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EPA Superfund
Record of Decision:

Federal Aviation Administration
Technical Center OU 11
Atlantic County, NJ
9/28/1999

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II

DATE:

SUBJECT: Final ROD for Areas 27, 56, F, R and S (OU11)

FROM: Julio F. Vazquez, Project Manager
Federal Facilities

TO: File, Areas 27, 56, F, R and S (OU11)
FAA Technical Center

THRU: Robert Wing, Chief
Federal Facilities Section

The above referenced ROD document was forwarded to the Superfund Document Center through Peter Moss, who noticed that tables included in Appendix D of the document were not properly keyed into the ROD text. The tables carried pagination numbers according to their source documents (i.e., RI/FS reports). This glitch was caught after the Final ROD document was duly signed on September 28, 1999, and there is nothing that can be made to change the situation at this point.

The inclusion of the tables into Appendix D of the Final ROD document responded to a verbal request made by the NJ DEP to include reference technical information from previous studies. Since the tables were added after the ROD document had been finalized, the tables included in Appendix D of the Final ROD document are not referenced throughout the ROD text, and do not influence in any way to the main body of the ROD text.

FINAL
RECORD OF DECISION

AREA 27 - FUEL MIST TEST AREA, AREA 56 - ABANDONED NAVY LANDFILL, AREA F - AIR BLAST FACILITY, AREA R - TRASH DUMP, AND AREA S - EXCAVATED AREA WEST OF TILTON ROAD

FAA WILLIAM J. HUGHES TECHNICAL CENTER
ATLANTIC CITY INTERNATIONAL AIRPORT
NEW JERSEY

AUGUST 17, 1999

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DECLARATION FOR THE RECORD OF DECISION

Area 27 - Fuel Mist Test Area
Area 56 - Abandoned Navy Landfill
Area F - Air Blast Facility
Area R - Trash Dump and
Area S - Excavated Area West of Tilton Road
FAA William J. Hughes Technical Center

FACILITY NAME AND LOCATION

Federal Aviation Administration (FAA) William J. Hughes Technical Center, Atlantic County Atlantic City International Airport, New Jersey

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for Area 27 - Fuel Mist Test Area, Area 56 - Abandoned Navy Landfill, Area F - Air Blast Facility, Area R - Trash Dump and Area S - Excavated Area West of Tilton Road at the FAA William J. Hughes Technical Center, Atlantic City International Airport, New Jersey. The remedial action decision was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record for Areas 27, 56, F, R and S.

The Commissioner of the New Jersey Department of Environmental Protection and the Pinelands Commission concur with the selected remedy (Appendix A).

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy for Areas 27, 56, F, R and S is an institutional control and ground water monitoring remedy, consisting of the following components for each individual area:

- Area 27 - Residential Site Use Restrictions;
- Area 56 - Residential Site Use Restrictions, Continued Ground Water Monitoring and Establishment of a Ground Water Classification Exception Area;
- Area F - Residential Site Use Restrictions;
- Area R - Residential Site Use Restrictions, Ground Water Use Restrictions Including the Establishment of a Ground Water Classification Exception Area; and Continued Ground Water Monitoring; and
- Area S - Residential Site Use Restrictions.

DECLARATION OF STATUTORY DETERMINATIONS

The Federal Aviation Administration and the U.S. Environmental Protection Agency (EPA), Region 2 have determined that no remedial actions other than institutional controls and ground water use restrictions at Area R are necessary at Areas 27, 56, F, R and S to ensure protection of human

health and the environment. Pursuant to Section 121(c) of CERCLA, 42 U.S.C. 9621(c) and Section 300.430(f)(4)(ii) of the National Contingency Plan, 40 C.F.R. Section 300.430(f)(4)(ii), five-year reviews of the selected remedial actions will be required since the remedy includes long-term institutional controls to ensure the continued protection of human health and the environment.

Gary Poulsen 9/7/99

(Signature) (Date)

Gary E. Poulsen, P.E., Manager
Facility Engineering and Operations Division
FAA William J. Hughes Technical Center

9/28/99

(Signature) (Date)

Jeanne M. Fox
Regional Administrator
United States Environmental Protection Agency, Region 2

DECISION SUMMARY
RECORD OF DECISION
Area 27 - Fuel Mist Test Area
Area 56 - Abandoned Navy Landfill
Area F - Air Blast Facility
Area R - Trash Dump and
Area S - Excavated Area West of Tilton Road
FAA William J. Hughes Technical Center

I. SITE NAME, LOCATION AND DESCRIPTION

The FAA William J. Hughes Technical Center (FAA Technical Center) encompasses an area of approximately 5,000 acres in Atlantic County, New Jersey, eight miles northwest of Atlantic City. Among the installations on the property are the Atlantic City International Air Terminal, the New Jersey Air National Guard 177th Fighter Interceptor Group, the Upper Atlantic City Reservoir, the Laurel Memorial Park Cemetery and the extensive facilities of the FAA Technical Center. Atlantic City's municipal water supply is provided by nine ground water production wells located just north of the Upper Atlantic City Reservoir on FAA property as well as by water drawn directly from the Atlantic City Reservoirs. The reservoirs are fed by the North and South Branches of Doughty's Mill Stream (also referred to as Absecon Creek), which traverse portions of the FAA Technical Center grounds. The public water supply facilities on site are owned by the Atlantic City Municipal Utilities Authority (ACMUA).

The FAA Technical Center is located within the Atlantic Coastal Plain, a broad, flat plain which encompasses the southern three-fifths of New Jersey. The area within two miles of the FAA Technical Center has a maximum relief of about 65 feet, ranging from an elevation of ten feet above mean sea level (msl) at the Lower Atlantic City Reservoir to 75 feet above msl to the west and north of the airport. The facility itself is relatively flat; slopes generally range from 0 to 3 percent. Forested areas exist north, south and east of the airport runways. These areas comprise about 40% of the 5,000-acre FAA Technical Center property. The remaining 60% of the site has been cleared for FAA facilities and consists of buildings and paved surfaces, grassed lawns and native grassland and shrubs adjacent to the runways.

The area within one mile of the FAA Technical Center boundaries includes open or forested land and commercial and residential areas. A large forested tract containing no commercial or residential property exists west of the FAA Technical Center. To the east, the property is bordered by the Garden State Parkway, the Lower Atlantic City Reservoir, and the forested land surrounding the reservoir. The area north of the FAA Technical Center contains commercial properties along the White Horse Pike (Rte. 30) and a concentrated residential area, Pomona Oaks, north of the White Horse Pike. The closest residential area south of the FAA Technical Center consists of a series of three trailer parks at the intersection of Tilton Road and Delilah Road. The majority of commercial and residential areas south of the FAA Technical Center are greater than 2,000 feet away from the FAA property, south of the Atlantic City Expressway. All residential areas in the vicinity of FAA appear to be upgradient of or otherwise isolated from the ground water flow at the FAA Technical Center.

The locations of the five areas of concern addressed herein are indicated in Figure 1. Area 27 is located south of the Atlantic City Reservoir, in the Research and Development (R&D) portion of the FAA Technical Center. As indicated in Figure 2, Area 27 includes an area located adjacent to Building 211, as well as downgradient portions of a storm drain and drainage swale which received runoff from the Building 211 area. The total site area is approximately 4 acres.

Area 56, the abandoned Navy landfill, is located near the current FAA hangar, south of the major east-west runway, as indicated in Figure 1. The 11-acre area is currently characterized by the presence of a softball field and a parking area over portions of the former disposal area, as indicated in Figure 3.

Area F is located north of the major east-west runway, in the airport operations area of the FAA Technical Center, as indicated in Figure 1. The Building 311 complex, consisting of buildings and trailers, is located at Area F, as are air blast test facilities which include a large concrete pad used in testing activities. The entire site is comprised of approximately 4 acres. A site location plan of Area F is provided in Figure 4.

Area R is a former trash dump located west of Tilton Road, as indicated in Figure 1. Approximately 7 acres in size, Area R currently consists of a cleared area surrounded by low trees. As indicated in Figure 5, a portion of the eastern part of the area which did not undergo significant filling is considerably lower than the rest of the area and occasionally contains ponded water. The higher elevations in the western part of the area are covered with broken concrete and asphalt fragments. The area is accessed by a dirt road off of English Creek Road.

Area S is located west of Tilton Road and approximately 1,300 feet south of Area R, as indicated in Figure 1. The 11-acre area is currently overgrown with trees, with edges of former excavation areas and small piles of soil materials and debris evident, as indicated in Figure 6. Areas of 1 to 4 feet of standing water are also present. The South Branch of Doughty's Mill Stream is approximately 200 feet to the southwest of the site.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

A. Land Use

The first significant development of what is now FAA property came during the 1930s when the Upper Atlantic City Reservoir was created by damming the South Branch of Doughty's Mill Stream. Prior to 1942, the entire property was wooded, except for the presence of large borrow pits near the present-day R&D facilities. On a 1940 aerial photograph, several dirt roads and what appears to be a railroad right-of-way traverse the property. In the early 1940s, a Naval Air Base and the Atlantic City Municipal Airport, including most of the existing runways, were constructed over much of the eastern two-thirds of the property. Many of the buildings in the western built-up area were also constructed at this time. In 1958, the Navy transferred its interests to the Airways Modernization Board (AMB).

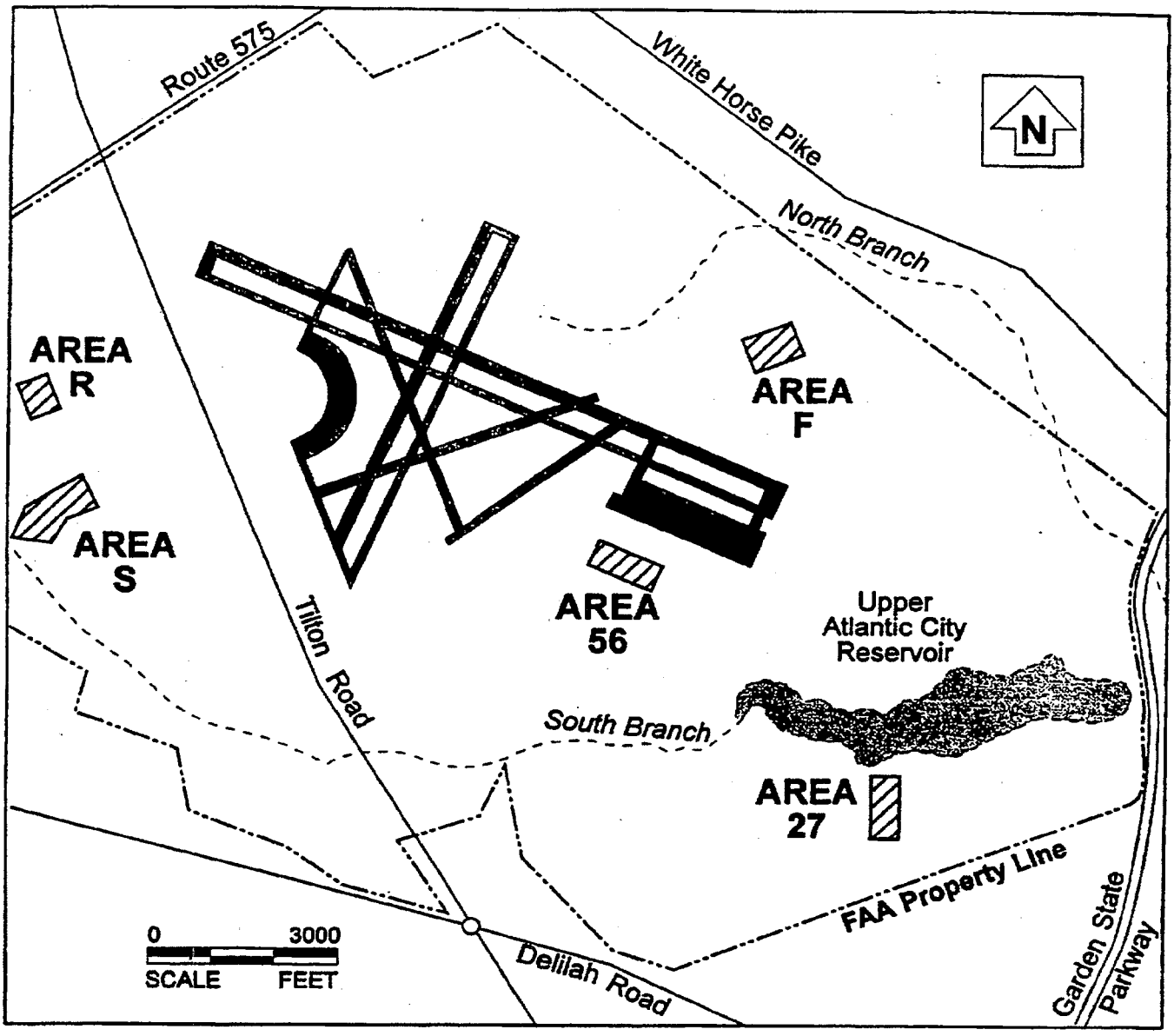

Figure 1. Locations of Areas 27,56,F, R and S, FAA Technical Center

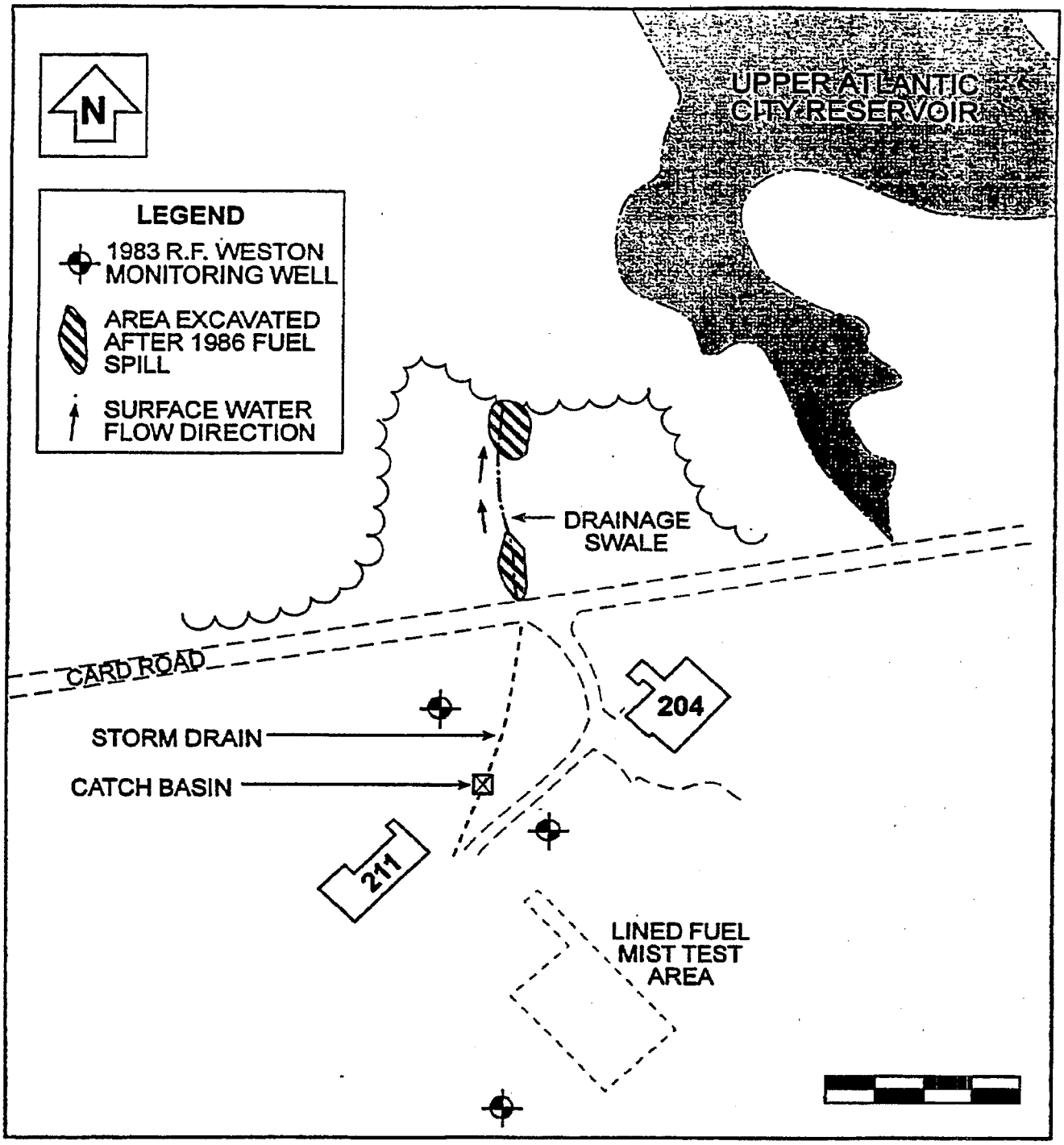

Figure 2. Area 27 - Fuel Mist Test Area

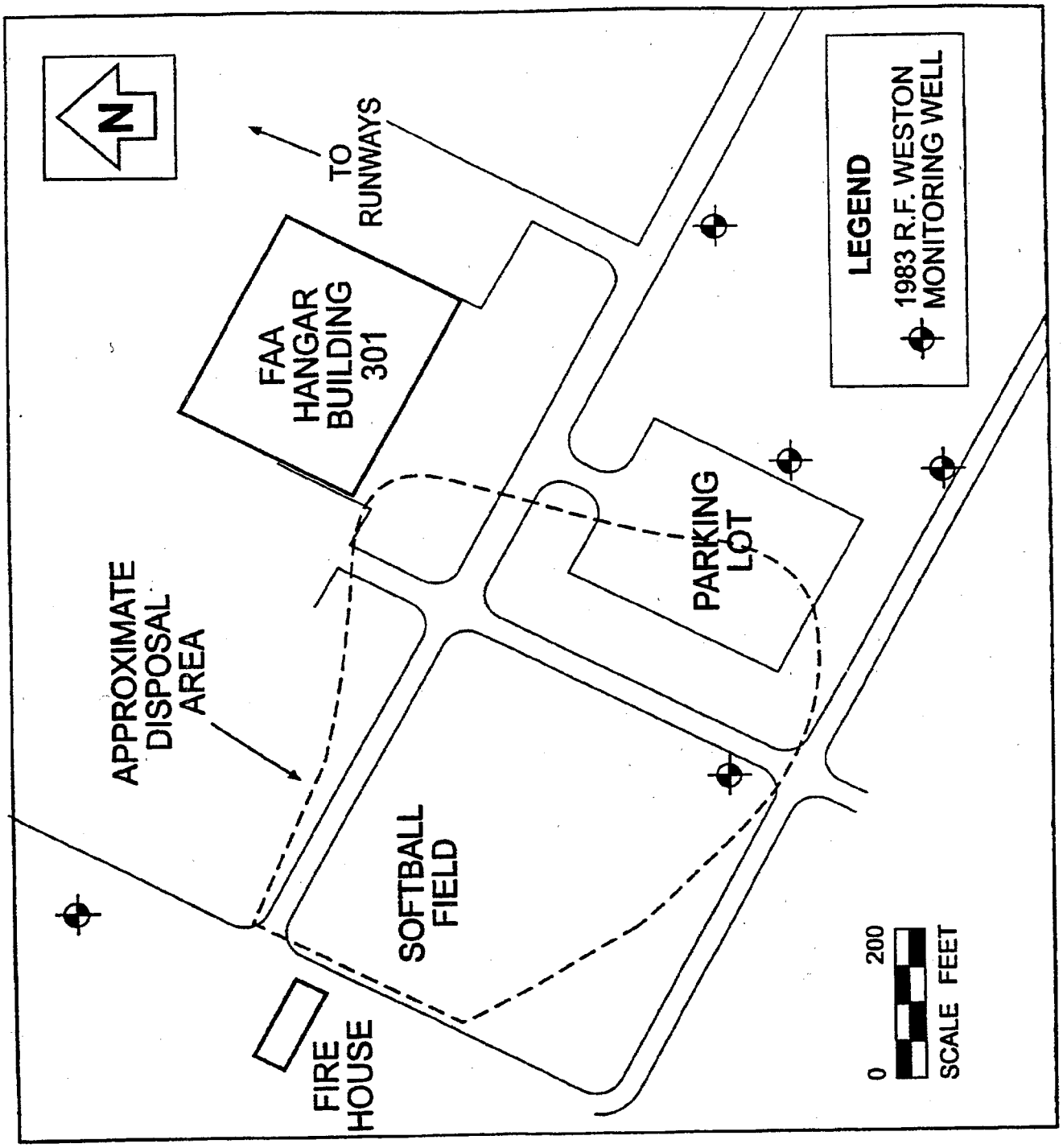

Figure 3. Area 56 - Abandoned Navy Landfill

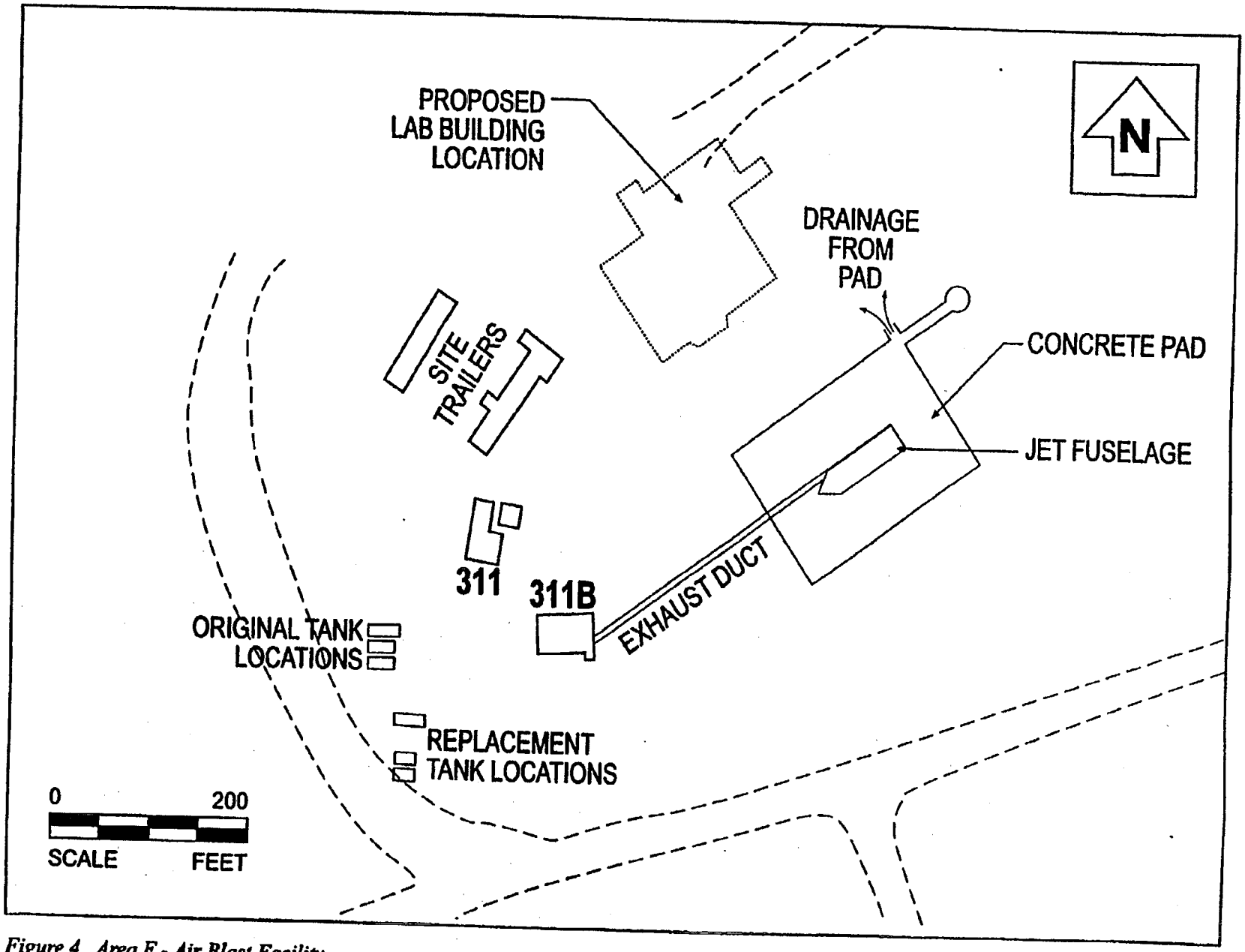

Figure 4. Area F - Air Blast Facility

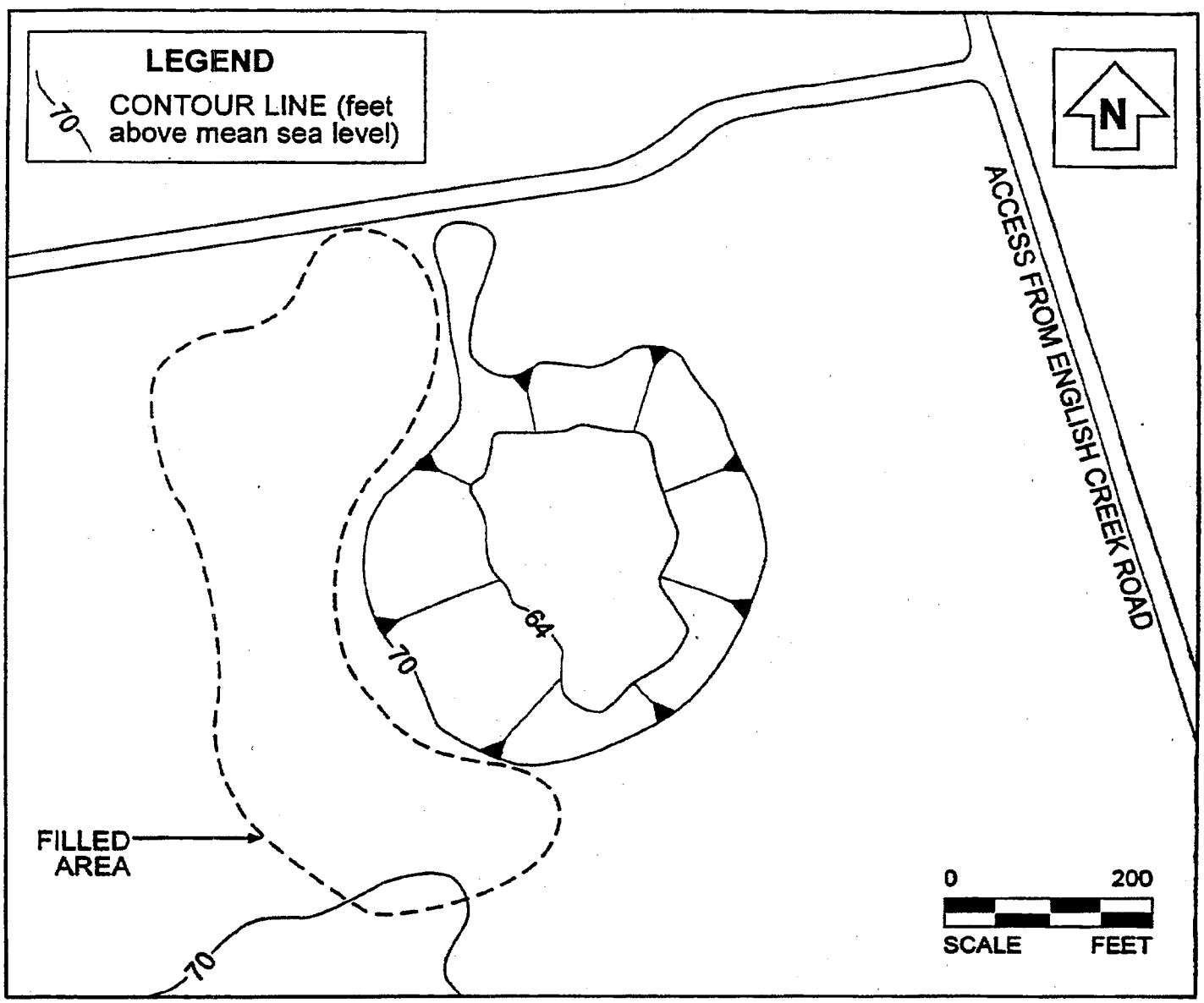

Figure 5. Area R - Trash Dump

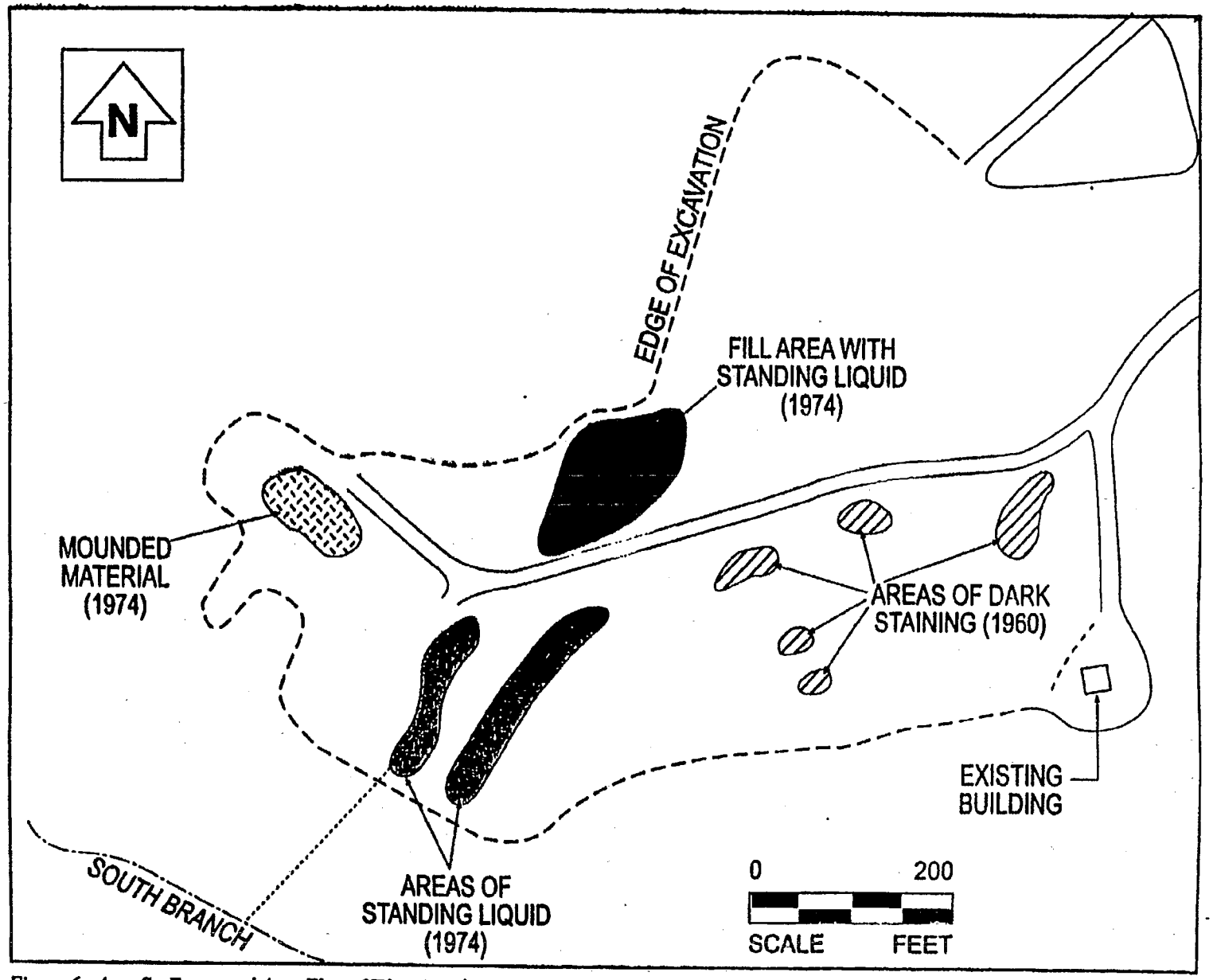

Figure 6. Area S - Excavated Area West of Tilton Road

The FAA took over the operations of the AMB in November 1958. The development of most of the R&D portion of the facility south of the Upper Atlantic City Reservoir occurred in the early 1960s. The FAA's large Technical/Administrative Building was constructed in 1979. The New Jersey Air National Guard has maintained its facilities south of the runways in the west-central portion of the facility since 1973.

The FAA Technical Center was listed on the National Priorities List (NPL) on August 30, 1990, 55 FR 35502, with an effective date of October 1, 1990. The FAA entered into an Interagency Agreement (IAG) with the U.S. Environmental Protection Agency (EPA) on May 17, 1993. The IAG is a legally enforceable document that memorializes FAA's commitment to remediate the site and defines the role of EPA in the cleanup process.

Each area of concern is discussed in more detail in the following sections.

Area 27

At Area 27, the fuel mist test facility was used for the testing of anti-misting additives for jet fuel until the practice was discontinued in 1986. The test procedure involved spraying the jet fuel and burning it in the open. Fuel mist tests were first conducted in 1979 over an unlined open area. Approximately 25 tests were run before the January 1980 installation of a Mylar liner for the collection of unburned fuel. In September 1985, a second Mylar liner was installed above the original. The location of the lined fuel mist test area is indicated in Figure 2.

In 1986, approximately 100 gallons of jet fuel were apparently spilled into a storm drainage piping system at Area 27 due to the malfunction of an oil/water separator at Building 211. This drainage system leads to a small, unlined drainage swale north of Area 27. At the time of the 1986 spill, jet fuel passed through the drainage system and contaminated soil in the swale. The contaminated soil was removed from the swale areas indicated in Figure 2 in the spring of 1986 and was disposed of according to applicable laws and regulations.

Area 56

The landfill at Area 56 was operated by the Navy between 1943 and 1958. The nature of material and total volume of material disposed of at the site are unknown. The approximate areal extent of the disposal area is indicated in Figure 3.

Area F

The air blast facility at Area F included a large exhaust duct which was used to route air at high velocity to a jet fuselage located on a concrete pad. During historic site use, ethylene glycol and jet fuel may have spilled onto the concrete pad during testing activities. The location of the concrete pad is noted in Figure 4.

Three JP-4 jet fuel underground storage tanks were historically located in the southwestern portion of Area F and were removed prior to the initiation of site investigations. Three replacement underground storage tanks were installed within 50 feet and south of the original tank locations.

While these replacement tanks were present at the time the site investigations were conducted, they have since been removed. A plan view of the area which indicates the former underground storage tank locations is provided as Figure 4. An unexplained apparent loss of 11,000 gallons of jet fuel from the fuel storage area (based on written fuel storage records) prompted the performance of site investigations to determine if a subsurface leak was a potential explanation for the discrepancy.

At the time the site investigations were conducted, Area F was also being considered as a potential site for a new laboratory building. While the building was eventually constructed in another area of the FAA Technical Center, the proposed building location, as indicated on Figure 4, was investigated.

Area R

The former trash dump area at Area R was reportedly used as a borrow pit until about 1958, when the Area 56 landfill was closed. At that time, Area R began to be used as a landfill for wood, brush, paper, and construction debris. In 1978 or 1979, a fire at the area prompted FAA to close the dump and use local landfills for trash disposal. A plan view of the area is presented in Figure 5.

Area S

The historic use of Area S is unknown. The site was identified in an EPA historic aerial photograph review as an area of "possible liquid impoundments and solid waste disposal." Aerial photographs taken over a period spanning from 1947 to the present indicate the presence of dark-toned material at the surface beginning in 1957. Subsequent photos show excavation areas, areas of standing liquid, and the presence of trenches and mounds of material at the site. One observed trench appears to drain towards the South Branch of Doughty's Mill Stream, located approximately 200 feet to the south. A plan view presenting some of the areas of staining, standing liquid and mounded material is presented in Figure 6.

B. Initial Investigations

In 1983, the New Jersey Department of Environmental Protection (NJDEP) directed Roy F. Weston (Weston) to conduct an assessment of potential pollution sources that could impact the then-proposed Atlantic City well field. The assessment included a review of all data on possible contaminant sources in the area, a limited field investigation of these sources, and soil and ground water sampling at five areas considered most threatening to ground water supplies in the area. The entire FAA Technical Center was included in the Weston study, and the five areas identified by Weston, including Areas 27 and 56, were all located on the FAA property. The locations of monitoring wells installed at Areas 27 and 56 under the Weston investigations are indicated in Figures 2 and 3. Weston's report led the FAA to initiate the present Environmental Investigation/Feasibility Study (EI/FS) of the five sites as well as additional areas, including Areas F, R and S, which were identified by the FAA.

C. Environmental Investigation

TRC Environmental Corporation (TRC) was contracted by the FAA to conduct an EI/FS at the FAA Technical Center. Included in the scope of work were the investigations of Areas 27, 56, F, R and S, as described below.

Area 27

The Area 27 EI included three phases of investigation conducted between February 1987 and October 1989. The scope of these investigations is described below. Sampling locations for the Phase I and Phase II EIs are presented in Figure 7.

Phase I - Site investigation activities conducted in 1987 during the Phase I EI included a soil gas survey, geophysical surveys, surface soil sampling, subsurface soil sampling and ground water sampling. Each of these Phase I EI components is discussed briefly below.

- A soil gas survey was conducted on a 100-foot grid over the area to identify potentially contaminated soils or contaminant plumes through the presence of elevated levels of volatile organic compounds (VOCs) within the soil's pore space. A small soil gas anomaly was located along the north end of the drainage swale which runs through the field north of Card Road. A surface soil sample subsequently collected at this location exhibited high concentrations of total petroleum hydrocarbons (TPH), considered to be attributable to the 1986 fuel spill to the ditch.

- A geophysical survey (EM-31 and EM-34) and resistivity profiling to detect buried metal objects were also conducted during the Phase I investigation. Geophysical anomalies found at Area 27 were attributable to known cultural features (e.g., pipes, buildings, power lines).

