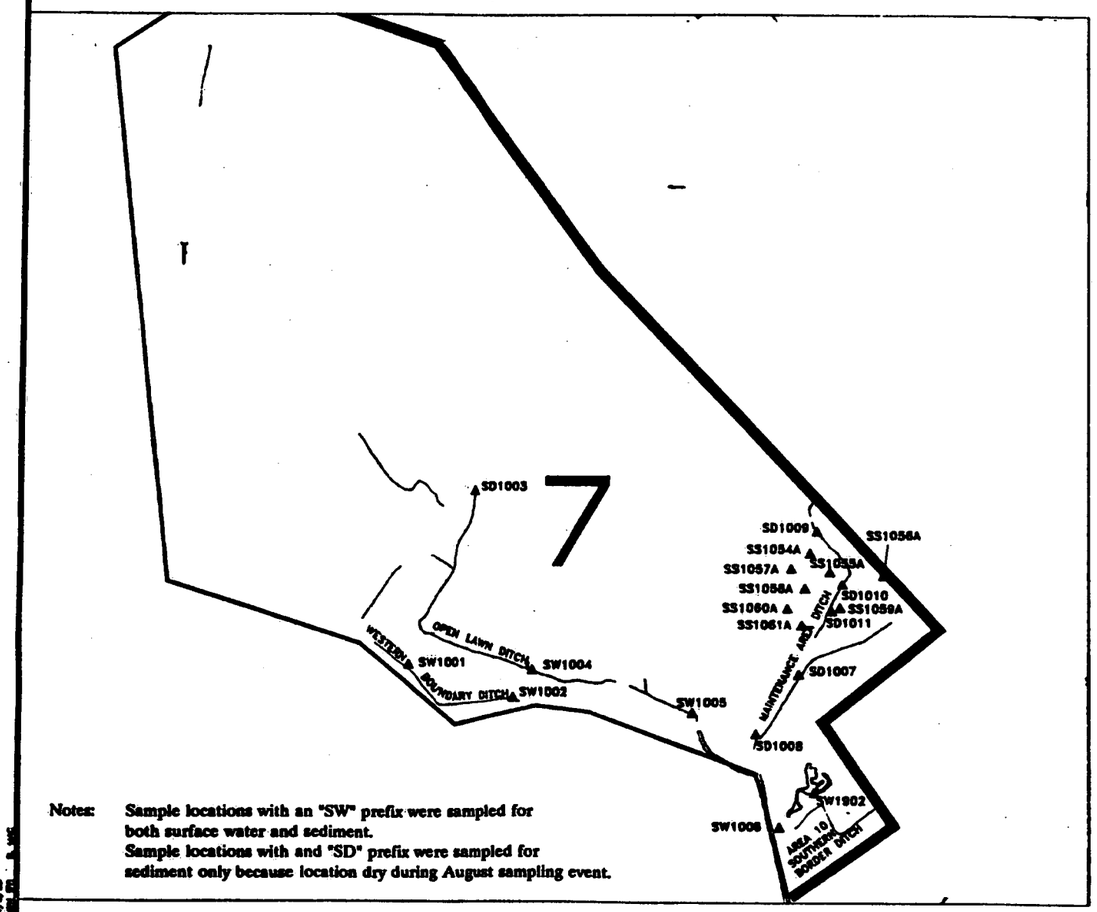
COMPOUND	DRY TRIBUTARY AREA 18		AREA 19 FOREST. WETL.		AREA 19 NE WETLANDS			AREA 19 SW WETLANDS		OLD RED ROOT CREEK		ASSOCIATED DITCHES AREA 16	
	SD-1801	SD-1802	SD-1901	SD-1903	SD-1908	SD-1909	SD-1910	SD-1904	SD-1905	SD-1604	SD-1605	SD-1613	SD-1614
ANTIMONY	NA	NA	2.090 U	NA	1.16 U	NA	NA	NA	1.31 U	NA	NA	NA	NA
ARSENIC	3.30 J-	6.90 J-	25.900 J	78.10 J	3.50	39.20 U	8.90 U	8.30 U	6.10	3.20	1.70 J+	21.00 J	8.10 J
CADMIUM	0.05	0.23	0.780	0.74 UJ	0.26 U	2.20 J	0.55 UJ	0.51 UJ	0.30 U	0.06 U	0.05 U	0.34 U	0.17 UJ
CHROMIUM	16.80	22.80	15.300	16.90 J	9.10	35.50 J	28.50 J	10.90 J	6.60	18.00	9.50	34.00 J	12.30 J
COPPER	48.30	48.30	39.800	108.00 J	9.60	89.10 J	31.50 J	20.00 J	20.20	12.30	11.00	49.50 J	24.80 J
LEAD	586.00	171.00	37.900	60.90 J	4.60	65.90 J	21.30 J	11.10 J	17.50	14.00	6.40	64.30 J	28.80 J
MERCURY	0.11 U	0.18 U	0.100 U	0.39 J	0.07 U	0.38 J	0.15 UJ	0.21 J	0.06 U	0.12 U	0.09 U	0.25 J	0.36 UJ
NICKEL	3.80	7.40	5.200	13.20 J	2.40	20.20 J	4.80 J	2.40 J	4.00	1.30 U	1.90	18.50 J	4.30 UJ
SILVER	0.95	0.50	0.400 U	1.40 J	0.38 J-	1.40 J	0.67 UJ	0.62 UJ	0.58 J-	0.26 U	0.25 U	0.90 J	0.85 UJ
ZINC	21.70 J	58.50 J	23.500	59.10 J	72.90	254.00 J	20.10 J	13.40 J	26.50	5.10	14.60	94.40 J	41.00 J

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS
DATE: 4/6/95
FIGURE #: 4-39A

LOCATION OF DRAINAGE





Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

NOTE:
- THIS SITE MAP HAS BEEN ADAPTED FROM A PHOTOGRAMMETRIC BASEMAP OF THE FORMER RARITAN ARSENAL PREPARED BY GEOD CORPORATION (12/22/92 OVERFLIGHT PHOTOGRAPHY) UNDER SUBCONTRACT TO WESTON.

ANALTICAL METAL RESULTS (MG/KG) - SEDIMENT
COUNTY PARK DRAINAGE AREA
FRESHWATER

COMPOUND	OPEN LAWN DITCH				MAINTENANCE AREA DITCH	
	SD-1003	SD-1004	SD-1005	SD-1012*	SD-1007	SD-1008
ARSENIC	7.40 J	1.30	4.40	8.20	5.60	18.40 J
CADMIUM	0.77 UJ	0.37 U	0.44 U	0.40 U	0.32 U	2.50 J
CHROMIUM	9.60 J	3.50	8.80	10.10	11.50	44.20 J
COPPER	324.00 J	7.20 J	9.10 J	13.20 J	14.60 J	84.70 J
IRON	NA	NA	NA	NA	NA	NA
LEAD	65.10 J	5.70 J	9.80 J	46.10 J	15.70 J	97.80 J
MERCURY	0.13 UJ	0.07 U	0.08 U	0.07 U	0.06 U	5.13 J
NICKEL	7.60 J	5.00	4.10	5.80	15.00	24.90 J
ZINC	117.00 J	32.50 U	27.70 U	40.20 U	104.00	280.00 J