- Sixteen surface soil samples (27-SS1 through 27-SS16) were collected at Area 27. Two samples, 27-SS5 and 27-SS6, were collected from above the liners of the fuel mist test area while most of the remaining samples were collected from around the edges of the fuel mist test and liner area. One sample, 27-SS10, was collected from the soil gas anomaly area. Five of the samples were analyzed for the full list of priority pollutants plus 40 additional peaks (PP+40), eight were analyzed for TPH and three underwent chromatograph fingerprinting in an attempt to identify the probable source of the fuel spill contamination. Methylene chloride, toluene and 1,1,2,2-tetrachloroethene were the only priority pollutant VOCs detected in the surface soil samples. VOC tentatively identified compounds (TICs) were detected in two of the surface soil samples. No priority pollutant semi-volatile organic compounds (SVOCs) were detected in the surface soil samples, although SVOC TICs were detected in three of the samples. The pesticides 4,4-DDT and 4,4-DDE were detected in one surface soil sample. No polychlorinated biphenyls (PCBs) were detected in the surface soil samples. Inorganics detected in the surface soil samples included arsenic, cadmium, chromium, copper, lead, and zinc. TPH was detected in six of the eight samples in which it was analyzed, including a surface soil sample collected from the drainage swale, in a sediment sample from a storm sewer catch basin, and in surface soil samples collected from around the lined test area. The

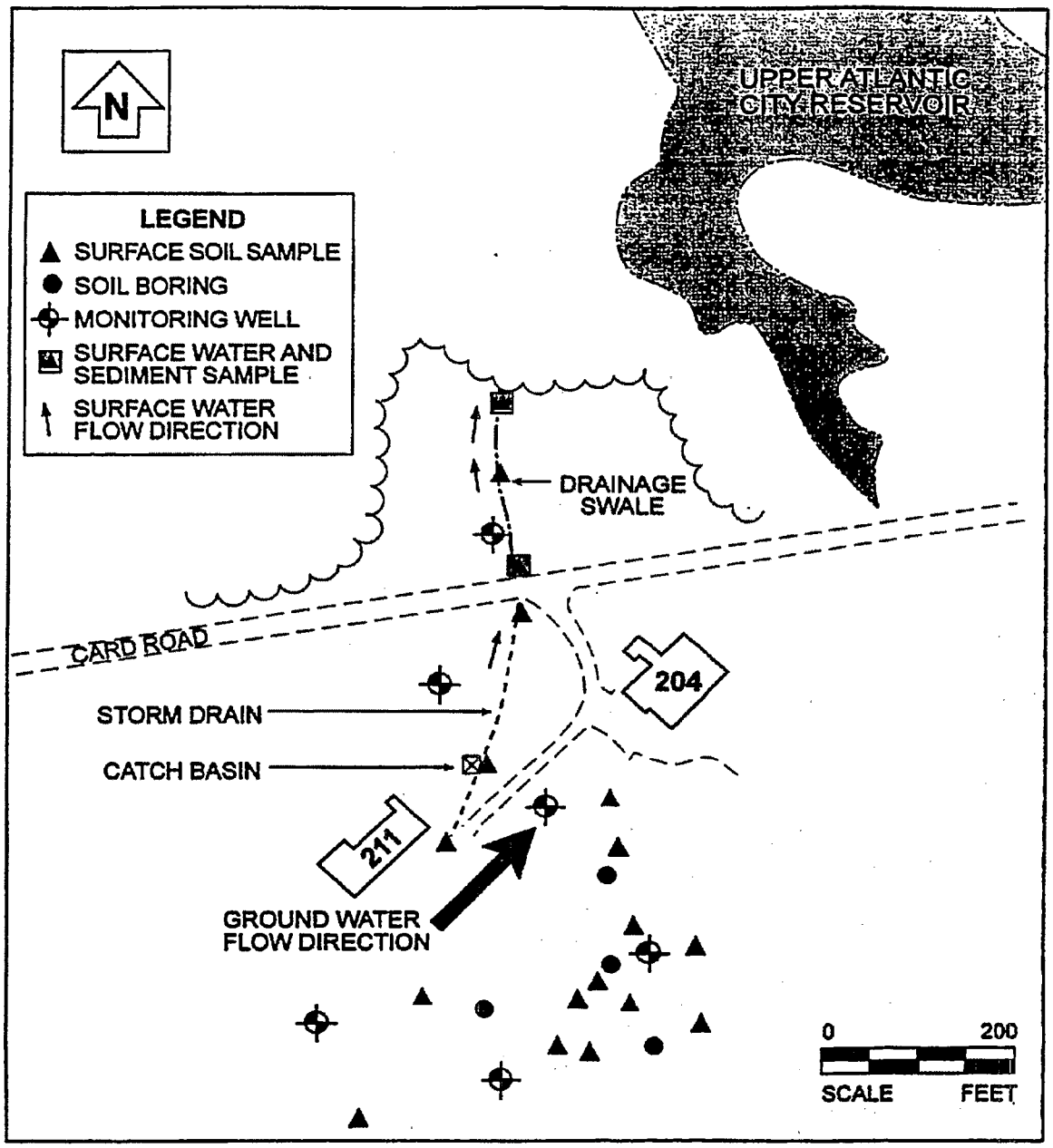

Figure 7. Area 27 - Phase I & II EI Sampling Locations

chromatograph fingerprinting could not differentiate between the three suspected types of fuel (i.e., jet-A, JP-4 and anti-misting kerosene) which may have been the source of the fuel spill.

- Four 30-foot-deep soil borings were drilled to characterize subsurface conditions and site geology. The borings were located in the area of the lined fuel mist test area. Two subsurface soil samples were collected from each boring location, with one of the samples analyzed for PP+40 and the second sample analyzed for VOCs and SVOCs only. Methylene chloride was the only priority pollutant VOC detected in the subsurface soil samples, present in five of the eight samples, and VOC TICs were detected in one sample. SVOC TICs were present in each of the subsurface soil samples. No pesticides or PCBs were detected in the four samples analyzed for PP+40; inorganics detected in the samples included chromium, copper, lead, and zinc.

- Three shallow monitoring wells were also installed during the Phase I EI, supplementing three shallow monitoring wells installed during the Weston Study. All monitoring wells were sampled, with the ground water samples analyzed for PP+40. VOC contaminants in the ground water samples included chloroform, detected in one sample, methylene chloride, detected in two samples, and acetone, a VOC TIC, detected in only one sample. SVOC TICs were detected in four samples. While pesticides were not detected, PCBs were detected in one sample. Detected inorganics include beryllium, chromium, mercury, lead, and zinc. Phenol was also detected in one sample.

- The Area 27 boring logs and ground water data provide geologic and hydrogeologic information on the area. The Area 27 near-surface soils are characterized as fine to coarse sands with some gravel to a depth of 5 to 15 feet, being thicker beneath the fuel mist test area than north of Card Road. Beneath the sandy surficial layer, sandy silt predominates to a depth of at least 30 feet, the maximum depth of most of the wells and borings. The water table was encountered at depths of 2 to 15 feet during the Phase I EI, depending on the location within the site and the season. As indicated in Figure 7, ground water at Area 27 flows to the northeast, towards the Upper Atlantic City Reservoir.

Phase II - A Phase II EI was conducted in 1988 to determine if the presence of PCBs, which were detected in one shallow monitoring well during the Phase I EI but were not detected in soil or other ground water samples, could be verified. Two ground water samples were collected during the Phase II EI from the monitoring well which exhibited PCBs during the Phase I EI. No PCBs were detected in the Phase II confirmation ground water samples.

The Phase II EI was also conducted to determine if previous removal activities had addressed all residual soil/sediment contamination from the fuel spill and to confirm that surface water quality had not been impacted by the fuel spill. Two sediment samples (plus one duplicate sample) and two surface water samples (plus one duplicate sample) were collected from the drainage swale north of Card Road. The surface water samples were analyzed for VOCs while the sediment samples were analyzed for TPH. No VOCs were detected in the surface water samples but TPH was detected in the sediment samples. Although previous soil removal activities had been conducted within the drainage swale, it was theorized that the contaminated soil identified in the catch basin during the

Phase I EI could be acting as a continued source of soil/sediment contamination in the downgradient drainage swale.

Additional Investigations - In October 1989, residual TPH contamination in the catch basin and the storm drain (see Figure 7 for the catch basin and storm drain locations) was removed through the physical removal of the catch basin soils and the flushing of the storm drain. Three downgradient "hot spot" areas identified in the swale based on the results of a soil gas survey were then excavated, as indicated in Figure 8. Following the completion of the soil excavation, five soil samples were collected from the base of the excavations to confirm that all contaminated soils had been excavated. Four of the samples were analyzed for TPH and one was analyzed for PP+40. The four samples analyzed for TPH exhibited TPH levels ranging from 11 parts per million (ppm) to 30 ppm. The only organic compounds present in the priority pollutant soil sample were also detected in the field or method blanks or were SVOC TICs not on the priority pollutant list. Inorganics detected in the soil included chromium, lead, zinc, and phenol.

During the October 1989 contaminated soil removal effort, it was noted that stained soils remained adjacent to the steel drainage pipe under the road. Therefore, in December 1990, twelve test borings were drilled around the drainage pipe buried beneath the road. One sample was collected from each boring for TPH analysis. All twelve soil samples exhibited TPH at concentrations ranging from 9.2 to 1,500 ppm. The highest levels beneath the road were generally observed in the locations closest to the drainage pipe.

Area 56

The Area 56 EI included three phases of investigation conducted between February 1987 and November 1992 to determine whether past activities had impacted environmental media. The scope of these investigations is described below. Sampling locations are presented in Figure 9.

Phase I - The Phase I EI was conducted in 1987 and consisted of a soil gas survey, a geophysical survey, surface soil sampling, subsurface soil sampling, and the installation and sampling of two intermediate-depth (80 to 100 feet deep) monitoring wells. Each of these Phase I EI components is discussed briefly below.

- A soil gas survey was conducted on a 100-foot grid over the site area. One small anomaly was detected in the eastern portion of the site.

- Geophysical methods employed at Area 56 included electromagnetic (EM-31 and EM-34) and magnetometer surveys, resistivity soundings, ground penetrating radar (GPR) and gamma logging of a deep borehole. The presence of buried utilities and other site characteristics limited the effectiveness of these techniques. One anomaly area detected during both the EM-31 and magnetometer surveys was indicative of buried ferrous metal.

- Since the landfill area had been covered with a thick layer of fill, only two composite surface soil samples, each composited from two sampling point locations, were collected and analyzed for PP+40, less the VOC fraction. Separate non-composited samples from each sampling site were analyzed for VOCs (4 samples total). Methylene chloride was detected

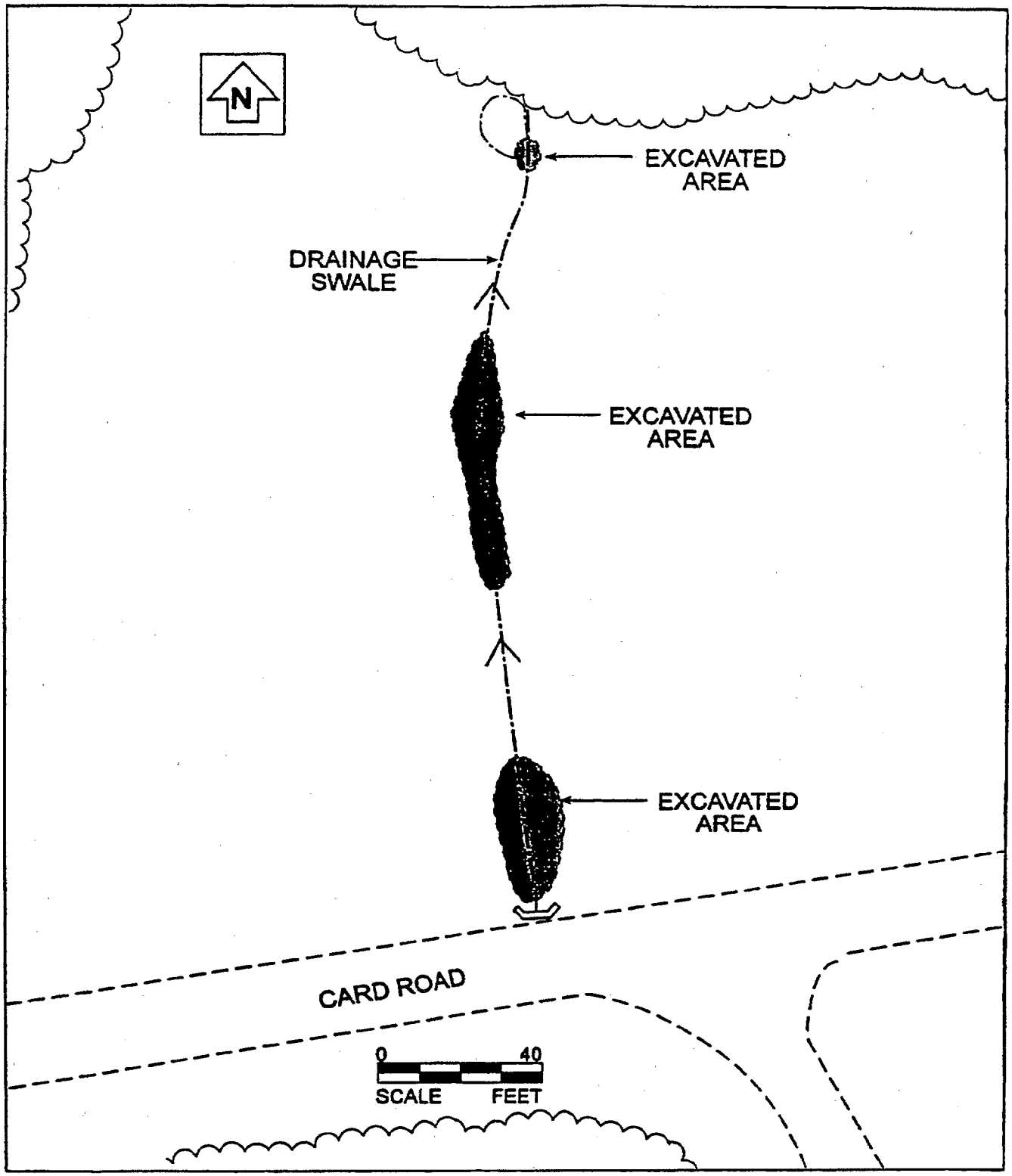

Figure 8. Area 27 - 1989 Excavation Areas

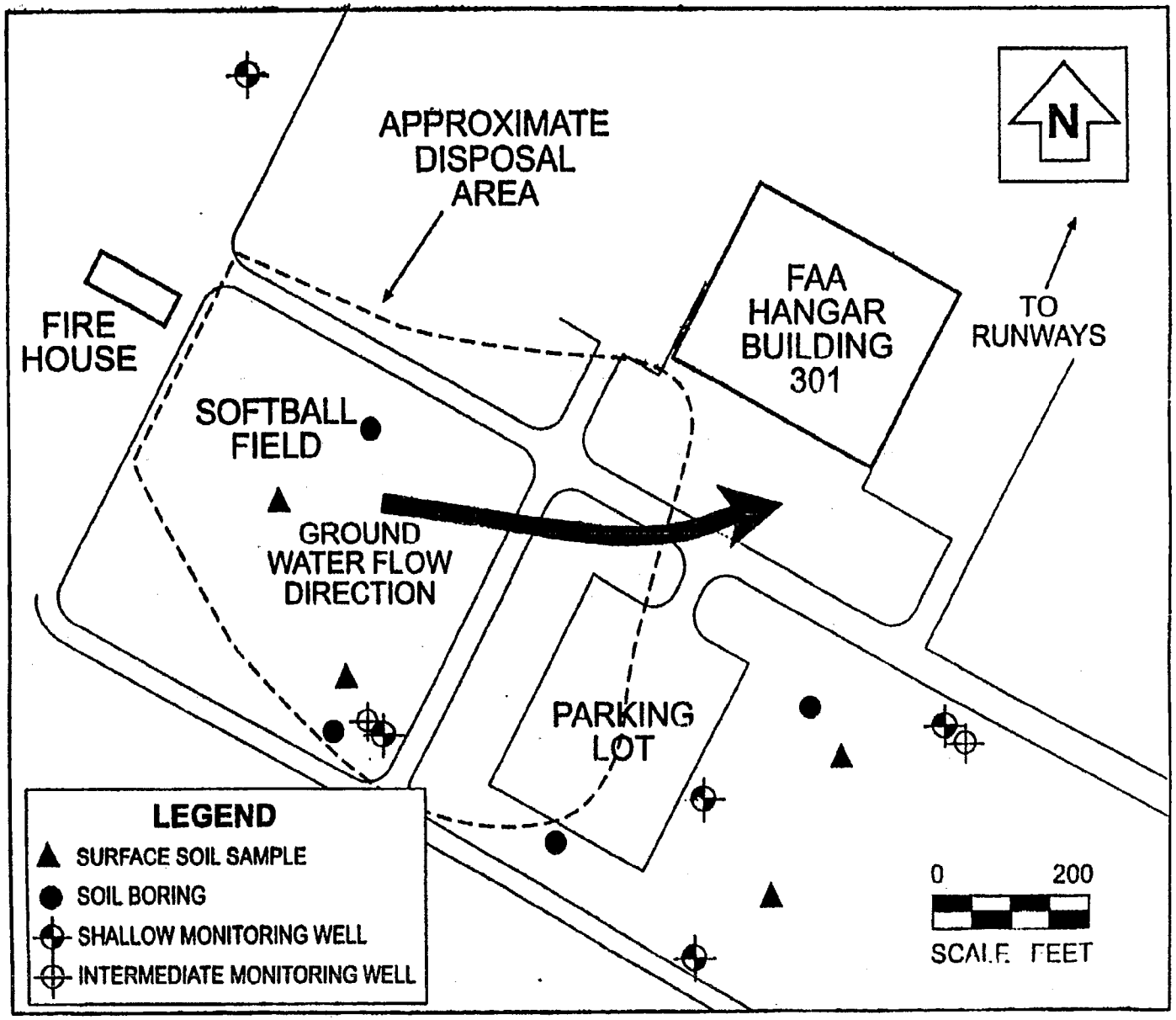

Figure 9. Area 56 - Phase I and II EI and Additional Investigation Sampling Locations

in one of the surface soil samples. No priority pollutant SVOCs were detected in the surface soil samples, although SVOC TICs were detected in two of the samples. No pesticides or PCBs were detected in the surface soil samples. Inorganics detected in the surface soil samples included chromium, lead and zinc.

- Four soil borings, ranging in depth from 15 to 24 feet, were drilled to characterize subsurface conditions and site geology. The borings were located in the former landfill area. Two samples were taken from each of the four borings, with one of the samples analyzed for PP+40 and the second sample analyzed for SVOCs. The SVOC sample from one of the borings (56-B1) was also analyzed for VOCs. Methylene chloride was the only VOC detected, present in each of the five subsurface soil samples analyzed for VOCs. VOC TICs were present in three samples and in the associated field and trip blank samples. Bis(2-ethylhexyl)phthalate was detected in two subsurface samples collected from boring location 56-B2. SVOC TICs were detected at the remaining three boring locations. No pesticides or PCBs were detected in the subsurface soil samples. Inorganics detected in the subsurface samples included chromium, lead, and zinc.

- Two intermediate-depth monitoring wells (56-MW2D, and 56-MW4D) were installed during the Phase I EI, supplementing five existing shallow monitoring wells installed during the Weston Study. These wells were screened at depths of 75 to 95 feet and 80 to 100 feet, respectively. All wells were sampled, with the ground water samples submitted for PP+40 analysis. Two VOCs, 1,1-dichloroethane and 1,1,1-trichloroethane, were detected in well 56-MW4D. No VOCs were detected in any of the other wells. Bis(2-ethylhexyl)phthalate was detected in five samples, but was also found in a field blank at similar concentrations. Fluoranthene was also detected in one sample. SVOC TICs were present in four of the ground water samples. No pesticides or PCBs were detected in the ground water samples. Inorganics detected in the wells included beryllium, cadmium, chromium, copper, mercury, nickel, lead, selenium, zinc, and cyanide. Phenol was also detected in each of the wells.

- The Area 56 monitoring well borings and ground water data provide geologic and hydrogeologic information on the area. No waste materials other than occasional glass chips and wood chips were encountered in the soil borings. There are two semi-confining layers within the top 100 feet at Area 56, each consisting of silty sand with some clay. The upper layer is encountered at depths of 28 to 33 feet and ranges in thickness from 25 to 35 feet. The lower semi-confining layer is present at depths of 68 to 78 feet and ranges in thickness from 10 to 30 feet. Fine to coarse sand is present above and between the semi-confining layers, and is poorly sorted in the top 10 feet, where it is thought to primarily consist of fill. A 202-foot boring drilled during the Weston Study in the northwest corner of Area 56 identified the presence of a semi-confining layer (the Middle Cohansey Clay) at a depth of 109 feet, with a thickness of 16 feet, and consisting of "silty/clayey" fine sand. The water table was encountered at depths of 8 to 33 feet during the Phase I EI. Local shallow ground water flow is to the east at Area 56, as indicated in Figure 9.

Phase II - The Phase II EI was conducted at Area 56 in late 1988 and early 1989 to further investigate the presence of elevated levels of metals in one of the shallow monitoring wells, 56-MW4S. A shallow ground water sample was collected from well 56-MW4S and was analyzed for

filtered and unfiltered inorganics. In addition, all five shallow wells were sampled for parameters indicative of a landfill leachate plume, including chemical oxygen demand (COD), total organic carbon (TOC), ammonia nitrogen, nitrates, and total suspended solids (TSS). The unfiltered sample from 56-MW4S exhibited chromium, copper, mercury, nickel and zinc, while only nickel and zinc were detected in the filtered sample. Consistent with other areas investigated at FAA, the number and concentrations of metals detected in filtered versus unfiltered samples is lower. The water quality parameters detected in the shallow wells included COD, ammonia nitrogen, nitrates, TOC, and TSS.

Additional Investigations - Due to EPA's disqualification of previously collected sampling data, the EPA required resampling at Area 56 to determine if VOCs were present in the soils and ground water. The resampling effort conducted in 1992 included the collection of three subsurface soil samples and five shallow and two intermediate ground water samples (one from each of the existing monitoring wells) for VOC analysis. No priority pollutant VOCs were detected in the subsurface soil samples. 1,1-Dichloroethene, 1,1,1-trichloroethane and 1,1-dichloroethane were detected in one of the intermediate monitoring wells (56-MW4D). Chlorobenzene and 1,4-dichlorobenzene were was also detected in a shallow monitoring well (56-MW2S).

Quarterly ground water sampling has been conducted at shallow well 56-MW4S and intermediate well 56-MW4D, located in the eastern portion of the site, since May 1994 to monitor any trends in the presence or absence of VOCs. The quarterly sampling employs an analytical method which provides low detection limits. The sample from the shallow well is also analyzed for filtered and unfiltered metals and nitrate. The quarterly ground water monitoring results indicate consistent VOC detections in the intermediate monitoring well, with a decreasing trend in contaminant levels, while the shallow well has exhibited periodic detections of VOCs. Inorganic concentrations have generally decreased within the shallow monitoring well over the quarterly monitoring period.

Area F

The Area F EI included three phases of investigation conducted between January 1987 and August 1996 to determine whether past activities had impacted environmental media. The scope of these investigations is described below. Sampling locations are presented in Figure 10.

Phase I - The Phase I EI was conducted in 1987 and consisted of a soil gas survey, geophysical surveys, surface/near-surface soil sampling, subsurface soil sampling, and the installation and sampling of three shallow monitoring wells. Each of these Phase I EI components is discussed briefly below.

- A soil gas survey was conducted on a 100-foot grid, with no anomalies detected.
- Electromagnetic (EM-31 and EM-34) surveys and resistivity profiling were conducted at Area F. One anomaly indicative of buried metal was detected just to the west of the former underground tanks.

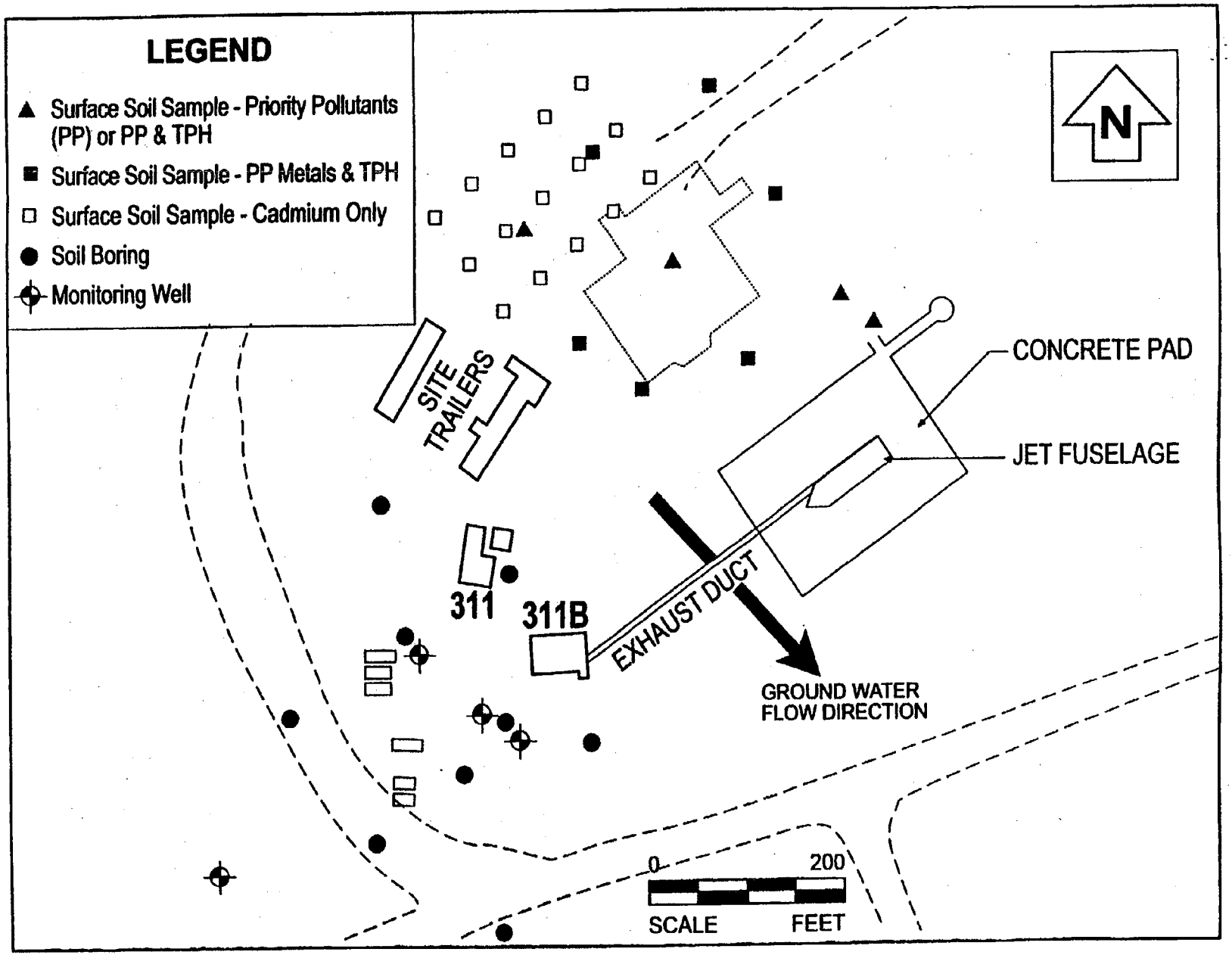

Figure 10. Area F - Phase I and II EI Sampling Locations

- Surface soil sampling was conducted to investigate soil quality in the area of a proposed new laboratory building and to characterize soil quality in an area which received runoff from the concrete test pad. One discrete surface soil sample and nine composite soil samples, each representing both the 0 to 2 foot interval and the 4 to 6 foot interval, were initially collected during the Phase I EI. Of these samples, one was analyzed for PP+40, three were analyzed for PP+40 and TPH, and the remaining six were analyzed for priority pollutant metals and TPH. Subsequently 16 additional surface soil samples (15 samples and one duplicate) were collected from the proposed lab building area and analyzed for cadmium. Methylene chloride was detected in each of the four soil samples analyzed for PP+40. VOC TICs were detected in only one of the samples. Bis(2-ethylhexyl)phthalate and di-n-butyl phthalate were the only priority pollutant SVOCs detected, each at estimated values. SVOC TICs were present in each of the four samples. Pesticides or PCBs were not detected in the samples. Inorganics detected in the samples included arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc and cyanide. Inorganic phenols and TPH were each detected in five of the nine samples in which they were analyzed.

- Four 30-foot-deep soil borings were drilled to characterize subsurface conditions and site geology. The borings were located in the general area of the former underground fuel storage tanks. Two samples were taken from each of the four borings, with one of the eight samples analyzed for PP+40 and the remaining seven samples analyzed for TPH. Two duplicate samples were also collected and analyzed for PP+40 and TPH, respectively. Subsequent to the initial sampling event, 16 additional subsurface soil samples (15 samples and one duplicate) were collected at depths of 4 to 6 feet below grade in the proposed lab building area and analyzed for cadmium. Methylene chloride, ethylbenzene and VOC TICs were detected in the single sample and duplicate sample analyzed for PP+40. Naphthalene and SVOC TICs were the only SVOCs detected in the samples. The PCB Aroclor 1242 was also detected in one of the two samples. Chromium, lead and zinc are detected in both samples. TPH was detected in each of the eight samples in which it was analyzed.

- Three shallow monitoring wells were installed to gather stratigraphic, hydrogeologic and ground water quality data. Each of the wells was sampled and analyzed for PP+40 and a duplicate sample was also collected for PP+40 analysis. Benzene and ethylbenzene were each detected at estimated concentrations in a single well and VOC TICs were present in each sample. Bis(2-ethylhexyl)phthalate and SVOC TICs were detected in each of the three samples. No pesticides or PCBs were detected in the ground water. Inorganics detected in the ground water samples included cadmium, chromium, copper, mercury, lead, selenium, and zinc. Phenol was also detected in each of the wells.

- The Area F subsurface investigations indicate that the upper 15 feet of soil at Area F are characterized by the presence of clay layers ranging in thickness from under one inch to several feet. Where the soil in the unsaturated zone is locally saturated because it overlies a clay layer above the water table, perched ground water exists. Of the three monitoring wells installed during the Phase I EI, one well was screened in the true water table while the remaining two wells were screened in the perched water table. Within the perched zone, water was encountered at depths of 11 to 12 feet. In the one well screened within the true water table, the water table was encountered at a depth of 30 feet. The water table in the

vicinity of Area F is nearly flat, with flow direction to the southeast. Water flow within the perched zones is controlled by the configuration of the upper clay layers.

Phase II - The Phase II EI was conducted at Area F in 1988 to further investigate potential subsurface contamination in the vicinity of the former underground storage tanks and to determine if the true water table aquifer had been impacted by fuel leakage from the tanks. The Phase II EI consisted of the drilling of five additional borings and the installation of a monitoring well which was screened within the true water table. Five subsurface soil samples were collected from the borings and analyzed for TPH. TPH was detected in four of the five samples. The new well was sampled along with one of the existing Phase I wells. The ground water sample from the new well was analyzed for PP+40 while the ground water sample from the existing well was analyzed for filtered and unfiltered inorganics. The Phase I EI well which had been installed within the true water table had been dry for one year, indicating that it had been installed above the level of the water table. Therefore, it was filled with grout during the Phase II EI. The only organic detected in the new monitoring well sample was acetone, identified as a VOC TIC. Inorganics detected in the new well included chromium, copper, lead and zinc. The existing well sample which was analyzed for filtered and unfiltered inorganics exhibited chromium, copper, lead and zinc in the unfiltered sample, with only zinc detected in the filtered sample. Consistent with other areas investigated at FAA, the number and concentrations of metals detected in the filtered versus unfiltered samples was lower.

Additional Investigations - Based on the ground water inorganic results from the Phase I and Phase II EIs, and the time which had passed since the EIs were conducted, ground water samples were collected from the three existing Area F monitoring wells in August 1996. The samples collected from one of the perched wells and from the true water table well (including a duplicate sample from the true water table well) were analyzed for priority pollutants. However, insufficient sample volume could be collected from the second perched well to support the full suite of chemical analyses; therefore, the sample from the third monitoring well was analyzed for VOCs and inorganics only. Carbon disulfide was the only VOC detected, present in one of the perched monitoring wells. SVOCs detected in the ground water samples included bis(2-ethylhexyl)phthalate, di-n-butyl phthalate, and SVOC TICs. Inorganics present in the ground water samples included arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc.

Area R

The Area R EI included four phases of investigation conducted between December 1988 and August 1994 to characterize the disposal area at the site and to determine if disposal activities had impacted soil or ground water quality, with the first investigations conducted under the Phase II EI. The scope of these investigations is described below. Sampling locations are presented in Figure 11.

Phase II - The Phase II EI was conducted in 1988 and consisted of subsurface soil sampling, and the installation and sampling of three shallow monitoring wells. Each of these Phase II EI components is discussed briefly below.

- Six 30-foot-deep soil borings were drilled to characterize subsurface conditions and site geology. The borings were located in the filled area of the site and in a depressed area just east of the filled area. One sample was collected from each of five of the borings, with two

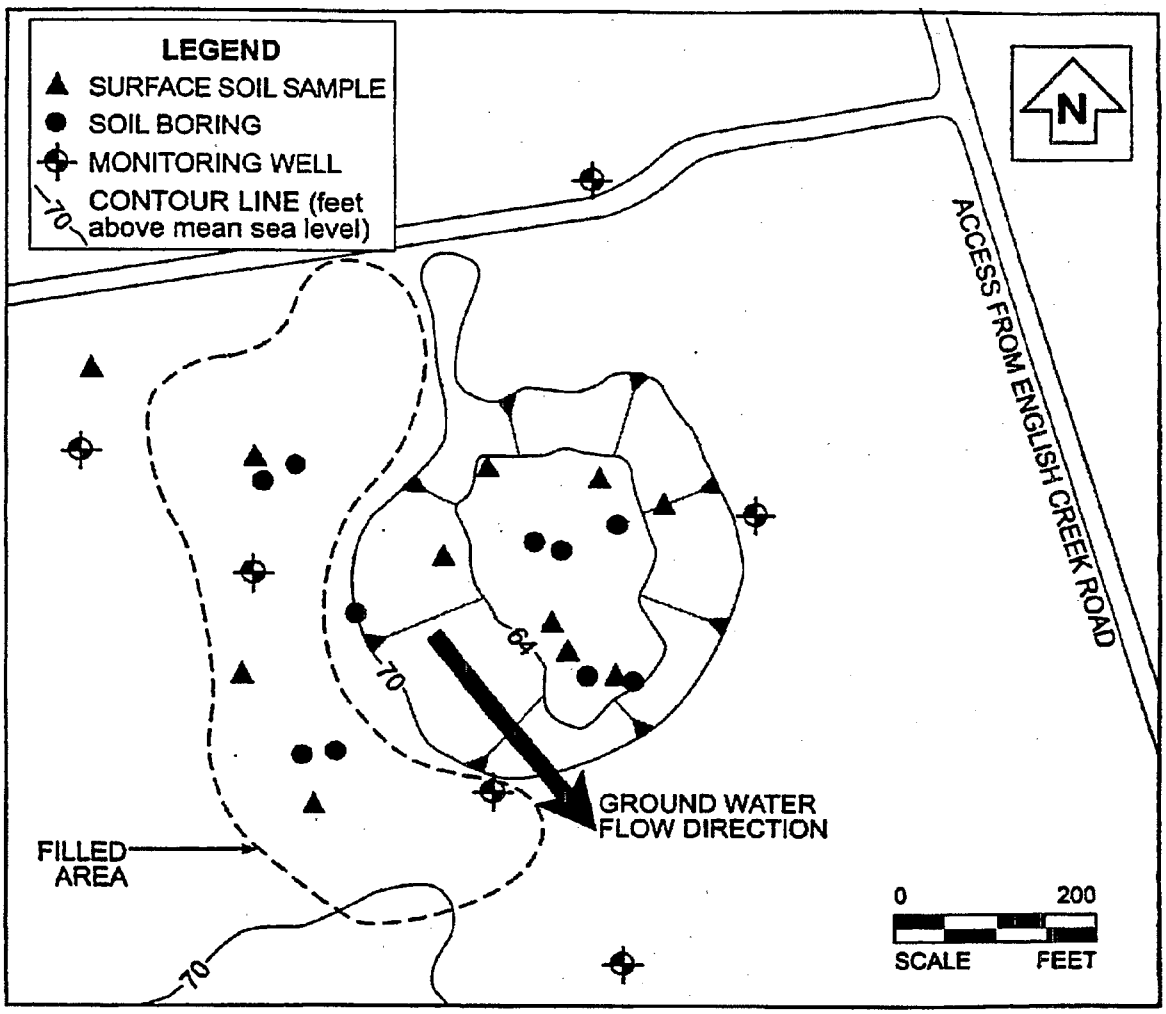

Figure 11. Area R - Phase II, Supplemental and Additional Investigation Sampling Locations

samples collected from the remaining boring. A duplicate sample was also collected. All samples were analyzed for PP+40 with the exception of one sample which was analyzed for VOCs and SVOCs only. VOC TICs were detected in four of the eight subsurface soil samples. Bis(2-ethylhexyl)phthalate was detected in two subsurface samples, benzo(b)fluoranthene was detected in one sample and SVOC TICs were detected in each of the samples. No pesticides or PCBs were detected in the subsurface soil samples. Inorganics detected in the subsurface samples included beryllium, chromium, copper, nickel, lead, and zinc.

- Three shallow monitoring wells were installed during the Phase II EI. Three ground water samples and a duplicate were collected. All ground water samples were submitted for PP+40 analysis. Due to a possibility of cross-contamination during the original sampling effort, two wells were resampled and analyzed for VOCs. Two VOCs, chlorobenzene and 1,4-dichlorobenzene, were each detected in two of the monitoring wells while benzene, chloroform, vinyl chloride and ethylbenzene were detected in one monitoring well. VOC TICs were present in each of the monitoring wells. Acenaphthene, bis(2-ethylhexyl)phthalate, and naphthalene were each detected in one well sample. 4,4-DDD was present in one sample and 4,4-DDT was present in two samples. Inorganics detected in the wells included chromium, copper, nickel, lead, and zinc.