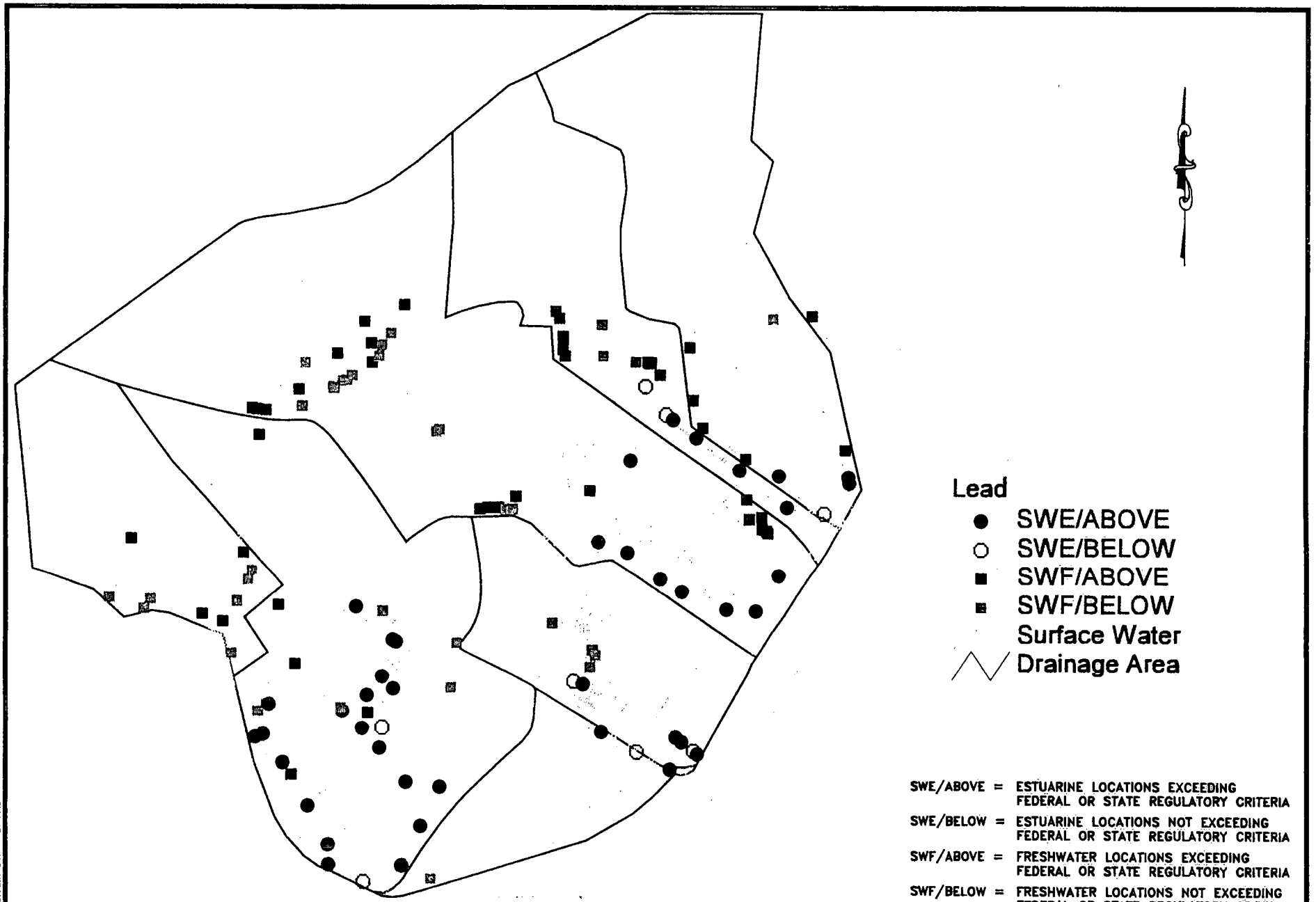
* SD-1012 is a duplicate of SD-1005.

COMPOUND	MAINTENANCE AREA DITCH			WESTERN BOUNDARY DITCH		AREA 10 SO. BORD. DITCH
	SD-1009	SD-1010	SD-1011	SD-1001	SD-1002	SD-1006
ARSENIC	32.40	14.80	1.20 J-	1.70 J-	1.30 U	2.90 J-
CADMIUM	0.48 U	0.41 U	0.26 U	0.38 U	0.41 U	0.35 U
CHROMIUM	24.20	13.10	3.00	6.30	5.40	6.70
COPPER	77.00 J	20.80 J	4.10 J	28.70 J	7.90 J	8.80 J
IRON	NA	NA	4660.00 J	23500.00 J	NA	5530.00 J
LEAD	272.00 J	14.80 J	5.50	25.50	12.00 J	10.80
MERCURY	0.10 U	0.09 U	0.05 U	0.07 U	0.08 U	0.07 U
NICKEL	9.40	9.30	1.90	3.40	2.40	3.10
ZINC	118.00	83.80	20.40 U	51.20 J	29.70 U	14.00 U

COMPOUND	FRESHWATER SEDIMENT QUALITY CRITERIA	
	Ontario LEL	Ontario SEL
ARSENIC	6	33
CADMIUM	0.6	10
CHROMIUM	26	110
COPPER	16	110
IRON	20000	40000
LEAD	31	250
MERCURY	0.2	2
NICKEL	16	75
ZINC	120	820

WESTON MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS
DATE: 4/6/95
FIGURE #: 4-40



SWE/ABOVE = ESTUARINE LOCATIONS EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

SWE/BELOW = ESTUARINE LOCATIONS NOT EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

SWF/ABOVE = FRESHWATER LOCATIONS EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

SWF/BELOW = FRESHWATER LOCATIONS NOT EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

NOTE:

DUE TO OVERLAPPING SYMBOLS, NOT ALL SAMPLING LOCATIONS MAY BE EVIDENT.

– NOT TO SCALE –

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME:
FORMER RARITAN ARSENAL
PHASE II
REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