- The Area R soil borings, monitoring well borings and ground water data provide geologic and hydrogeologic information on the area to a maximum depth of 37 feet. The basic stratigraphy consists of fine to coarse sands overlain by fill. Running sands were encountered and forced the termination of two borings located in the depressed portion of the site. Where fill material was encountered, it consisted of concrete, sand, asphalt, wood, metal and plastic and ranged in thickness from 2 to 12 feet, with the thickest portion in the western part of the site. The water table was encountered at depths of 19 to 22 feet, with the ground water flow direction to the southeast, as indicated in Figure 11.

Supplemental Investigations - A supplemental investigation was conducted at Area R in late 1989 to further characterize ground water quality upgradient and downgradient of the former disposal area. One shallow upgradient well was installed to determine if the organic constituents detected during the Phase II EI had an upgradient source and two shallow downgradient wells were installed to determine if the organic constituents had migrated beyond the borders of the original disposal area. The three new monitoring wells were sampled and analyzed for PP+40. Methylene chloride and chloroform were the only VOCs detected and were present in only one monitoring well. Methylene chloride was also present in the associated blank samples. Copper and zinc were the only other analytes detected in the ground water samples, with copper present in one sample and zinc present in all three monitoring well samples.

Additional Investigations - Due to EPA's disqualification of previously collected sampling data, the EPA required resampling at Area R to determine if VOCs were present in the soils and ground water. The resampling effort conducted in 1992 included the collection of four subsurface soil samples and four shallow ground water samples for VOC analysis. No priority pollutant VOCs were detected in the subsurface soil samples. Two shallow wells within the fill area exhibited

chlorobenzene, 1,2-dichlorobenzene and 1,4-dichlorobenzene. Ethylbenzene was detected in one well.

Sampling of surface soils was completed in August 1994 to support the performance of a human health risk assessment. Eleven surface soil samples were collected and analyzed for priority pollutants. VOCs were not detected in any of the surface soil samples, although one sample exhibited the presence of VOC TICs. Eleven SVOCs, including phenanthrene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene and benzo(g,h,i)perylene, were detected in each of the surface samples except for the background sample. Other SVOCs detected in the samples include phenol, naphthalene, acenaphthene, fluorene, anthracene, and SVOC TICs. Two pesticides, 4,4-DDE and 4,4-DDT, were detected in two surface soil samples. Two PCBs, Aroclor-1242 and Aroclor 1254, were detected in three surface soil samples. Inorganics detected in the surface soil samples included arsenic, beryllium, cadmium, chromium, copper, cyanide, lead, mercury, nickel, silver, and zinc.

Quarterly ground water sampling and analysis have been conducted at all six shallow wells at Area R since May 1993 to confirm that VOCs have not migrated outside of the fill area. This program uses an analytical method which provides low detection limits. The results of the quarterly monitoring indicate that the two wells screened in the fill area continue to exhibit several VOCs. Two additional shallow wells located sidegradient and downgradient of the fill area have exhibited the presence of chloroform. Chloroform, however, cannot be attributed to the fill material, since it has not consistently been detected in the fill area wells. It has, however, been consistently detected in the monitoring well located upgradient of the fill area. No known site activities have occurred upgradient of Area R which could be contributing to the presence of chloroform in the upgradient well. The detection of chloroform in wells located upgradient of other areas of concern indicate that this constituent my be characteristic of regional ground water quality in the FAA Technical Center area and that it does not appear to be related to the areas of concern at the facility, including Area R.

Area S

The Area S EI included three phases of investigation conducted between August 1989 and May 1995 to determine whether past activities had impacted environmental media. The scope of these investigations is described below. Sampling locations are presented in Figure 12.

Supplemental Investigations - Area S was first investigated as part of the Supplemental Investigations conducted in 1989. The study consisted of a soil gas survey, a geophysical survey, test pitting, surface soil sampling, subsurface soil sampling, sediment sampling, surface water sampling, and the installation and sampling of three monitoring wells. Each of these investigation components is discussed briefly below.

- A soil gas survey was conducted on a 100-foot grid. No significant anomalies were detected.

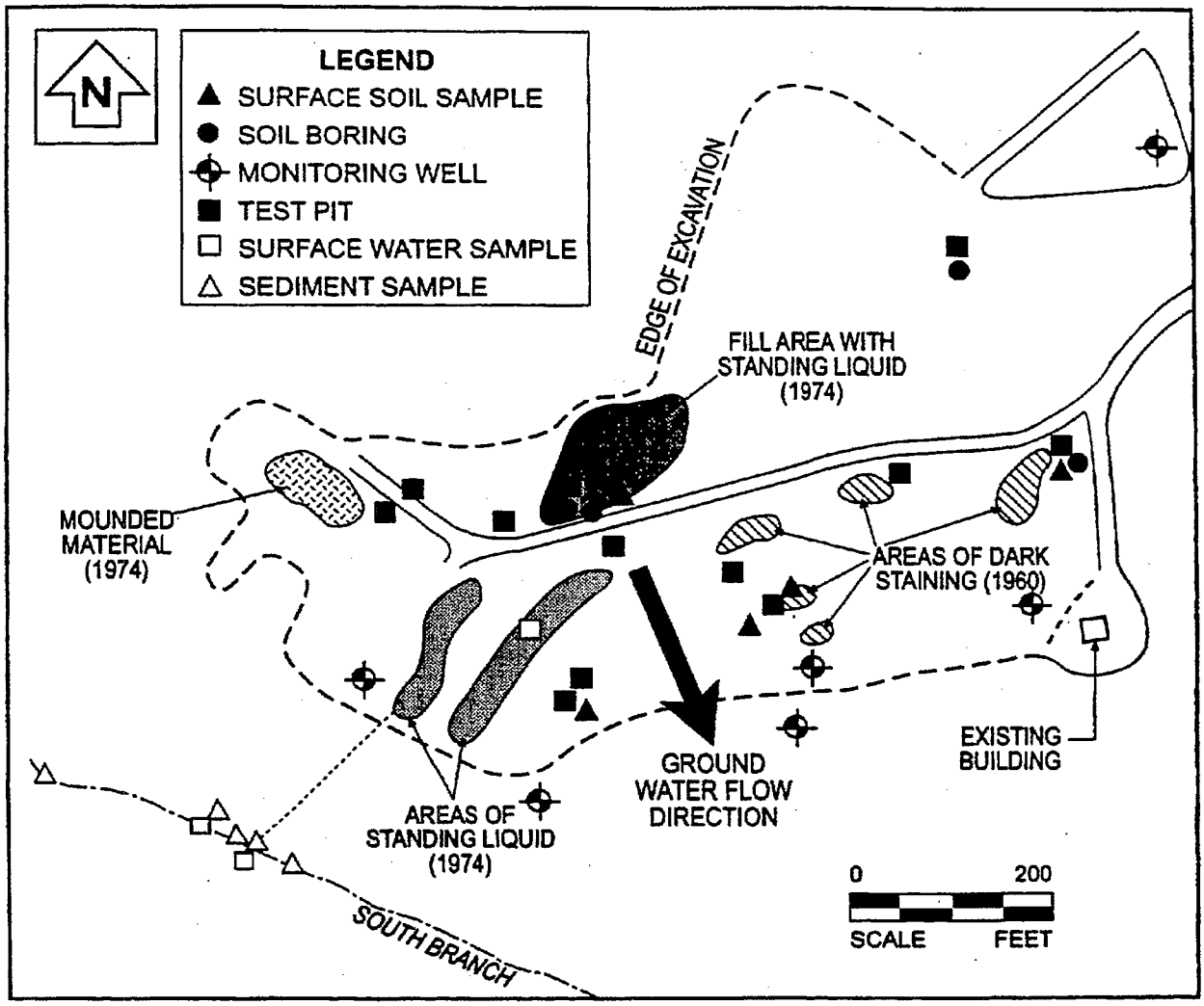

Figure 12. Area S - Supplemental and Additional Investigation Sampling Locations

- A magnetometer survey was conducted on a 100-foot grid, with a more detailed survey (50-foot grid) conducted in obvious fill areas or where magnetic anomalies were detected. Three strong anomalies were detected, two in the central portion of the site and one in the northeast portion of the site.

- Twelve test pits were dug in areas of suspected dumping (e.g., magnetic anomalies, hummocky areas or areas of mounded material). At some of the test pit locations, the presence of metallic debris (responsible for the magnetic anomalies), decayed wood, and other debris was identified. Other test pits exhibited no evidence of environmental contamination. A near-surface soil sample (i.e., collected from depths of 1 to 4 feet) was collected from each of four of the test pits and analyzed for PP+40. Methylene chloride was detected in each of the test pit soil samples although it was also present in the blank samples. Toluene was detected in three samples, tetrachloroethene in two samples, and chloroform in one sample. VOC TICs were detected in one of the samples. Phenol and bis(2-ethylhexyl)phthalate were each detected in two test pit samples, while fluoranthene, pyrene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, naphthalene and phenanthrene were each detected in one of the test pit soil samples. SVOC TICs were detected in each of the samples. No pesticides or PCBs were detected in the test pit soil samples. Inorganics detected in the test pit soil samples included chromium, copper, mercury, lead, and zinc.

- Two composite surface soil samples were collected and analyzed for PP+40. Two separate non-composited samples were collected for the VOC portion of the analysis. Methylene chloride was detected in each of the surface soil samples although it was also present in the blank samples. Tetrachloroethene was also detected in the surface soil samples. Bis(2-ethylhexyl)phthalate and SVOC TICs were detected in both of the surface soil samples while di-n-butylphthalate, fluoranthene and phenol were each detected in one sample. No pesticides or PCBs were detected in the surface soil samples. Inorganics detected in the surface soil samples included chromium, lead, and zinc.

- Two shallow soil borings were drilled in the vicinities of two test pits which exhibited the presence of debris to determine the vertical extent of the debris. One sample was collected from each boring and analyzed for PP+40. Methylene chloride was detected in each of the subsurface soil samples, although it was also present in the blank samples. VOC TICs were also present in the subsurface soil samples. SVOCs detected in the samples include di-n-butylphthalate (present in both samples) and bis(2-ethylhexyl)phthalate (present in only one sample). SVOC TICs were also detected in both samples. No pesticides or PCBs were detected in the subsurface soil samples. Inorganics in the subsurface samples included lead and zinc.

- Six sediment and two surface water samples were collected from the South Branch of Doughty's Mill Stream and one surface water sample was collected from an impoundment of standing water on the site. Two of the sediment samples and one surface water sample were analyzed for PP+40 while the remaining sediment and surface water samples were analyzed for VOCs only. Methylene chloride was detected in each of the sediment samples although it was also present in the blank samples. Toluene was detected in two sediment

samples and VOC TICs were present in four samples. SVOC TICs, lead and zinc were detected in the two sediment samples analyzed for PP+40. In the surface water, methylene chloride was detected in one sample although it was also present in the blank samples. Acetone was detected as a VOC TIC in each of the surface water samples and associated blank samples. Copper and zinc were the only other analytes detected, present in the single surface water sample analyzed for PP+40.

- Three shallow monitoring wells were installed and sampled, with the samples analyzed for PP+40. VOC TICs, bis(2-ethylhexyl)phthalate, di-n-butylphthalate, phenol, pyrene and lead were each detected in one well and zinc was detected in a second well.

- The Area S test pits, monitoring well borings and ground water data provide geologic and hydrogeologic information on the area. To a depth of 27 feet (the depth of the deepest recovered samples during the Supplemental Investigations), the Area S subsurface soils are characterized as predominantly light brown fine- to medium-grained sand, often grading to medium to coarse sand with a trace of gravel. The water table was encountered at depths of 4 to 13 feet below grade during the Supplemental Investigations. Ground water flow is south to southeast, as indicated in Figure 12.

Additional Investigations - Due to EPA's disqualification of previously collected sampling data, the EPA required resampling at Area S to determine if VOCs were present in the surface and subsurface soils, sediment, and shallow ground water. The resampling effort conducted in 1992 included the collection of four surface soil samples, three subsurface soil samples, three sediment samples, and three shallow ground water samples for VOC analysis. Due to the fact that there was no ponded or running water in the South Branch at the time of sampling, surface water was not resampled. Toluene was detected in three of the four surface soil samples, with VOC TICs detected in two of the samples. No priority pollutant VOCs were detected in the subsurface soil samples, although VOC TICs were detected in one sample. Trichlorofluoromethane was detected in one sediment sample. Methylene chloride was present in two sediment samples but was also detected in the associated blank sample. No VOCs were detected in the ground water samples.

An additional investigation was subsequently conducted in May 1995 due to EPA concern that the three existing monitoring wells at Area S did not provide sufficient coverage to determine whether ground water contamination was emanating from the site. The investigation consisted of the installation of three additional monitoring wells and sampling of all Area S wells. The ground water samples from the three new wells were analyzed for PP+40, with the VOC fraction analyzed using a method which provides low detection limits. Samples collected from the three existing wells were analyzed for VOCs only using the low detection limit methodology. Chloroform was detected in three of the wells and butylbenzylphthalate was detected in one well. SVOC TICs were identified in each of the new wells. Chromium, lead, nickel, copper, and zinc were detected in each of the ground water samples although the zinc results were rejected due to the presence of zinc in the field blank.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

A newspaper notification of the availability of the Proposed Plan for Areas 27, 56, F, R and S was published in the Atlantic City Press on February 11, 1999. The notice invited the public to comment on the EI/FS and Proposed Plan. The public comment period was held from February 11, 1999 through March 15, 1999. The Proposed Plan and EI/FS Reports were placed in the administrative record maintained at the Atlantic County Library.

A public meeting was held on March 4, 1999 at the Atlantic County Library. At the meeting, representatives from the FAA, FAA's environmental consultant (TRC Environmental Corporation), EPA, and NJDEP were available to answer questions about Areas 27, 56, F, R and S. The attendance list from the meeting is attached (see Appendix B). No comments on the Proposed Plan were received during the public comment period, as noted in the Responsiveness Summary which follows this Decision Summary.

This decision document presents the selected institutional control alternative for Areas 27, 56, F, R and S of the FAA Technical Center in Atlantic County, New Jersey, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the NCP. The decision for Areas 27, 56, F, R and S is based on the administrative record.

IV. SCOPE AND ROLE OF RESPONSE ACTION

Based on a comparison of the constituents detected at Areas 27, 56, F, R and S to relevant regulatory or background levels, no principal threats to human health under continued employee use scenarios or to the environment have been identified at Areas 27, 56, F, R and S, thereby providing the basis for the "institutional control" decision. It should be noted that Areas 27, 56, F, R and S represent only five of more than 20 areas of potential environmental concern identified at the FAA Technical Center. This document addresses only Areas 27, 56, F, R and S, and is not intended to address the entire FAA property. The other areas of concern at the FAA Technical Center will be subject to separate response action decisions.

V. SUMMARY OF SITE CHARACTERISTICS

For each environmental medium (e.g., soil, ground water, etc.) sampled at Areas 27, 56, F, R and S, detected concentrations of contaminants are summarized below. Original data summary tables are included in Appendix D.

A. Area 27

Soil

During the EI activities at Area 27, a total of 41 surface and subsurface soil samples were collected for chemical analysis. In the six surface soil samples analyzed for PP+40, methylene chloride, toluene and 1,1,2,2-tetrachloroethene were the only priority pollutant VOCs detected. Two of the surface soil samples exhibited 1,1,2,2-tetrachloroethene at concentrations of 0.0059 ppm and

0.011 ppm, respectively. Toluene was detected in one surface soil sample at a concentration of 0.0073 ppm. Methylene chloride was present in four samples at concentrations ranging from 0.005 to 0.021 ppm, but it was also found in the field blank sample. VOC TICs were detected in three surface soil samples at total concentrations ranging from 0.012 to 0.16 ppm. The VOC TICs consisted of acetone, an unsaturated hydrocarbon, terpene and an unknown compound. In the eight subsurface soil samples analyzed for VOCs, methylene chloride was the only priority pollutant VOC detected. Methylene chloride was detected in five of the eight samples at concentrations ranging from 0.006 to 0.019 ppm, but it was also detected in the trip blank sample. Only one subsurface sample exhibited VOC TICs (at 0.008 ppm). The VOC TICs consisted entirely of acetone; however, acetone was also detected in the associated field blank samples.

Fourteen surface and subsurface soil samples were analyzed for SVOCs. No priority pollutant SVOCs were detected in the surface or subsurface soil samples. SVOC TICs were detected in four of the surface soil samples, at concentrations ranging from 2 to 731 ppm. The SVOC TICs consisted mainly of octane, decane, nonene, dimethylnaphthalene, unknown cyclohexanes, unknown cycloalkanes, and unknown alkanes. SVOC TICs were present in each of the subsurface soil samples at concentrations ranging from 1.6 to 87 ppm. The SVOC TICs consisted mainly of dioctylphthalate ester, dimethyl heptane, trichloro-2-methyl-2-propanol, 2,4-dimethyl-3-heptanone, dioctyl phthalate, unknown hydrocarbons, and other unknowns.

Ten surface and subsurface soil samples were analyzed for pesticides and/or PCBs. The pesticides 4,4-DDE and 4,4-DDT were detected in one of six surface soil samples at concentrations of 0.059 ppm and 0.15 ppm, respectively. Pesticides were not detected in the four subsurface soil samples and PCBs were not detected in the surface or subsurface soil samples.

Ten surface and subsurface soil samples were analyzed for inorganics. The inorganics detected in the six surface soil samples included arsenic (2.2 ppm), cadmium (1.1 to 2.4 ppm), chromium (3.9 to 16 ppm), copper (5.5 to 9.7 ppm), lead (3.9 to 9.9 ppm), and zinc (6.9 to 12.6 ppm). Inorganics detected in the four subsurface soil samples included chromium (2.6 to 6.9 ppm), copper (6.9 to 8.7 ppm), lead (2.5 to 4 ppm), and zinc (7.5 to 19.4 ppm).

Twelve surface soil and twelve subsurface soil samples were analyzed for TPH. Six surface soil samples collected around the lined test area exhibited TPH concentrations ranging from 4 to 23 ppm, whereas a surface soil sample collected at the soil gas anomaly location at the northern end of the drainage swale exhibited 283 ppm of TPH and a soil sample collected in a storm sewer catch basin exhibited a TPH concentration of 16,000 ppm. After removal of this residual contaminated sediment from the catch basin and other residual surface soil contamination from the drainage swale, four additional surface soil samples were collected from the drainage swale for TPH analysis, with the samples exhibiting TPH values ranging from 11 to 30 ppm. The twelve subsurface soil samples collected adjacent to the drainage pipe beneath the road exhibited TPH at levels ranging from 9.2 to 1,500 ppm, with the highest levels detected nearest the pipe.

Ground Water

A total of eight ground water samples were collected from six monitoring wells at Area 27 during the site investigations. Six of the samples were analyzed for VOCs. Methylene chloride and

chloroform were the only priority pollutant VOCs detected in the ground water samples. Methylene chloride was detected in two samples at levels of 8 parts per billion (ppb) and 9 ppb but was also detected in the field and trip blanks. Chloroform was detected in one sample at a concentration of 6 ppb. Acetone, a VOC TIC, was also detected in one sample at a concentration of 91 ppb.

No priority pollutant SVOCs were detected in the ground water samples, although SVOC TICs were present in four of the wells, with total concentrations ranging from 6 to 165 ppb. The SVOC TICs consisted of benzenecarboxcylic acid, unknown hydrocarbons and other unknowns. SVOC TICs were also present in the field blank and trip blank samples.

During the Phase I EI, the PCB Aroclor 1242 was detected in one ground water sample at a concentration of 0.83 ppb. Two additional ground water samples were collected from the subject well during the Phase II investigations, with no PCBs detected.

Inorganics detected in the ground water samples include beryllium (8.2 ppb), chromium (13.3 ppb), mercury (0.54 ppb), lead (7.4 to 11.7 ppb), and zinc (28.8 to 261 ppb). Phenol was also detected in one sample, at a concentration of 15.5 ppb.

Sediment

Three sediment samples (two samples and a duplicate) were collected from the drainage swale north of Card Road and analyzed for TPH. The samples exhibited TPH levels ranging from 89 to 350 ppm. These sediments were removed during a subsequent removal action in October 1989. The analytical results for soil verification samples collected after sediment removal are included in the soil description above.

Surface Water

Three surface water samples (two samples and a duplicate) were collected from the drainage swale north of Card Road and analyzed for VOCs. No VOCs were detected in the surface water samples.

B. <u>Area 56</u>

Soil

During the EI activities at Area 56, a total of 15 surface and subsurface soil samples were collected for chemical analysis. In the four surface soil samples analyzed for VOCs, methylene chloride was detected in one sample at a level of 0.006 ppm. However, methylene chloride was also detected in the field blank sample. In the eight subsurface soil samples analyzed for VOCs, methylene chloride was again the only priority pollutant VOC detected. Methylene chloride was detected in five samples at concentrations ranging from 0.01 to 0.021 ppm, but it was also present in the associated soil field and trip blank samples. During the Phase I EI, three of the five subsurface soil samples analyzed for VOCs exhibited VOC TICs, along with the associated field and trip blank samples. The TICs included acetone, carbon disulfide, 1,1,2-trichloro-1,2,2-trifluoroethane and an unknown

hydrocarbon. During the additional investigations, one of three subsurface soil samples exhibited a VOC TIC, acetone at a concentration of 0.071 ppm.

Ten surface and subsurface soil samples were analyzed for SVOCs. No priority pollutant SVOCs were detected in the two surface soil samples analyzed for SVOCs, while SVOC TICs were detected at concentrations of 6.2 ppm and 210 ppm. The SVOC TICs consisted mainly of unknown hydrocarbons, unknown organics, and an unknown organic acid. Bis(2-ethylhexyl)phthalate was detected in two subsurface soil samples from a single soil boring location at concentrations of 4.2 ppm and 7.5 ppm. The SVOC TIC concentrations in the eight subsurface soil samples ranged from non-detectable to 77.9 ppm. The SVOC TICs consisted mainly of an unknown hexanedioic acid, unknown benzebicarboxylic acid, dimethyl heptanes, 2,4-dimethyl-3-heptanone, dioctyl phthalate and other unknown organics.

Six surface and subsurface soil samples were analyzed for pesticides and/or PCBs. No pesticides or PCBs were present in the samples.

Six surface and subsurface soil samples were analyzed for inorganics. Inorganics detected in the two surface soil samples included chromium (5.1 ppm and 8 ppm), lead (6.2 ppm in both) and zinc (9.9 ppm and 10 ppm). Inorganics detected in the subsurface samples also included chromium (3.1 to 4.6 ppm), lead (1.2 to 49.3 ppm), and zinc (5 to 23.3 ppm).

Ground Water

A total of twenty ground water samples were collected from the five shallow and two intermediate monitoring wells during site investigations at Area 56. During the Phase I EI, 1,1-dichloroethane and 1,1,1-trichloroethane were detected in intermediate well 56-MW4D at concentrations of 29 ppb and 27 ppb, respectively. During the additional investigations, chlorobenzene and 1,4-dichlorobenzene were detected for the first time in one shallow monitoring well at concentrations of 6 ppb and 4 ppb, respectively, and 1,1-dichloroethane, 1,1-dichloroethene, and 1,1,1-trichloroethane were detected in intermediate well 56-MW4D at concentrations of 19 ppb, 4 ppb, and 28 ppb, respectively. VOCs have also consistently been detected in this intermediate monitoring well during the quarterly sampling.

Two SVOCs, fluoranthene and bis(2-ethylhexyl)phthalate, were detected in the ground water samples. Fluoranthene was detected in a single shallow monitoring well at a level of 11 ppb. Bis(2-ethylhexyl)phthalate was detected in four shallow and one intermediate monitoring wells at concentrations ranging from 11 to 18 ppb, but it was also present in the associated field blank sample. SVOC TICs were detected in four ground water samples at levels ranging from 24 to 148 ppb and were identified as unknown alkanes, unknown decane or other unknown organics.

No pesticides or PCBs were detected in the Area 56 ground water samples.

Inorganics detected in the shallow monitoring wells include beryllium at 4 to 8 ppb, cadmium at 40 ppb, chromium at 237 to 281 ppb, copper at 32.3 to 216 ppb, cyanide at 17.6 ppb, mercury at 0.23 to 3.1 ppb, nickel at 117 to 306 ppb, lead at 5.1 to 204 ppb, selenium at 5.8 to 6 ppb, and zinc at 23 to 415 ppb. Intermediate monitoring wells exhibited chromium at 12 to 21 ppb, mercury at 0.65

ppb, lead at 18.2 to 37.2 ppb, and zinc at 30 to 40 ppb. The filtered ground water sample collected from a shallow well during the Phase II EI exhibited only nickel (at 183 ppb) and zinc (at 79.7 ppb). During the quarterly sampling, inorganic concentrations have generally decreased within the shallow monitoring well.

Of the five ground water samples analyzed for ground water quality parameters representative of landfill characteristics, chemical oxygen demand (COD) ranged from 11.2 to 13.2 ppm, ammonia as nitrate was measured in one sample at 0.47 ppm, nitrate as nitrogen ranged from 0.27 to 4.6 ppm, total organic nitrogen was measured in one sample at 0.13 ppm, total organic carbon (TOC) ranged from 1.3 to 2.4 ppm and total suspended solids (TSS) ranged from 11 to 248 ppm.

C. Area F

Soil

During the EI activities at Area F, a total of 26 surface soil samples and 31 subsurface soil samples were collected for chemical analysis. Four surface soil samples and two subsurface soil samples were analyzed for priority pollutant VOCs. Methylene chloride was the only priority pollutant VOC detected in the surface soil samples, present at levels ranging from 0.0066 to 0.011 ppm. Acetone, a VOC TIC, was also detected at a level of 0.012 ppm in one surface soil sample. The two subsurface soil samples also exhibited methylene chloride at levels of 1.3 ppm in each sample; however, methylene chloride was also present in the field blank at a concentration of 0.810 ppm. The subsurface soil samples also exhibited ethylbenzene at concentrations of 1 ppm and 1.4 ppm and VOC TICs at concentrations of 39.8 ppm and 61.3 ppm. The VOC TICs consisted of 4-methyl-2-pentanone, 2-hexanone, unknown hydrocarbons, xylenes, an unknown cyclic compound, and other unknowns.

Four surface soil samples were analyzed for SVOCs. Bis(2-ethylhexyl)phthalate was detected in three of the four samples at estimated concentrations ranging from 0.12 to 0.21 ppm while di-n-butylphthalate was present in only one sample at an estimated concentration of 0.041 ppm. SVOC TICs were detected at concentrations ranging from 1.9 to 8.1 ppm. The SVOC TICs consisted of unknown compounds. One of the two subsurface soil samples analyzed for SVOCs exhibited naphthalene at a concentration of 0.54 ppm, while both samples exhibited SVOC TICs at concentrations of 64.4 ppm and 246 ppm, consisting of unknown hydrocarbons and other unknowns.

No pesticides or PCBs were detected in the four surface soil samples analyzed for PP+40. One of the two subsurface soil samples analyzed for pesticides/PCBs exhibited the PCB Aroclor 1242 at a level of 0.33 ppm.

Inorganics detected in the one discrete surface soil sample analyzed for PP+40 included cadmium at 1.7 ppm, chromium at 11.1 ppm, cyanide at 1.3 ppm, lead at 10.7 ppm, nickel at 10.7 ppm and zinc at 19.1 ppm. Composite samples collected over both the 0- to 2-foot interval and the 4- to 6-foot interval exhibited arsenic at levels ranging from 0.5 to 1.1 ppm, cadmium at 0.8 to 4.9 ppm, chromium at 3.3 to 19.0 ppm, copper at 1.4 to 3.8 ppm, cyanide at 0.39 to 0.56 ppm, lead at 2.4 to 6.0 ppm, mercury at 0.3 ppm, nickel at 6.7 to 8.8 ppm, and zinc at 2.3 to 7.5 ppm. Cadmium was not detected in the 32 surface soil and near-surface (4 to 6 feet in depth) samples analyzed for

cadmium only. In the two soil boring samples, chromium was present at 5.5 to 5.8 ppm, lead was present at 5.2 to 6.3 ppm, and zinc was present at 6.1 and 7.9 ppm.

Nine surface and thirteen subsurface soil samples were analyzed for TPH. Detected levels of TPH in the surface soil samples ranged from 1 to 2 ppm while detected levels of TPH in the subsurface soil samples ranged from 1 to 2,920 ppm.

Ground Water

A total of ten ground water samples were collected from the Area F shallow monitoring wells. Nine of the samples were analyzed for VOCs. Benzene, ethylbenzene and carbon disulfide were the only priority pollutant VOCs detected, each present in one sample at concentrations of 2 ppb, 1 ppb, and 0.4 ppb, respectively. VOC TICs were detected at levels ranging from 6 to 1,009 ppb during the Phase I EI. These VOC TICs consisted of xylenes, cycloalkanes, alkenes, paraffins, mixed hydrocarbons, acetone, olefins and other unknowns. Acetone, a VOC TIC, was detected at a level of 3,400 ppb in the single ground water sample analyzed for VOCs during the Phase II investigations; however VOC TICs were also detected in the associated field blank sample.

Bis(2-ethylhexyl)phthalate and di-n-butylphthalate were the only priority pollutant SVOCs detected in the ground water, present at levels ranging from 10 to 57 ppb and at a level of 0.6 ppb, respectively. SVOC TICs were also detected at levels ranging from 399 to 4,719 ppb, and consisted of decane, nonene, benzene carboxylic acid, trimethyl benzene, unknown hydrocarbons, phthalate, unknown alkanes, unknown octane and other unknowns.

No pesticides or PCBs were detected in the ground water samples.

Inorganics detected in the ground water samples subject to unfiltered inorganic analysis included arsenic (1.8 to 2.5 ppb), beryllium (0.38 to 0.40 ppb), cadmium (16 to 20 ppb), chromium (13.5 to 159 ppb), copper (6.1 to 81 ppb), mercury (0.26 to 1.9 ppb), lead (3.5 to 67.4 ppb), nickel (8.3 ppb), selenium (1.5 to 5.1 ppb) and zinc (2 to 199 ppb). However, the Phase II EI filtered analysis of a ground water sample identified the presence of zinc alone at a concentration of 35.5 ppb.

D. Area R

Soil

During the EI activities at Area R, a total of 11 surface soil samples and 12 subsurface soil samples were collected for chemical analysis. All of these samples were analyzed for priority pollutant VOCs. Priority pollutant VOCs were not detected in the surface or subsurface soil samples, although VOC TICs were detected in one surface soil sample at a concentration of 0.020 ppm and in four subsurface soil samples at concentrations ranging from 0.091 to 0.29 ppm. The VOC TICs in the surface soil consisted entirely of terpene while the VOC TICs in the subsurface soil samples consisted of acetone. VOC TICs were also detected in the trip blanks and field blanks associated with the subsurface soil samples.

Eleven surface soil samples and eight subsurface soil samples were analyzed for SVOCs. The SVOCs detected in the surface soil samples and their detected levels are presented in Table 1. In the eight subsurface soil samples analyzed for SVOCs, bis(2-ethylhexyl)phthalate and benzo(b)fluoranthene were the only priority pollutants detected. Bis(2-ethylhexyl)phthalate was detected in three samples at concentrations ranging from 0.47 to 1.1 ppm and benzo(b)fluoranthene was detected in one sample at a concentration of 0.49 ppm. SVOC TICs were also detected in the subsurface soil samples at concentrations ranging from 0.1 to 4.4 ppm.

Eleven surface soil samples and seven subsurface soil samples were analyzed for pesticides and PCBs. Two pesticides, 4,4-DDE and 4,4-DDT, were detected in the surface soil samples at concentrations ranging from 0.0030 to 0.0039 ppm and from 0.0029 to 0.0038 ppm, respectively. The PCB Aroclor 1242 was detected in three surface soil samples at concentrations ranging from 0.042 to 0.440 ppm, while Aroclor 1254 was detected in only one surface soil sample at a concentration of 0.047 ppm. Neither pesticides nor PCBs were detected in the seven subsurface soil samples which were analyzed for pesticides/PCBs.

Inorganics detected in the eleven surface soil samples included arsenic at 1.0 ppm, beryllium at 0.15 to 0.43 ppm, cadmium at 0.42 to 0.83 ppm, chromium at 4.5 to 14.2 ppm, copper at 2.7 to 43.4 ppm, cyanide at 0.61 to 2.2 ppm, lead at 2.3 to 16.3 ppm, mercury at 0.07 to 0.15 ppm, nickel at 2.0 to 5.5 ppm, silver at 0.65 to 2.4 ppm and zinc at 2.8 to 57.7 ppm. The seven subsurface soil samples analyzed for inorganics exhibited beryllium at 1.3 ppm, chromium at 2.7 to 7.3 ppm, copper at 5.7 to 7.3 ppm, nickel at 8.1 to 12.9 ppm, lead at 1.1 to 2.5 ppm, and zinc at 4.3 to 41.8 ppm.

Ground Water

A total of thirteen ground water samples were collected from the Area R shallow monitoring wells during the EI. All thirteen samples were analyzed for VOCs. Priority pollutant VOCs which were detected in the ground water samples include the following:

Constituent	Range in Concentration (ppb)
Ethylbenzene	9 to 14
Chlorobenzene	1 to 42
1,2-Dichlorobenzene	2
1,4-Dichlorobenzene	3 to 13
Methylene Chloride[1]	5
Chloroform[1]	9
Benzene	1
Vinyl Chloride	1

[1] Also detected in blank samples

TABLE 1

SUMMARY OF SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN AREA R SURFACE SOIL SAMPLES

Constituent	Range in Concentration (ppm)
Phenol	0.019 - 0.22
Naphthalene	0.21
Acenaphthene	0.024 - 1.6
Fluorene	0.022 - 1.9
Phenanthrene	0.037 - 21
Anthracene	0.022 - 6.0
Fluoranthene	0.17 - 56.0
Pyrene	0.15 - 49.0
Benzo(a)anthracene	0.082 - 32.0
Chrysene	0.12 - 32.0
Benzo(b)fluoranthene	0.15 - 33.0
Benzo(k)fluoranthene	0.12 - 30.0
Benzo(a)pyrene	0.100 - 32.0
Indeno(1,2,3-cd)pyrene	0.061 - 22.0
Dibenzo(a,h)anthracene	0.029 - 9.5
Benzo(g,h,i)perylene	0.068 - 23.0
Tentatively Identified Compounds (TICs)	1.48 - 219

VOC TICs were also detected in ground water samples at levels ranging from 13 to 95 ppb during the Phase II EI and consisted of acetone. Acetone was also present in the associated field and trip blank samples.

Seven ground water samples were analyzed for SVOCs, pesticides/PCBs and inorganics. Acenaphthene, bis(2-ethylhexyl)phthalate and naphthalene were the only priority pollutant SVOCs detected in the ground water, each present in one well at levels of 1 ppb, 11 ppb, and 8 ppb, respectively. No SVOC TICs or PCBs were detected in Area R ground water samples. 4,4-DDD was present in once sample at a concentration of 0.030 ppb and 4,4-DDT was present in two samples at concentrations of 0.02 ppb and 0.04 ppb. Inorganics detected in the ground water samples included chromium at 15.9 to 31.2 ppb, copper at 35.4 to 35.6 ppb, nickel at 47.8 to 112 ppb, lead at 10.4 ppb, and zinc at 31.3 to 204 ppb.

E. Area S

Soil

During the EI activities at Area S, a total of ten surface and near-surface soil samples and five subsurface soil samples were collected for chemical analysis. All of these samples were analyzed for priority pollutant VOCs. Surface soil samples and test pit samples collected at depths ranging from the surface to 4 feet deep exhibited methylene chloride at concentrations ranging from 0.016 to 0.027 ppm; however, methylene chloride was also detected in the associated blank samples at concentrations of 0.007 and 0.008 ppm. Toluene was also detected in six of the samples at concentrations ranging from 0.001 to 0.005 ppm. Tetrachloroethene was present in four samples at concentrations ranging from 0.002 to 0.005 ppm, while chloroform was present in one sample at a concentration of 0.001 ppm. VOC TICs were detected in surface/near-surface soil samples at concentrations ranging from 0.007 to 0.232 ppm. The VOC TICs included an unknown octadienol, acetone, terpene and other unknowns. In subsurface soil samples, methylene chloride was detected in two samples at concentrations of 0.017 and 0.020 ppm; however, it was also present in the associated blank samples at concentrations of 0.005 and 0.007 ppm. VOC TICs were detected in three subsurface soil samples at concentrations ranging from 0.05 ppm to 0.46 ppm. The VOC TICs in the subsurface soil samples consisted of alkane, vinyl acetate, acetone and terpene.

Six surface/near-surface soil samples and two subsurface soil samples were analyzed for SVOCs, PCBs/pesticides and inorganics. SVOCs detected in the surface/near-surface soil samples, are summarized in Table 2. SVOC TICS were detected in each of the six surface/near-surface soil samples at concentrations ranging from 3.1 ppm to 31.4 ppm. The SVOC TICs included alkanes, alkenes, unidentified hydrocarbons, adipate and aldol condensate. In the two subsurface soil samples, di-n-butylphthalate and bis(2-ethylhexyl)phthalate were the only SVOCs detected at concentrations of 3.1 to 3.9 ppm and 0.39 ppm, respectively. SVOC TICs, consisting of aldol condensate and other unknowns, were detected in each of the subsurface soil samples at total concentrations of 4.3 ppm and 5.1 ppm.

No pesticides or PCBs were detected in the six surface/near-surface and two subsurface soil samples. Inorganics detected in the surface/near-surface soil samples included chromium at 2.9 to

TABLE 2

SUMMARY OF SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN AREA S SURFACE AND NEAR-SURFACE SOIL SAMPLES

Constituent	Range in Concentration (ppm)
Phenol	0.295 - 0.415
Naphthalene	0.12
Fluoranthene	0.047 - 0.42
Phenanthrene	0.4
Pyrene	0.56
Benzo(a)anthracene	0.26
Chrysene	0.38
Bis(2-ethylhexyl)phthalate	0.11 - 2.4
Benzo(b)fluoranthene	0.29
Benzo(k)fluoranthene	0.26
Benzo(a)pyrene	0.29
Di-n-butylphthalate	0.067

4.7 ppm, copper at 8.4 to 8.8 ppm, mercury at 0.22 ppm, lead at 4.0 to 19 ppm, and zinc at 8.2 to 27.1 ppm. Subsurface soil samples exhibited lead at 0.96 to 2.7 ppm and zinc at 25.5 ppm.

Ground Water

A total of twelve ground water samples were collected from the Area S shallow monitoring wells during the EI. All twelve samples were analyzed for VOCs. Chloroform was the only priority pollutant VOC which was detected in the ground water samples, present in four samples at concentrations ranging from 0.1 to 4.0 ppb. VOC TICs were also detected in one ground water sample at a level of 26 ppb and consisted of unknowns.

Six ground water samples were analyzed for SVOCs, pesticides/PCBs and inorganics. The only priority pollutant SVOCs detected in the ground water include butylbenzylphthalate, present in one well at a level of 1 ppb, and bis(2-ethylhexyl)phthalate, di-n-butylphthalate, phenol and pyrene, each present in a second well at concentrations of 2,600 ppb, 2 ppb, 9.55 ppb, and 2 ppb, respectively. SVOC TICs were detected in four ground water samples at concentrations ranging from 5 to 173 ppb. The SVOC TICs consisted of alkanes and other unknowns. No pesticides or PCBs were detected in Area S ground water samples. Inorganics detected in the ground water samples included chromium at 4.9 to 10.5 ppb, copper at 2.0 to 14.7 ppb, nickel at 9.0 to 13.1 ppb, lead at 2.4 to 30.4 ppb, and zinc at 23.4 to 88.4 ppb.

Sediment

A total of nine sediment samples were collected from the South Branch adjacent to Area S during the site investigations. Each of these samples was analyzed for priority pollutant VOCs. Toluene was detected in two samples at concentrations of 0.095 and 5.7 ppm. Trichlorofluoromethane was detected in one sample at a concentration of 0.005 ppm. Methylene chloride was detected in eight sediment samples at concentrations ranging from 0.023 to 0.22 ppm; however, it was also detected in the associated blank samples at concentrations ranging from 0.007 to 0.18 ppm. VOC TICs were detected in four sediment samples at concentrations ranging from 0.07 to 0.664 ppm. The VOC TICs consisted of 1,1,2-trichloro-1,2,2-trifluoroethane and unknowns.

Two sediment samples were analyzed for SVOCs, pesticides/PCBs and inorganics. No priority pollutant SVOCs were detected in the sediment samples but SVOC TICs were present at concentrations of 190 and 324 ppm. The SVOC TICs consisted of aldol condensate, alkanes, alkenes and other unknowns. No pesticides/PCBs were detected in the sediment samples. Lead and zinc were the only inorganics detected in the two samples, at concentrations ranging from 48.8 to 61.8 ppm and 26.6. to 58.1 ppm, respectively.

Surface Water

Three surface water samples were collected from the South Branch adjacent to Area S. One of the samples was analyzed for PP+40, while the remaining two samples were analyzed for VOCs only. Methylene chloride was the only priority pollutant VOC detected in the surface water samples, present in one sample at a concentration of 6 ppb. It was also detected in the associated blank samples, however, at concentrations ranging from 7 to 180 ppb. VOC TICs, all attributed to the

presence of acetone, were detected in each of the surface water samples at concentrations ranging from 6 to 13 ppb and in each of the associated blank samples at concentrations ranging from 6 to 29 ppb. No SVOCs, pesticides or PCBs were detected in the single surface water sample analyzed for full priority pollutants. Inorganics detected in this single sample include copper at 50.7 ppb and zinc at 20.2 ppb.

VI. SUMMARY OF SITE RISKS

A baseline risk assessment estimates the human health and ecological risks which could result from contamination at a site if no remedial action is taken. For Areas 27, 56, F and R, quantitative human health baseline risk assessments were conducted based upon site investigation results to estimate the potential risks associated with current and future land uses at these sites. A qualitative baseline risk assessment was conducted for Area S. Summaries of the Human Health Risk Assessment (HHRA) and Ecological Risk Assessment (ERA) methodologies are presented below, followed by site-specific risk assessment descriptions.

A. Human Health Risk Assessments

Each HHRA consisted of a four-step process to assess the potential site-related human health risks under both current and potential future exposure scenarios. The four-step process includes hazard identification, exposure assessment, toxicity assessment, and risk characterization steps, as summarized below.

The hazard identification involves the selection of the constituents of concern (COCs), the constituents detected during the investigations which have inherent toxic/carcinogenic effects that are likely to pose the greatest concern with respect to the protection of human health.

The exposure assessment identifies the potential pathways and routes for COCs to reach potential receptors, estimates the constituent concentrations at the points of exposure, and characterizes the extent of the potential exposures. Exposure assessments for areas of concern at the FAA Technical Center are predicated upon the fact that the entire FAA Technical Center is restricted by a fence and security, and only government employees have access to the facility, thereby precluding persons under the age of 18. Therefore, all risk assessments were conducted assuming continued non-residential site use in the future. Constituent release mechanisms from the environmental media, based on relevant hydrologic and hydrogeologic information (fate and transport) and other pertinent site-specific information, are also presented in the HHRA.

The toxicity assessment summarizes the types of adverse health effects associated with exposures to each COC and the relationship between magnitude of exposure (dose) and severity of toxic effect (response).

For potential carcinogens, risks are estimated as probabilities. Constituent-specific cancer potency factors (CPFs) are estimates of the constituent's carcinogenic potency based upon studies, most often in laboratory animals but occasionally in humans, which test the relationship between the magnitude of exposure and the prevalence of tumors in the exposed population. The CPFs used in

the HHRA are presented as the expected cancer risk for a chronic exposure to 1 mg/kg/day of the specific constituent (i.e., risk per unit dose or $(mg/kg/day)^{-1}$), and correspond to the largest possible linear slope (within a 95% confidence interval) of the dose-response curve.

Determining the potential for chronic non-cancer (systemic) effects was based on the use of constituent-specific reference doses (RfDs). RfDs are estimates of the daily exposure to the population that are likely to be without appreciable risk of deleterious effect. RfD values incorporate numerous safety and/or modifying factors which serve as a conservative downward adjustment of the numerical value.

The risk characterization combines the estimates of exposure with the dose-response (or toxicity) values to derive estimates of the potential cancer risks and the potential for adverse non-cancer health effects.

Excess lifetime cancer risks were determined for each COC by multiplying the COC-specific exposure dose by the COC-specific CPF, described above. The resulting cancer risk estimates are expressed in scientific notation as a probability (e.g. 1×10^{-6} for one in a million) and indicate (using this example), that an average individual is likely to have a one in a million chance of developing cancer over a 70 year lifetime. Current EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of constituents. That is, the COC-specific cancer risks are summed to estimate pathway-specific cancer risks.

Hazard indices (HIs) were also calculated for each pathway as a measure of the potential for non-carcinogenic health effects. The HI is the sum of the constituent-specific hazard quotients (HQs) which are calculated by dividing the exposure dose by the reference dose (RfD). In general, HQs are assumed additive for constituents with similar toxic endpoints.

The estimated cancer risks and non-cancer HIs were evaluated using EPA's established target risk range for Superfund cleanups (i.e, cancer risk range of 10^{-6} to 10^{-4}) and target HI value (i.e., HI less than or equal to 1). The State of New Jersey defines acceptable lifetime career risks as risks of 10^{-6} or less.

B. Ecological Risk Assessments

Ecological risk assessments either consisted of qualitative evaluations of ecological risk (e.g., for Areas 27, 56 and S) or quantitative risk assessments (e.g., for Areas F and R). For Areas F, R and S a four-step process was utilized for assessing site-related ecological risks for a reasonable maximum environmental exposure scenario.

In the first step, referred to as Problem Formulation, a qualitative evaluation of constituent presence and distribution is conducted. COCs are identified, along with receptors and habitats of interest and potential exposure pathways. Finally, endpoints are selected for further study.

In the Exposure Assessment step, a quantitative evaluation of receptor exposures and constituent uptake into the food chain is conducted. Exposure point concentrations are measured or estimated.

In the Ecological Effects Assessment step, literature reviews, field studies, and/or toxicity tests are used to link contaminant concentrations to effects on ecological receptors. The sensitive toxic effects (e.g., developmental, neurological, etc.) on mammalian and avian receptors are considered for each COC and benchmark doses are identified.

In the final Risk Characterization step, the potential for adverse effects is estimated by comparing exposure doses to benchmark doses. By dividing the exposure dose by the ecological benchmark dose for a specific COC, the ecological hazard quotient (EHQ) is calculated. An EHQ of less than 1 indicates a low potential for adverse ecological effects while an EHQ greater than 1 indicates that a potential for adverse effects exists. Other factors which can aid in the interpretation of EHQ values include, for example, spatial extent of affected media, significance of affected habitat, and corroborating field evidence. EHQ values are summed across COCs when exposure occurs within the same receptor, although the assumption of additivity may not be appropriate in situations where the type of toxic effect (e.g., target organ) differs.

Also considered in the evaluation of ecological risks were the conclusions of the U.S. Fish and Wildlife Service (USFWS) based on their Environmental Contaminants Impact Analysis and Ecological Risk Assessment for the FAA Technical Center (USFWS, 1996), a facility-wide evaluation of potential ecological risks. This study involved the quantitative evaluation of ecological risks based on soil and sediment characterizations, macroinvertebrate community assessments, sediment bioassays, and/or earthworm bioassays at certain areas of concern (AOCs) and qualitative evaluations of ecological risks at other AOCs.

Because several of the risk assessments were performed before the gathering of environmental data was complete, potential risks were also evaluated by comparing detected contaminant levels for all of the data with chemical-specific applicable or relevant and appropriate requirements (ARARs) and to-be-considered criteria (TBCs). Soil contaminant levels were compared to the most stringent of NJDEP's soil cleanup criteria, including residential soil cleanup criteria, non-residential soil cleanup criteria and impact to ground water soil cleanup criteria. Promulgated state and federal standards (i.e., federal and state Maximum Contaminant Levels (MCLs) and Ground Water Quality Standards) were used to evaluate ground water contamination. The New Jersey Ground Water Quality Standards state that for Class I-Pineland (Protection Area) ground water, as is applicable to Areas 27, 56, F, R and S, the ground water quality standard shall be the background water quality. Where a constituent standard (i.e., background) is of a lower concentration than the practical quantitation level (PQL), a discharge is not considered to contravene the standard as long as the ground water concentration is less than the PQL. Therefore, in the following discussions, contaminant levels are compared to MCLs and PQLs.

The risk assessments/risk evaluations for each of the areas of concern are discussed separately below.

C. Area 27

A quantitative baseline HHRA and a qualitative ERA were conducted based upon the results of the Phase I EI to estimate the potential risks associated with current and future land uses at Area

27. A summary of the HHRA and ERA is presented below. A more complete description can be found in the Phase I EI Report, Volume I (TRC, 1988).

Human Health Risk Assessment

Hazard Identification - The COCs which were identified for Area 27 on the basis of the Phase I EI included 4,4-DDT, which was detected in one surface soil sample, and the PCB Aroclor 1242, which was detected in a single shallow ground water sample.

Exposure Assessment - At Area 27, the current receptor population was characterized as limited to government employees. Area 27 is located within a built-up section of the R&D area of the Technical Center, and workers could be exposed to surface soils through dermal contact and/or ingestion under current site use. Future land use at Area 27 may consist of various activities including construction/excavation projects where construction workers could potentially be exposed to subsurface soils. However, based on the relatively low concentrations of constituents detected in subsurface soil samples, a quantitative assessment of risk associated with subsurface soil exposures was not conducted. While there is no potable well currently located at Area 27, a well could potentially be installed on-site in the future. Therefore, potential future exposures to ground water via ingestion were evaluated. However, based on Area 27's location relative to existing potable wells at the Technical Center and the depth at which the potable wells are screened, it is safe to assume no migration of Area 27 constituents to potable wells would occur and, therefore, no exposure risks in ground water are likely to occur.

The assumptions used in the HHRA regarding the magnitude, frequency, and duration of exposures to the COCs in surface soils and ground water are provided in Table 3. Two exposure point concentrations (EPCs) were identified for each COC; namely, the arithmetic average concentration and the maximum detected concentration. The average and maximum concentrations (and corresponding exposure assumptions) were used to characterize the "most probable case" and "realistic worst case" exposures to the identified COCs, respectively. Under each exposure "case", acute and chronic exposure doses were also estimated, corresponding to potential exposures averaged over a single day and a lifetime, respectively.

Toxicity Assessment - The dose-response values used in the HHRA include the non-cancer reference dose for PCBs (0.0003 mg/kg/day) which was obtained from the EPA's Environmental Criteria and Assessment Office (May 1985) and the carcinogenic potency factors for 4,4-DDT (0.34 $(mg/kg/day)^{-1}$) and PCBs (4.34 $(mg/kg/day)^{-1}$) which were obtained from the EPA's Health Effects Assessment (May 1986).

Risk Characterization - The results of the baseline risk assessment for Area 27 indicate that modeled exposures to surface soil do not pose an unacceptable risk to human health under federal guidelines. That is, estimated cancer risks and non-cancer HIs were below the target values (i.e., 10^{-6} to 10^{-4} and 1.0, respectively). The total carcinogenic risk associated with the current use scenario for surface soil ingestion and dermal contact was estimated to be 7×10^{-8}. The cancer risks associated with ingestion of ground water under future site use were estimated to fall within the target cancer risk range of 10^{-6} to 10^{-4} under the realistic worst case (based on the maximum detected concentrations), and to fall below this range under the most probable case (based on the average

TABLE 3
EXPOSURE ASSESSMENT INPUT PARAMETERS
USED IN THE AREA 27 AND AREA 56 HHRAS

AREA 27 - FUEL MIST TEST FACILITY
AREA 56 - ABANDONED NAVY LANDFILL
FAA TECHNICAL CENTER

Input Parameter	Most Probable Case	Realistic Worst Case
General (a)		
Exposure Point Concentration (mg/kg; mg/l): (b)	Average	Maximum
Body Weight, Adult (kg):	70	70
Current FAA Worker (Surface Soils)		
Ingestion		
Ingestion Rate (kg/d):	NA	0.0002
Oral Absorption (--):		
Area 27:		
4,4-DDT	NA	1.0
Area 56:		
Bis(2-ethylhexyl)phthalate		1.0
Chromium		0.1
Lead		0.1
Exposure Frequency (d/yr):	NA	20
Exposure Duration (yr):	NA	2
Dermal Contact		
Dermal Contact Rate (kg/d):	NA	0.01
Dermal Absorption (--):		
Area 27:		
4,4-DDT	NA	0.5
Area 56:		
Bis(2-ethylhexyl)phthalate		0.5
Chromium		0.1
Lead		0.1
Exposure Frequency (d/yr):	NA	240
Exposure Duration (yr):	NA	2
Future FAA Worker (Ground Water)		
Ingestion		
Ingestion rate (l/d):	1	2
Oral absorption (--):		
Area 27:		
PCBs	1.0	1.0
Area 56:		
Bis(2-ethylhexyl)phthalate	1.0	1.0
Cadmium	0.1	0.1
Chromium	0.1	0.1
Lead	0.1	0.1
Mercury	0.1	0.1
Exposure Frequency (d/yr):	250	250
Exposure Duration (yr):	10	20

(a) Input parameters shown describe potential chronic exposures averaged over a lifetime. Potential acute exposures were also evaluated within the HHRA, based on an exposure over a single day (i.e., without the application of the exposure frequency and exposure duration factors listed above).
(b) Chemical-specific
NA = not analyzed

concentrations). The carcinogenic risk associated with the ingestion of ground water was estimated to be 2×10^{-5} under the realistic worst case and 8×10^{-7} under the most probable case. The realistic worst case risk estimate was based on the detection of PCBs in one monitoring well at a concentration of 0.83 ppb. However, subsequent Phase II EI resampling of the monitoring well in which the PCBs were detected did not confirm the presence of PCBs in the monitoring well. Therefore, there is a degree of uncertainty associated with this risk estimate.

The estimated non-cancer HIs for exposures to surface soil and ground water were less than 1.0 under both the realistic worst case and the most probable case. The total hazard index for chronic effects associated with exposures to surface soils via ingestion and dermal contact combined was 0.0004 under the realistic worst case. A total hazard index for acute effects associated with soil exposures could not be calculated as the required toxicity value for 4,4-DDT was not available at the time the risk assessment was conducted. The total hazard indices for acute and chronic effects for exposures to ground water via ingestion were 0.002 and 0.05, respectively, under the realistic worst case and 0.0002 and 0.007, respectively, under the most probable case.

Based on the results of the risk assessment, risks to human health under continued non-residential use posed by constituents detected in the soil or ground water at Area 27 do not exceed federal guidelines but do exceed the State of New Jersey's acceptable lifetime risk definition. The detection of PCBs in a Phase I ground water sample is responsible for the exceedance of the State's acceptable carcinogenic risk standard. However, there is a degree of uncertainty associated with the calculated risks for this constituent since the presence of PCBs could not be verified through resampling.

Ecological Risk Assessment

A qualitative ecological risk assessment was conducted on the basis of the same COCs as the human health risk assessment. Due to the lack of an exposure pathway, wildlife generally is not exposed to ground water. However, small mammals and earthworms could be exposed to 4,4-DDT via soil contact. However, given the detection of 4,4-DDT in only one surface soil sample and the relatively low level detected, major toxic effects associated with the presence of 4,4-DDT in Area 27 surface soils are unlikely. Therefore, it is unlikely that Area 27 would be associated with adverse impacts to ecological receptors. Based upon the results of bioassays conducted within the Area 27 drainage swale, the U.S. Fish and Wildlife Service (USFWS) facility-wide Ecological Risk Assessment also concluded that Area 27 is not presenting unacceptable risks to ecological receptors.

Comparison to ARARs/TBCs

Because only Phase I EI data were used in the HHRA and ERA, Area 27 data were also compared to ARARs and TBCs. Area 27 soil contaminant levels were evaluated with respect to New Jersey soil cleanup criteria. At the time of sampling, New Jersey soil action levels had not been established for individual compounds, but soil action levels of 10 ppm for total VOCs, 10 ppm for total SVOCs and 100 ppm for TPH had been established. Following the completion of additional soil removal actions at Area 27, these action levels were not exceeded by the detected levels of surface soil contaminants, with the exception of TPH levels of up to 1,500 ppm which remained in soils adjacent to the drainage pipe beneath Card Road. However, the remaining TPH concentrations do

not exceed the current New Jersey residential soil cleanup criterion of 10,000 ppm for total organics or current federal or state ARARs. Therefore, the presence of TPH in the soils beneath Card Road at Area 27 evidences no significant threat to human health or the environment.

Cadmium was the only soil constituent which was detected at a level which exceeds the current New Jersey residential soil cleanup criterion. However, based on NJDEP's approval of a facility-wide Alternate Cleanup Standard of 39 ppm for cadmium, detected cadmium levels at Area 27 (which range from 1.1 to 2.4 ppm) are not indicative of adverse environmental impact. Also, cadmium was not detected in subsurface soil samples or ground water samples, further illustrating its lack of impact on environmental media at the site.

In ground water, chloroform and PCBs were the only organics detected at levels exceeding MCLs and/or PQLs. However, each constituent was detected in only one ground water sample and the presence of PCBs in the ground water was not verified by resampling of the well in which it was originally detected. Beryllium, chromium, mercury, lead and zinc were the only inorganics detected in ground water samples at levels exceeding MCLs or PQLs. Two constituents were present at levels exceeding PQLs in the Area 27 upgradient monitoring well: lead (at 10.9 ppb) and chromium (at 13.3 ppb). Zinc was also present in the upgradient well but at a level of 28.8 ppb, which was just below the PQL of 30 ppb. Beryllium, mercury and lead were each detected at a level exceeding applicable standards in a single site well (with each constituent detected in a different well). Beryllium was detected at a level of 8.2 ppb, which exceeds the MCL of 4 ppb. Mercury was detected at a level of 0.54 ppb, which slightly exceeds the MCL and PQL values of 0.5 ppb, but is within the mercury levels (0.4 to 2.9 ppb) detected in upgradient wells at the Technical Center. Lead was detected at a level of 11.7 ppb, which slightly exceeds the PQL of 10 ppb, but is within the range for upgradient wells (6.1 to 67 ppb). Zinc was present in two site wells at levels of 105 ppb and 261 ppb, each of which exceed the PQL of 30 ppb. Given the presence of chromium, lead and zinc in the background well and the infrequency of detection of the other inorganics in site wells, it is concluded that past activities at Area 27 have not impacted ground water quality and the area does not present a human health or ecological concern.

D. Area 56

A quantitative baseline HHRA and a qualitative ERA were conducted based upon the results of the Phase I EI to estimate the potential risks associated with current and future land uses for Area 56. A summary of the HHRA and ERA is presented below. A more complete description can be found in the Phase I EI Report, Volume II (TRC, 1988).

Human Health Risk Assessment

Hazard Identification - The COCs which were identified for Area 56 on the basis of the Phase I EI included bis(2-ethylhexyl)phthalate, cadmium, chromium, mercury, and lead. VOCs were not included as COCs, primarily due to their low concentrations. Bis(2-ethylhexyl)phthalate, chromium and lead were detected in both surface and subsurface soil and shallow and intermediate ground water while cadmium and mercury were detected in shallow and/or intermediate ground water only.

Exposure Assessment - At Area 56, the current receptor population was characterized as limited to government employees due to the size and security of the FAA Technical Center. A parking lot has been constructed on a portion of Area 56 and another portion of the site is periodically used for recreational activities by FAA employees. Therefore, workers could be exposed to surface soils through dermal contact and/or ingestion under current site use. Future land use at Area 56 may consist of various activities including construction/excavation projects where construction workers could potentially be exposed to subsurface soil contaminants. Similarly, while there is no potable well currently located at Area 56, a well could potentially be installed on-site in the future, resulting in exposures to shallow or intermediate ground water via ingestion. Therefore, potential future exposures to ground water via ingestion were evaluated.

The assumptions used in the HHRA regarding the magnitude, frequency, and duration of exposures to the COCs in surface soils, subsurface soils, and ground water are provided in Table 3. Two exposure point concentrations (EPCs) were identified for each COC; namely, the arithmetic average concentration and the maximum detected concentration. The average and maximum concentrations (and corresponding exposure assumptions) were used to characterize the "most probable case" and "realistic worst case" exposures to the identified COCs, respectively. Under each exposure "case", acute and chronic exposure doses were also estimated, corresponding to potential exposures averaged over a single day and a lifetime, respectively.

Toxicity Assessment - The dose-response values used in the HHRA are summarized in Table 4.

Risk Characterization - The results of the baseline risk assessment for Area 56 indicate that modeled exposures to surface soil, subsurface soil, and shallow and intermediate ground water do not pose an unacceptable risk to human health under federal or state guidelines. That is, estimated cancer risks and non-cancer HIs were below the target values (i.e., 10^{-6} to 10^{-4} and 1.0, respectively). The only carcinogenic COC detected in surface soil was chromium and chromium is not considered to be carcinogenic via the oral or dermal routes of adsorption. Therefore, no carcinogenic risks were estimated in association with exposures to surface soils. Under future site use conditions, the total carcinogenic risk associated with dermal contact with and ingestion of the subsurface soil was estimated to be 7×10^{-9} under the realistic worst case (the most probable case was not evaluated). The carcinogenic risk associated with the future ingestion of ground water was estimated to be 7×10^{-8} under the reasonable worst case and 9×10^{-9} under the most probable case.

The estimated non-cancer HIs for exposures to surface soil, subsurface soil, and shallow and intermediate ground water were less than 1.0 under both the realistic worst case and the most probable case. The total hazard indices for acute and chronic noncarcinogenic effects, respectively, under the realistic worst case were estimated to be 0.002 and 0.002 for exposures to surface soils via ingestion and dermal contact combined, 0.0005 and 0.4 for exposures to subsurface soils via ingestion and dermal contact combined, and 0.03 and 0.2 for future exposures to ground water via ingestion. Under the most probable case, total hazard indices for acute and chronic noncarcinogenic effects, respectively, were estimated to be 0.002 and 0.02 for future exposures to ground water via ingestion (the most probable case was not evaluated for soil exposures).

TABLE 4
TOXICITY VALUES USED IN THE HHRA
AREA 56 - ABANDONED NAVY LANDFILL
FAA TECHNICAL CENTER

Constituent	Non-Cancer Reference Dose (a) (mg/kg/d)	Cancer Potency Factor (b) (mg/kg/d)-1
Bis(2-ethylhexyl)phthalate	0.6	0.000684
Cadmium	0.0005	6.1
Chromium	0.0021	41
Lead	0.0044	
Mercury	0.002	--

(a) EPA, 1985. Environmental Criteria & Assessment Office
(Bis(2-ethylhexyl)phthalate, cadmium, chromium and lead - ADI's, EPA, 1985)

(b) EPA, 1986. Health Effects Assessment
(Bis(2-ethylhexyl)phthalate - Carcinogenic Assessment Group)

Based on the results of the risk assessment, under continued non-residential site use, constituents detected in the soil or ground water at Area 56 do not pose unacceptable risks under federal or state guidelines.

Ecological Risk Assessment

A qualitative ERA was conducted on the basis of the same COCs as the HHRA. Due to the lack of an exposure pathway, wildlife generally is not exposed to ground water. Potential risks to wildlife associated with the presence of chromium and lead in surface soils would not be considered to be significant, as the detected levels of these constituents were not elevated above state background levels. Similarly, the potential risk associated with exposures to bis(2-ethylhexyl)phthalate in subsurface soils is low because the compound exhibits low toxicity, is not well absorbed, and was detected only in two of eight subsurface soil samples collected at depths of 8 to 10 feet and 16 to 18 feet, respectively. Therefore, it is unlikely that Area 56 would be associated with adverse impacts to ecological receptors. Based on a review of available contaminant data and site inspections, the USFWS also concluded that no exposure concern exists for terrestrial receptors at Area 56.

Comparison to ARARs/TBCs

Because only Phase I EI data were used in the HHRA and ERA, Area 56 data were also compared to ARARs and TBCs. Area 56 soil contaminant levels were evaluated with respect to New Jersey soil cleanup criteria . No soil constituents were detected at levels which exceed New Jersey residential soil cleanup criteria. In ground water, 1,1,1-trichloroethane and, to a lesser extent, 1,1-dichloroethene have been consistently detected in an intermediate monitoring well at levels exceeding PQLs. Inorganics have consistently been detected in a shallow monitoring well at levels exceeding PQLs or MCLs. Detected concentrations have generally decreased during the quarterly ground water monitoring, with nickel, chromium, and nitrate as nitrogen consistently detected at levels exceeding PQLs and lead and zinc periodically detected at levels exceeding PQLs. While these exceedances have been identified in on-site ground water samples, no evidence of off-site migration has been detected. Table 22 in the Area 56 ground water summary tables presented in Appendix D compares historic ground water data to PQLs.

E. Area F

A quantitative baseline HHRA and a quantitative ERA were conducted based upon the results of the Phase I and Phase II EIs to estimate the potential risks associated with current and future land uses for Area F. A summary of the HHRA and ERA is presented below. A more complete description can be found in the Draft Final Risk Assessment, Area F, Air Blast Facility (TRC, 1996).

Human Health Risk Assessment

Hazard Identification - The COCs which were identified for Area F on the basis of the Phase I and Phase II EIs are listed in Table 5. For the purposes of the HHRA, only those samples collected at depths of 0 to 2 feet were considered surface soil samples. Composite samples that included soil from depths of 0 to 2 feet and 4 to 6 feet were evaluated as subsurface soil samples.

TABLE 5
CONSTITUENTS OF POTENTIAL CONCERN

AREA F - AIR BLAST FACILITY
FAA TECHNICAL CENTER

4 SURFACE SOIL	10 SUBSURFACE SOIL	12 GROUND WATER
2 INORGANICS Cadmium Chromium	1 INORGANIC Cadmium	7 INORGANICS Cadmium Chromium Copper Lead Mercury Selenium Zinc
1 VOLATILES Acetone	6 VOLATILES Acetone Ethylbenzene Hexanone,2- Methyl,2-pentanone,4- Methylene chloride Xylene	4 VOLATILES Acetone Benzene Ethylbenzene Xylene
1 SEMIVOLATILE Phenol	2 SEMIVOLATILES Bis(2-ethylhexyl)phthalate Naphthalene	1 SEMIVOLATILE Phenol
	1 PCB Aroclor 1242	

Exposure Assessment - At Area F, the current receptor population was characterized as limited to government employees. Current site use of Area F is limited to occasional visits by an FAA employee or contractor to the Building 311 complex. Access to the general area in which Area F is located is restricted because the site is located within the Airport Operations Area (AOA), an area accessible only to pre-authorized employees through a small number of mechanized security gates. At Area F, workers could be exposed to surface soils through dermal contact and/or ingestion under current site use. While no development of the site is currently planned, future land use at Area F was considered to possibly include construction/excavation projects where construction workers could potentially be exposed to subsurface soil contaminants via dermal contact and incidental ingestion. Similarly, while there is no potable well currently located at Area F, a well could potentially be installed on-site in the future, resulting in exposures ground water via ingestion and dermal contact. Therefore, potential future exposures to ground water via ingestion and dermal contact were evaluated. For each exposure scenario, the reasonable maximum exposure concentrations were evaluated.

The assumptions used in the HHRA regarding the magnitude, frequency, and duration of exposures to the COCs in surface soils, subsurface soils, and ground water are provided in Table 6.

Toxicity Assessment - The dose-response values used in the HHRA are summarized in Tables 7A through 7C.

Risk Characterization - The results of the baseline risk assessment for Area F indicate that modeled non-residential exposures to surface soil, subsurface soil, and shallow ground water do not pose an unacceptable risk to human health under federal or state guidelines. That is, estimated cancer risks and non-cancer HIs were below the target values (i.e., 10^{-6} to 10^{-4} and 1.0, respectively). Due to a lack of EPA cancer slope factors and/or EPA dermal absorption values for the surface soil COCs, cancer risks were not calculated for surface soil exposures under the current FAA worker or future commercial/industrial exposure scenarios. Under future conditions, the total carcinogenic risk associated with dermal contact with and ingestion of the subsurface soil was estimated to be 3×10^{-7}. The carcinogenic risk associated with the future ingestion of ground water was estimated to be 2×10^{-7}.

The estimated non-cancer HIs for exposures to surface soil, subsurface soil, and shallow ground water were less than 1.0 under all exposure scenarios. The total hazard indices were estimated to be 0.0002 for exposures to surface soils via ingestion and dermal contact combined, 0.009 for exposures to subsurface soils via ingestion and dermal contact combined, and 0.9 for future exposures to ground water via ingestion.

Based on the results of the risk assessment, under continued non-residential site use, constituents detected in the soil or ground water at Area F do not pose unacceptable risks under federal or state guidelines.

Ecological Risk Assessment

Problem Formulation - Problem formulation included relating the quantitative and spatial extent of constituents to key habitats to determine what receptors may be at greatest potential risk,

TABLE 6
SUMMARY OF EXPOSURE PARAMETER VALUES

AREA F - AIR BLAST FACILITY
FAA TECHNICAL CENTER

PARAMETER	VALUE USED	RATIONALE FOR VALUE USED	REFERENCE FOR VALUE USED
Global variables:			
Body Weight (kg)			
- Adult (Current FAA Worker; Future Construction Worker; Future Commercial/Industrial)	70	Value based on average of males and females between 18-75 yrs	EPA 1993a
Exposure Duration (yr)			
- Current FAA Worker	25	National upper-bound (95th percentile) at one job.	EPA 1993a
- Future Construction Worker	1	Time spent doing construction, excavation, or utility work.	BPJ
- Future Commercial/Industrial	25	National upper-bound (95th percentile) at one job.	EPA 1993a
Averaging Time (d)			
- Cancer risks	25,550	Value based upon 70 year life expectancy.	EPA 1989a
- Noncancer hazard quotients			
Current FAA Worker	9,125	Value based upon exposure duration.	
Construction	365	Value based upon exposure duration.	
Future Commercial/Industrial	9,125	Value based upon exposure duration.	
Adherence Factor for Soil (mg/cm2)	1	Reasonable upper value	EPA, 1992b
Fraction of Exposed Surface Area that contacts soil	0.5		EPA, 1989c
Relative Absorption Factors (–)			
- Ingestion of soil & ground water	1.0	(a)	BPJ
- Dermal contact with soil			
Cadmium	0.01	Fraction absorbed (b)	EPA, 1992b
PCBs	0.06	Fraction absorbed (c)	EPA, 1992b
Chemical Concentration Justification:			
Soils; Ground Water		The 95% UCL or maximum concentrations were used in estimating exposure	
Scenario 1 - Current FAA Worker			
Exposure Frequency (d/yr)	40	Based on visits to the site for 3 hours per day, 2 days per week	FAA, 1996
Ingestion of Constituents in Soils			
Ingestion Rate (mg/d)	100	Assumes non-contact intensive exposures	EPA 1993a
Dermal Contact with Chemicals in Soils			
Skin Surface Area (cm2)	2,000	Corresponds to 10% total body surface area	EPA 1992b

TABLE 6 (Continued)
SUMMARY OF EXPOSURE PARAMETER VALUES

AREA F - AIR BLAST FACILITY
FAA TECHNICAL CENTER

PARAMETER	VALUE USED	RATIONALE FOR VALUE USED	REFERENCE FOR VALUE USED
Scenario 2 - Future Construction Worker			
Exposure Frequency (d/yr)	250	Number of days spent doing construction, excavation, or utility work	BPJ
Ingestion of Chemicals in Soils			
Ingestion Rate (mg/d)	480	Based upon extensive contact with the soil.	EPA 1993a
Dermal Contact with Chemicals In Soils			
Skin Surface Area (cm2)	4800	Corresponds to 25% total body surface area	EPA 1992b
Scenario 3 - Future Commercial/Industrial			
Exposure Frequency (d/yr)	250	Based on an estimate of the number of days at work.	EPA 1993a
Ingestion of Constituents in Soils			
Ingestion Rate (mg/d)	100	Assumes non-contact intensive exposures.	EPA 1993a
Ingestion of Constituents in Water			
Ingestion Rate (l/d)	1	Assumes1/2 total intake (i.e., adult 90th percentile of 2 l/d) occurs at work	EPA 1993a
Dermal Contact with Chemicals In Soils			
Skin Surface Area (cm2)	2,000	Corresponds to 10% total body surface area	EPA 1992b

BPJ = Best professional judgment

TABLE 7A
SUMMARY OF TOXICITY VALUES ASSOCIATED WITH CARCINOGENIC EFFECTS: ORAL

AREA F - AIR BLAST FACILITY
FAA TECHICAL CENTER

Constituent	SLOPE FACTOR (SF) ORAL $(mg/kg\text{-}day)^{-1}$	WEIGHT-OF EVIDENCE CLASS	TYPE OF CANCER	SF BASIS/ SOURCE
INORGANICS				
Cadmium	NA	B1		NA/IRIS,HEAST
Chromium III	NA			NA/IRIS,HEAST
Chromium VI	NA	A		NA/IRIS,HEAST
Copper	NA	D		NA/IRIS,HEAST
Lead	NA	B2	Kidney	Oral/IRIS
Mercury	NA	D		NA/IRIS,HEAST
Selenium	NA	D		NA/IRIS,HEAST
Zinc	NA			NA/IRIS,HEAST
VOLATILES				
Acetone	NA	D		NA/IRIS,HEAST
Benzene	0.029	A	Acute Myelogenous Leukemia	Occupational/IRIS
Ethylbenzene	NA	D		NA/IRIS,HEAST
Hexanone,2-	NA			
Methyl,2-pentanone,4-	NA			
Methylene chloride	0.0075	B2	Liver	Diet/IRIS
Xylene	NA	D		NA/IRIS,HEAST
SEMIVOLATILES				
Bis(2-Ethylhexyl)phthalate	0.014	B2	Liver	Diet/IRIS
Naphthalene	NA	D		NA/IRIS,HEAST
Phenol	NA	D		NA/IRIS,HEAST
PCBs				
Aroclor-1242(a)	7.7	B2	Liver	Diet/IRIS

IRIS = U.S. EPA, 1995a, Integrated Risk Information System (IRIS) Database
HEAST = U.S. EPA, 1995b, Health Effects Assessment Summary Tables (HEAST): Annual Update
NA = Toxicity value not available

(a) Cancer slope factor for polychlorinated biphenyls (PCBs)

TABLE 7B
SUMMARY OF TOXICITY VALUES ASSOCIATED WITH NONCARCINOGENIC CHRONIC EFFECTS: ORAL

AREA F - AIR BLAST FACILITY
FAA TECHICAL CENTER

Constituent	Chronic RfD (Oral) (mg/kg-day)	Confidence Level	Critical Effect	Oral RfD Basis/Source	Uncertainty Factor	Modifying Factor
INORGANICS						
Cadmium (a)	0.001	High	Proteinuria	Diet/IRIS	10	1
Chromium III	1	Low	None observed	Diet/IRIS	100	10
Chromium VI	0.005	Low	None observed	Water/IRIS	500	1
Copper (b)	0.037		Local gastrointestinal irritation	Oral/HEAST		
Lead	NA			NA/IRIS,HEAST		
Mercury	0.0003		Kidney effects	Oral/HEAST	1000	
Selenium	0.005	High	Clinical selenosis, liver effects	Oral/IRIS	3	1
Zinc	0.3	Medium	Anemia	Diet/IRIS	3	1
VOLATILES						
Acetone	0.1	Low	Increased liver and kidney weight	Gavage/IRIS	1000	1
Benzene	NA			NA/IRIS,HEAST		
Ethylbenzene	0.1	Low	Liver and kidney toxicity	Oral/IRIS	1000	1
Hexanone,2-	NA			NA/IRIS,HEAST		
Methyl,2-pentanone,4-	0.08		Lethargy, increased body weight, increased urinary protein in females	Gavage/HEAST	3000	
Methylene chloride	0.06	Medium	Hepatoxicity	Water/IRIS	100	1
Xylene	2	Medium	Hyperactivity,decreased body weight,increased mortality	Gavage/IRIS	100	1
SEMIVOLATILES						
Bis(2-Ethylhexyl)phthalate	0.02	Medium	Increased relative liver weight	Diet/IRIS	1000	1
Naphthalene	0.04		Increased body weight gain	Gavage/HEAST92	10000	
Phenol	0.6	Low	Reduced fetal body weight	Gavage/IRIS	100	1
PCBs						
Aroclor-1242	NA			NA/IRIS,HEAST		

IRIS = U.S. EPA, 1995a, Integrated Risk Information System (IRIS) Database
HEAST = U.S. EPA, 1995b, Health Effects Assessment Summary Tables (HEAST): Annual Update
HEAST92 = U.S. EPA, 1992f, Health Effects Assessment Summary Tables (HEAST): Annual Update. Used per guidance from EPA Region II
NA = Toxicity value not available

(a) Value for food ingestion; RfD for water is 5E-04 mg/kg-day
(b) Value derived from current drinking water standard of 1.3 mg/l

TABLE 7C
SUMMARY OF TOXICITY VALUES ASSOCIATED WITH NONCARCINOGENIC SUBCHRONIC EFFECTS: ORAL

AREA F - AIR BLAST FACILITY
FAA TECHICAL CENTER

Constituent	Subchronic RfD (Oral) (mg/kg-day)	Critical Effect	Oral RfD Basis/Source	Uncertainty Factor
INORGANICS				
Cadmium (a)	0.001	Proteinuria	Diet/IRIS	10
Chromium III	1	None observed	Diet/HEAST	1000
Chromium VI	0.02	None observed	Water/HEAST	100
Copper (b)	0.037	Local gastrointestinal irritation	Oral/HEAST	
Lead	NA		NA/HEAST	
Mercury	0.0003		Kidney effects	Oral/HEAST
Selenium	0.005	Selenosis	Diet/HEAST	3
Zinc	0.3	Blood effects	Diet/HEAST	3
VOLATILES				
Acetone	1	Increased liver and kidney weights,neprotoxicity	Gavage/HEAST	100
Benzene	NA		NA/HEAST	
Ethylbenzene	0.1	Liver and kidney toxicty	Oral/HEAST	1000
Hexanone,2-	NA		NA/HEAST	
Methyl,2-pentanone,4-	0.8	Increased liver and kidney weights	Gavage/HEAST	
Methylene chloride	0.06	Liver toxicity	Water/HEAST	100
Xylene	2	Hyperactivity;decreased body weight;increased mortality	Gavage/HEAST	100
SEMIVOLATILES				
Bis(2-Ethylhexyl)phthalate	0.02	Increased relative liver weight	Diet/HEAST	1000
Naphthalene	0.04	Decreased body weight gain	Gavage/HEAST92	10000
Phenol	0.6	Reduced fetal body weight gain	Gavage/HEAST	100
PCBs				
Aroclor-1242	NA		NA/HEAST	

HEAST = U.S. EPA, 1995b, Health Effects Assessment Summary Tables (HEAST): Annual Update
HEAST92 = U.S. EPA, 1992e, Health Effects Assessment Summary Tables (HEAST): Annual Update. Used per verbal guidance from EPA Region II.
NA = Toxicity value not available

(a) Subchronic RfD not available; Value shown is the chronic RfD
(b) Value derived from current drinking water standard of 1.3 mg/l

scoping the approach for assessing these risks, and selecting COCs for detailed analysis. Surface soil was determined to be the media of greatest concern with respect to ecological effects. Subsurface soil and ground water were not considered to be potential sources of exposure to terrestrial receptors. The Area F surface soil COCs included acetone, phenol, cadmium, chromium, lead, and zinc.