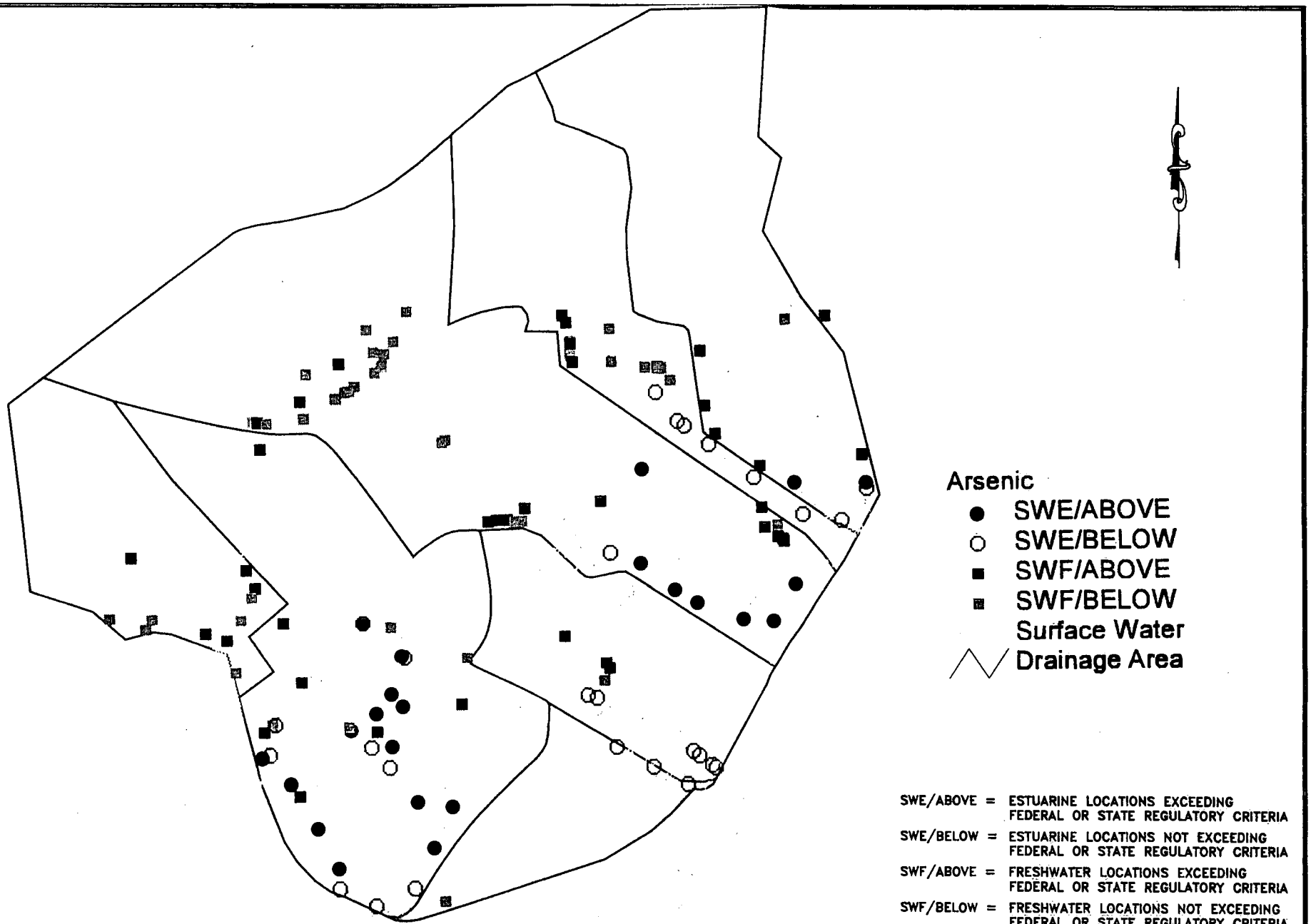
CLIENT NAME:
U.S. ARMY CORPS OF ENGINEERS

LOCATIONS EXCEEDING
LEAD
GUIDELINES IN SEDIMENT

DATE: 04/12/95

FIGURE #: 4-41

REVISION #: 0000 DATE: 5/18/95
FILE NAME: TBLOCKS.DWG DRAWN BY: B. MAC



SWE/ABOVE = ESTUARINE LOCATIONS EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

SWE/BELOW = ESTUARINE LOCATIONS NOT EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

SWF/ABOVE = FRESHWATER LOCATIONS EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

SWF/BELOW = FRESHWATER LOCATIONS NOT EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

– NOT TO SCALE –

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME:
FORMER RARITAN ARSENAL
PHASE II
REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

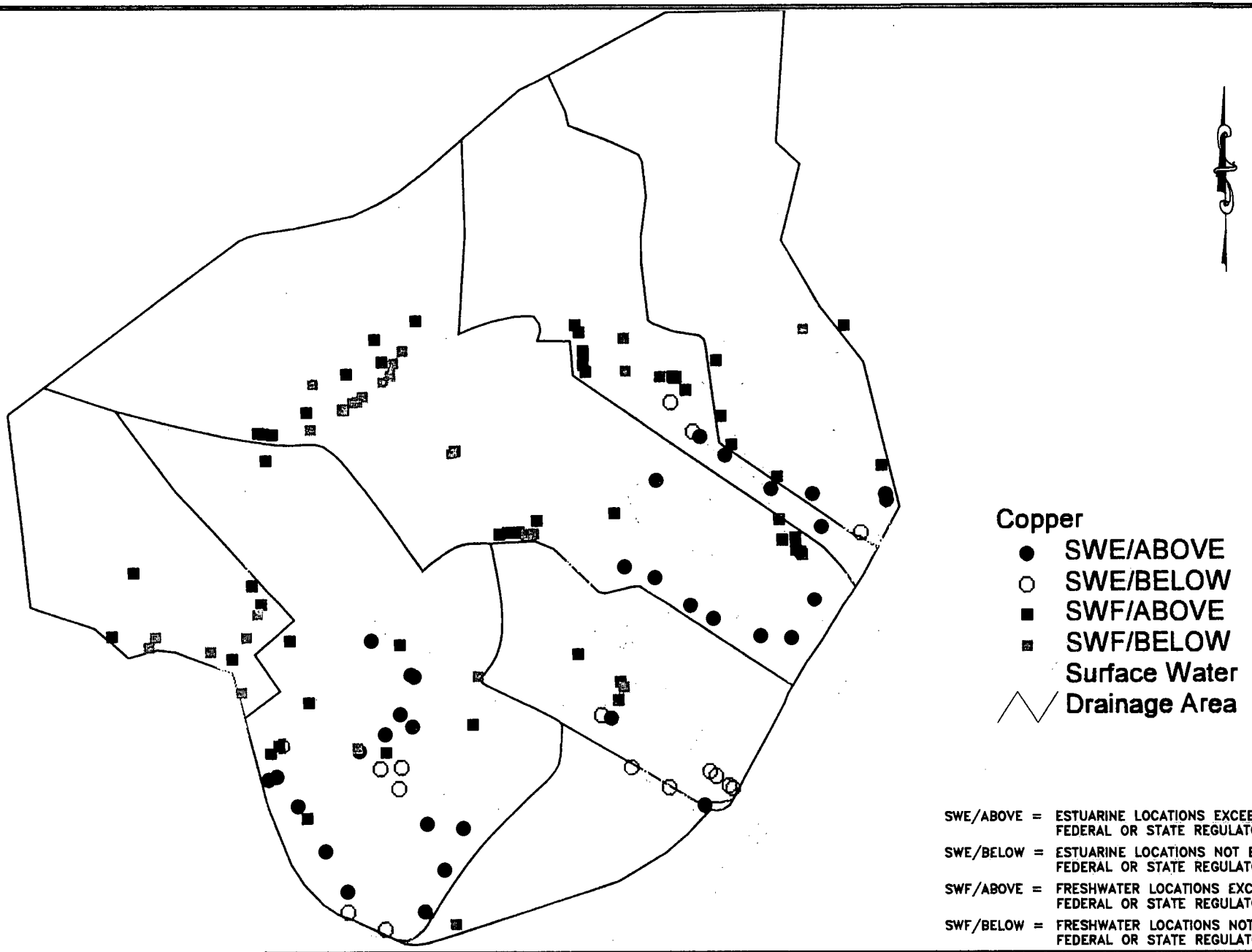
CLIENT NAME:
U.S. ARMY CORPS OF ENGINEERS

LOCATIONS EXCEEDING
ARSENIC
GUIDELINES IN SEDIMENT

DATE: 04/12/95

FIGURE #: 4-42

REVISION #: 0000 DATE: 5/16/95
FILE NAME: TBLOCKS.DWG DRAWN BY: B. MAC



SWE/ABOVE = ESTUARINE LOCATIONS EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

SWE/BELOW = ESTUARINE LOCATIONS NOT EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

SWF/ABOVE = FRESHWATER LOCATIONS EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

SWF/BELOW = FRESHWATER LOCATIONS NOT EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

NOTE:

DUE TO OVERLAPPING SYMBOLS, NOT ALL SAMPLING LOCATIONS MAY BE EVIDENT.