The respective ecological receptors (plant or animal species or habitat) modeled as potentially being exposed to these COCs include the following:

- White-footed mouse, due to its likely presence in the grassland habitats near Area F, its ingestion of insects and vegetation, and its consumption by higher order species;
- White-tailed deer, due to its documented presence at the FAA Technical Center and herbivorous nature;
- Red fox, due to its tendency to prey on small mammals and vegetation;
- American robin, due to its identification at the facility and preference for habitat similar to that found at or near Area F and its consumption of both insects and vegetation; and
- Broad-winged hawk, due to its consumption of small mammals and young birds and its potential for experiencing biomagnification.

Exposure Assessment - The exposure assessment provides a determination of which pathways are most likely to produce significant exposures to selected indicator species and the derivation of estimates of the daily exposure dose indicator species would obtain from on-site COCs. Major exposure pathways that were evaluated for the Area F indicator species included the following:

- White-footed mouse -ingestion of vegetation, insects, and soil;
- White-tailed deer - ingestion of vegetation and soil ;
- Red fox - ingestion of white-footed mice, vegetation, and soil
- American robin - ingestion of insects, earthworms, soil and vegetation; and
- Broad-winged hawk - ingestion of white-footed mice and soil.

Stressor-Response Assessment - The stressor-response assessment requires the development of an understanding of COC potency for indicator species via a review of pertinent laboratory or field toxicity studies and the linking of COC concentrations to potential effects on ecological receptors. The sensitive toxic effects (e.g., developmental, neurological, etc.) on mammalian and avian receptors were considered for each COC and benchmark doses were identified using a two-step process. In the first step, benchmark doses were identified based on the chronic no observable adverse effect level (NOAEL) pertinent to the indicator species or, if no chronic NOAEL was available, by deriving an ecological benchmark dose from another toxicity endpoint by the application of an uncertainty factor

(ranging from 5 for a chronic LOAEL to 100 for an LD_{50}). In the second step, the chronic NOAEL value (identified or estimated) was then modified to account for uncertainties associated with phylogenetic effects.

Risk Characterization - The estimated cumulative EHQs for soil-related exposures at Area F are summarized in Table 8. As indicated, the estimated EHQs exceed 1 for all five indicator species evaluated and indicate that a potential for adverse ecological effects exists. The EHQs for the mouse (7) and deer (2) are primarily attributable to cadmium, while the EHQ for the fox (2) is primarily due to cadmium and zinc. Zinc is also the primary contributor to the EHQs for the robin (20) and hawk (20). Key uncertainties in the risk characterization included the detection of chromium, lead and zinc in surface soil at concentrations which were less than the maximum background levels reported for New Jersey soils by NJDEP and the incorporation of uncertainty factors ranging from 8 to 800 into the species-specific ecological benchmark doses for cadmium, chromium, lead and zinc.

The USFWS conducted a qualitative review of available contaminant data from Area F and conducted site inspections which indicated the presence of poor foraging habitat at Area F. Based on this evaluation, the USFWS concluded that the site does not pose much, if any, threat of exposure to fish and wildlife.

Comparison to ARARs/TBCs

Because only Phase I and Phase II EI data were used in the HHRA and ERA, Area F data were also compared to ARARs and TBCs. Area F soil contaminant levels were evaluated with respect to New Jersey soil cleanup criteria. No soil constituents were detected at Area F at levels which exceed New Jersey residential soil cleanup criteria or the facility-wide Alternate Cleanup Standard of 39 ppm for cadmium (granted by NJDEP in 1996). In ground water, benzene was detected in a single Phase I perched ground water sample at a concentration of 2 ppb, which exceeds the PQL of 1 ppb. It was not detected, however, in a duplicate sample or in a sample collected from the same well in August 1996. Inorganics have been detected in ground water at levels exceeding PQLs or MCLs but they have not been consistently detected in each sampling round. Of the inorganics detected in the Phase I ground water sampling effort at levels exceeding PQLs, lead and chromium were the only ones detected in subsequent sampling efforts at levels exceeding PQLs. Lead was detected in two Phase II samples at levels of 25.2 ppb and 25.8 ppb, which exceed the PQL of 10 ppb but are within the range of lead levels (i.e., 6.1 to 67 ppb) detected in upgradient wells at the Technical Center. Lead did not exceed PQLs in the August 1996 sampling effort. Chromium was detected in two August 1996 perched ground water samples at 19 ppb and 13.5 ppb, which exceed the PQL of 10 ppb but are less than the average FAA background concentration of 21 ppb.

F. Area R

A quantitative baseline HHRA and a quantitative ERA were conducted based upon the results of all environmental data collected during the Area R site investigations to estimate the potential risks associated with current and future land uses. A summary of the HHRA and ERA is presented below. A more complete description can be found in the Draft Final Risk Assessment, Area R, Trash Dump (TRC, 1995).

TABLE 8
SUMMARY OF ECOLOGICAL HAZARD QUOTIENTS

AREA F - AIR BLAST FACILITY
FAA TECHNICAL CENTER

Constituent	Mouse	Deer	Fox	Robin	Hawk
INORGANICS					
Cadmium	**6**	1	0.6	**2**	0.03
Chromium	0.2	0.04	0.1	**2**	0.2
Lead	0.1	0.02	0.01	**4**	0.1
Zinc	0.2	0.05	1	**10**	**20**
VOLATILES					
Acetone	0.07	0.02	0.004	0.03	0.000002
SEMIVOLATILES					
Phenol	0.01	0.004	0.0008	NA	NA
TOTAL	**7**	**2**	**2**	**20**	**20**

shaded text = EHQ >1

Human Health Risk Assessment

Hazard Identification - The COCs which were identified for Area R on the basis of the site investigations and quarterly monitoring data are listed in Table 9. No subsurface soil COCs were identified, as no constituents were detected in the two subsurface soil samples collected from 1 to 10 feet below grade (considered a reasonable maximum depth of excavation for construction projects).

Exposure Assessment - At Area R, the current receptor population was characterized as limited to government employees. Current site use of Area R is limited to occasional visits by an FAA employee. Access to the general area in which Area R is located is via a locked gate off of English Creek Road. No signs of trespassing are evident at the site. At Area R, workers could be exposed to surface soils through dermal contact and/or ingestion under current site use. While no development of the site is currently planned, future land use at Area R was considered to possibly include construction/excavation projects where construction workers could potentially be exposed to subsurface soil contaminants via dermal contact and incidental ingestion. However, as described in the previous paragraph, no subsurface soil COCs were identified and, therefore, a quantitative assessment of risk associated with subsurface soil exposures was not conducted. While there is no potable well currently located at Area R, a well could potentially be installed on-site in the future, resulting in exposures ground water via ingestion and dermal contact. Therefore, based on potential future development of the site, future exposures to surface soils and ground water via dermal contact and/or ingestion were evaluated. For each exposure scenario, the reasonable maximum exposure concentrations were evaluated.

The assumptions used in the HHRA regarding the magnitude, frequency, and duration of exposures to the COCs in surface soils and ground water are provided in Table 10.

Toxicity Assessment - The dose-response values used in the HHRA are summarized in Tables 11A through 11C.

Risk Characterization - The results of the baseline risk assessment for Area R indicate that modeled non-residential exposures to surface soil and shallow ground water do not pose an unacceptable risk to human health under federal guidelines. That is, estimated cancer risks and non-cancer HIs were within or below the target values (i.e., 10^{-6} to 10^{-4} and 1.0, respectively). Under current site use conditions, the total carcinogenic risk associated with dermal contact with and ingestion of surface soils is 6×10^{-6}. Under a future commercial/industrial use scenario, the total carcinogenic risk associated with dermal contact with and ingestion of surface soils and ingestion of ground water is estimated to be 2×10^{-4}, which is near the upper end of EPA's acceptable cancer risk range. Of this total, the carcinogenic risk associated with incidental ingestion of surface soil was 1×10^{-4} and the carcinogenic risk associated with ingestion of ground water was 2×10^{-5}. Polynuclear aromatic hydrocarbons (PAHs) in the surface soils and vinyl chloride in the ground water were the main contributors to these risk estimates. The key uncertainties associated with these risk estimates include the use of maximum PAH concentrations in soil to estimate exposure, the presence of asphalt fragments over the surface of the site (which may have contributed to the detection of PAHs in the surface soil samples), and the detection of vinyl chloride in ground water at or below the MCL (0.002 mg/l) in 3 of 4 detections (33 samples total).

TABLE 9
CONSTITUENTS OF POTENTIAL CONCERN

AREA R - TRASH DUMP
FAA TECHNICAL CENTER

30 SURFACE SOIL	0 SUBSURFACE SOIL	22 GROUND WATER
10 INORGANICS		5 INORGANICS
Arsenic		Chromium
Beryllium		Copper
Chromium		Lead
Copper		Nickel
Cyanide		Zinc
Lead		
Mercury		12 VOLATILES
Nickel		Acetone
Silver		Benzene
Zinc		Butanone, 2-
		Chlorobenzene
16 SEMIVOLATILES		Chloroform
Acenaphthene		Dichlorobenzene, 1,2-
Anthracene		Dichlorobenzene, 1,3-
Benzo(a)anthracene		Dichlorobenzene, 1,4-
Benzo(a)pyrene		Dichloroethene, 1,2-(cis)
Benzo(b)fluoranthene		Ethylbenzene
Benzo(g,h,i)perylene		Vinyl chloride
Benzo(k)fluoranthene		Xylene (total)
Chrysene		
Dibenzo(a,h)anthracene		3 SEMIVOLATILES
Fluoranthene		Acenaphthene
Fluorene		Bis(2-ethylhexyl)phthalate
Indeno(1,2,3-cd)pyrene		Naphthalene
Naphthalene		
Phenanthrene		2 PESTICIDES
Phenol		DDD, 4,4'
Pyrene		DDT, 4,4'
2 PESTICIDES		
DDE, 4,4'-		
DDT, 4,4'-		
2 PCBs		
Aroclor 1242		
Aroclor 1254		

TABLE 10
SUMMARY OF EXPOSURE PARAMETER VALUES

AREA R - TRASH DUMP
FAA TECHNICAL CENTER

PARAMETER	VALUE USED	RATIONALE FOR VALUE USED	REFERENCE FOR VALUE USED
Global variables:			
Body Weight (kg)			
- Adult (Current FFA Worker; Future Commercial/Industrial)	70	Value based on average of males and females between 18-75 yrs	EPA 1993a
Exposure Duration (yr)			
- Current FAA Worker	25	National upper-bound (95th percentile) at one job.	EPA 1993a
- Future Commercial/Industrial	25	National upper-bound (95th percentile) at one job.	EPA 1993a
Averaging Time (d)			
- Cancer risks	25,550	Value based upon 70 year life expectancy.	EPA 1989a
- Noncancer hazard quotients			
Current FAA Worker	9,125	Value based upon exposure duration.	
Future Commercial/Industrial	9,125	Value based upon exposure duration.	
Relative Absorption Factors (--)			
- Dermal contact with soil			
PCBs	0.06	Fraction absorbed; unadjusted since oral absorption >90% (ATSDR, 1989)	EPA, 1992b
Adherence Factor for Soil (mg/cm2)	1.0	Based upon EPA review of soil adherence data	EPA, 1992b
Fraction of Exposed Surface Area that contacts soil	0.5	Assumes half the exposed surface area contacts soil	BPJ; EPA, 1989c
Chemical Concentration Justification:			
Surface Soils; Ground Water		The 95% UCL or maximum concentrations were used in estimating exposure	
Scenario 1 - Current FAA Worker			
Exposure Frequency (d/yr)	10	Assumes occasional visit to the site.	BPJ
Ingestion of Constituents in Soils			
Ingestion Rate (mg/d)	100	Assumes non-contact intensive exposures.	EPA 1993a
Dermal Contact with Constituents in Soils			
Skin Surface Area (cm2)	2,000	Assumes 10% total body surface area unprotected	EPA 1992b
Scenario 2 - Future Commercial/Industrial			
Exposure Frequency (d/yr)	250	Based on an estimate of the number of days at work.	EPA 1993a
Ingestion of Constituents in Soils			
Ingestion Rate (mg/d)	100	Assumes non-contact intensive exposures.	EPA 1993a
Dermal Contact with Constituents in Soils			
Skin Surface Area (cm2)	2,000	Assumes 10% total body surface area unprotected.	EPA 1992b
Ingestion of Constituents in Water			
Ingestion Rate (l/d)	1	Assumes half of total water intake (i.e., adult 90th percentile of 2 l/d) occurs at work	EPA 1993a

BPJ = Best professional judgment
NA = Not applicable

TABLE 11A
SUMMARY OF TOXICITY VALUES ASSOCIATED WITH CARCINOGENIC EFFECTS: ORAL

AREA R - TRASH DUMP
FAA TECHNICAL CENTER

Constituent	SLOPE FACTOR (SF) ORAL (mg/kg-day)-1	WEIGHT-OF EVIDENCE CLASS	TYPE OF CANCER	SF BASIS/ SOURCE
INORGANICS				
Arsenic (a)	1.75	A	Skin	Water/IRIS
Beryllium	4.3	B2	Multiple Sites	Water/IRIS
Chromium III	NA			NA/IRIS,HEAST
Chromium VI	NA	A		NA/IRIS,HEAST
Copper	NA	D		NA/IRIS,HEAST
Cyanide	NA	D		NA/IRIS,HEAST
Lead	NA	B2	Kidney	Oral/IRIS
Mercury	NA	D		NA/IRIS,HEAST
Nickel	NA			NA/IRIS,HEAST
Silver	NA	D		NA/IRIS,HEAST
Zinc	NA			NA/IRIS,HEAST
VOLATILES				
Acetone	NA	D		NA/IRIS,HEAST
Benzene	0.029	A	Leukemia	Occupational/IRIS
Butanone, 2-	NA	D		NA/IRIS,HEAST
Chlorobenzene	NA	D		NA/IRIS,HEAST
Chloroform	0.0061	B2	Kidney	Water/IRIS
Dichlorobenzene, 1,2-	NA	D		NA/IRIS/HEAST
Dichlorobenzene, 1,3-	NA			NA/IRIS/HEAST
Dichlorobenzene, 1,4-	0.024	B2	Liver	Gavage/HEAST
Dichloroethene, 1,2-(cis)	NA	D		NA/IRIS/HEAST
Ethylbenzene	NA	D		NA/IRIS,HEAST
Vinyl chloride	1.9	A	Lung, liver	Diet/HEAST
Xylene (total)	NA	D		NA/IRIS,HEAST
SEMIVOLATILES				
Acenaphthene	NA	D		NA/IRIS,HEAST
Anthracene	NA	D		NA/IRIS,HEAST
Benzo(a)anthracene (b)	0.73	B2	Forestomach	Diet/IRIS
Benzo(a)pyrene	7.3	B2	Forestomach	Diet/IRIS
Benzo(b)fluoranthene (b)	0.73	B2	Forestomach	Diet/IRIS
Benzo(g,h,i)perylene	NA	D		NA/IRIS,HEAST
Benzo(k)fluoranthene (b)	0.73	B2	Forestomach	Diet/IRIS
Bis(2-Ethylhexyl)phthalate	0.014	B2	Liver	Diet/IRIS
Chrysene (b)	0.073	B2	Forestomach	Diet/IRIS
Dibenzo(a,h)anthracene (b)	7.3	B2	Forestomach	Diet/IRIS
Fluoranthene	NA	D		NA/IRIS,HEAST
Fluorene	NA	D		NA/IRIS,HEAST
Indeno(1,2,3-cd)pyrene (b)	0.73	B2	Forestomach	Diet/IRIS
Naphthalene	NA	D		NA/IRIS,HEAST
Phenanthrene	NA	D		NA/IRIS,HEAST
Phenol	NA	D		NA/IRIS,HEAST
Pyrene	NA	D		NA/IRIS,HEAST
PESTICIDES				
DDD, 4,4-	0.24	B2	Liver	Diet/IRIS
DDE, 4,4-	0.34	B2	Liver	Diet/IRIS
DDT, 4,4-	0.34	B2	Liver	Diet/IRIS
PCBs				
Aroclor-1242 (c)	7.7	B2	Liver	Diet/IRIS
Aroclor-1254 (c)	7.7	B2	Liver	Diet/IRIS

IRIS = U.S. EPA, 1994a, Integrated Risk Information System (IRIS) Database
HEAST = U.S. EPA (ECAO), 1994b, Health Effects Assessment Summary Tables (HEAST): Annual Update
NA = Toxicity value not available

(a) Estimated from unit risk of 5 x 10-5 (ug/l)-1
(b) Cancer slope factor for benzo(a)pyrene combined with the toxic equivalency factors (TEFs) for the other carcinogenic PAHs
(c) Cancer slope factor for polychlorinated biphenyls (PCBs)

TABLE 11B
SUMMARY OF TOXICITY VALUES ASSOCIATED WITH NONCARCINOGENIC CHRONIC EFFECTS: ORAL

AREA R - TRASH DUMP
FAA TECHNICAL CENTER

Constituent	Chronic RfD (Oral) (mg/kg-day)	Confidence Level	Critical Effect	Oral RfD Basis/Source	Uncertainty Factor	Modifying Factor
INORGANICS						
Arsenic	0.0003	Medium	Hyperpigmentation, keratosis, possible vascular effects	Water/IRIS	3	1
Beryllium	0.005	Low	None observed	Water/IRIS	100	1
Chromium III	1	Low	None observed	Diet/IRIS	100	10
Chromium VI	0.005	Low	None observed	Water/IRIS	500	1
Copper (a)	0.037		Local gastrointestinal irritation	Oral/HEAST		
Cyanide	0.02	Medium	Decreased body wt., thyroid effects, myelin degeneration	Diet/IRIS	100	5
Lead	NA			NA/IRIS,HEAST		
Mercury	0.0003		Kidney effects	Oral/HEAST	1000	
Nickel (b)	0.02	Medium	Reduced body and organ weight	Diet/IRIS	300	1
Silver	0.003	Low	Dermal effects	I.V./IRIS	3	1
Zinc	0.3	Medium	Anemia	Diet/IRIS	3	1
VOLATILES						
Acetone	0.1	Low	Increased liver and kidney weight	Gavage/IRIS	1000	1
Benzene	NA			NA/IRIS,HEAST		
Butanone, 2-	0.6	Low	Decreased fetal birth weight	Oral/IRIS	3000	1
Chlorobenzene	0.02	Medium	Liver toxicity	Oral/IRIS	1000	1
Chloroform	0.01	Medium	Fetotoxic, Fatty cysts in the liver	Oral/IRIS	1000	1
Dichlorobenzene, 1,2-	0.09	Low	None observed	Gavage/IRIS	1000	1
Dichlorobenzene, 1,3-	NA			NA/IRIS,HEAST		
Dichlorobenzene, 1,4-	NA			NA/IRIS,HEAST		
Dichloroethene, 1,2-(cis)	0.01		Blood	Gavage/HEAST	3000	
Ethylbenzene	0.1	Low	Liver and kidney toxicity	Oral/IRIS	1000	1
Vinyl chloride	NA			NA/IRIS,HEAST		
Xylene (total)	2	Medium	Hyperactivity,decreased body weight,increased mortality	Gavage/IRIS	100	1
SEMIVOLATILES						
Acenaphthene	0.06	Low	Hepatotoxicity	Gavage/IRIS	3000	1
Anthracene	0.3	Low	None observed	Gavage/IRIS	3000	1
Benzo(a)anthracene	NA			NA/IRIS,HEAST		
Benzo(a)pyrene	NA			NA/IRIS,HEAST		
Benzo(b)fluoranthene	NA			NA/IRIS,HEAST		
Benzo(g,h,i)perylene (c)	0.04		Decreased body weight gain	Gavage/HEAST92	10000	NA
Benzo(k)fluoranthene	NA			NA/IRIS,HEAST		
Bis(2-ethylhexyl)phthalate	0.02	Medium	Increased relative liver weight	Diet/IRIS	1000	1
Chrysene	NA			NA/IRIS,HEAST		
Dibenzo(a,h)anthracene	NA			NA/IRIS,HEAST		
Fluoranthene	0.04	Low	Kidney, liver, blood, and clinical effects	Gavage/IRIS	3000	1
Fluorene	0.04	Low	Hematological effects	Gavage/IRIS	3000	1
Indeno(1,2,3-cd)pyrene	NA			NA/IRIS,HEAST		
Naphthalene	0.04		Decreased body weight gain	Gavage/HEAST92	10000	
Phenanthrene (c)	0.04		Decreased body weight gain	Gavage/HEAST92	10000	NA
Phenol	0.6	Low	Reduced fetal body weight	Gavage/IRIS	100	1
Pyrene	0.03	Low	Kidney effects	Gavage/IRIS	3000	1
PESTICIDES						
DDD, 4,4-	NA			NA/IRIS,HEAST		
DDE, 4,4-	NA			NA/IRIS,HEAST		
DDT, 4,4-	0.0005	Medium	Liver lesions	Diet/IRIS	100	1
PCBs						
Aroclor-1242	NA			NA/IRIS,HEAST		
Aroclor-1254	NA			NA/IRIS,HEAST		

IRIS = U.S. EPA, 1994a, Integrated Risk Information System (IRIS) Database
HEAST = U.S. EPA (ECAO), 1994b, Health Effects Assessment Summary Tables (HEAST): Annual Update
HEAST92 = U.S. EPA (ECAO), 1992f, Health Effects Assessment Summary Tables (HEAST): Annual Update. Used per guidance from EPA Region II.
NA = Toxicity value not available

(a) Value derived from current drinking water standard of 1.3 mg/l
(b) Value for metallic nickel
(c) Value for naphthalene

TABLE 11C
SUMMARY OF TOXICITY VALUES ASSOCIATED WITH NONCARCINOGENIC SUBCHRONIC EFFECTS: ORAL

AREA R - TRASH DUMP
FAA TECHNICAL CENTER

Constituent	Subchronic RfD (Oral) (mg/kg-day)	Confidence Level	Critical Effect	Oral RfD Basis/Source	Uncertainty Factor
INORGANICS					
Arsenic	0.0003		Keratosis and hyperpigmentation	Oral/HEAST	1000
Beryllium	0.005		None observed	Water/HEAST	100
Chromium III	1		None observed	Diet/HEAST	1000
Chromium VI	0.02		None observed	Water/HEAST	100
Copper (a)	0.037		Local gastrointestinal irritation	Oral/HEAST	
Cyanide	0.02		Decreased body wt., thyroid effects, myelin degeneration	Diet/HEAST	500
Lead	NA			NA/HEAST	
Mercury	0.0003		Kidney effects	Oral/HEAST	1000
Nickel (b)	0.02		Decreased body and organ weight	Diet/HEAST	300
Silver	0.005		Dermal effects	I.V./HEAST	3
Zinc	0.3		Anemia	Diet/HEAST	3
VOLATILES					
Acetone	1		Increased liver and kidney weights,nephrotoxicity	Gavage/HEAST	100
Benzene	NA			NA/HEAST	
Butanone, 2-	2		Decreased birth weight	Water/HEAST	1000
Chlorobenzene (c)	0.02	Medium	Liver toxicity	Oral/IRIS	1000
Chloroform	0.01		Fetotoxic, Fatty cysts in the liver	Oral/HEAST	1000
Dichlorobenzene, 1,2- (c)	0.09	Low	None observed	Gavage/IRIS	1000
Dichlorobenzene, 1,3-	NA			NA/HEAST	
Dichlorobenzene, 1,4-	NA			NA/HEAST	
Dichloroethene, 1,2-(cis)	0.1		Blood	Gavage/HEAST	300
Ethylbenzene (c)	0.1	Low	Liver and kidney toxicity	Oral/IRIS	1000
Vinyl chloride	NA			NA/HEAST	
Xylene (total) (c)	2	Medium	Hyperactivity; decreased body weight; increased mortality	Gavage/IRIS	100
SEMIVOLATILES					
Acenaphthene	0.6		Hepatotoxicity	Gavage/HEAST	300
Anthracene	3		None observed	Gavage/HEAST	300
Benzo(a)anthracene	NA			NA/HEAST	
Benzo(a)pyrene	NA			NA/HEAST	
Benzo(b)fluoranthene	NA			NA/HEAST	
Benzo(g,h,i)perylene (d)	0.04		Decreased body weight gain	Gavage/HEAST92	10000
Benzo(k)fluoranthene	NA			NA/HEAST	
Bis(2-ethylhexyl)phthalate (c)	0.02	Medium	Increased relative liver weight	Diet/IRIS	1000
Chrysene	NA			NA/HEAST	
Dibenzo(a,h)anthracene	NA			NA/HEAST	
Fluoranthene	0.4		Kidney, liver, and blood effects	Gavage/HEAST	300
Fluorene	0.4		Decreased erythrocyte counts	Gavage/HEAST	300
Indeno(1,2,3-cd)pyrene	NA			NA/HEAST	
Naphthalene	0.04		Decreased body weight gain	Gavage/HEAST92	10000
Phenanthrene (d)	0.04		Decreased body weight gain	Gavage/HEAST92	10000
Phenol	0.6		Reduced fetal body weight	Gavage/HEAST	100
Pyrene	0.3		Renal effects	Gavage/HEAST	300
PESTICIDES					
DDD, 4,4-	NA			NA/HEAST	
DDE, 4,4-	NA			NA/HEAST	
DDT, 4,4-	0.0005		Liver lesions	Diet/HEAST	100
PCBs					
Aroclor-1242	NA			NA/HEAST	
Aroclor-1254	NA			NA/HEAST	

HEAST = U.S. EPA (ECAO), 1994b, Health Effects Assessment Summary Tables (HEAST): Annual Update
HEAST92 = U.S. EPA (ECAO), 1992f, Health Effects Assessment Summary Tables (HEAST): Annual Update. Used per verbal guidance from EPA Region II.
NA = Toxicity value not available

(a) Value derived from current drinking water standard of 1.3 mg/l
(b) Value for metallic nickel
(c) Subchronic RfD not available, chronic value used.
(d) Value for naphthalene

The estimated non-cancer HIs for exposures to surface soil and shallow ground water were less than 1.0 under all exposure scenarios. The total hazard indices were estimated to be 0.0003 for exposures to surface soils via ingestion and dermal contact combined, and 0.1 for future exposures to surface soils via ingestion and dermal contact and to ground water via ingestion combined.

Based on the results of the risk assessment, under continued non-residential site use, risks to human health posed by constituents detected in the soil or ground water at Area R do not exceed federal guidelines, but do exceed the State of New Jersey's acceptable lifetime risk definition. However, there is a degree of uncertainty associated with the calculated risks associated with PAHs in the surface soil, as described above. In a letter to the FAA Technical Center from NJDEP dated October 17, 1995, NJDEP concurred with the conclusion that the risk assessment exceedances were primarily due to the existence of asphalt in the soil samples and, therefore, no remedial actions are required.

Ecological Risk Assessment

Problem Formulation - Problem formulation included relating the contaminant data to site-specific biological species/habitat information to determine what receptors may be at greatest potential risk, scoping the approach for assessing these risks, and selecting COCs for detailed analysis. Surface soil was determined to be the media of greatest concern with respect to ecological effects. Subsurface soil and ground water were not considered to be potential sources of exposure to terrestrial receptors. The Area R surface soil COCs are listed in Table 9.

The respective ecological receptors (plant or animal species or habitat) modeled as potentially being exposed to these COCs include the following:

- Deer mouse, due to its likely presence in the grassland portions of Area R, its ingestion of insects and vegetation, and its consumption by higher order species;
- White-tailed deer, due to its documented presence at the FAA Technical Center and herbivorous nature;
- Red fox, due to its tendency to prey on small mammals and vegetation;
- Grasshopper sparrow, due to its identification at the facility, the presence of suitable habitat at Area R, its consumption of both insects and vegetation, and its small spatial range; and
- Broad-winged hawk, due to its consumption of small mammals, amphibians, reptiles, and occasionally young birds, and its potential for experiencing biomagnification.

Exposure Assessment - The exposure assessment provides a determination of which pathways are most likely to produce significant exposures to selected indicator species and the derivation of estimates of the daily exposure dose indicator species would obtain from on-site COCs. Major exposure pathways that were evaluated for the Area R indicator species included the following:

- Deer mouse - dermal contact with soil and ingestion of vegetation, insects, and soil;
- White-tailed deer - dermal contact with soil and ingestion of vegetation and soil;
- Red fox - dermal contact with soil and ingestion of deer mice, vegetation, and soil;
- Grasshopper sparrow - dermal contact with soil and ingestion of insects, soil and vegetation; and
- Broad-winged hawk - ingestion of deer mice and soil.

Stressor-Response Assessment - The stressor-response assessment requires the development of an understanding of COC potency for indicator species via a review of pertinent laboratory or field toxicity studies and the linking of COC concentrations to potential effects on ecological receptors. The sensitive toxic effects (e.g., developmental, neurological, etc.) on mammalian and avian receptors were considered for each COC and benchmark doses were identified, typically based on no observable adverse effect levels (NOAELs) pertinent to the indicator species.

Risk Characterization - The estimated cumulative EHQs for soil-related exposures at Area R are summarized in Table 12. As indicated, the estimated EHQs exceed 1 for three indicator species, the deer mouse, grasshopper sparrow and broad-winged hawk, indicating that a potential for adverse ecological effects exists. The EHQs for the remaining species (white-tailed deer and red fox) were less than 1. The EHQ for the mouse (11) is primarily attributable to copper, lead and zinc, the EHQ for the sparrow (14) is primarily due to copper and zinc, and the EHQ for the broad-winged hawk (2.2) is primarily due to zinc. Key uncertainties in the risk characterization included the derivation of ecological benchmark doses for the COCs.

The USFWS conducted a qualitative review of available Area R contaminant data and site inspections and concluded that the site does not pose much, if any, threat of exposure to fish and wildlife.

Comparison to ARARs/TBCs

Area R data were also compared to ARARs and TBCs. Area R soil contaminant levels were evaluated with respect to New Jersey soil cleanup criteria. PAHs were detected in Area R soils at levels which exceed New Jersey residential soil cleanup criteria. However, the detection of PAHs in Area R surface soils is thought to be attributable to the presence of asphalt fragments over the surface of the site, as PAHs are commonly detected in soils which contain asphalt. The only other soil contaminant detected at levels exceeding New Jersey residential soil cleanup criteria was beryllium, detected in a single subsurface soil sample collected at a depth of 20 to 22 feet, thereby limiting the potential for direct exposure.

In shallow ground water at Area R, chloroform and chlorobenzene have been consistently detected at levels exceeding PQLs. Chlorobenzene and other volatile organics have been consistently detected within the shallow ground water in the fill area and are expected to be attributable to the historic disposal activities. Chloroform, detected in shallow wells located outside of the fill area, is

TABLE 12
ECOLOGICAL HAZARD QUOTIENT SUMMARY
Terrestrial and Avian Receptors

AREA R - TRASH DUMP
FAA TECHNICAL CENTER

Compound	Mouse	Deer	Fox	Sparrow	Hawk
INORGANICS					
Arsenic	0.12	0.0025	0.00015	0.0077	0.00020
Beryllium	0.0031	0.000075	0.0000038	0.0040	0.00010
Chromium	0.20	0.0044	0.00035	0.91	0.038
Copper	**5.8**	0.021	0.011	**7.9**	0.33
Lead	**1.7**	0.033	0.0017	0.56	0.0098
Mercury	0.021	0.00043	0.000064	0.056	0.0044
Nickel	0.064	0.0014	0.000079	0.083	0.0021
Silver	0.0030	0.000019	0.0000031	0.0041	0.000068
Zinc	**2.6**	0.0048	0.036	**3.6**	**1.4**
SEMIVOLATILES					
Acenaphthene	0.0076	0.000030	0.0000045	0.026	0.000086
Anthracene	0.016	0.000099	0.000011	0.054	0.00039
Benzo(a)anthracene	0.032	0.00047	0.000072	0.11	0.0058
Benzo(a)pyrene	0.027	0.00047	0.00011	0.089	0.010
Benzo(b)fluoranthene	0.023	0.00048	0.00031	0.075	0.030
Benzo(g,h,i)perylene	0.014	0.00033	0.00083	0.046	0.084
Benzo(k)fluoranthene	0.020	0.00043	0.00050	0.064	0.050
Chrysene	0.032	0.00047	0.000072	0.11	0.0058
Dibenz(a,h)anthracene	0.0081	0.00014	0.000032	0.027	0.0029
Fluoranthene	0.0029	0.000036	0.0000044	0.0098	0.00031
Fluorene	0.0068	0.000033	0.0000043	0.023	0.00011
Indeno(1,2,3-cd)pyrene	0.013	0.00032	0.0021	0.043	0.21
Naphthalene	0.0020	0.0000050	0.0000011	0.0067	0.000010
Phenanthrene	0.055	0.00035	0.000040	0.19	0.0014
Phenol	0.0011	0.0000017	0.00000055	0.0015	0.00000063
Pyrene	0.034	0.00038	0.000043	0.11	0.0027
PESTICIDES/PCBs					
DDE, 4,4'-	0.0040	0.000025	0.000029	0.0021	0.00043
DDT, 4,4'-	0.00099	0.000016	0.0000046	0.00051	0.000067
Aroclor 1242	0.40	0.0064	0.00051	0.052	0.0014
Aroclor 1254	0.042	0.00069	0.000055	0.0056	0.00014
Total Ecological Ratio	**11**	0.078	0.054	**14**	**2.2**

shaded text = EHQ >1

not expected to be associated with the historic disposal activities and its presence does not pose an unacceptable human health risk. Zinc, detected in the most recent inorganic ground water analyses at levels exceeding the PQL, is present at levels which are less than the average zinc level in upgradient wells at the FAA Technical Center. Table 19 in the Area R ground water summary tables presented in Appendix D compares historic ground water data to PQLs.

G. Area S

A qualitative baseline HHRA was conducted on the basis of all ground water data collected during the Area S site investigations. Other media were not considered in the evaluation as they are unlikely to pose a concern with respect to human health. A qualitative ERA was conducted based upon the surface soil data collected during the Area S site investigations. Potential ecological risks associated with aquatic exposures to the sediments in the adjacent South Branch of Doughty's Mill Stream were evaluated within the USFWS' facility wide ecological risk assessment and are also described herein. A summary of the HHRA and ERA is presented below. A more complete description can be found in the Risk Assessment, Area S, Excavated Area West of Tilton Road (TRC, 1996).

Human Health Risk Assessment

Hazard Identification - The ground water COCs which were identified for Area S on the basis of the site investigations are listed in Table 13.

Exposure Assessment - Currently, there is no means of exposure to ground water at Area S (i.e., there are no potable wells) and no site development involving installation of a well is proposed for the site. However, it is possible (although unlikely) that the ground water at Area S could be used as a source of potable water, resulting in future ingestion exposures to FAA personnel.

Toxicity Assessment - For the purposes of the qualitative HHRA, the dose-response assessment identified the available human health-based ground water standards and guidelines, including EPA MCLs, New Jersey MCLs, New Jersey PQLs for organics and the higher of the background concentration for the FAA Technical Center and the PQL for inorganics. The ground water standards and guidelines used in the HHRA are summarized in Table 14.

Risk Characterization - The risk characterization for the Area S qualitative HHRA involved the comparison of estimated EPCs and the selected ground water criteria. An exceedance above the criterion for a given COC was interpreted to infer a potential concern with respect to human exposures and health. The results of the comparison are shown in Table 14. Lead and bis(2-ethylhexyl)phthalate are the only constituents for which the selected ground water criteria are exceeded. The key uncertainties associated with this analysis include the following: data uncertainties due to infrequent detections, limited numbers of samples or qualified data; the assumption that Area S ground water will be used as a potable water source; the detection of lead in ground water a concentrations within the range reported for the upgradient wells at the FAA (0.0061 to 0.067 mg/l); and, for bis(2-ethylhexyl)phthalate, its presence in the method blank, its absence in the other four Area S ground water samples and its unlikelihood to be site-related.

TABLE 13
CONSTITUENTS OF POTENTIAL CONCERN
FOR GROUND WATER

AREA S - EXCAVATED AREA WEST OF TILTON ROAD
FAA TECHNICAL CENTER

GROUND WATER (7)
INORGANICS (1) Lead
VOLATILES (1) Chloroform
SEMIVOLATILES (5) Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Di-n-butyl phthalate Phenol Pyrene

TABLE 14
SUMMARY OF IDENTIFIED GROUND WATER STANDARDS/GUIDELINES AND COMPARISON TO EXPOSURE POINT CONCENTRATIONS

AREA S - EXCAVATED AREA WEST OF TILTON ROAD
FAA TECHNICAL CENTER

Constituent	Federal Maximum Contaminant Level (a) (mg/l)	New Jersey Maximum Contaminant Level (b) (mg/l)	New Jersey Ground Water Quality Standard (c) (mg/l)		Selected Ground Water Quality Criterion (d) (mg/l)		Exposure Point Concentration (mg/l)	
INORGANICS								
Lead	0.015 (e)	NA	0.02		0.015	(g)	0.030	**
VOLATILES								
Chloroform	0.1	NA	0.001	*	0.001	(f)	0.0002	**
SEMIVOLATILES								
Bis(2-ethylhexyl)phthalate	0.006	NA	0.03	*	0.03	(f)	2.6	**
Butylbenzylphthalate	NA	NA	0.02	*	0.02	(f)	0.001	**
Di-n-butyl phthalate	NA	NA	0.02	*	0.02	(f)	0.002	**
Phenol	NA	NA	0.01	*	0.01	(f)	0.0089	
Pyrene	NA	NA	0.02	*	0.02	(f)	0.002	**

* = PQL
NA = Not available
** = Maximum detected concentration used as the exposure point concentration (EPC) since the 95% upper confidence limit (UCL) exceeds the maximum detected concentration

(a) EPA. 1995. Drinking Water Regulations and Health Advisories, May.
(b) N.J.A.C. 7:10 (NJDEP, 1989)
(c) Class I. For organics, the practical quantitation limit (PQL). For inorganics, the higher of the background concentration and PQL (N.J.A.C. 7:9-6) (NJDEP, 1993); The background concentration for each inorganic was calculated as the 95% UCL for the upgradient wells at the FAA Technical Center

(d) Lower of the identified standards provided the lower value is not less than the PQL. In the latter situation, the PQL is selected.
(e) EPA action level at the tap
(f) New Jersey Ground Water Quality Standard
(g) EPA action level

Based on the results of the qualitative risk assessment, under continued non-residential site use, constituents detected in the soil and ground water at Area S do not pose unacceptable risks under federal or state guidelines.

Ecological Risk Assessment

Problem Formulation - Problem formulation included the identification of the habitats, species and COCs at Area S. Surface soil COCs are listed in Table 15.

Four protected plant species were listed as being in the immediate vicinity of Area S. Terrestrial species identified as being likely to occur include the deer mouse, white-tailed deer, red fox, grasshopper sparrow, and broad-winged hawk.

Exposure Assessment - The 95% upper confidence limits (UCLs) or maximum detected concentrations were used as the EPCs for this qualitative ERA.

Stressor-Response Assessment - Surface soil criteria used in the USFWS Ecological Risk Assessment were used in screening whether on-site conditions may pose a concern with regard to ecological receptors. The criteria used in the ERA are provided along with the EPCs in Table 16.

Risk Characterization - The potential for adverse impacts was evaluated by comparing the estimated surface soil EPCs to the surface soil criteria selected by the USFWS, as presented in Table 16. As indicated, all of the surface soil EPCs are at least an order of magnitude less than the selected criteria concentrations.

The USFWS facility-wide risk assessment evaluated potential risks associated with aquatic exposures to the sediments in the South Branch of Doughty's Mill Stream. The risk assessment included the performance of bioassays using sediments collected from the South Branch at a point adjacent to Area S. USFWS concluded that there is little evidence to indicate serious risk to ecological receptors inhabiting areas surrounding the sediment sampling station.

Comparison to ARARs/TBCs

Area S data were also compared to ARARs and TBCs. Area S soil contaminant levels were evaluated with respect to New Jersey soil cleanup criteria within the qualitative ERA. No exceedances of the residential soil cleanup criteria were identified at Area S.

A comparison of ground water constituents to ARARs/TBCs was conducted in the qualitative HHRA (see previous discussion).

TABLE 15
CONSTITUENTS OF POTENTIAL CONCERN
FOR SURFACE SOIL

AREA S - EXCAVATED AREA WEST OF TILTON ROAD
FAA TECHNICAL CENTER

SURFACE SOIL (14)
VOLATILES (2)
Tetrachloroethene
Toluene
SEMIVOLATILES (12)
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Bis(2-ethylhexyl)phthalate
Chrysene
Di-n-butyl phthalate
Fluoranthene
Napthalene
Phenanthrene
Phenol
Pyrene

TABLE 16
EVALUATION OF SURFACE SOIL
EXPOSURE POINT CONCENTRATIONS
USING THE SELECTED SOIL SCREENING CRITERIA

AREA S - EXCAVATED AREA WEST OF TILTON ROAD
FAA TECHNICAL CENTER

Constituent	Exposure Point Concentration (mg/kg)		Soil Screening Criteria (a) (mg/kg)	
VOLATILES				
Tetrachloroethene	0.029	*	6.0	(b)
Toluene	0.002	*	1.5	(c)
SEMIVOLATILES				
Benzo(a)anthracene	0.26	*	(e)	
Benzo(a)pyrene	0.29	*	(e)	
Benzo(b)fluoranthene	0.29	*	(e)	
Benzo(k)fluoranthene	0.26	*	(e)	
Bis(2-ethylhexyl)phthalate	2.4	*	50	(c)
Chrysene	0.38	*	(e)	
Di-n-butyl phthalate	0.067	*	8.1	(c)
Fluoranthene	0.42	*	(e)	
Naphthalene	0.12	*	(e)	
Phenanthrene	0.4	*	(e)	
Phenol	0.415	*	1.0	(c)
Pyrene	0.56	*	(e)	
PAH (total)	2.98		200	(d)

* = Maximum detected concentration in surface soil (0-2 feet)
(a) As selected by USFWS (1995)
(b) NJDEP, 1994
(c) NYDEP, 1992
(d) Beyer, 1990
(e) see PAH (total)

VII. DESCRIPTION OF INSTITUTIONAL CONTROL REMEDIES

The selected alternative for Areas 27, 56, F, R and S at the FAA Technical Center consists of the implementation of an institutional control remedy consisting of such components as residential site use restrictions, continued ground water monitoring, and/or ground water use restrictions. The components of the remedy applicable to each of area concern and the justification for their application are provided below for each area.

A. Area 27

The selected remedy for Area 27 consists of residential site use restrictions. While Area 27 does not exhibit the presence of soil contaminants at levels exceeding the residential New Jersey soil cleanup criteria and does not present unacceptable risks under continued non-residential site use, risks associated with residential use of the site were not evaluated. Therefore, while it was concluded that Area 27 is not serving as a continuing source of contamination and therefore does not present an environmental or human health concern under continued non-residential site use, residential site use restrictions will be implemented to ensure its continued future protectiveness.

B. Area 56

The selected remedy for Area 56 consists of residential site use restrictions combined with continued ground water monitoring. No surface or subsurface soil constituents were detected at Area 56 at levels exceeding residential New Jersey soil cleanup criteria. Carcinogenic and non-carcinogenic risk estimates associated with current and future non-residential exposures to the site were within acceptable federal and state guidelines and no adverse ecological impacts are anticipated. However, risks associated with residential use of the site were not evaluated. Therefore, while no remedial activities or monitoring are proposed for Area 56 soils, residential site use restrictions will be implemented to ensure the site's continued protectiveness of human health.

In ground water, volatile organics have consistently been detected in one intermediate ground water monitoring well and inorganics have consistently been detected in one shallow ground water monitoring well, both at levels exceeding PQLs. Due to the low concentrations of detected constituents and the lack of evidence of an area of concentrated "hot spot" contamination, further action at Area 56 is not warranted, although continued ground water monitoring at Area 56 is warranted to monitor any trends in the presence of these ground water constituents. Therefore, the selected alternative includes continued ground water monitoring to ensure the future protection of human health and the environment at Area 56. A Classification Exception Area will also be established for the site, as per NJAC 7:26E 6.2(a)17.

C. Area F

The selected remedy for Area F consists of residential site use restrictions. While Area F does not exhibit the presence of soil contaminants at levels exceeding the residential New Jersey soil cleanup criteria and does not present unacceptable risks under continued non-residential site use, risks associated with residential use of the site were not evaluated. Therefore, while it was concluded that Area F is not serving as a continuing source of contamination and therefore does not present an

environmental or human health concern under continued non-residential site use, residential site use restrictions will be implemented to ensure its continued future protectiveness.

D. Area R

The selected remedy for Area R consists of residential site use restrictions combined with continued ground water monitoring and the establishment of ground water use restrictions. PAHs were detected in surface soils at Area R at levels exceeding residential New Jersey soil cleanup criteria, but were thought to be attributable to the presence of asphalt in the soil samples. Due to the presence of these PAH compounds, carcinogenic risk estimates associated with potential future commercial/industrial exposures to the site soils were near the upper end of EPA's acceptable carcinogenic risk range. Therefore, while no remedial activities or monitoring are proposed for Area R soils, residential site use restrictions will be implemented to ensure the site's continued protectiveness of human health.

In ground water, chlorobenzene and zinc have been consistently detected at levels exceeding PQLs within the shallow ground water in the fill area. Other volatile organics have also consistently been detected in the shallow ground water in this portion of the site. Due to the presence of vinyl chloride in the fill area ground water, the carcinogenic risk estimate associated with potential future commercial/industrial exposures to the site ground water was near the upper end of EPA's acceptable carcinogenic risk range. Therefore, based on the presence of elevated organic levels in the shallow fill area ground water, ground water use restrictions and continued ground water monitoring at Area R will be implemented to prevent future employee exposures to the ground water and to monitor any trends in the presence of these ground water constituents in fill area, upgradient or downgradient wells. A Classification Exception Area will also be established for the site, as per NJAC 7:26E 6.2(a)17.

E. Area S

The selected remedy for Area S consists of residential site use restrictions. While Area S does not exhibit the presence of soil contaminants at levels exceeding the residential New Jersey soil cleanup criteria, the human health risk assessment for Area S was based on continued non-residential use of the site. Therefore, while it was concluded that Area S is not serving as a continuing source of contamination and therefore does not present an environmental or human health concern under continued non-residential site use, residential site use restrictions will be implemented to ensure its continued future protectiveness.

After reviewing the existing database for Areas 27, 56, F, R and S, the NJDEP and Pinelands Commission have indicated concurrence with the Proposed Plan of institutional controls, as defined above. Copies of the declarations of concurrence are attached as Appendix A.

VIII. DOCUMENTATION OF NO SIGNIFICANT CHANGES

The Proposed Plan for Areas 27, 56, F, R and S was released for public comment on February 11, 1999. The Proposed Plan concluded that institutional controls consisting of residential site use

restrictions, continued ground water monitoring and/or ground water use restrictions are required to ensure protection of human health and the environment at Areas 27, 56, F, R and S. No written or oral comments on the Proposed Plan were submitted during the public comment period. Therefore, it has been determined that no significant changes to the remedy, as originally identified in the Proposed Plan, are necessary.

RESPONSIVENESS SUMMARY
RECORD OF DECISION
Area 27 - Fuel Mist Test Area
Area 56 - Abandoned Navy Landfill
Area F - Air Blast Facility
Area R - Trash Dump and
Area S - Excavated Area West of Tilton Road
FAA William J. Hughes Technical Center

The purpose of this Responsiveness Summary is to review public response to the Proposed Plan for Areas 27, 56, F, R and S. It also documents the FAA's consideration of such comments during the decision-making process and provides answers to any major comments raised during the public comment period.

The Responsiveness Summary is divided into the following sections:

- Overview - This section briefly describes the selected remedy and any changes to the remedy from that included in the Proposed Plan for Areas 27, 56, F, R and S.
- Background on Community Development - This section provides a summary of community interest in Areas 27, 56, F, R and S and identifies key public issues. It also describes community relations activities conducted with respect to these areas of concern.
- Summary of Major Questions and Comments - This section summarizes verbal and written comments received during the public meeting and public comment period.

I. OVERVIEW

The FAA William J. Hughes Technical Center is located at the Atlantic City International Airport in Atlantic County, New Jersey. Area 27, located south of the Upper Atlantic City Reservoir, is the former Fuel Mist Test Area, Area 56, located south of the major east-west runway and near the FAA hangar, is an abandoned Navy landfill area, Area F, located northeast of the major east-west runway in the Airport Operations Area of the facility, is the Air Blast Facility, Area R, located west of Tilton Road, is a former trash dump area and Area S, also located west of Tilton Road, was identified as a former excavation area.

II. BACKGROUND ON COMMUNITY INVOLVEMENT

This section provides a brief history of community participation in the Environmental Investigation/Feasibility Study (EI/FS) activities conducted at Areas 27, 56, F, R and S.

Throughout the investigation period, the EPA, NJDEP, Atlantic County Department of Health and the Pinelands Commission have been directly involved through proposal and project review and

comments. Periodic meetings have been held to maintain open lines of communication and to keep all parties abreast of current activities.

On February 11, 1999, a newspaper notification was published in the Atlantic City Press inviting the public to comment on the EI/FS process and Proposed Plan. The announcement also identified the time and location of a public meeting to be held to discuss the Proposed Plan, the location of the information repository, the length of the public comment period, and the address to which written comments could be sent. Public comments were accepted from February 11, 1999 through March 15, 1999.

A public meeting was held on March 4, 1999 at the Atlantic County Library in Mays Landing, New Jersey. The Areas 27, 56, F, R and S EI/FS results were discussed. Keith C. Buch, Program Manager, Environmental Branch, represented the FAA, Julio Vázquez, Remedial Project Manager, Federal Facilities Section, represented the EPA Region 2 Emergency and Remedial Response Division and Ian Curtis, Case Manager, represented the NJDEP Bureau of Federal Case Management. TRC Environmental Corporation, FAA's environmental contractor, also attended. The complete attendance list is provided as Appendix B to this Record of Decision. A transcript of the public meeting is provided as Appendix C.

III. SUMMARY OF MAJOR QUESTIONS AND COMMENTS

No questions or comments with regard to the Proposed Plan for Areas 27, 56, F, R and S were raised at the public meeting held on March 4, 1999. In addition, no written comments were received during the thirty-day public comment period.

APPENDIX A

NJDEP AND PINELANDS COMMISSION LETTERS OF CONCURRENCE

State of New Jersey

Department of Environmental Protection

Christine Todd Whitman
Governor

Robert C. Shinn, Jr.
Commissioner

Mr. Keith Buch
FAA Technical Center
Environmental Programs Branch
ACM-440
Atlantic City International Airport, N.J. 08405

FEB 0 2 1997

Dear Mr. Buch,

Re: Proposed Plan 27, 56, R and S
FAA Technical Center
Egg Harbor Township, Atlantic County

The NJDEP has reviewed the Proposed Plan dated September 1996 for Areas 27, 56, R and S at the Federal Aviation Administration (FAA) Technical Center located in Pomona, Atlantic County. A draft of this proposed plan was submitted to the NJDEP in June of 1996 and approved at that time. This document incorporates additional comments provided by the USEPA and as such does not constitute a significant change from previously approved versions. Therefore, the NJDEP approves this proposed plan as submitted.

Areas 27, 56, R and S are four "No Further Action" areas at the FAA Technical Center. The proposed plan documents previously reviewed and approved proposed remedial actions. The environmental investigations conducted at each of these sites did not detect contaminant levels which pose a threat to human health and the environment. No remedial activities, exposure controls, or monitoring are proposed for Areas 27 and S. The proposed continuation of ground water sampling at Area-56 and Area-R will monitor any unanticipated changes in ground water quality or contaminant distribution which would necessitate further remedial action. Therefore, the proposed "No Action" remedial alternative is protective of human health and the environment, and acceptable to the NJDEP. The Pinelands Commission has approved the Proposed Plan (see letter dated January 14, 1997 from William F. Harrison, Assistant Director, Pinelands Commission). The Proposed Plan for Areas 27, 56, R and S is therefor acceptable as written.

The NJDEP looks forward to working with the FAA in addressing the remedial activities at the FAA Technical Center. If you should need any assistance or additional information, please feel free to contact Ian Curtis, case manager, of my staff at (609) 633-7232.

Sincerely,

Ian R. Curtis, Case Manager
Bureau of Federal Case Management

c. Betsy Donovan, USEPA
Steven Byrnes, BEERA
George Nicholas, BGWPA

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THE PINELANDS COMMISSION
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(609) 894-9342

CHRISTINE TODD WHITMAN
Governor

February 11, 1999

Ian Curtis, NJDEP
P.O. Box 028
401 East State Street
Trenton, NJ 08625-0028

Please Always Refer to
This Application Number

Re: Application #87-0046.15
Areas 27, 56, R & S
App. #87-1058.15
Area F
Egg Harbor Township

Dear Mr. Curtis:

We have received and reviewed the February, 1999 Final Proposed Plan for Areas 27, 56, F, R, and S at the FAA Technical Center.

The revisions were made in accordance with EPA comments. The revised plan does not raise any significant issues regarding compliance with the standards of the Pinelands Comprehensive Management Plan. Please refer to our January 14, 1997 letter regarding additional comments related to these sites.

If you have any questions, please contact the project review staff.

Sincerely,

Todd DeJesus
Environmental Specialist

cc: Keith Buch, FAA
Jean Oliva, TRC
Martha Williams

APPENDIX B

PUBLIC MEETING ATTENDANCE LIST

SIGN-IN SHEET
PUBLIC MEETING
MARCH 4, 1999

PROPOSED PLAN PRESENTATION FOR
AREAS 27, 56, F, R & S
FAA WILLIAM J. HUGHES TECHNICAL CENTER
ATLANTIC CITY INTERNATIONAL AIRPORT, NEW JERSEY

	NAME	AFFILIATION/ADDRESS	PHONE NUMBER
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APPENDIX C

PUBLIC MEETING TRANSCRIPT

PUBLIC MEETING AGENDA

PROPOSED PLAN FOR:

AREA 27 - FUEL MIST TEST AREA

AREA 56 - ABANDONED NAVY LANDFILL

AREA F - AIR BLAST FACILITY

AREA R - TRASH DUMP

ORIGINAL

AREA S - EXCAVATED AREA WEST OF TILTON ROAD

TAKEN BEFORE: BETTY ANN WASILEWSKI, a Certified Shorthand Reporter, License No. XI01032, Registered Professional Reporter, Certificate of Merit Holder and Notary Public of the State of New Jersey, at the ATLANTIC COUNTY LIBRARY, 2 South Farragut Avenue, Mays Landing, New Jersey 08330, on Thursday, March 4, 1999, commencing at 2:02 p.m.

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2 A P P E A R A N C E S:
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5 Keith Buch, Program Manager
FAA Technical Center
6
7 Jean Oliva, P.E., Project Engineer
TRC Environmental Corporation
8
9 Larry Butlien, Project Hydrogeologist
TRC Environmental Corporation
10
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1 MR. BUCH: Good afternoon. I'm
2 Keith Buch, Superfund Program Manager for the FAA
3 Technical Center Superfund Cleanup Program.
4 Notice of this meeting has been duly
5 advertised in the Press of Atlantic City. We're
6 starting a few minutes after two to make sure that
7 anyone that may arrive late has time to come to the
8 meeting to express any opinions that they may
9 offer.
10 This meeting is limited to
11 discussions on Area 27, Area 56, Area F, Area R and
12 Area S.
13 If you have another question
14 regarding an environmental program or another
15 superfund issue at the Tech Center, you're more
16 than welcome to see me after the meeting and I will
17 happily answer your question.
18 The Tech Center cannot investigate
19 and study the sites on their own. We have to
20 enlist the help of capable consultants. In this
21 case, the firm of TRC, Incorporated, who have been
22 here since 1986 and done an excellent job, has
23 prepared a proposed plan for these five no action
24 sites. They have a nice presentation that explains
25 our rationale in detail as to why we're taking no

1 action at these five sites.

2 So at this point, I would like to

3 turn the meeting over to our capable personnel at

4 TRC Environmental.

5 MS. OLIVA: Good afternoon. My name

6 is Jean Oliva. I'm Project Engineer with TRC

7 Environmental Corporation, and the first area we'll

8 be discussing today is Area 27, which is known as

9 the Fuel Mist Test Area.

10 Area 27 is located south of the

11 upper Atlantic City reservoir in the research and

12 development portion of the Technical Center.

13 Anti-misting additives to jet fuel were tested at

14 Area 27 in a designated test area from 1979 until

15 1986.

16 Also, in 1986, a fuel spill occurred

17 in which fuel drained into a catch basin down

18 through a storm drain and into a downgradient

19 drainage swale.

20 Contaminated soils were excavated

21 from the drainage swale and disposed of in

22 accordance with appropriate regulatory requirements

23 after the spill.

24 This is a photograph of one of the

25 fuel mist tests being conducted at Area 27.

1 At Area 27, several phases of
2 investigation were conducted to determine if the
3 fuel mist testing or the historic fuel spill had
4 impacted the environment. It included studies of
5 soil, groundwater, sediment and surface water
6 quality.
7 This is a photograph of one of the
8 wells being installed at Area 27, and over in this
9 area to the right of the red van is the drainage
10 swale where some of the contaminated soils were
11 removed.
12 The studies conducted at Area 27
13 concluded that there was no significant
14 contamination associated with the Fuel Mist Test
15 Area, itself.
16 However, it did identify the
17 presence of residual petroleum contamination within
18 the storm drain and the drainage swale. The storm
19 drain was flushed out and residual contaminants
20 were removed from the drainage swale and disposed
21 of off site.
22 Also, during the investigations,
23 polychlorinated biphenyls, or PCBs, were detected
24 in one groundwater sample.
25 However, their presence was not

1 confirmed by subsequent groundwater sampling.
2 A risk assessment was conducted for
3 Area 27 which concluded that human health and
4 ecological risks were within acceptable risk
5 guidelines under continued government use.
6 Therefore, no remedial activities or continued
7 monitoring were warranted.
8 Because the risk assessment in Area
9 27 was based on continued government use of the
10 site as a nonresidential area, the proposed plan
11 for Area 27 consists of Residential Site Use
12 Restrictions.
13 MR. BUTLIEN: The next area that
14 we're going to discuss today is Area 56, which is
15 known as the Abandoned Navy Landfill.
16 Area 56 is located in or adjacent to
17 the airport operations area south of the major
18 east-west runway and immediately southwest of the
19 FAA hangar.
20 Area 56 was the site of a closed
21 landfill which was operated by the Navy from 1943
22 to 1958. The nature and total volume of the land
23 fill material is unknown.
24 Currently, the 11-acre site is used
25 as a parking lot and softball field.

1 I don't know. It's supposed to be a
2 photograph of -- wait a minute. Okay. Technical
3 difficulty. This is supposed to be a photograph of
4 Area 56 showing the general layout of the site with
5 the softball field and the parking lot.
6 Here is a photograph on the ground
7 level showing the softball field looking toward the
8 southwest.
9 There were several phases of
10 remedial investigation which took place at Area 56
11 within and downgradient of the landfill area. The
12 studies included surface soil, subsurface soil and
13 groundwater quality testing.
14 In addition, a program of quarterly
15 groundwater monitoring began during May of 1994.
16 The results of the investigation did
17 not identify the presence of environmental impacts
18 to the site soils. There were several inorganic
19 contaminants which were identified in the
20 groundwater from the shallow aquifer above state
21 groundwater limits, which are known as PQLs.
22 Also, there were several volatile
23 organic compounds known as VOCs, which were
24 identified in the groundwater from the intermediate
25 aquifer above PQL area.

1 However, the results from the
2 quarterly groundwater sampling program has
3 indicated that there's been a significant decrease
4 in the levels of VOCs and inorganics over time.
5 This is a slide of a histogram, or
6 bar chart, which clearly indicates the downward
7 trend of inorganics in the shallow aquifer, which
8 is represented by the upper two bar charts, and the
9 decrease in VOCs in the intermediate aquifer, which
10 is represented by the lower bar chart.
11 The results of the risk assessment
12 indicated that human health and ecological risks
13 were within acceptable risk guidelines under a
14 continued government use scenario.
15 However, the continuation of
16 groundwater monitoring is justified due to the
17 presence of VOCs and inorganics above state
18 groundwater limits.
19 Therefore, the proposed plan for
20 Area 56 consists of Residential Site Use
21 Restrictions since the risk assessment was based on
22 continued government use as a nonresidential area
23 and continued groundwater monitoring to ensure that
24 contaminant concentrations do not pose a threat to
25 human health and environment in the future.

1 MS. OLIVA: The next area of
2 discussion is Area F, which is referred to as the
3 Air Blast Facility.
4 Area F is located north of the
5 east-west runway in the airport operations area of
6 the Technical Center.
7 Area F was a testing area where air
8 was blasted at high velocities at jet fuselages,
9 which were located on a concrete pad.
10 Area F was also the site of
11 underground storage of jet fuel in original storage
12 tanks and replacement storage tanks, each of which
13 have subsequently been removed from the site. In
14 the late 1980s, Area F was also the proposed
15 location of a laboratory building.
16 This was to be a photograph of
17 historic air blast testing activities at the site.
18 Area F was investigated to determine
19 if the air blast testing or fuel storage activities
20 had impacted the environment.
21 The investigation was also conducted
22 to characterize the proposed laboratory building
23 site to ensure that if the building was
24 constructed, that the occupants would not be
25 exposed to unhealthy conditions.

1 The area of investigation includes
2 studies of soil and groundwater quality.
3 The studies conducted at Area F did
4 not identify the presence of environmental impacts
5 associated with either the air blast test area or
6 the underground fuel storage area, and no
7 environmental impacts were identified in the
8 proposed laboratory building area.
9 A human health risk assessment was
10 conducted which concluded that the site -- that
11 human health risks were within acceptable risk
12 guidelines under continued government use and that
13 the site posed no significant risk to ecological
14 receptors.
15 Therefore, no remedial activities or
16 continued monitoring are warranted. Because the
17 area of risk assessment was based on continued
18 government use of the site as a nonresidential
19 area, the proposed plan for Area F consists of
20 Residential Site Use Restrictions.
21 MR. BUTLIEN: The next area that
22 we'll be discussing is Area R, which is known as
23 the Trash Dump.
24 Area R is located in a relatively
25 undeveloped portion of the FAA facility west of

1 Tilton Road.

2 Area R was the site of a former

3 borrow pit until 1958 when the Area 56 landfill was

4 closed.

5 The Area R landfill was operated by

6 the FAA from 1958 to 1978 or 1979 when it was

7 closed by a fire. The landfill material consists

8 of over 26,000 cubic yards of wood, brush, paper

9 and assorted construction debris. The western

10 portion of the site consists of fill material and

11 is higher in elevation and the eastern portion of

12 the site did not undergo significant filling and

13 occasionally contains ponded water. The entire

14 seven-acre cleared area is surrounded by dense

15 woods.

16 This was to be a photo of the

17 entrance to Area R.

18 We got one photo. This is a photo

19 of the general layout of the site showing the lower

20 area to the left and the higher filled area to the

21 right-side of the photo.

22 This is a close-up shot of some

23 construction debris that's on the ground surface in

24 the filled area. What you see is some concrete

25 blocks and there are some asphalt fragments that

1 make up a majority of the construction material on
2 the surface of the ground.
3 There were several phases of
4 investigation which took place within and
5 downgradient of the landfill area. The studies
6 included surface soil, subsurface soil and
7 groundwater sample testing.
8 In addition, a program of quarterly
9 groundwater monitoring began during May of 1993.
10 The studies indicated that the
11 site's surface soils exhibited semi-volatile
12 organic compounds known as SVOCs above soil cleanup
13 criteria in six of 11 samples.
14 However, this was due to an
15 abundance of asphalt fragments which were found in
16 the fill area surface soils. There was only one
17 subsurface soil sample which exceeded the soil
18 cleanup criteria for Beryllium. Also, there were
19 select VOCs and inorganics which exceeded PQLs in
20 the shallow groundwater at the site.
21 Quarterly groundwater sampling has
22 been used to confirm that VOCs have not migrated
23 outside of the fill area.
24 This is a histogram of a monitoring
25 well located in the fill area indicating a

1 consistent level of VOCs over time.
2 The results of the risk assessment
3 indicated that human health risks were within
4 acceptable risk guidelines under a continued
5 government use scenario.
6 In addition, there were no
7 significant risks to ecological receptors.
8 However, the continuation of
9 groundwater monitoring is justified due to the
10 presence of VOCs above state groundwater limits.
11 Furthermore, since the groundwater
12 ingestion risk at Area R is at the upper end of
13 EPA's acceptable cancer risk range, groundwater use
14 restrictions will be established for the site.
15 Therefore, the proposed plan for
16 Area R consists of Residential Site Use
17 Restrictions since a risk assessment was based on a
18 continued government use as a nonresidential area,
19 continued groundwater monitoring to ensure the
20 contaminants do not migrate outside of the fill
21 area and do not pose a threat to human health or
22 the environment and, finally, government or
23 groundwater use restrictions to prevent future
24 employee exposure to the ground water at the site.
25 MS. OLIVA: Our last area of

1 discussion is Area S, which is referred to as the
2 Excavated Area West of Tilton Road. It's located
3 in an undeveloped portion of the facility just
4 south of Area R.
5 The historic use of Area S is
6 unknown. The site was identified on the basis of
7 an EPA review of historic aerial photographs which
8 identified the presence of areas of standing
9 liquid, stained areas and mounded material. The
10 site is currently characterized by areas of ponded
11 water and a few mounded areas.
12 Area S was investigated to determine
13 if the historic site use had impacted the
14 environment. The site investigations included
15 characterization of soil, groundwater, sediment and
16 surface water quality. Some of the mounded areas
17 at the site were investigated by digging test
18 pits.
19 This slide showed what some of the
20 test pits encountered and some of the test pits in
21 their debris, such as cable and wood was
22 encountered. Other test pits simply encountered
23 soil materials.
24 The studies conducted at Area S did
25 not identify the presence of any environmental

1 impacts associated with its historic site use.
2 Toluene was detected in two sediment samples
3 collected at the site.
4 However, its presence was not
5 confirmed by subsequent sampling.
6 The Area S risk assessment concluded
7 that the site poses no significant risks to human
8 health or to ecological receptors and, therefore,
9 no remedial activities or continued monitoring is
10 warranted.
11 Because the Area S risk assessment
12 was based on continued government use of the site
13 as a nonresidential area, the proposed plan for
14 Area S consists of Residential Site Use
15 Restrictions.
16 In summary, the preferred remedy for
17 each of the areas includes Residential Site Use
18 Restrictions.
19 In addition, Area 56 includes
20 continued groundwater monitoring and Area R
21 includes both continued groundwater monitoring and
22 groundwater use restrictions.
23 The EPA, New Jersey DEP and the
24 Pinelands Commission have all provided concurrence
25 with this proposed plan.

1 This slide summarizes the decision
2 process which will be used to develop the final
3 Record of Decision, or ROD, for the site.
4 Based on verbal public comments
5 which will be accepted here this afternoon, as well
6 as written public comments, which will be accepted
7 through March 15th, the final ROD will be
8 developed.
9 Public comments will be addressed
10 within the responsiveness summary section of the
11 ROD, which will be made available here at the
12 Atlantic County Public Library.
13 When the ROD is finalized, a notice
14 will also be placed in the Press of Atlantic City.
15 With that, I'll turn the
16 presentation back to Keith.
17 MR. BUCH: Why don't we attempt to
18 take about two minutes to see if we can resurrect
19 those photos that we weren't able to see?
20 If we're unsuccessful after two
21 minutes, I'll close the meeting.
22 (Pause.)
23 MR. BUTLIEN: There it is. Okay.
24 MR. BUCH: Why don't we go through
25 the photos we weren't able to see and, Larry and

1 Jean, you can just describe them to the audience so
2 they have a record of what was shown.
3 MR. BUTLIEN: Now, this is a
4 photograph of Area 56, which was taken from atop
5 the FAA hangar. It's a nice panoramic shot showing
6 the parking lot to the left-side and the softball
7 field to the right-side of the photo.
8 MS. OLIVA: This is a photograph at
9 Area F of one of the air blast tests being
10 conducted on the concrete pad.
11 MR. BUTLIEN: Yes. This is a
12 photograph at the entrance to Area R indicating
13 that it is a superfund site.
14 MS. OLIVA: And this is a photograph
15 of the test pits at Area S. It's not very clear,
16 but in this test pit right in this area, there are
17 a number of cables that you can see.
18 MR. BUCH: Yes.
19 MS. OLIVA: And pieces of wood.
20 This test pit, which was dug in a mounded area,
21 simply consisted of soil materials, and that should
22 be all the photographs.
23 MR. BUTLIEN: Those were the missing
24 photos.
25 MR. BUCH: Very good. Sorry for the

technical difficulty, but machines will be machines.

That concludes our public hearing. As Jean said, comments can be sent to my address, which would be Keith C. Buch, Project Manager, Federal Aviation Administration Technical Center at 630 Atlantic City International Airport, New Jersey 08405.

Written comments may be sent to me as long as they arrive postmarked on or before March 15th, 1999.

Thank you very much for coming out today and have a safe trip home. This meeting is adjourned.

(Meeting adjourned at 2:28 p.m.)