- NOT TO SCALE -

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME:
FORMER RARITAN ARSENAL
PHASE II
REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

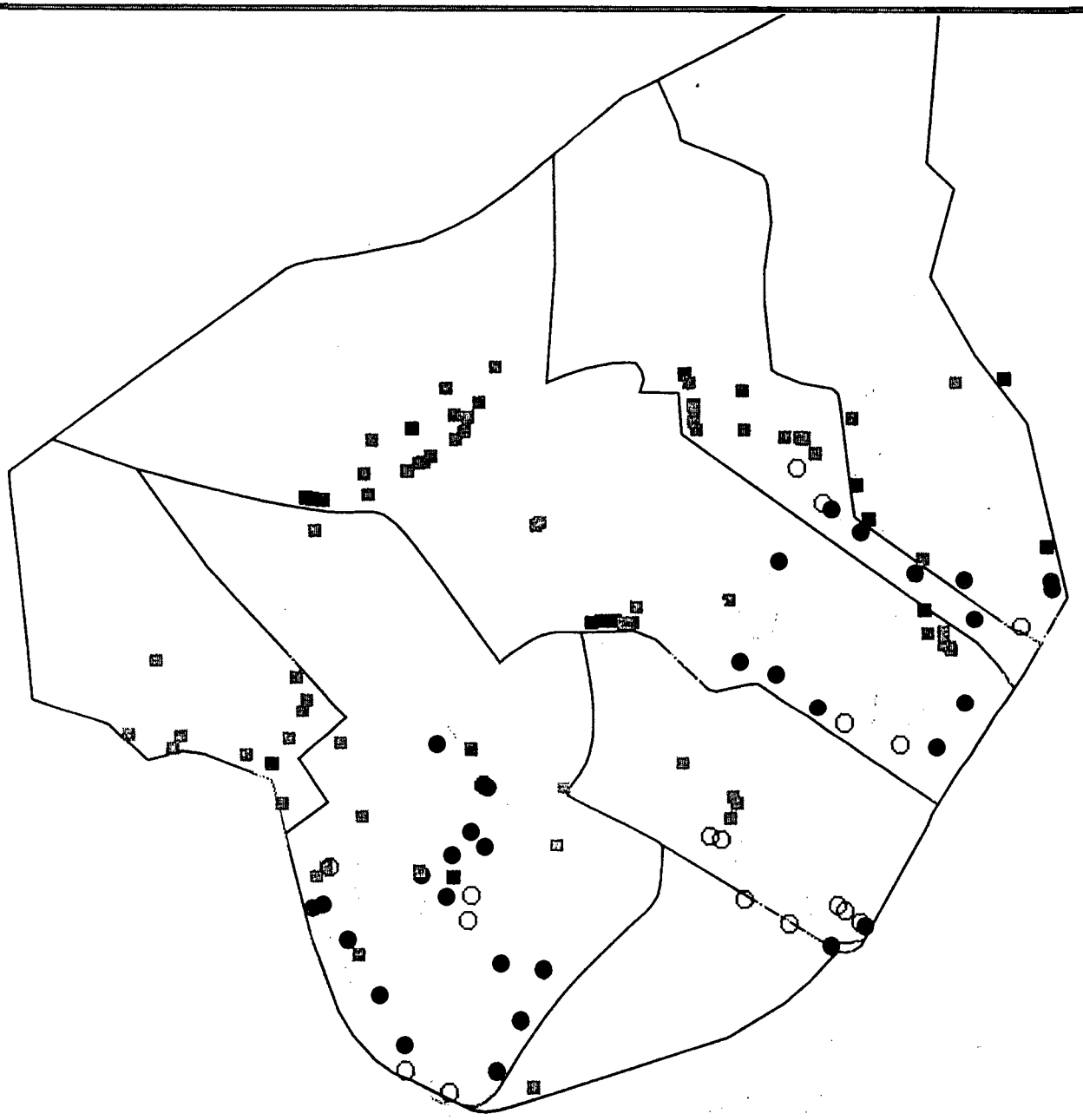
CLIENT NAME:
U.S. ARMY CORPS OF ENGINEERS

LOCATIONS EXCEEDING
COPPER
GUIDELINES IN SEDIMENT

DATE: 04/12/95

FIGURE #: 4-43

REVISION #: 0000 DATE: 5/16/95
FILE NAME: TBLOCKS.DWG DRAWN BY: B. MAC



Zinc
- SWE/ABOVE
- SWE/BELOW
- SWF/ABOVE
- SWF/BELOW
- Surface Water Drainage Area

SWE/ABOVE = ESTUARINE LOCATIONS EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

SWE/BELOW = ESTUARINE LOCATIONS NOT EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

SWF/ABOVE = FRESHWATER LOCATIONS EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

SWF/BELOW = FRESHWATER LOCATIONS NOT EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

NOTE:

DUE TO OVERLAPPING SYMBOLS, NOT ALL SAMPLING LOCATIONS MAY BE EVIDENT.

– NOT TO SCALE –

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME:
FORMER RARITAN ARSENAL
PHASE II
REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

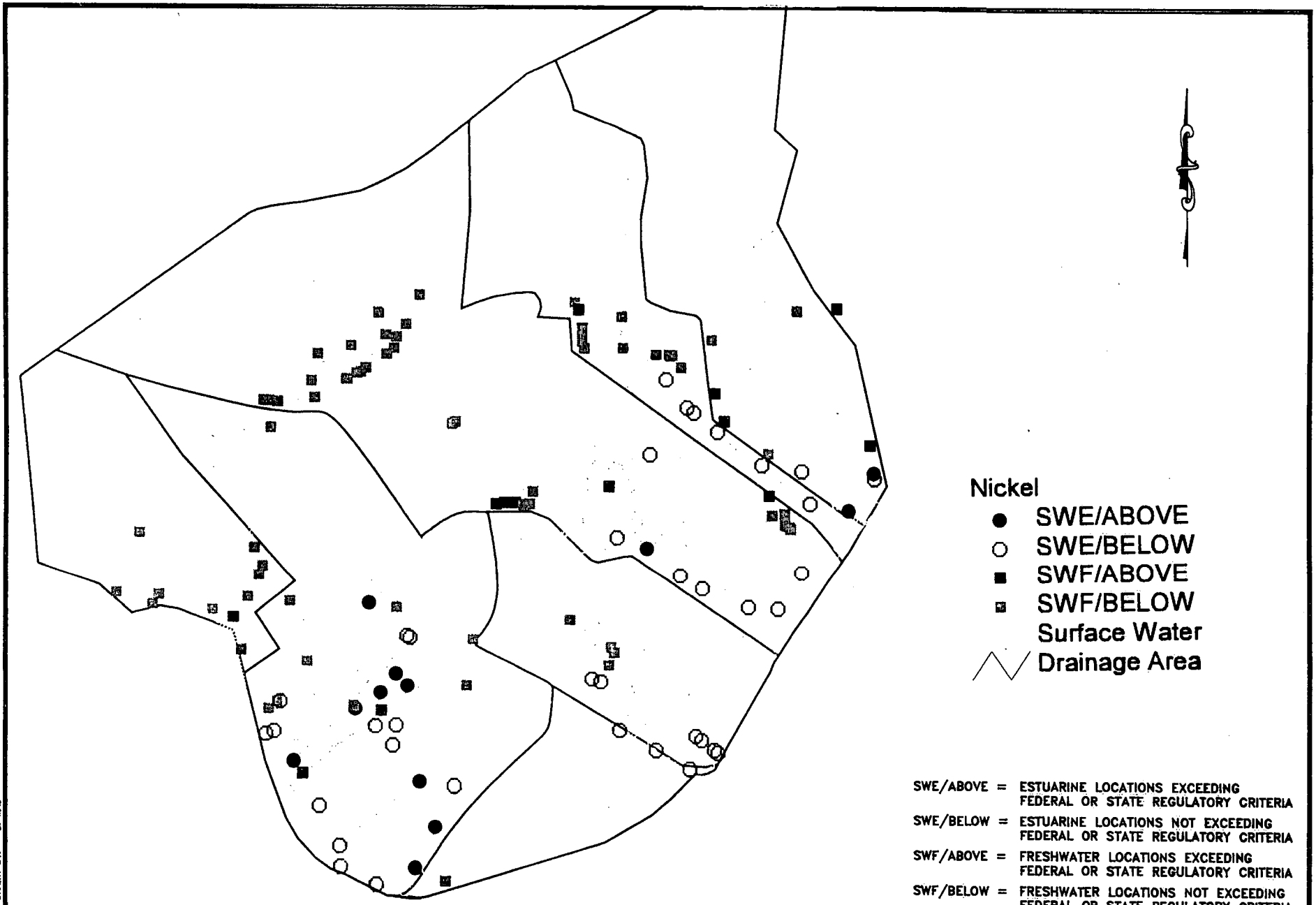
CLIENT NAME:
U.S. ARMY CORPS OF ENGINEERS

LOCATIONS EXCEEDING
ZINC
GUIDELINES IN SEDIMENT

DATE: 04/12/95

FIGURE #: 4-44

REVISION #: 0000 DATE: 5/18/95
FILE NAME: TBLOCKS.DWG DRAWN BY: B. MAC



SWE/ABOVE = ESTUARINE LOCATIONS EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

SWE/BELOW = ESTUARINE LOCATIONS NOT EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

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SWF/BELOW = FRESHWATER LOCATIONS NOT EXCEEDING FEDERAL OR STATE REGULATORY CRITERIA

- NOT TO SCALE -

WESTON MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME:
FORMER RARITAN ARSENAL
PHASE II
REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

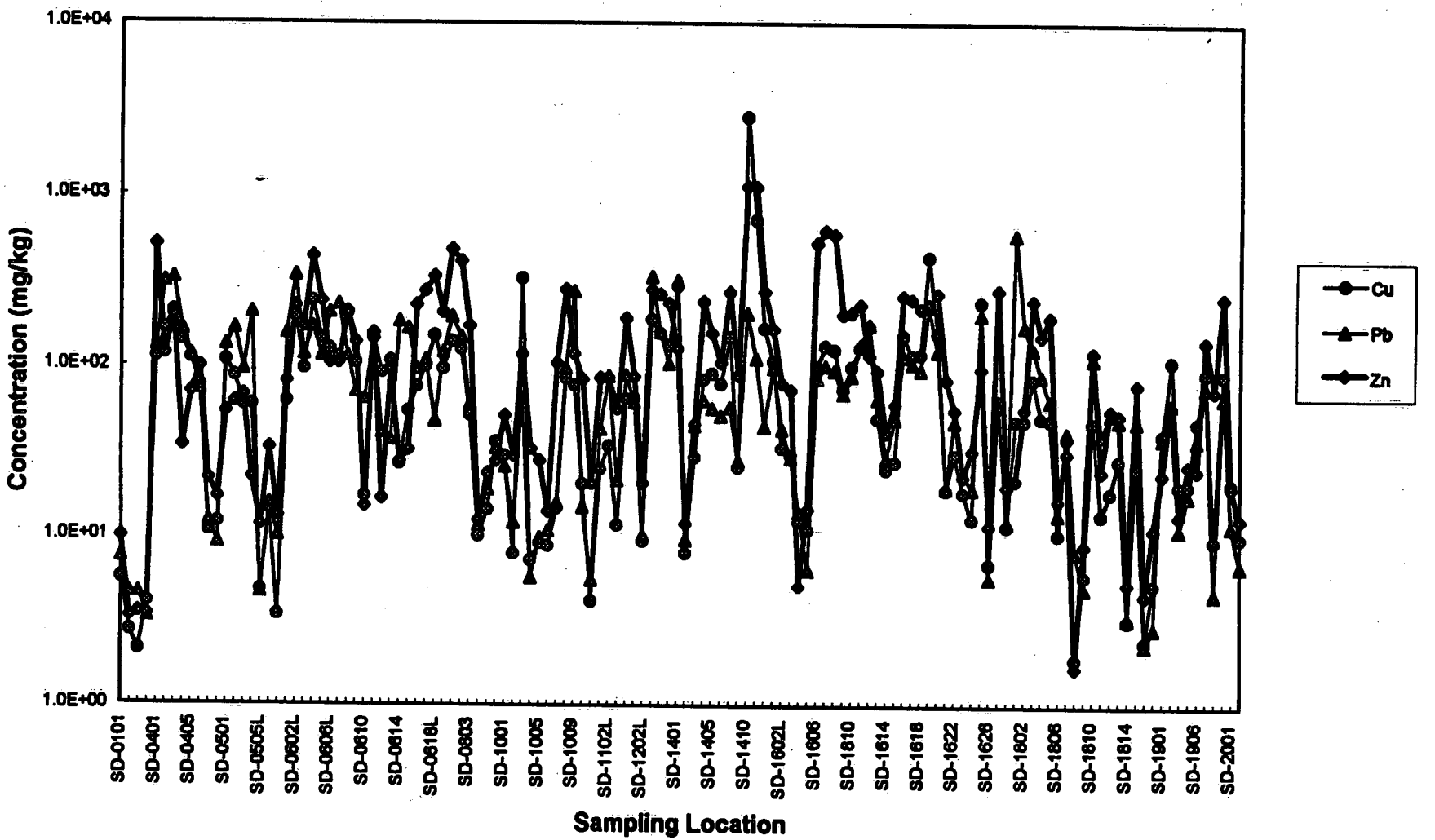
CLIENT NAME:
U.S. ARMY CORPS OF ENGINEERS

LOCATIONS EXCEEDING NICKEL GUIDELINES IN SEDIMENT

DATE: 04/12/95

FIGURE #: 4-45

REVISION #: 0000 DATE: 5/18/95
FILE NAME: TBLOCKS.DWG DRAWN BY: B. MAC



WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME:
FORMER RARITAN ARSENAL
PHASE II
REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