1 C E R T I F I C A T I O N

2

3 I, BETTY ANN WASILEWSKI, a Certified
4 Shorthand Reporter of the State of New Jersey, do
5 hereby certify that the foregoing is a true and
6 accurate transcript of the testimony as taken
7 stenographically by and before me at the time,
8 place and on the date hereinbefore set forth.
9 I DO FURTHER CERTIFY that I am neither a
10 relative nor employee nor attorney nor counsel of
11 any of the parties to this action, and that I am
12 neither a relative nor employee of such attorney or
13 counsel, and that I am not financially interested
14 in this action.
15
16
17 BETTY ANN WASILEWSKI
Certified Shorthand Reporter
18 License No. XI01032
Certificate of Merit
19 Registered Professional Reporter
My Commission expires 12/18/03
20
21 DATED: March 4, 1999.
22
23
24
25

APPENDIX D

DATA SUMMARY TABLES

TABLE 10-3. SURFACE SOIL SAMPLES — SITE 27

Sample ID	Date Taken	New Jersey Grid Coordinates N	New Jersey Grid Coordinates E	Depth (ft)	Analysis	Constituents Detected? (Y/N)	Notes
27-SS1	3/25/87	219,294	2,032,044	0 - 2	HCIR	N	
27-SS2	3/25/87	219,324	2,032,161	0 - 2	HCIR	Y	
27-SS3	3/25/87	219,346	2,032,087	0-2, VOA @ .5-1	PP+40	Y	
27-SS4	3/25/87	219,413	2,032,145	0 - 2	HCIR	Y	
27-SS5	3/25/87	219,350	2,032,029	0-0.5 (to liner)	HCIR	N	
27-SS6	3/25/87	219,377	2,032,050	0-0.5 (to liner)	PP+40	Y	
27-SS7	3/25/87	219,354	2,031,877	0-2, VOA @ .5-1	PP+40	Y	
27-SS8	3/25/87	219,433	2,031,084	0 - 2	HCIR	Y	
27-SS9	3/25/87	219,302	2,032,004	0 - 2	HCIR	Y	
27-SS10	3/25/87	219,932	2,031,937	0 - 2	HCIR	Y	
27-SS11	3/25/87	219,566	2,032,058	0-2, VOA @ .5-1	PP+40	Y	
27-SS12	3/25/87	219,505	2,032,068	0 - 2	HCIR	Y	
27-SS13	3/25/87	219,198	2,031,823	0-2, VOA @ .5-1	PP+40	Y	
27-SS14A	3/26/87	219,614	2,031,946	0 - 1	JFC	Y	
27-SS14B	3/26/87	219,614	2,031,946	0 - 1	JFC	Y	DUPLICATE OF 27-SS14A
27-SS15	3/25/87	219,778	2,031,962	0 - 1	JFC	N	
27-SS16	3/25/87	219,528	2,031,891	0 - 1	JFC	N	
41-FB2	3/25/87	Field Blank		------	VOA	Y	
TB-100-7	3/26/87	Trip Blank		------	VOA	N	

Analysis:

HCIP = Petroleum hydrocarbons
PP+40 = Priority pollutants plus 40 additional peak
VOA = Voltaile organic analysis
JFC = Jet fuel chromatograph fingerprinting

TABLE 10-4
CONSTITUENTS DETECTED IN SURFACE SOIL -- SITE 27

SAMPLE IDENTIFICATION:	27-SS2	27-SS3	27-SS4	27-SS6	27-SS7	27-SS8	27-SS9	27-SS10	27-SS11	27-SS12	27-SS13	27-SS14A	27-SS14B	41-FB2
SAMPLE DEPTH (FT):	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-1	0-1	BLANK
SAMPLE ANALYSIS:	HCIR	PP+40	HCIR	PP+40	PP+40	HCIR	HCIR	HCIR	PP+40	HCIR	PP+40	JFC	JFC	VOA
****** VOA (PPB) ********														
METHYLENE CHLORIDE.....				11	21				11		5			7.1
TETRACHLOROETHENE.....					11				5.9					
TOLUENE.....					7.3									
ADDITIONAL VOA PEAKS.....		0		149	0				160		0			110
***** BNA (PPB) *******														
ADDITIONAL BNA PEAKS.....		641000		731000	8040				0		0			
***** PEST/PCB (PPB) *****														
4,4'-DDE.....									59					
4,4'-DDT.....									150					
***** METALS (PPM) ******														
AS.....				2.2										
CD.....		1.7		2.4	1.1				1.1		1.7			
CR.....		10.6		16	4.9				4.3		12			
CU.....		7.4		9.7	5.5				5.8		7.1			
PB.....		9.1		9.9	9.6				7.5		8.7			
ZN.....		12.6		8	7.6				6.9		9			
CYANIDE (PPM).....														
PHENOL (PPM).....				0.47										
PETROLEUM HYDROCARBONS (PPM).....	4.2		14			5.1	7.6	283		23		16000	11000	

NOTE: ONLY CONCENTRATIONS ABOVE THE DETECTION LIMITS ARE SHOWN

TABLE 10-6. SOIL BORING SAMPLES -- SITE 27

Sample ID	Date Taken	New Jersey Grid Coordinates N	New Jersey Grid Coordinates E	Depth (ft)	Analysis	Constituents Detected? (Y/N)	Notes
27-B1-3	6/08/87	219,347	2,031,922	4 - 6	PP+40	Y	
27-B1-5	6/08/87	219,347	2,031,922	8 - 10	BNA, VOA	Y	
27-B2-3	6/01/87	219,312	2,032,109	4 - 6	PP+40	Y	
27-B2-5	6/01/87	219,312	2,032,109	8 - 10	BNA, VOA	Y	
27-B3-2	6/30/87	219,375	2,032,045	2 - 4	PP+40	Y	
27-B3-5	6/30/87	219,375	2,032,045	8 - 10	HCIR	Y	
27-B4-3	6/01/87	219,495	2,032,048	4 - 6	PP+40	Y	
27-B4-5	6/01/87	219,495	2,032,048	8 - 10	BNA, VOA	Y	
27-B1-FB16	6/08/87	Field Blank		------	VOA	N	
41-B2-TB8	6/09/87	Trip Blank		------	VOA	N	
27-B3-FB30	6/30/87	Field Blank		------	VOA	Y	
FAA-TB5	7/01/87	Trip Blank		------	VOA	N	
27-B4-FB11	6/01/87	Field Blank		------	VOA	N	
29-B3-TB6	6/03/87	Trip Blank		------	VOA	Y	

Analyses:

PP+40 = Priority pollutant plus 40 additional peaks
BNA = Base/neutral and acid extractables
VOA = Volatile organics

TABLE 10-7
CONSTITUENTS DETECTED IN SOIL BORING SAMPLES -- SITE 27

SAMPLE IDENTIFICATION:	27-B1-3	27-B1-5	27-B2-3	27-B2-5	27-B3-2	27-B3-5	27-B4-3	27-B4-5	29-B3-TB6
SAMPLE DEPTH (FT):	4 - 6	8 - 10	4 - 6	8 - 10	2 - 4	8 - 10	4 - 6	8 - 10	BLANK
SAMPLE ANALYSIS:	PP+40	BNA,VOA	PP+40	BNA,VOA	PP+40	BNA,VOA	PP+40	BNA,VOA	VOA
****** VOA (PPB) ********									
METHYLENE CHLORIDE.....				7	10	19	7	6	61
ADDITIONAL VOA PEAKS.....	0	0	0	0	0	8	0	0	44
***** BNA (PPB) *******									
ADDITIONAL BNA PEAKS.....	3600	1600	10600	8200	86960	43970	8000	19900	
***** PEST/PCB (PPB) *****									
***** METALS (PPM) ******									
CR.....	2.6		3.5		4.3		6.9		
CU.....			8.7				6.9		
PB.....	3		2.5		4		3.4		
ZN.....	11		7.5		19.4		11		
CYANIDE (PPM).....									
PHENOL (PPM).....			0.13						

NOTE: ONLY CONCENTRATIONS ABOVE THE DETECTION LIMITS ARE SHOWN

TABLE 10-8. GROUND WATER SAMPLES -- SITE 27

Sample ID	Date Taken	New Jersey Grid Coordinates N	New Jersey Grid Coordinates E	Depth (ft)	Analysis	Constituents Detected? (Y/N)	Notes
27-MW-1S	6/25/87	219,261	2,031,950	7.0 - 27.0	PP+40	Y	
27-MW-2S	6/25/87	219,564	2,031,986	5.0 - 25.0	PP+40	Y	
27-MW-3S	6/29/87	219,697	2,031,877	5.0 - 25.0	PP+40	Y	
27-MW-4S	6/29/87	219,861	2,031,924	3.0 - 23.0	PP+40	Y	
27-MW-5S	6/25/87	219,405	2,032,100	5.0 - 25.0	PP+40	Y	
27-MW-6S	6/25/87	219,336	2,031,758	10.0 - 30.0	PP+40	Y	
27-MW-FB6	6/29/87	Field Blank		------	PP Organics	Y	
MW-TB4	6/29/87	Trip Blank		------	PP Organics	Y	
27-MW-FB4	6/25/87	Field Blank		------	PP Organics	Y	
FAA-TB3	6/25/87	Trip Blank		------	PP Organics	Y	

Analyses:

PP+40 = Priority pollutant plus 40 additional peaks

PP Organics = Priority pollutant organics

TABLE 10-9
CONSTITUENTS DETECTED IN GROUND WATER -- SITE 27

SAMPLE IDENTIFICATION:	27-MW1S	27-MW2S	27-MW-3S	27-MW4S	27-MW5S	27-MW6S	27-MW-FB4	27-MW-FB6	FAA-MW-TB3	FAA-MW-TB4
SAMPLE DEPTH (FT):	7 - 27	5 - 25	3 - 18	3 - 23	5 - 25	10 - 30	BLANK	BLANK	BLANK	BLANK
SAMPLE ANALYSIS:	PP+40	PP+40	PP+40	PP+40	PP+40	PP+40	PP+40	PP+40	PP+40	PP+40
****** VOA (PPB) ********										
METHYLENE CHLORIDE.....			8	9				87	160	11
CHLOROFORM.....	5									
ADDITIONAL VOA PEAKS.....	91	0	0	0	0	0	0	0	0	*
***** BNA (PPB) *******										
ADDITIONAL BNA PEAKS.....	0	0	6	165	48	48	146	5	5	*
***** PEST/PCB (PPB) *****										
AROCLOR-1242.....					0.83					
***** METALS (PPB) ******										
BE.....	8.2									
CR.....						13.3				
HG.....					0.54					
PB.....		11.7		7.4	8.9	10.9				
ZN.....				261	105	28.8				
CYANIDE (PPB).....										
PHENOL (PPB).....			15.5							
PH (STANDARD UNITS).....	5	5	6.5	5.5	4.65	5.8				
CONDUCTIVITY (MICROMHOS/CM).....	32	82	75	50	49	50				

* DATA NOT REPORTED
NOTE: ONLY CONCENTRATIONS ABOVE THE DETECTION LIMITS ARE SHOWN

TABLE 3-1

PHASE II SAMPLES - AREA 27

SAMPLE NUMBER	MATRIX	DATE	NJ GRID COORD NORTH	NJ GRID COORD EAST	DEPTH	ANALYSIS	NOTES
27-MW5S	WATER	11/30/88	219,405	2,032,100	5.0 - 25.0	PCB	WELL 27-MW5S
27-MW5SB	WATER	12/5/88	219,405	2,032,100	5.0 - 25.0	PCB	RESAMPLE OF 27-MW5S
20A-MW-FB3	WATER	11/30/88	FIELD BLANK		- -	PP+40	
27-MW-FB6	WATER	12/5/88	FIELD BLANK		- -	PCB	
SW-9	WATER	09/21/88	220,012	2,031,943	0.5	VOA	SURFACE WATER, AREA 27 SWALE DOWNSTREAM
SD-9	SEDIMENT	09/21/88	220,012	2,031,943	0 - 0.5	HCIR	SEDIMENT, AREA 27 SWALE DOWNSTREAM
SW-10	WATER	09/21/88	219,832	2,031,950	0.5	VOA	SURFACE WATER, AREA 27 SWALE UPSTREAM
SD-10	SEDIMENT	09/21/88	219,832	2,031,950	0 - 0.5	HCIR	SEDIMENT, AREA 27 SWALE UPSTREAM
SD-FB1	WATER	09/21/88	FIELD BLANK		- -	PP+40, HCIR	
SD-TB1	WATER	09/21/88	FIELD BLANK		- -	VOA	

ANALYSIS CODES:

HCIR	TOTAL PETROLEUM HYDROCARBONS
PCB	POLYCHLORINATED BIPHENYLS (AROCLOR)
VOA	VOLATILE ORGANIC ANALYSIS
PP+40	PRIORITY POLLUTANTS PLUS 40 ADDITIONAL PEAKS

TABLE 3-2

CONSTITUENTS DETECTED IN GROUND WATER, SEDIMENT, AND SURFACE WATER - AREA 27

(PAGE 1 OF 2)

	GROUND WATER			BLANK		SEDIMENT			BLANK		
SAMPLE IDENTIFICATION:	27-MW5S	27-MW5S-A	27-MW5S-B	20A-MWFB3	27-MW-FB6	SD-9	SD-9	SD-10	SD-FB1	SD-TB1	
SAMPLE DEPTH (FT):	5 - 25	5 - 25	5 - 25	BLANK	BLANK	0.0-0.5	DUPLICATE	0.0-0.5	BLANK	BLANK	NJDEP
SAMPLE ANALYSIS:	PP+40	PCB	PCB	PP+40	PCB	HCIR	HCIR	HCIR	PP+40,HCIR*	VOA	SOIL
DATE:	1987	1988	1988	1988	1988	1988	1988	1988	1988	1988	CLEANUP OBJECTIVE
****** VOA (PPB) ********											
CHLOROFORM				5							
ADDITIONAL LEKS				120					270		
***** PCB (PPB) *****											
AROCLOR-1242.....	0.83	ND	ND	ND	ND						
PETROLEUM HYDROCARBONS (PPM)						110	89	350			100
PH (STANDARD UNITS).....	4.65	4.5	5.1								
CONDUCTIVITY (MICROMHOS/CM).	49	15	35								

NOTE: ONLY CONCENTRATIONS ABOVE THE DETECTION LIMITS ARE SHOWN

ND = NOT DETECTED

* ONLY VOLATILE, PCB, AND PETROLEUM HYDROCARBON DATA SHOWN FOR BLANKS

TABLE 3-2

CONSTITUENTS DETECTED IN GROUND WATER, SEDIMENT, AND SURFACE WATER - AREA 27

(PAGE 2 OF 2)

	SURFACE WATER		
SAMPLE IDENTIFICATION:	SW-9	SW-9	SW-10
SAMPLE DEPTH (FT):	0.5	DUPLICATE	0.5
SAMPLE ANALYSIS:	VOA	VOA	VOA
DATE:	1988	1988	1988
****** VOA (PPB) ********	ND	ND	ND

TABLE 1
CONSTITUENTS DETECTED IN SEDIMENT SAMPLES -- AREA 27

SAMPLE IDENTIFICATION:	27-SD11	27-SD12	27-SD13	27-SD14	27-SD15	27-FB1	27-TB1
SAMPLE DEPTH (FT):	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	BLANK	BLANK
SAMPLE ANALYSIS:	TPH	PP+40	TPH	TPH	TPH	PP+40	VOA
****** VOA (PPB) ********							
METHYLENE CHLORIDE.....		7				6	5
ADDITIONAL VOA PEAKS.....		12 (1)				19 (1)	17 (1)
***** BNA (PPB) *******							
DI-N-BUTYLPHTHALATE.....		2100					
ADDITIONAL BNA PEAKS.....		2000					
***** PEST/PCB (PPB) *****							
***** METALS (PPM) ******							
CR.....		3.9					
PB.....		3.9					
ZN.....		7.1					
CYANIDE (PPM).....							
PHENOL (PPM).....		0.25					
PETROLEUM HYDROCARBONS (PPM).....	30		29	11	16		

NOTE: ONLY CONCENTRATIONS ABOVE THE DETECTION LIMITS ARE SHOWN
METHYLENE CHLORIDE AND DI-N-BUTYLPHTHALATE WERE ALSO DETECTED IN METHOD BLANK

(1) The concentration of additional VOA peaks were due to the presence of acetone.

TABLE 1

TOTAL PETROLEUM HYDROCARBONS DETECTED IN SUBSURFACE SOIL SAMPLES - AREA 27

SAMPLE IDENTIFICATION:	27-B5	27-B6	27-B7	27-B8	27-B9	27-B10	27-B11
SAMPLE DEPTH (FT):	2 - 4	2 - 4	0 - 2	0 - 2	2 - 4	2 - 4	0 - 2
SAMPLE ANALYSIS:	TPH	TPH	TPH	TPH	TPH	TPH	TPH
PETROLEUM HYDROCARBONS (PPM)	390	110	190	1500	35	9.2	690

SAMPLE IDENTIFICATION:	27-B12	27-B13	27-B14	27-B15	27-B16	27-FB
SAMPLE DEPTH (FT):	2 - 4	2 - 4	0 - 2	0 - 2	2 - 4	2 - 4
SAMPLE ANALYSIS:	TPH	TPH	TPH	TPH	TPH	TPH
PETROLEUM HYDROCARBONS (PPM)	72	150	210	95	100	1.0 U

U = Not detected to the reported detection limit

TRC

TABLE 13-3. SURFACE SOIL SAMPLES — SITE 56

Sample ID	Date Taken	New Jersey Grid Coordinates N	New Jersey Grid Coordinates E	Depth (ft)	Analysis	Constituents Detected? (Y/N)	Notes
56-SS1A	3/25/87	224,023	2,027,479	.5 - 1	VOA	N	
56-SS1B	3/25/87	224,139	2,027,459	.5 - 1	VOA	Y	CONSTITUENT ALSO IN BLANK
56-SS2A	3/25/87	223,910	2,027,532	.5 - 1	VOA	N	
56-SS2B	3/25/87	223,730	2,028,171	.5 - 1	VOA	N	
56-SS1	3/25/87	224,023 224,139	2,027,479 2,027,459	0 - 2	PP+40	Y	NO VOA ANALYSIS COMPOSITE OF 1A+1B
56-SS2	3/25/87	223,910 223,730	2,027,532 2,028,171	0 - 2	PP+40	Y	NO VOA ANALYSIS COMPOSITE OF 2A+2B
41-FB2	3/25/87	Field Blank		-	VOA	Y	
TB-100-7	3/26/87	Trip Blank		-	VOA	N	

Analysis:
PP+40 = Priority pollutant plus 40 additional peaks
VOA = Volatile organics

TABLE 13-4
CONSTITUENTS DETECTED IN SURFACE SOIL -- SITE 56

SAMPLE IDENTIFICATION:	56-SS1	56-SS1A	56-SS1B	56-SS2	56-SS2A	56-SS2B	41-FB2
SAMPLE DEPTH (FT):	0 - 2	0.5-1.0	0.5-1.0	0 - 2	0.5-1.0	0.5-1.0	BLANK
SAMPLE ANALYSIS:	PP+40	VOA	VOA	PP+40	VOA	VOA	VOA
****** VOA (PPB) ********							
METHYLENE CHLORIDE.....			6				
ADDITIONAL VOA PEAKS.....		0	0		0	0	7.1
***** BNA (PPB) *******							
BIS(2-ETHYLHEXYL)PHTHALATE.....							
ADDITIONAL BNA PEAKS.....	210000			6200			
***** PEST/PCB (PPB) *****							
***** METALS (PPM) ******							
CR.....	5.1			8			
PB.....	6.2			6.2			
ZN.....	9.9			10			
CYANIDE (PPM).....							
PHENOL (PPM).....							

NOTE: ONLY CONCENTRATIONS ABOVE THE DETECTION LIMITS ARE SHOWN

TABLE 13-6. SOIL BORING SAMPLES — SITE 56

Sample ID	Date Taken	New Jersey Grid Coordinates N	New Jersey Grid Coordinates E	Depth (ft)	Analysis	Constituents Detected? (Y/N)	Notes
56-B1-4	7/01/87	224,231	2,027,568	6 - 8	PP+40	Y	
56-B1-11	7/01/87	224,231	2,027,568	20 - 22	BNA, VOA	Y	CONSTITUENT ALSO IN BLANK
56-B2-5	5/26/87	223,857	2,027,516	8 - 10	BNA	Y	
56-B2-9	5/26/87	223,857	2,027,516	16 - 18	PP+40	Y	
56-B3-2	5/21/87	223,867	2,028,187	2 - 4	PP+40	Y	
56-B3-12	5/21/87	223,867	2,028,187	22 - 24	BNA	N	
56-B4-2	5/21/87	223,687	2,027,826	2 - 4	PP+40	Y	
56-B4-8	5/21/87	223,687	2,027,826	14 - 16	BNA	N	
56-B3-FB5	5/21/87	Field Blank		-	VOA	Y	
56-B4-FB6	5/22/87	Field Blank		-	VOA	Y	
56-B4-TB3	5/22/87	Trip Blank		-	VOA	Y	
D-B3-FB7	5/26/87	Field Blank		-	VOA	Y	
D-B2-TB4	5/27/87	Trip Blank		-	VOA	Y	
56-B1-FB31	7/01/87	Field Blank		-	VOA	Y	
FAA-TB5	7/01/87	Trip Blank		-	PP Organics	N	
56-B1-FB32	7/01/87	Field Blank		-	VOA	Y	
56-B3-TB3	5/21/87	Trip Blank		-	VOA	N	

Analyses:

PP+40 = Priority pollutant plus 40 additional peaks
BNA = Base/neutral and acid extractables
VOA = Volatile organics
PP Organics = priority pollutant organics

TABLE 13-7
CONSTITUENTS DETECTED IN SOIL BORINGS -- SITE 56

SAMPLE IDENTIFICATION:	56-B1-2	56-B1-11	56-B2-5	56-B2-9	56-B3-2	56-B3-12	56-B4-2	56-B4-8	56-B1-FB31	56-B1-FB32	56-B3-FB5	56-B4-FB6	56-B4-TB3	D-B3-FB7	D-B2-TB4
SAMPLE DEPTH (FT):	2 - 4	20 - 22	8 - 10	16 - 18	2 - 4	22-24	2 - 4	14-16	BLANK	BLANK	BLANK	BLANK	BLANK	BLANK	BLANK
SAMPLE ANALYSIS:	PP+40	BNA,VOA	BNA	PP+40	PP+40	BNA	PP+40	BNA	VOA	VOA	VOA	VOA	VOA	VOA	VOA
****** VOA (PPB) ********															
METHYLENE CHLORIDE.....	18	14		10	21		16		560	640	7	7	22	15	17
ADDITIONAL VOA PEAKS.....	52	0		31	27		0		250	210	125	35	100	81	84
***** BNA (PPB) *******															
BIS(2-ETHYLHEXYL)PHTHALATE.....			4200	7500											
ADDITIONAL BNA PEAKS.....	940	77870	0	0	20000	20200	7400	400							
***** PEST/PCB (PPB) *****															
***** METALS (PPM) ******															
CR.....	4.2				4.6		3.1								
PB.....	49.3			1.4	5.4		1.2								
ZN.....	23.3			5.3	8.1		5								
CYANIDE (PPM).....															
PHENOL (PPM).....															

NOTE: ONLY CONCENTRATIONS ABOVE THE DETECTION LIMITS ARE SHOWN

TABLE 13-8. GROUND WATER SAMPLES — SITE 56

Sample ID	Date Taken	New Jersey Grid Coordinates N	New Jersey Grid Coordinates E	Depth (ft)	Analysis	Constituents Detected? (Y/N)	Notes
56-MW-1S	6/24/87	224,670	2,027,348	8.0 - 28.0	PP+40	Y	
56-MW-2D	6/24/87	223,864	2,027,573	75.0 - 95.0	PP+40	Y	
56-MW-2S	6/24/87	223,855	2,027,594	11.5 - 31.5	PP+40	Y	
56-MW-3S	6/23/87	223,772	2,028,025	17.0 - 37.0	PP+40	Y	
56-MW-4D	6/23/87	223,843	2,028,377	80.0 - 100.0	PP+40	Y	
56-MW-4S	6/23/87	223,857	2,028,369	18.9 - 39.2	PP+40	Y	
56-MW-5S	6/23/87	223,547	2,028,015	18.6 - 38.8	PP+40	Y	
56-MW-FB2	6/23/87	Field Blank		-	PP Organics	Y	
29-MW-FB3	6/24/87	Field Blank		-	PP Organics	N	
FAA-MW-TB2	6/24/87	Trip Blank		-	PP Organics	N	

Analyses:

PP+40 = Priority pollutant plus 40 additional peaks

PP Organics = Priority pollutant organics

TABLE 13-9
CONSTITUENTS DETECTED IN MONITORING WELLS -- SITE 56

SAMPLE IDENTIFICATION:	56-MW-1S	56-MW-2S	56-MW-2D	56-MW-3S	56-MW-4S	56-MW-4D	56-MW-5S	56-MW-FB2
SAMPLE DEPTH (FT):	8 - 28	11.5-31.5	75 - 95	17 - 37	18.9-39.2	80 - 100	18.6-38.8	BLANK
SAMPLE ANALYSIS:	PP+40	PP+40	PP+40	PP+40	PP+40	PP+40	PP+40	PP+40
****** VOA (PPB) ********								
METHYLENE CHLORIDE.....								180
1,1-DICHLOROETHANE.....						29		
1,1,1-TRICHLOROETHANE.....						27		
ADDITIONAL VOA PEAKS.....	0	0	0	0	0	0	0	0
***** BNA (PPB) *******								
N-NITROSODIPHENYLAMINE.....								43
FLUORANTHENE.....					11			
BIS(2-ETHYLHEXYL)PHTHALATE.....		11	14	11	18		11	14
ADDITIONAL BNA PEAKS.....	0	0	0	28	131	24	148	0
***** PEST/PCB (PPB) *****								
***** METALS (PPB) ******								
BE.....					8			
CD.....					40			
CR.....			12		281	71		
CU.....					216			
HG.....				0.36	3.1	0.65		
NI.....					117			
PB.....	5.1		37.2	6	204	18.2	10.9	
SE.....				5.8	6			
ZN.....	33	50	30	23	415	40	42	
CYANIDE (PPB).....					17.6			
PHENOL (PPB).....	33.5	15.9	17.3	19.2	36.8	14.8	27	
PH (STANDARD UNITS).....	5.6	6.5	7.36	4.65	5.2	6.8	5.4	
CONDUCTIVITY (MICROMHOS/CM).....	68	162	65	125	80	185	80	

TABLE 6-1

GROUND WATER SAMPLES - AREA 56

SAMPLE NUMBER	DATE	NJ GRID COORD NORTH	NJ GRID COORD EAST	DEPTH (FT)	ANALYSIS	NOTES
56-MW1S	12/5/88	224,670	2,027,348	8.0 - 28.0	GWQP	
56-MW2S	12/5/88	223,855	2,027,594	11.5 - 31.5	GWQP	
56-MW3S	12/5/88	223,772	2,028,025	17.0 - 37.0	GWQP	
56-MW5S	12/5/88	223,547	2,028,015	18.6 - 38.8	GWQP	
56-MW-FB6	12/5/88	FIELD BLANK		- -	GWQP, PP METALS (U/F)	
56-MW4S	1/25/89	223,857	2,028,369	18.9 - 39.2	GWQP, PP METALS (U/F)	
56-MW4SFB	1/25/89	FIELD BLANK		- -	GWQP, PP METALS (U/F)	

ANALYSIS CODES:

GWQP	GROUND WATER QUALITY PARAMETERS CHEMICAL OXYGEN DEMAND, TOTAL ORGANIC CARBON, NITRATE, NITROSGEN, TOTAL SUSPENDED SOLIDS
PP METALS	PRIORITY POLLUTANT METALS
(U/F)	UNFILTERED SAMPLE/FILTERED SAMPLE

TABLE 6-2

CONSTITUENTS DETECTED IN MONITORING WELLS -- AREA 56

SAMPLE IDENTIFICATION:	56-MW-1S	56-MW-2S	56-MW-3S	56-MW-4SU	56-MW-4SF	56-MW-5S	56-MW-FB6	56-MW4SFB
SAMPLE DEPTH (FT):	8 - 28	11.5-31.5	17 - 37	18.9-39.2	18.9-39.2	18.6-38.8	BLANK	BLANK
SAMPLE ANALYSIS:	GWQP	GWQP	GWQP	GWQP METALS (TOTAL)	METALS (DISS.)	GWQP	GWQP	GWQP METALS (DISS.)
* WATER QUALITY PARAMETERS (PPM)*								
CHEMICAL OXYGEN DEMAND		13.2	11.2					
AMMONIA, AS N.....		0.47						
NITRATE, AS N.....	0.85	0.27	2.2	4.6		1.6		
TOTAL ORGANIC NITROGEN.....						0.13		
TOTAL ORGANIC CARBON.....	1.3	2.4	1.3	1.5		1.3		0.52
TOTAL SUSPENDED SOLIDS.....	11.0	45.0	206	248		13.0		
***** METALS (PPB) ******								
CR.....				237				
CU.....				32.3				
HG.....				0.23				
NI.....				306	183			
PB.....							69.7	
ZN.....				114	79.7		249	62.4
PH (STANDARD UNITS).....	4.85	5.7	4.2	5.6		5.0		
CONDUCTIVITY (MICROMHOS/CM).....	45	182	120	120		80		

NOTE: ONLY CONCENTRATIONS ABOVE THE DETECTION LIMITS ARE SHOWN

GWQP = GENERAL WATER QUALITY PARAMETERS
CHEMICAL OXYGEN DEMAND, TOTAL ORGANIC CARBON, TOTAL SUSPENDED SOILDS, NITRATES, NITROGEN

TABLE 8-3
FAA TECHNICAL CENTER
NO ACTION AREA INVESTIGATIONS SAMPLE SUMMARY
AREA 56 – ABANDONED NAVY LANDFILL

Sample Identification	Sample Type	Date Sampled	New Jersey Grid Coordinates N	New Jersey Grid Coordinates E	Ground Surface Elevation[1] (ft)	Sample Depth[2] (ft)	Well Screened Interval[2] (ft)	Analysis[3]
56-B5	Soil Boring	10/29/92	223,858.50	2,027,522.98	51.48	16-18	–	PPVOA+20
56-B6	Soil Boring	10/29/92	223,883.65	2,028,181.00	60.60	16-18	–	PPVOA+20
56-B7	Soil Boring	10/29/92	223,690.77	2,027,826.77	52.95	26-28	–	PPVOA+20
56-MW1S	Ground Water	11/04/92	224,670.80	2,027,348.46	59.57	–	8-28	PPVOA+20
56-MW2S	Ground Water	11/04/92	223,855.12	2,027,594.37	52.29	–	11.5-31.5	PPVOA+20
56-MW2D	Ground Water	11/04/92	223,864.21	2,027,573.24	51.86	–	75-95	PPVOA+20
56-MW3S	Ground Water	11/04/92	223,772.70	2,028,025.97	57.16	–	17-37	PPVOA+20
56-MW4S	Ground Water	11/04/92	223,857.69	2,028,369.67	61.15	–	19-39	PPVOA+20
56-MW4D	Ground Water	11/04/92	223,843.97	2,028,377.78	61.16	–	80-100	PPVOA+20
56-MW5S[4]	Ground Water	11/04/92	223,547.08	2,028,015.36	42.80	–	18.6-38.8	PPVOA+20
FB-102992	Field Blank	10/29/92	–	–	–	–	–	PPVOA+20
TB-110492	Trip Blank	11/04/92	–	–	–	–	–	PPVOA+20

Notes:
[1] Ground Surface Elevation in Feet Above Mean Sea Level
[2] Sample Depth and Well Screened Interval in Feet Below Ground Surface
[3] PPVOA+20 – Priority Pollutant Volatile Organic Analysis Plus 20 Peaks
[4] MS and MSD samples taken at 56-MW5S

TABLE 8-4
FAA TECHNICAL CENTER
NO ACTION AREA INVESTIGATIONS
SOIL BORING ANALYTICAL RESULTS
AREA 56 – ABANDONED NAVY LANDFILL

SAMPLE IDENTIFICATION:	56-B5	56-B6	56-B7	FB-102992
SAMPLE DEPTH (FT):	16-18	16-18	26-28	FIELD BLANK
SAMPLE ANALYSIS:	PPVOA + 20	PPVOA + 20	PPVOA + 20	PPVOA + 20
VOA (ppb)				
Methylene Chloride				4J
Tentatively Identified Compounds (TICs)			71 C	

J – Analyte present. Reported value may not be accurate or precise.
C – Response factor from daily standard

TABLE 8-5
FAA TECHNICAL CENTER
NO ACTION AREA INVESTIGATIONS
GROUND WATER ANALYTICAL RESULTS
AREA 56 – ABANDONED NAVY LANDFILL

Sample Identification:	56-MW1S	56-MW2S	56-MW2D	56-MW3S	56-MW4S	56-MW4D	56-MW5S	TB-110492
Sample Depth (ft):	8-28	11.5-31.5	75-95	17-37	19-39	80-100	18.6-38.8	TRIP BLANK
Sample Analysis:	PPVOA + 20	PPVOA + 20	PPVOA + 20	PPVOA + 20	PPVOA + 20	PPVOA + 20	PPVOA + 20	PPVOA + 20
VOA (ppb)								
Chlorobenzene		6J						
1,1-Dichloroethane						19		
1,1-Dichloroethene						4J		
1,4-Dichlorobenzene		4J						
Methylene Chloride								5J
1,1,1-Trichloroethane						28		

J – Analyte Present. Reported Value May Not Be Accurate or Precise

TABLE 22

COMPARISON OF HISTORIC GROUND WATER VOC / INORGANIC ANALYTICAL RESULTS - AREA 56

SAMPLE IDENTIFICATION	[illegible]			[illegible]					56-MW2D		56-MW3S			NJ PQLs (ppb)
SAMPLE DEPTH	[illegible]			[illegible]					75-95		17-37			
SAMPLE ANALYSIS	VOA	GWQP	VOA	VOA	GWQP	VOA	LCW	LCW	VOA	VOA	VOA	GWQP	VOA	
SAMPLING ROUND	6/87	12/88	11/92	6/87	12/88	11/92	5/94	8/94	6/87	11/92	6/87	12/88	11/92	
VOLATILE ORGANICS (ppb)														
1,4-DICHLOROBENZENE						4J								5
CHLOROBENZENE						6J								2
Water Quality Parameters (ppm)														
CHEMICAL OXYGEN DEMAND					13.2							11.2		
AMMONIA, AS N					0.47									
NITRATE, AS N		0.85			0.27							2.2		0.4 (ppm)
TOTAL ORGANIC NITROGEN														
TOTAL ORGANIC CARBON		1.3			2.4							1.3		
TOTAL SUSPENDED SOLIDS		11.0			45.0							206		

NOTES: ONLY CONCENTRATIONS THAT ARE ANALYTICALLY VALID AND ABOVE THE DETECTION LIMIT ARE SHOWN.

SAMPLE ANALYSIS: VOA - Volatile Organic Analysis, EPA CLP (3/90 SOW)

LCW - EPA Low Concentration Water Volatile Organic Analysis (CLP SOW OLC 02.1)

GWQP - General Water Quality Parameters

TABLE 22 (continued)

COMPARISON OF HISTORIC GROUND WATER VOC / INORGANIC ANALYTICAL RESULTS - AREA 56

SAMPLE IDENTIFICATION	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SAMPLE DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SAMPLE ANALYSIS	VOA	VOA	VOA	LCW	LCW	LCW+3	LCW+3	LCW	LCW	PPM	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	VOA	GWQP	VOA
SAMPLING ROUND	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3/87	12/88	11/92
VOLATILE ORGANICS (ppb)										NA															NA	
1,1-DICHLOROETHENE		4J	3J	2	2	3	3	4	4		3	2	1	1	1J	0.9J	1	0.7J	0.7J	0.1J						2
1,1-DICHLOROETHANE	29	19	12	11	12	16	17	27	20		16	17	13	13	12	9	10	6	6	2	2	7				-
1,1,1-TRICHLOROETHANE	27	26	18	12	22	19	21	36	23		16	13	10	11	9	7	8	4	4	0.9J	1	5				1
TOLUENE												0.1J														5
DIBROMOCHLOROMETHANE																					0.1J					1
BROMOFORM																					0.2J					0.8
TOTAL XYLENES												0.1J														2
BROMOCHLOROMETHANE														0.3J												-
INORGANICS																										
Priority Pollutant Metals (ppb)	NA	NA	NA	NA	NA	NA	NA	NA			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Beryllium										0.11																20
Copper										7.2																1000
Mercury									0.22																	0.5
Nickel										8.7																10
Lead									2.0	0.9																10
Zinc									10.4	12.5																30
Water Quality Parameters (ppm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			NA
CHEMICAL OXYGEN DEMAND																										
AMMONIA, AS N																										
NITRATE, AS N																									1.8	0.4
TOTAL ORGANIC NITROGEN																									0.13	(ppm)
TOTAL ORGANIC CARBON																									1.3	
TOTAL SUSPENDED SOLIDS																									13.0	

NOTES. ONLY CONCENTRATIONS THAT ARE ANALYTICALLY VALID AND ABOVE THE DETECTION LIMIT ARE SHOWN

SAMPLE ANALYSIS: VOA - Volatile Organic Analysis, EPA CLP (3/90 SOW)

LCW - EPA Low Concentration Water Volatile Organic Analysis (CLP SOW OLC 02.1)

LCW+3 - LCW plus Acrolein, Acrylonitrile, and 2-Chloroethyl vinyl ether

GWQP - General Water Quality Parameters

PPM - Priority Pollutant Metals (U - Unfiltered, F - Filtered)(CLP/ILM04.0)

TABLE 22 (continued)

COMPARISON OF HISTORIC GROUND WATER VOC / INORGANIC ANALYTICAL RESULTS - AREA 56

SAMPLE IDENTIFICATION																																									
SAMPLE DEPTH																																									
SAMPLE ANALYSIS																																									
SAMPLING ROUND																																			7/96		10/96				
VOLATILE ORGANICS (ppb)		NA	NA	NA	NA	NA	NA	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA				NA		NA						
1,1,1-TRICHLOROETHANE															0.1J																											1
TOLUENE											1																															5
TOTAL XYLENES																			0.1J																							2
ADDITIONAL VOA PEAKS									4J																								4J									-
INORGANICS																																									
Priority Pollutant Metals (ppb)																																									
Antimony							2.6		3.3		2.1	3.1	5.5														3.3							1.1								20
Arsenic						18.4	2.6	3.0	3.1		4.9	4.7						2.8					2.9							1.5	1.4					3.4						8
Beryllium	8							0.32		0.24	0.14	0.17	0.27			0.48	0.18	0.4		0.51	0.39		0.2	0.38	0.2	0.99	0.93			0.22	0.21	0.21	0.18	0.53		0.19	0.1					20
Cadmium	40												1.1														2.2			1.3	1.3				1.8							2
Chromium	281	237		72.5		150	2.6	30.4	3.1	12.0	2.3	80	19.7	95.9		165		46.3	8.2	55.6	3.0	12.2	5.9	26.8		8	1.6	10.8	1.8	9.5	1.8	13.5		88.1	3.5	34.4	5.6	67.2	2.5	50.1	3.4	10
Copper	216	32.3		19.4	2.7	24.2	2.6	8.2	1.6	38.2	3.2	12.5	8.6	13.4		25.3		30.5		29.1	10.6	14.2	14.0	11.8		1.7		8.0	7.1	8.3	6.8	3.5		16.3	19.2	8.6				15.8	12.8	1000
Mercury	3.1	0.23				0.22								0.15		0.18						0.12	0.1											0.13		0.1						0.5
Lead	204			12.5		18.9		3.8		3.2	2.9	7.6	4.9	1.5		17.5	1.3	13.5	7.2	29.3	18.7	15.1	12.6	6.6	3.4	5.4	1.4	3.9	1.1	7.4	5.4	3.3	1.7	12	2.1			9.9	3.0	11.3	6.7	10
Nickel	117	306	183	56.2	39.7	72.9	49.9	43.5	37.4	29.2	29.4	35.4	33.3	28.6	19.8	41.1	23.4	40	23.1	22.3	15.6	19.8	18.0	41.3	31.4	33	32	27.4	26.4	19.3	18.3	27.3	27.3	39	23	13.3	10.2	16.3	14.3	22.0	15.2	10
Selenium	6						6.3				15.0	3.7								1.9						1.6	2.1					1.6						4				10
Silver																																							3.7			2
Thallium							3.9		3.8	28.0																1.1	1.2					1.7										10
Zinc	415	114	79.7	37.4	20.9	20.9	16.5	23.2	14.0	21.2	16.6	23.7	45.9	27.1	13.4	65.4	40.4	47.1	25.5	31.5	31.2	37.2	41.0	24.8	23.8	17.8	19.8	19.2	13.1	8.7	9	9.2	11.1	22.9	27			36.2	3.0	17.7		30
Water Qlty. Parameters (ppm)	NA																																								
CHEMICAL OXYGEN DEMAND																																									
AMMONIA, AS N																																									
NITRATE, AS N		4.6		8.88		6.42		4.6R		0.149		5.25		4.4		7.3		7.6		7.3		29.9		6.1		0.27		5.9		6		5.8		6.7		4.5		5.4		5.8		0.4
TOTAL ORGANIC NITROGEN																																										(ppm)
TOTAL ORGANIC CARBON		1.5																																							
TOTAL SUSPENDED SOLIDS		248																																							