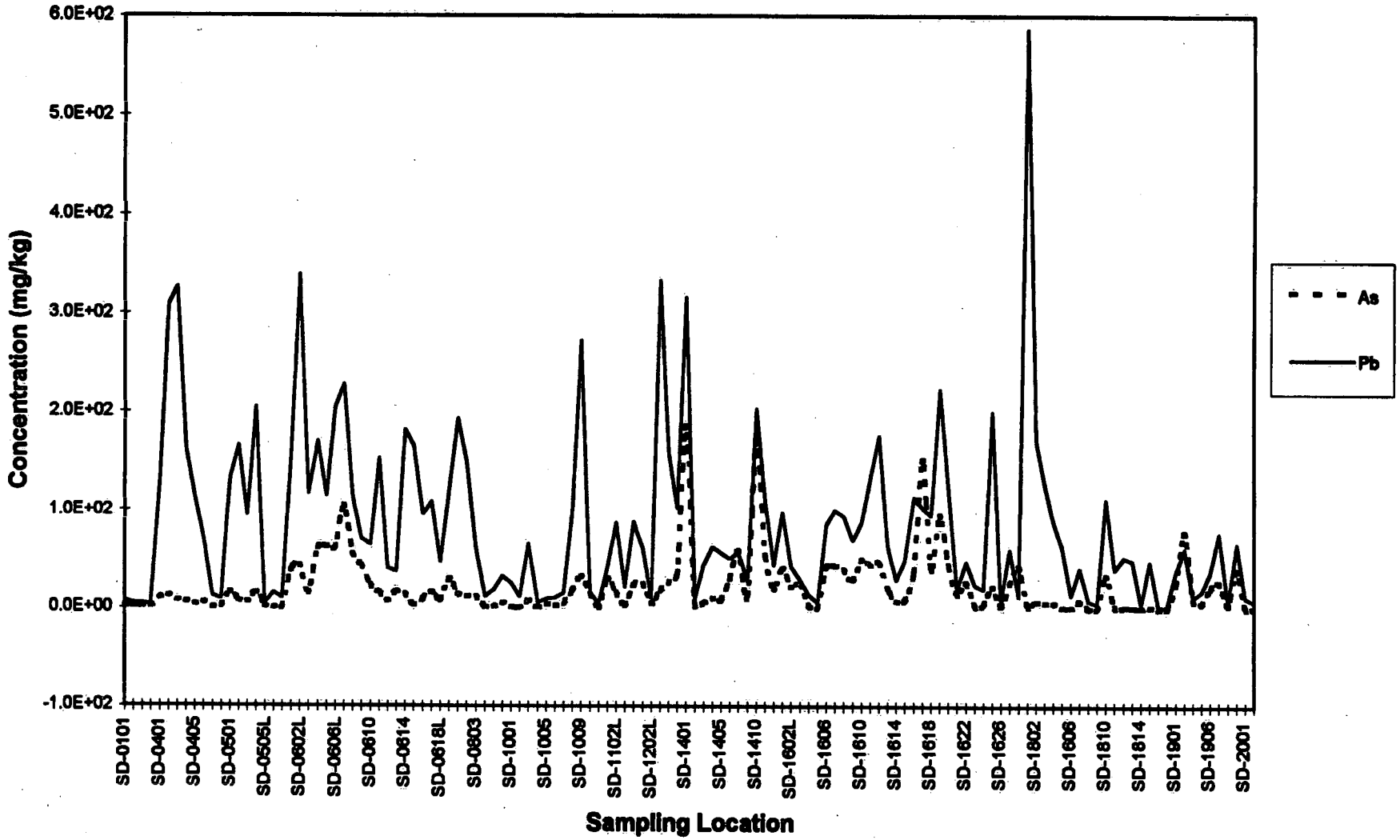
CLIENT NAME:
U.S. ARMY CORPS OF ENGINEERS

COPPER, LEAD, AND ZINC CONCENTRATIONS IN SEDIMENT (mg/kg)

DATE: 04/13/95

FIGURE #: 4-46

REVISION #: 0000 DATE: 4/13/95
FILE NAME: TBLOCKS.DWG DRAWN BY: B. MAC



WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME:
FORMER RARITAN ARSENAL
PHASE II
REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

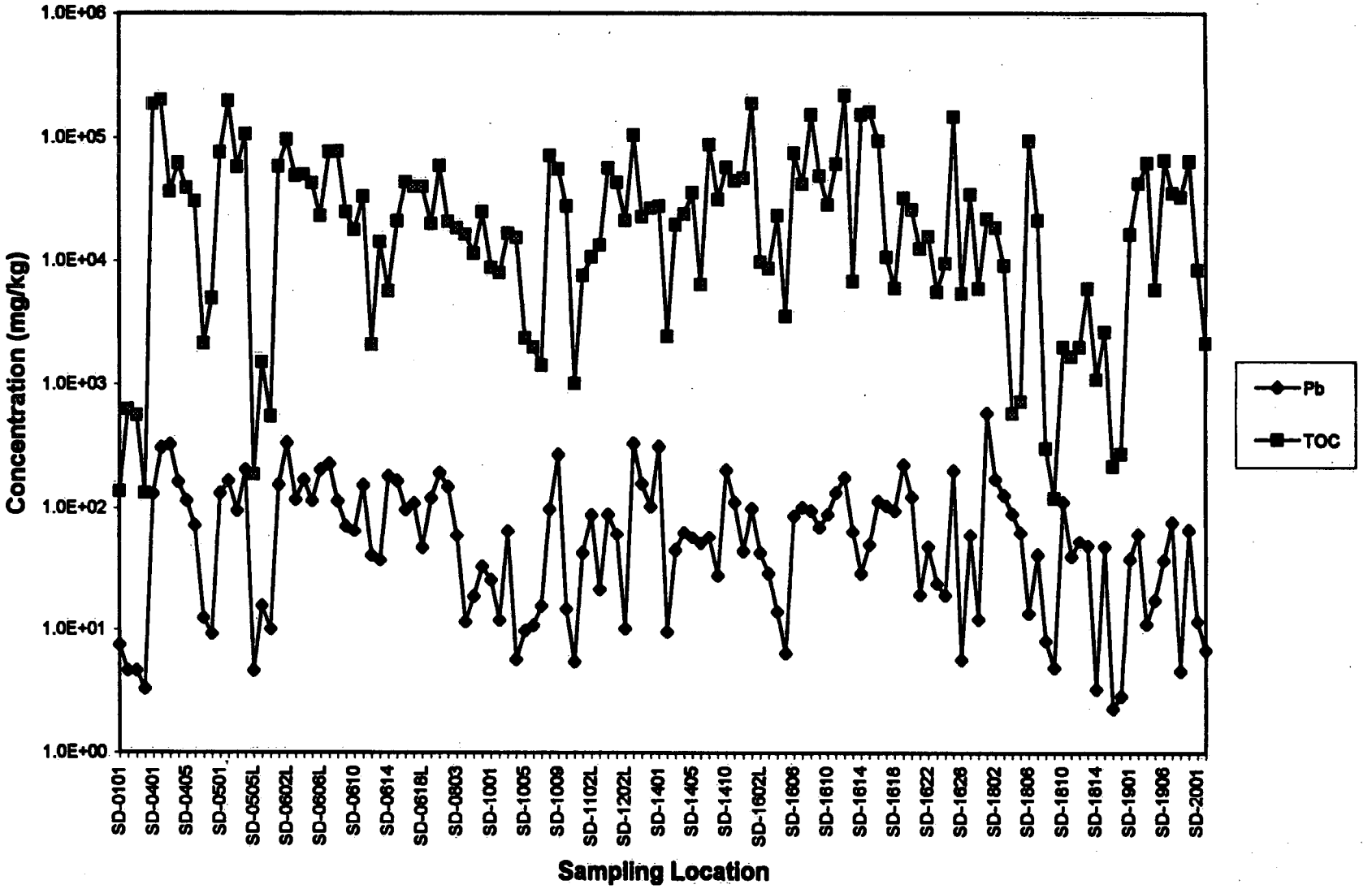
CLIENT NAME:
U.S. ARMY CORPS OF ENGINEERS

COMPARISON OF ARSENIC AND LEAD CONCENTRATIONS IN SEDIMENT (mg/kg)

DATE: 04/13/95

FIGURE #: 4-47

REVISION #: 0000 DATE: 4/13/95
FILE NAME: TBLOCKS.DWG DRAWN BY: B. NAC



WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME:
FORMER RARITAN ARSENAL
PHASE II
REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

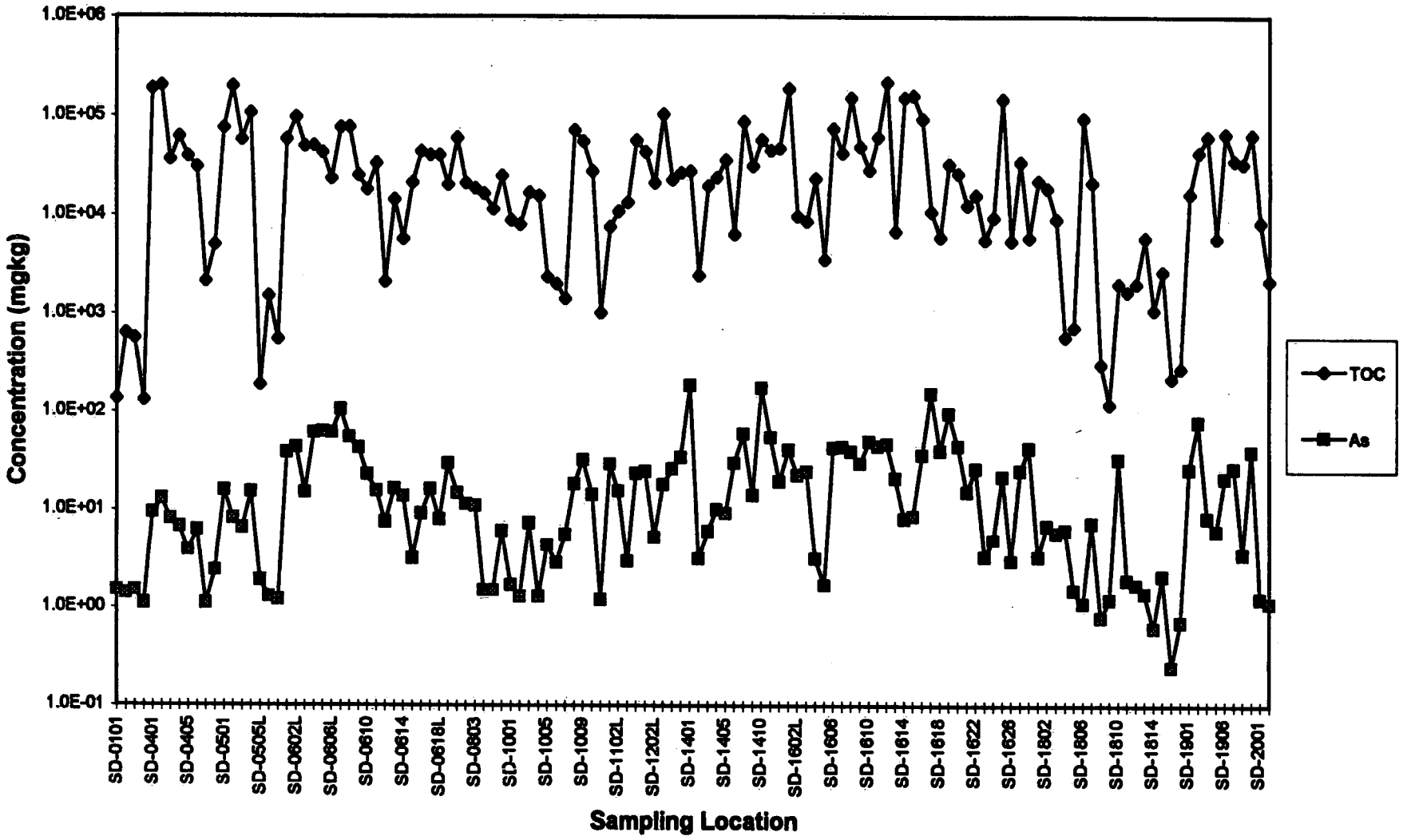
CLIENT NAME:
U.S. ARMY CORPS OF ENGINEERS

COMPARISON OF TOC AND LEAD CONCENTRATIONS IN SEDIMENT (mg/kg)

DATE: 04/13/95

FIGURE #: 4-48

REVISION #: 0000 DATE: 4/13/95
FILE NAME: TRLOC03.DWG DRAWN BY: B. MAC



WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME:
FORMER RARITAN ARSENAL
PHASE II
REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

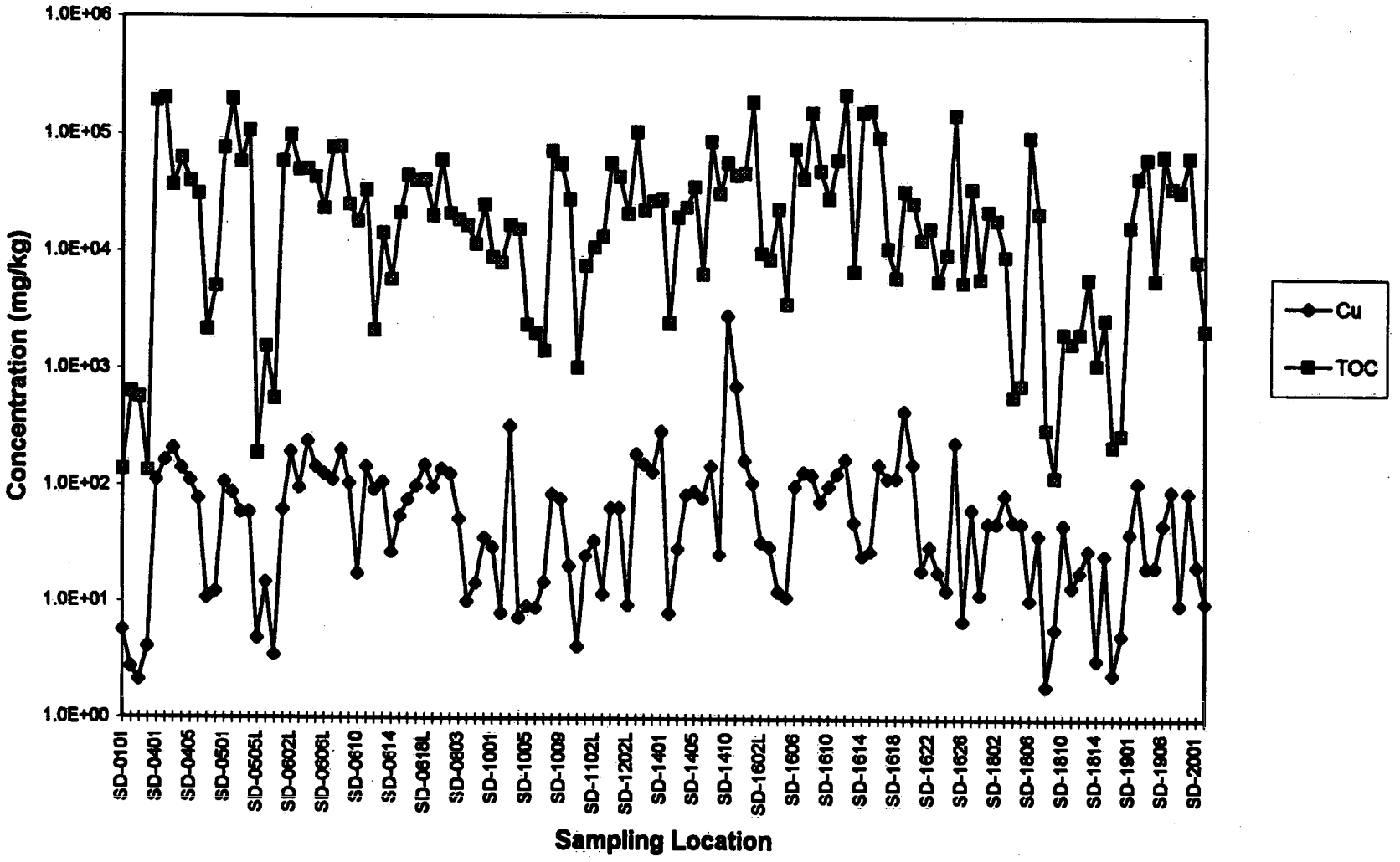
CLIENT NAME:
U.S. ARMY CORPS OF ENGINEERS

COMPARISON OF TOC AND ARSENIC CONCENTRATIONS IN SEDIMENT (mg/kg)

DATE: 04/13/95

FIGURE #: 4-49

REVISION #: 0000 DATE: 4/13/95
FILE NAME: TBLOCKS.DWG DRAWN BY: B. MAC



WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME:
FORMER RARITAN ARSENAL
PHASE II
REMEDIAL INVESTIGATION
EDISON, NEW JERSEY

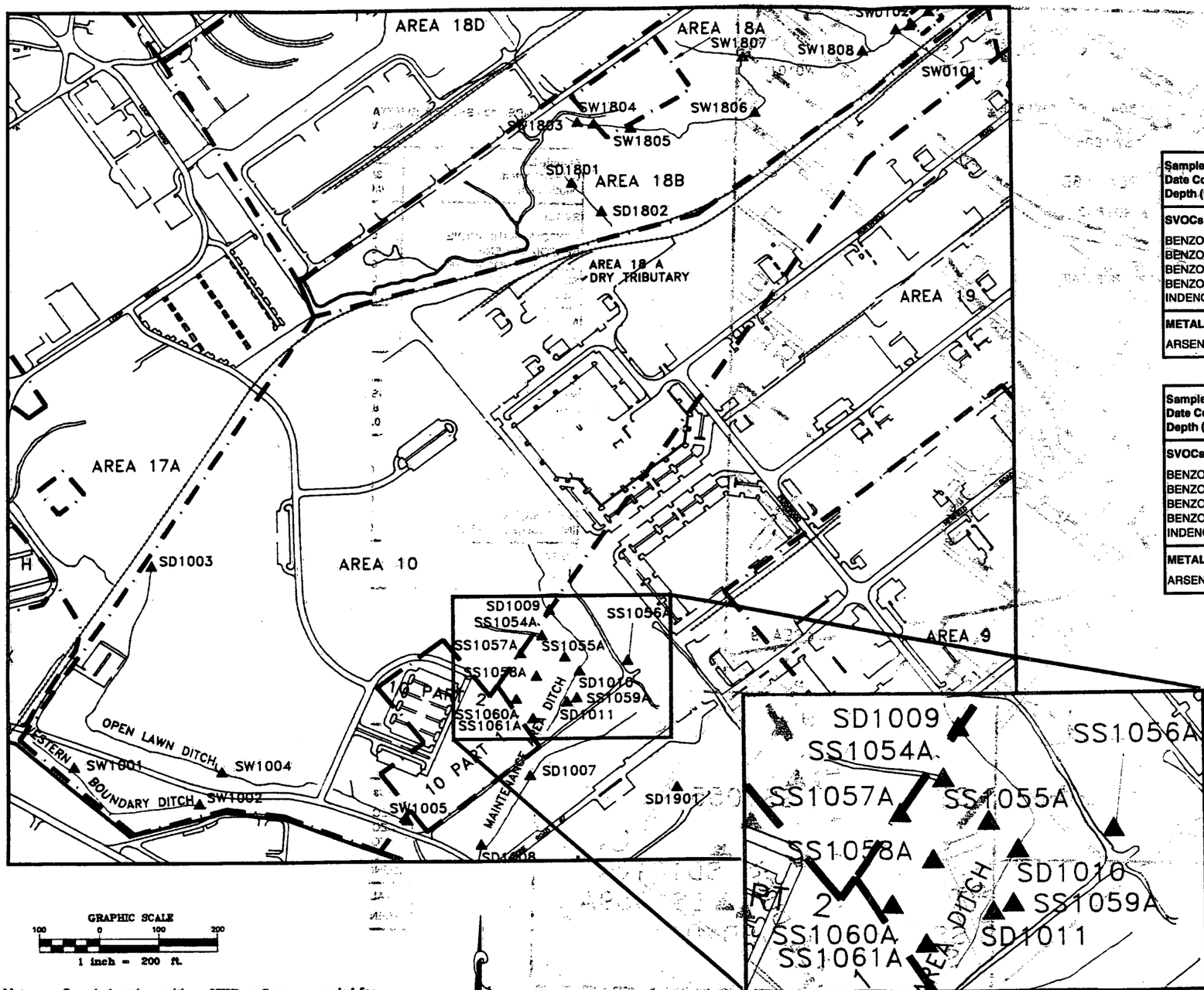
CLIENT NAME:
U.S. ARMY CORPS OF ENGINEERS

COMPARISON OF TOC AND COPPER CONCENTRATIONS IN SEDIMENT (mg/kg)

DATE: 04/13/95

FIGURE #: 4-50

REVISION #: 0000 DATE: 4/13/95
FILE NAME: TBLOCKS.DWG DRAWN BY: B. MAC



AREA 10 - SVOCs AND METALS IN SOIL EXCEEDING NJDEP CRITERIA
ALL VALUES IN (mg/kg)

Sample ID:	SS-1054A	SS-1055A	SS-1056A	SS-1057A
Date Collected:	8/16/94	8/16/94	8/16/94	8/16/94
Depth (feet):	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5
SVOCs				
BENZO(A)ANTHRACENE	0.420 U	0.400 U	1.300	0.051 J
BENZO(A)PYRENE	0.420 U	0.400 U	1.300	0.410 U
BENZO(B)FLUORANTHRENE	0.420 U	0.400 U	1.400	0.410 U
BENZO(K)FLUORANTHRENE	0.420 U	0.400 U	1.500	0.410 U
INDENO(1,2,3-C,D)PYRENE	0.420 U	0.400 U	0.540	0.410 U
METALS				
ARSENIC	6.8 J-	3.8 J-	5.3 J-	3.5 J-

Sample ID:	SS-1058A	SS-1059A	SS-1060A	SS-1061A
Date Collected:	8/16/94	8/16/94	8/16/94	8/16/94
Depth (feet):	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5
SVOCs				
BENZO(A)ANTHRACENE	0.068 J	0.400 U	3.200	0.120 J
BENZO(A)PYRENE	0.076 J	0.400 U	1.700	0.130 J
BENZO(B)FLUORANTHRENE	0.210 J	0.400 U	3.900	0.180 J
BENZO(K)FLUORANTHRENE	0.120 J	0.400 U	3.900	0.180 J
INDENO(1,2,3-C,D)PYRENE	0.350 U	0.400 U	0.970	0.460 U
METALS				
ARSENIC	3.4 J-	12.8 J-	2.2 J-	56.6 J-

COMPOUND	NJDEP RDCSCC	NJDEP NRDCSCC	NJDEP IGWSCC
SVOCs			
BENZO(A)ANTHRACENE	0.9	4	500
BENZO(A)PYRENE	0.66	0.66	100
BENZO(B)FLUORANTHRENE	0.9	4	50
BENZO(K)FLUORANTHRENE	0.9	4	500
INDENO(1,2,3-C,D)PYRENE	0.9	4	500
METALS			
ARSENIC	20	20	20

Notes: Sample locations with an "SW" prefix were sampled for both surface water and sediment.
Sample locations with and "SD" prefix were sampled for sediment only because location dry during August sampling event.

NOTE:
- THIS SITE MAP HAS BEEN ADAPTED FROM A PHOTOGRAMMETRIC BASEMAP OF THE FORMER RARITAN ARSENAL PREPARED BY GEOD CORPORATION (12/22/92 OVERFLIGHT PHOTOGRAPHY) UNDER SUBCONTRACT TO WESTON.

GRAPHIC SCALE
1 inch = 100 ft.

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: FORMER RARITAN ARSENAL PHASE II REMEDIAL INVESTIGATION
EDISON, NEW JERSEY
CLIENT NAME: U.S. ARMY CORPS OF ENGINEERS

ANALYTICAL RESULTS
AREA 10 SOIL SAMPLES

DATE: 4/18/95
FIGURE #: 4-51