NOTES: ONLY CONCENTRATIONS THAT ARE ANALYTICALLY VALID AND ABOVE THE DETECTION LIMIT ARE SHOWN.
SAMPLE ANALYSIS: VOA - Volatile Organic Analysis, EPA CLP (2/88 SOW)
LCW - EPA Low Concentration Water Volatile Organic Analysis (CLP SOW OLC 02.1)
LCW+3 - LCW plus Acrolein, Acrylonitrile, and 2-Chloroethyl vinyl ether
GWQP - General Water Quality Parameters
PPM - Priority Pollutant Metals (U - Unfiltered; F - Filtered)(CLP/ILM04.0)
NO3 - Nitrate (EPA METHOD 353.2)

TABLE 19-2

SURFACE SOIL SAMPLES
SITE F

SAMPLE ID	DATE TAKEN	NEW JERSEY GRID COORDINATES N	E	DEPTH (FT)	ANALYSIS	CONSTITUENTS DETECTED? (Y/N)	NOTES
F-LAB1	1/15/87	227,996	2,030,556	0-2,4-6 composite	PP+40, HCIR	Y	
F-LAB2	1/15/87	227,964	2,030,507	0-2,4-6 composite	PP Metals, HCIR	Y	
F-LAB3	1/15/87	227,953	2,030,455	0-2,4-6 composite	PP Metals, HCIR	Y	
F-LAB4	1/15/87	228,044	2,030,522	0-2,4-6 composite	PP Metals, HCIR	Y	
F-LAB5	1/15/87	228,009	2,030,467	0-2,4-6 composite	PP+40, HCIR	Y	
F-LAB6	1/15/87	227,975	2,030,424	0-2,4-6 composite	PP Metals, HCIR	Y	
F-LAB7	1/15/87	228,090	2,030,485	0-2,4-6 composite	PP Metals, HCIR	Y	
F-LAB8	1/15/87	228,057	2,030,438	0-2,4-6 composite	PP Metals, HCIR	Y	
F-LAB9	1/15/87	228,022	2,030,389	0-2,4-6 composite	PP+40, HCIR	Y	
F-LAB10-1	11/19/87	228,030	2,030,349	0 - 2	Cadmium	N	
F-LAB10-2	11/19/87	228,030	2,030,349	4 - 6	Cadmium	N	
F-LAB11-1	11/19/87	228,010	2,030,365	0 - 2	Cadmium	N	
F-LAB11-2	11/19/87	228,010	2,030,365	4 - 6	Cadmium	N	
F-LAB12-1	11/19/87	227,990	2,030,381	0 - 2	Cadmium	N	
F-LAB12-2	11/19/87	227,990	2,030,381	4 - 6	Cadmium	N	
F-LAB13-1	11/19/87	228,047	2,030,368	0 - 2	Cadmium	N	
F-LAB13-2	11/19/87	228,047	2,030,368	4 - 6	Cadmium	N	
F-LAB14-1	11/19/87	228,027	2,030,384	0 - 2	Cadmium	N	
F-LAB14-2	11/19/87	228,027	2,030,384	4 - 6	Cadmium	N	
F-LAB15-1	11/19/87	228,006	2,030,400	0 - 2	Cadmium	N	
F-LAB15-2	11/19/87	228,006	2,030,400	4 - 6	Cadmium	N	
F-LAB16-1	11/19/87	228,063	2,030,387	0 - 2	Cadmium	N	
F-LAB16-2	11/19/87	228,063	2,030,387	4 - 6	Cadmium	N	
F-LAB17-1	11/19/87	228,043	2,030,404	0 - 2	Cadmium	N	
F-LAB17-2	11/19/87	228,043	2,030,404	4 - 6	Cadmium	N	

(CONTINUED ON NEXT PAGE)

TABLE 19-2

SURFACE SOIL SAMPLES
SITE F
(CONTINUED)

F-LAB18-1	11/19/87	228,023	2,030,420	0 - 2	Cadmium	N	
F-LAB18-2	11/19/87	228,023	2,030,420	4 - 6	Cadmium	N	
F-LAB19-1	11/20/87	228,078	2,030,406	0 - 2	Cadmium	N	
F-LAB19-2	11/20/87	228,078	2,030,406	4 - 6	Cadmium	N	
F-LAB20-1	11/20/87	228,058	2,030,422	0 - 2	Cadmium	N	
F-LAB20-2	11/20/87	228,058	2,030,422	4 - 6	Cadmium	N	
F-LAB21-1	11/20/87	228,038	2,030,439	0 - 2	Cadmium	N	
F-LAB21-2	11/20/87	228,038	2,030,439	4 - 6	Cadmium	N	
F-LAB22-1	11/20/87	228,094	2,030,426	0 - 2	Cadmium	N	
F-LAB22-2	11/20/87	228,094	2,030,426	4 - 6	Cadmium	N	
F-LAB23-1	11/20/87	228,073	2,030,442	0 - 2	Cadmium	N	
F-LAB23-2	11/20/87	228,073	2,030,442	4 - 6	Cadmium	N	
F-LAB24-1	11/20/87	228,053	2,030,459	0 - 2	Cadmium	N	
F-LAB24-2	11/20/87	228,053	2,030,459	4 - 6	Cadmium	N	
F-LAB25-1	11/19/87	228,027	2,030,384	0 - 2	Cadmium	N	DUPLICATE OF F-LAB14-1
F-LAB25-2	11/19/87	228,027	2,030,384	4 - 6	Cadmium	N	DUPLICATE OF F-LAB14-2
F-SS1	3/24/87	227,980	2,030,555	0-2, VOA @ 0.5-1	PP+40	Y	
F-FB1	1/15/87	FIELD BLANK		--	HCIR	N	
F-TB1	1/15/87	TRIP BLANK		--	HCIR	N	
29-FB1	3/24/87	FIELD BLANK		--	VOA	N	
29-TB1	3/24/87	TRIP BLANK		--	VOA	N	

TABLE 19-3
CONSTITUENTS DETECTED IN SURFACE SOIL SAMPLES-- SITE F

SAMPLE IDENTIFICATION:	F-LAB1	F-LAB2	F-LAB3	F-LAB4	F-LAB5	F-LAB6	F-LAB7	F-LAB8	F-LAB9	F-SS1
SAMPLE DEPTH (FT):	0-2,4-6	0-2,4-6	0-2,4-6	0-2,4-6	0-2,4-6	0-2,4-6	0-2,4-6	0-2,4-6	0 - 2	0 - 2
SAMPLE ANALYSIS:	PP+40	HCIR METALS	HCIR METALS	HCIR METALS	PP+40	HCIR METALS	HCIR METALS	HCIR METALS	PP+40	PP+40
****** VOA (PPB) ********										
METHYLENE CHLORIDE.....	9.3				6.6				7.7	11
ADDITIONAL VOA PEAKS.....	0				0				0	12
***** BNA (PPB) *******										
ADDITIONAL BNA PEAKS.....	1900				2400				2500	8100
***** PEST/PCB (PPB) *****										
***** METALS (PPM) ******										
AS.....	0.5	0.7	0.9	0.5	0.8	1.0	0.7	0.8	1.1	
CD.....	0.8	2.0	1.3	2.1	1.7	2.6	2.4	3.6	4.9	1.7
CR.....	3.3	9.0	6.9	7.4	6.9	11.0	8.4	13.0	19.0	11.1
CU.....	1.4	3.5	2.8	2.1	2.4	3.3		2.3	3.8	
PB.....	3.1	3.3	3.8	2.8	3.5	3.1	2.6	2.4	6.0	10.7
HG.....				0.3						
NI.....						7.2	6.7	7.6	8.8	10.7
ZN.....	2.3	4.6	3.6	3.2	3.7	7.4	3.9	4.4	7.5	19.1
CYANIDE (PPM).....										
PHENOL (PPM).....	0.39				0.47				0.56	1.3
PETROLEUM HYDROCARBONS (PPM).....		2	2	1		2	2			

NOTE: ONLY CONCENTRATIONS ABOVE THE DETECTION LIMITS ARE SHOWN

TABLE 19-5

SOIL BORING SAMPLES
SITE F

SAMPLE ID	DATE TAKEN	NEW JERSEY GRID COORDINATES N	E	DEPTH (FT)	ANALYSIS	CONSTITUENTS DETECTED? (Y/N)	NOTES
F-B1-9	6/30/87	227,731	2,030,322	16-18	HCIR	Y	
F-B1-11	6/30/87	227,731	2,030,322	20-22	HCIR	Y	
F-B2-4	6/29/87	227,828	2,030,337	6-8	PP+40	Y	
F-B2-7	6/29/87	227,828	2,030,337	12-14	HCIR	Y	
F-B3-3	7/02/87	227,781	2,030,392	4-6	HCIR	Y	
F-B3-7	7/02/87	227,781	2,030,392	12-14	HCIR	Y	
F-B4-7	7/13/87	227,762	2,030,365	12-14	HCIR	Y	
F-B4-11	7/13/87	227,762	2,030,365	20-22	HCIR	Y	
F-B5-4	6/29/87	227,828	2,030,337	6-8	PP+40	Y	DUPLICATE OF F-B2-4
F-B5-7	6/29/87	227,828	2,030,337	12-14	HCIR	Y	DUPLICATE OF F-B2-7
29-B4-FB29	6/29/87	FIELD BLANK		--	VOA	N	
MW-TB4	6/29/87	TRIP BLANK		--	VOA	N	
F-B3-FB32	7/02/87	FIELD BLANK		--	VOA	Y	
FAA-TB5	7/01/87	TRIP BLANK		--	PP+40	N	

TABLE 19-6

CONSTITUENTS DETECTED IN SOIL BORING SAMPLES -- SITE F

SAMPLE IDENTIFICATION:	F-B1-9	F-B1-11	F-B2-4	F-B2-7	F-B3-3	F-B3-7	F-B4-7	F-B4-11	F-B5-4	F-B5-7	F-B3-FB32
SAMPLE DEPTH (FT):	16-18	20-22	6 - 8	12 - 14	4 - 6	12-14	12-14	20-22	6 - 8	12-14	BLANK
SAMPLE ANALYSIS:	HCIR	HCIR	PP+40	HCIR	HCIR	HCIR	HCIR	HCIR	PP+40	HCIR	VOA
****** VOA (PPB) ********											
METHYLENE CHLORIDE.....			1300						1300		810
ETHYLBENZENE.....			1000						1400		
ADDITIONAL VOA PEAKS.....			39800						61300		0
***** BNA (PPB) *******											
NAPHTHALENE.....									540		
ADDITIONAL BNA PEAKS.....			64440						246000		
***** PEST/PCB (PPB) *****											
AROCLOR-1242.....			330								
***** METALS (PPM) ******											
CR.....			5.8						5.5		
PB.....			6.3						5.2		
ZN.....			7.9						6.1		
CYANIDE (PPM).....											
PHENOL (PPM).....											
PETROLEUM HYDROCARBONS (PPM).....	130	1		3	7	3	2920	2		6	

NOTE: ONLY CONCENTRATIONS ABOVE THE DETECTION LIMITS ARE SHOWN

TABLE 19-7

GROUND WATER SAMPLES
SITE F

SAMPLE ID	DATE TAKEN	NEW JERSEY GRID COORDINATES N	E	DEPTH (FT)	ANALYSIS	CONSTITUENTS DETECTED? (Y/N)	NOTES
F-MW1S	6/24/87	227,725	2,030,245	10.0 - 30.0	PP+40	Y	
F-MW2S	6/24/87	227,783	2,030,382	2.3 - 12.3	PP+40	Y	
F-MW3S	6/24/87	227,820	2,030,338	2.0 - 12.0	PP+40	Y	
F-MW4S	6/24/87	227,783	2,030,382	2.3 - 12.3	PP+40	Y	DUPLICATE OF F-MW-2S
29-MW-FB3	6/24/87	FIELD BLANK		--	PP ORGANICS	Y	
FAA-MW-TB2	6/24/87	TRIP BLANK		--	PP ORGANICS	Y	

TABLE 19-B

CONSTITUENTS DETECTED IN GROUND WATER -- SITE F

SAMPLE IDENTIFICATION:	F-MW1S	F-MW2S	F-MW3S	F-MW-4S	29-MW-FB3	29-MW-TB2
SAMPLE DEPTH (FT):	10-30	2.3-12.3	2-12	2.3-12.3	BLANK	BLANK
SAMPLE ANALYSIS:	PP+40	PP+40	PP+40	PP+40	PP ORG	PP ORG
****** VOA (PPB) ********						
ADDITIONAL VOA PEAKS.....	1009	573	6	120	0	0
***** BNA (PPB) *******						
BIS(2-ETHYLHEXYL)PHTHALATE.....	57	29	16	10		
ADDITIONAL BNA PEAKS.....	4719	1405	399	0	90	13
***** PEST/PCB (PPB) *****						
***** METALS (PPB) ******						
CD.....	20	16				
CR.....	105	159	18			
CU.....	81	70				
HG.....	1.9	0.31	0.26	0.4		
PB.....	67.4	66.6	10.5			
SE.....				5.1		
ZN.....	132	199	75	45		
CYANIDE (PPB).....						
PHENOL (PPB).....	23.7	32.9	19.2	15.9		
PH (STANDARD UNITS).....	5.7	6	5.2			
CONDUCTIVITY (MICROMHOS/CM).....	50	110	50			

NOTE: ONLY CONCENTRATIONS ABOVE THE DETECTION LIMITS ARE SHOWN

TABLE 12-3

SOIL BORING SAMPLES - AREA F

SAMPLE NUMBER	DATE	NJ GRID COORD NORTH	NJ GRID COORD EAST	DEPTH	ANALYSIS	NOTES
F-B5-5	09/26/88	227,800	2,030,272	8.0 - 10.0	HCIR	
F-B6-4	09/26/88	227,890	2,030,315	6.0 - 8.0	HCIR	
F-B7-5	09/27/88	227,855	2,030,388	8.0 - 10.0	HCIR	
F-B8-9	09/27/88	227,788	2,030,430	16.0 - 18.0	HCIR	
F-B9-9	09/27/88	227,682	2,030,369	16.0 - 18.0	HCIR	
F-FB1	09/26/88	FIELD BLANK		- -	HCIR	
F-FB2	09/27/88	FIELD BLANK		- -	HCIR	

ANALYSIS CODES: HCIR TOTAL PETROLEUM HYDROCARBONS

TABLE 12-4

CONSTITUENTS DETECTED IN SOIL BORING SAMPLES -- AREA F

SAMPLE IDENTIFICATION: SAMPLE DEPTH (FT): SAMPLE ANALYSIS:	F-B5-5 8 - 10 HCIR	F-B6-4 6 - 8 HCIR	F-B7-5 8 - 10 HCIR	F-B8-9 16 - 18 HCIR	F-B9-9 16 - 18 HCIR	F-FB1 BLANK HCIR	F-FB2 BLANK HCIR	NJDEP SOIL CLEANUP OBJECTIVE
PETROLEUM HYDROCARBONS (PPM).....	2	2	2	2				100

NOTE: ONLY CONCENTRATIONS ABOVE THE DETECTION LIMITS ARE SHOWN

HCIR = TOTAL PETROLEUM HYDROCARBONS

TABLE 12-5

GROUND WATER SAMPLES - AREA F

SAMPLE NUMBER	DATE	NJ GRID COORD NORTH	NJ GRID COORD EAST	DEPTH	ANALYSIS	NOTES
F-MW2S	12/5/88	227,783	2,030,382	2.3 - 12.3	PP METALS (U/F),TSS	
F-MW4S	12/01/88	227,776	2,030,385	22.5 - 42.5	PP+40	
F-MW-FB4	12/01/88	FIELD BLANK		- -	PP+40	
20A-MW-TB2	12/01/88	TRIP BLANK		- -	VOA	
56-MW-FB6	12/5/88	FIELD BLANK		- -	GWQP, PP METALS (U/F)	

ANALYSIS CODES:

VOA	VOLATILE ORGANIC ANALYSIS
PP+40	PRIORITY POLLUTANTS PLUS 40 ADDITIONAL PEAKS
PP METALS	PRIORITY POLLUTANT METALS
(U/F)	UNFILTERED SAMPLE/FILTERED SAMPLE
GWQP	GROUND WATER QUALITY PARAMETERS CHEMICAL OXYGEN DEMAND, TOTAL ORGANIC CARBON, NITRATE, NITROGEN, TOTAL SUSPENDED SOLIDS

TABLE 12-6

CONSTITUENTS DETECTED IN GROUND WATER SAMPLES - AREA F

SAMPLE IDENTIFICATION:	F-MW2S		F-MW4S	F-MW-FB4	20A-MW-TB2	56-MWFB6
SAMPLE DEPTH (FT):	2.3-12.3		22.5-42.5	BLANK	BLANK	BLANK
SAMPLE ANALYSIS:	METALS		PP+40	PP+40	VOA	METALS
	TOTAL	DISSOLVED				DISSOLVED
****** VOA (PPB) ******						
CHLOROFORM.....				7		
ADDITIONAL VOA PEAKS.....			3400	83	0	
***** BNA (PPB) *****						
BIS(2-ETHYLHEXYL)PHTHALATE.....						
ADDITIONAL BNA PEAKS.....					13	
***** PEST/PCB (PPB) *****						
***** METALS (PPB) *****						
CR.....	41.1		64.4	23		
CU.....	39.7		25.5			
NI.....						69.7
PB.....	25.8		25.2			
ZN.....	92.0	35.5	192.0	117		249.0
CYANIDE (PPB).....						
PHENOL (PPB).....						
PH (STANDARD UNITS).....	5.4					
CONDUCTIVITY (MICROMHOS/CM).....	10					
TOTAL SUSPENDED SOLIDS (PPM).....	1460					

NOTE: ONLY CONCENTRATIONS ABOVE THE DETECTION LIMITS ARE SHOWN

TABLE B-2

GROUND WATER ORGANIC AND INORGANIC SAMPLE SUMMARY
AREA F - AIR BLAST FACILITY
August 8, 1996

SAMPLE NUMBER	SAMPLING DATE	NJ PLANE COORDINATES(3) NORTH	EAST	DEPTH (1)	ANALYSIS (2)	NOTES
AREA F						
F-MW2S	08/08/96	227,784	2,030,383	2.3-12.3	LCW+3, PPMET (unfiltered)	
F-MW3S	08/08/96	227,820	2,030,339	2.0-12.0	LCW+3, SVOA, PEST/PCBs, PPMET, CN, PN	
F-MW4S	08/08/96	227,776	2,030,385	22.5-42.5	LCW+3, SVOA, PEST/PCBs, PPMET, CN, PN	
F-MW4SMS	08/08/96	227,776	2,030,385	22.5-42.5	LCW+3, SVOA, PEST/PCBs, PPMET, CN, PN	MATRIX SPIKE
F-MW4SMSD	08/08/96	227,776	2,030,385	22.5-42.5	LCW+3, SVOA, PEST/PCBs, PPMET, CN, PN	MATRIX SPIKE DUPLICATE
F-MW5S	08/08/96	227,776	2,030,385	22.5-42.5	LCW+3, SVOA, PEST/PCBs, PPMET, CN, PN	DUPLICATE OF F-MW4S
QA/QC BLANKS						
FB-080896	08/08/96	--	--	--	LCW+3, SVOA, PEST/PCBs, PPMET, CN, PN	FIELD BLANK
TB-080896	08/08/96	--	--	--	LCW+3	TRIP BLANK

NOTES:

(1) DEPTH IS SCREEN INTERVAL MEASURED FROM GROUND SURFACE

(2) ANALYSIS CODE: LCW+3 - EPA Low Concentration Water Volatile Organic Analysis (10/92 SOW SAM) plus Acrolein, Acrylonitrile, and 2-Chloroethyl vinyl ether
SVOA - Semivolatile Organic Analysis, EPA CLP 3/90 OLM01.8
PEST/PCBs - Pesticides and Polychlorinated Biphenyls, EPA CLP 3/90
PPMET - Priority Pollutant Metals Analyses, Unfiltered, CLP 3/90 ILM03.0
CN - Cyanide, CLP 3/90 ILM04.0
PN - Phenol, EPA Method 420.2

(3) Horizontal Datum: NJ State Plane Coordinates NAD 27

TABLE B-3

VALIDATED GROUND WATER SAMPLE ORGANICS / INORGANICS ANALYTICAL RESULTS
AREA F - AIR BLAST FACILITY
August 8, 1996

SAMPLE IDENTIFICATION SAMPLE DEPTH (FT)	F-MW2S 2.3-12.3	F-MW3S 2.0-12.0	F-MW4S 22.5-42.5	F-MW5S (Duplicate of F-MW4S)	FB-080896	TB-080896	NJ PQLs*
ORGANICS							
Volatile Organics (ppb)							
Methylene Chloride					2 B	2 B	2
Acetone					3 BJ		--
Carbon Disulfide	0.4 J						--
Semivolatile Organics (ppb)	NA					NA	
Bis (2-Ethylhexyl) Phthalate		1 J					30
Di-n-butylphthalate			0.6 J				20
Additional SVOA TICS		2 NJ	65 NJ	6 NJ	83 NJ		
Pesticides/PCBs (ppb)	NA					NA	
INORGANICS							
Priority Pollutant Metals + CN (ppb)						NA	
Arsenic	1.8 J1,4	2.5 J1,4					8
Beryllium	0.38 B	0.40 B					20
Cadmium			1.5 B	1.5 B			2
Chromium	19.0	13.5					10
Copper	14.0 B	16.0 B	6.1 B				1000
Lead	13.4 J2	15.4 J2	6.4 J2,5	4.4 J2,5	3.5 J2,5		10
Mercury		0.31					0.5
Nickel		8.3 B					10
Selenium	2.2 J1,3,4	1.8 J1,3	3.0 J1,3	1.5 J1,3	2.9 J1,3		10
Zinc	22.6	18.1 B	9.2 B	6.0 B	2.0 B		30
Cyanide	NA						40
Total Phenol (ppb)	NA						10

NOTES:

ORGANICS

J - INDICATES AN ESTIMATED VALUE. THE VALUE IS BELOW THE SAMPLE QUANTITATION LIMIT BUT GREATER THAN ZERO.
B - INDICATES THE ANALYTE IS FOUND IN THE ASSOCIATED BLANK AS WELL AS IN THE SAMPLE.
NJ - PRESUMPTIVE EVIDENCE FOR THE PRESENCE OF THE MATERIAL AT AN ESTIMATED VALUE.
NA - INDICATES THAT THE SAMPLE WAS NOT ANALYZED FOR THE INDICATED ANALYTICAL METHOD.

INORGANICS

J1 - INDICATES AN ESTIMATED VALUE DUE TO THE MATRIX SPIKE RECOVERY BELOW THE LOWER CONTROL LIMIT.
J2 - INDICATES AN ESTIMATED VALUE DUE TO THE DUPLICATE ANALYSIS WAS GREATER THAN THE CRDL.
J3 - INDICATES AN ESTIMATED VALUE DUE TO THE CRDL STANDARD WAS ABOVE THE UPPER CONTROL LIMIT.
J4 - INDICATES AN ESTIMATED VALUE DUE TO THE POST DIGESTION SPIKE RECOVERY FOR GFAA WAS BELOW THE LOWER CONTROL LIMIT.
J5 - INDICATES AN ESTIMATED VALUE DUE TO THE CRDL STANDARD WAS BELOW THE LOWER CONTROL LIMIT.
B - GREATER THAN INSTRUMENT DETECTION LIMITS BUT LESS THAN CONTRACT REQUIRED DETECTION LIMITS (CRDL).
NA - INDICATES THAT THE SAMPLE WAS NOT ANALYZED FOR THE INDICATED ANALYTICAL METHOD.
* - NEW JERSEY PRACTICAL QUANTITATION LEVELS, N.J.A.C. 7:9-6.4

TABLE 19-3

SOIL BORING SAMPLES - AREA R

SAMPLE NUMBER	DATE	NJ GRID COORD NORTH	NJ GRID COORD EAST	DEPTH	ANALYSIS	NOTES
R-B1-7	12/9/88	227,541	2,018,225	12.0 - 14.0	PP+40	
R-B2-6	12/9/88	227,524	2,018,146	10-14, 10-12	PP+40	PP+40 FROM 10-14',VOA FROM 10-12'
R-B3-7	12/8/88	227,380	2,018,212	12.0 - 14.0	PP+40	
R-B4-11	12/8/88	227,297	2,017,921	20.0 - 24.0	PP+40	DUPLICATE OF R-B4-12
R-B4-12	12/8/88	227,297	2,017,921	20.0 - 24.0	PP+40	
R-B5-11	12/7/88	227,442	2,017,968	20.0 - 22.0	PP+40	
R-B5-8	12/7/88	227,442	2,017,968	14.0 - 16.0	VOA,BNA	
R-B6-12	12/7/88	227,587	2,017,902	22.0 - 24.0	PP+40	
R-TB-4	12/7/88	TRIP BLANK		- -	VOA	
R-FB-1	12/7/88	FIELD BLANK		- -	VOA	
R-TB-2	12/8/88	TRIP BLANK		- -	VOA	
R-FB-2	12/8/88	FIELD BLANK		- -	VOA	
R-FB-3	12/9/88	FIELD BLANK		- -	VOA	

ANALYSIS CODES:

PP+40	PRIORITY POLLUTANTS PLUS 40 ADDITIONAL PEAKS
VOA	VOLATILE ORGANIC ANALYSIS
BNA	BASE NEUTRAL/ACID EXTRACTABLE COMPOUNDS

TABLE 19-4

CONSTITUENTS DETECTED IN SOIL BORING SAMPLES — AREA R

SAMPLE IDENTIFICATION:	R-B1-7	R-B2-6	R-B3-7	R-B4-12	R-B4-12	R-B5-8	R-B5-11	R-B6-12	R-TB2	R-TB4	R-FB1	R-FB2	R-FB3	NJDEP SOIL CLEANUP OBJECTIVE
SAMPLE DEPTH (FT):	12-14	10-12	12-14	20-24	20-24	14-16	20-22	22-24	BLANK	BLANK	BLANK	BLANK	BLANK	
SAMPLE ANALYSIS:	PP+40	PP+40	PP+40	PP+40	PP+40 DUPL.	BNA,VOA	PP+40	PP+40	VOA	VOA	VOA	VOA	VOA	
****** VOA (PPB) ********														
METHYLENE CHLORIDE.....										11	10			
CHLOROFORM.....												17	12	
CHLOROBENZENE.....											6			
ADDITIONAL VOA PEAKS.....	0	290		0	0	91	110	100	110	374	429	189	2934	1000
***** BNA (PPB) *******														
BIS(2-ETHYLHEXYL)PHTHALATE.....				700	470			1100						
BENZO(B)FLUORANTHENE.....								490						
ADDITIONAL BNA PEAKS.....	400	500	100	1300	600	4400	1100	200						10000
***** PEST/PCB (PPB) *****														
***** METALS (PPM) ******														
BE.....							1.3							
CR.....	2.7	5.7	2.7	7.3	5.9		6.1	4.7						3
CU.....				5.7			7.3	6.1						170
NI.....	9.8			12.9			11.5	8.1						100
PB.....		2.5	1.1	1.4	1.2		2.2	1.4						250-1000
ZN.....	12.1	17.2	4.3	41.8			8.6	17.5						350
CYANIDE (PPM).....														12
PHENOL (PPM).....	0.36	0.25	0.26	0.3	0.21		0.28	0.22						

NOTE: ONLY CONCENTRATIONS ABOVE THE DETECTION LIMITS ARE SHOWN

TABLE 19-5

GROUND WATER SAMPLES - AREA R

SAMPLE NUMBER	DATE	NJ GRID COORD NORTH	NJ GRID COORD EAST	DEPTH (FT)[1]	ANALYSIS	NOTES
R-MW1S	1/25/89	227,487	2,017,866	17.0 - 37.0	PP+40	
R-MW2S	1/25/89	227,268	2,018,091	15.0 - 35.0	PP+40	
R-MW3S	1/25/89	227,895	2,018,196	17.0 - 37.0	PP+40	
R-MW14S	1/25/89	227,268	2,018,091	15.0 - 35.0	PP+40	DUPLICATE OF R-MW2S
R-MWFB	1/25/89	FIELD BLANK		- -	PP+40	
TB-1	1/25/89	TRIP BLANK		- -	VOA	
R-MW1SA	3/22/89	227,487	2,017,866	17.0 - 37.0	VOA	RESAMPLE OF R-MW1S
R-MW2SA	3/22/89	227,268	2,018,091	15.0 - 35.0	VOA	RESAMPLE OF R-MW2S
R-MWFB2	3/22/89	FIELD BLANK		- -	VOA	
R-TB2	3/22/89	TRIP BLANK		- -	VOA	

ANALYSIS CODES:

PP+40	PRIORITY POLLUTANTS PLUS 40 ADDITIONAL PEAKS
VOA	VOLATILE ORGANIC ANALYSIS

[1] SCREEN DEPTH IN FEET BELOW GROUND SURFACE

TABLE 19-6

CONSTITUENTS DETECTED IN GROUND WATER SAMPLES — AREA R

SAMPLE IDENTIFICATION:	R-MW1S	R-MW1SA	R-MW2S	R-MW2S	R-MW2SA	R-MW3S	R-MWFB	TB-1	R-MWFB2	R-TB2
SAMPLE DEPTH (FT):	17 - 37	17 - 37	15 - 35	15 - 35	15 - 35	17 - 37	BLANK	BLANK	BLANK	BLANK
SAMPLE ANALYSIS:	PP+40	VOA	PP+40	PP+40	VOA	PP+40	PP+40	VOA	VOA	VOA
COLLECTION DATE:	1/25/89	3/22/89 RESAMPLE	1/25/89	1/25/89 DUPLICATE	3/22/89 RESAMPLE	1/25/89	1/25/89	1/25/89	3/22/89	3/22/89
****** VOA (PPB) ********										
ETHYLBENZENE.....	9	14								
CHLOROBENZENE.....	24	42	24	21	18					
1,4-DICHLOROBENZENE.....		13	5							
ADDITIONAL VOA PEAKS.....	20	63	49	30	95	13	14	93	19	25
***** BNA (PPM) *******										
BIS(2-ETHYLHEXYL)PHTHALATE.....			11							
ADDITIONAL BNA PEAKS.....										
***** PEST/PCB (PPB) *****										
***** TOTAL METALS (PPB) ******										
CR.....	31.2		18.5	15.9						
CU.....	35.6									
NI.....	112		47.8			81.4				
PB.....	10.4									
ZN.....	181		120	166		204	133			
CYANIDE (PPM).....										
PHENOL (PPM).....										
PH (STANDARD UNITS).....	5.6		5.9	-		4.9				
CONDUCTIVITY (MICROMHOS/CM).....	112		190	-		-				

NOTE: ONLY CONCENTRATIONS ABOVE DETECTION LIMITS ARE SHOWN

TABLE 5-2

GROUND WATER SAMPLES
AREA R

SAMPLE ID	DATE TAKEN	NEW JERSEY GRID COORDINATES N	E	DEPTH (FT)	ANALYSIS	NOTES
R-MW4S	10/17/89	227,616	2,017,678	12-32	PP+40	SLIGHTLY SILTY SAMPLE
R-MW5S	10/17/89	227,095	2,018,193	8-28	PP+40	CLEAR SAMPLE
R-MW6S	10/17/89	227,541	2,018,322	5-25	PP+40	CLEAR SAMPLE
41-FB1	10/17/89	--		--	PP+40	FIELD BLANK
41-TB1	10/17/89	--		--	VOA	TRIP BLANK

ANALYSIS CODES:

PP+40	PRIORITY POLLUTANTS PLUS 40 ADDITIONAL PEAKS
VOA	VOLATILE ORGANIC ANALYSIS

TABLE 5-3

CONSTITUENTS DETECTED IN GROUND WATER - AREA R

SAMPLE IDENTIFICATION:	R-MW4S	R-MW5S	R-MW6S	FB-1	TB-1
SAMPLE DEPTH (FT):	12-32	8-28	5-25	BLANK	BLANK
SAMPLE ANALYSIS:	PP+40	PP+40	PP+40	PP+40	VOA
****** VOA (PPB) ********					
METHYLENE CHLORIDE.....			5	6	9
CHLOROFORM.....			9		
ADDITIONAL VOA PEAKS.....					
***** BNA (PPB) *******					
***** PEST/PCB (PPB) *****					
***** METALS (PPB) ******					
CU.....	35.4				
ZN.....	42.1	41.4	31.3		
CYANIDE (PPB).....					
PHENOL (PPB).....					
PH (STANDARD UNITS).....	5.3	4.5	4.6		
CONDUCTIVITY (MICROMHOS/CM).....	25	36	30		
TEMPERATURE (CELSIUS).....	17	17	18		

NOTE: ONLY CONCENTRATIONS ABOVE THE DETECTION LIMITS ARE SHOWN
METHYLENE CHLORIDE WAS DETECTED IN METHOD BLANK

TABLE 6-3
FAA TECHNICAL CENTER
NO ACTION AREA INVESTIGATIONS SAMPLE SUMMARY
AREA R – TRASH DUMP

Sample Identification	Sample Type	Date Sampled	New Jersey Grid Coordinates N	New Jersey Grid Coordinates E	Ground Surface Elevation[1] (ft)	Sample Depth[2] (ft)	Well Screened Interval[2] (ft)	Analysis[3]
R-B7	Soil Boring	10/28/92	227,512.18	2,018,149.01	62.74	8-10	–	PPVOA+20
R-B8	Soil Boring	10/28/91	227,298.07	2,017,932.06	73.89	19-21	–	PPVOA+20
R-B9	Soil Boring	10/28/92	227,368.46	2,018,214.26	62.82	7-9	–	PPVOA+20
R-B10	Soil Boring	10/28/92	227,592.52	2,017,890.62	74.23	16-18	–	PPVOA+20
R-MW1S	Ground Water	11/05/92	227,486.64	2,017,865.77	73.42	–	17-37	PPVOA+20
R-MW2S	Ground Water	11/05/92	227,268.08	2,018,090.53	70.48	–	15-35	PPVOA+20
R-MW4S	Ground Water	11/05/92	227,616.15	2,017,678.28	72.97	–	12-32	PPVOA+20
R-MW5S	Ground Water	11/05/92	227,095.11	2,018,193.04	72.51	–	8-28	PPVOA+20
FB-102892	Field Blank	10/28/92	–	–	–	–	–	PPVOA+20
TB-110592	Trip Blank	11/05/92	–	–	–	–	–	PPVOA+20

Notes:
[1] Ground Surface Elevation in Feet Above Mean Sea Level
[2] Sample Depth and Well Screened Interval in Feet Below Ground Surface
[3] PPVOA+20 – Priority Pollutant Volatile Organic Analysis Plus 20 Peaks

TABLE 6–4
FAA TECHNICAL CENTER
NO ACTION AREA INVESTIGATIONS
SOIL BORING ANALYTICAL RESULTS
AREA R – TRASH DUMP

Sample Identification:	R–B7	R–B8	R–B9	R–B10	FB–102892
Sample Depth (ft):	8–10	19–21	7–9	16–18	FIELD BLANK
Sample Analysis:	PPVOA + 20	PPVOA + 20	PPVOA + 20	PPVOA + 20	PPVOA + 20
VOA (ppb)					
Methylene Chloride					5J
Tentatively Identified Compounds (TICs)	390 CJ	94 C		200 C	

J – Analyte present. Reported value may not be accurate or precise.
C – Response factor from daily standard

TABLE 6–5
FAA TECHNICAL CENTER
NO ACTION AREA INVESTIGATIONS
GROUND WATER ANALYTICAL RESULTS
AREA R – TRASH DUMP

Sample Identification:	R–MW1S	R–MW2S	R–MW4S	R–MW5S	TB–110592
Sample Depth (ft):	17–37	15–35	12–32	8–28	TRIP BLANK
Sample Analysis:	PPVOA + 20	PPVOA + 20	PPVOA + 20	PPVOA + 20	PPVOA + 20
VOA (ppb)					
Chlorobenzene	35	12		1J	
1,2–Dichlorobenzene	2J	2J			
1,4–Dichlorobenzene	5J	9J			
Ethylbenzene	9J				
Methylene Chloride					4J

J – Analyte present. Reported value may not be accurate or precise.

TABLE A-1
AREA R - TRASH DUMP
SURFACE SOIL ANALYTICAL RESULTS
FAA TECHNICAL CENTER
August 1994

Sample Identification	R-SS1	R-SS2	R-SS3	R-SS4	R-SS5	R-SS6	R-SS12 (Dup. of R-SS6)	R-SS7	R-SS8	R-SS9	R-SS10	R-SS11	New Jersey Soil Cleanup Criteria* (Nonresid.)	FB081994
Dilution Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	10.0	10.0		1.0
Volatile Organics (ug/kg)														
Tentatively Identified Compounds (TICs)	-	-	-	-	-	20 JN	-	-	-	-	-	-		
Total VOCs	-	-	-	-	-	20	-	-	-	-	-	-		-
Semi-volatile Organics (ug/kg)													1,000,000	-
Phenol	92J	-	-	-	-	-	-	19 J	-	220 J	-	-	10,000,000	-
Naphthalene*	-	-	-	-	210 J	-	-	-	-	-	-	-	4,200,000	-
Acenaphthene*	-	-	-	31 J	1200 J	71 J	24 J	-	-	-	1600 J	1300 J	10,000,000	-
Fluorene*	-	-	-	22 J	880 J	59 J	-	-	-	-	1900 J	1200 J	10,000,000	-
Phenanthrene*	-	50 J	760 J	770 J	16000 J	960 J	500 J	54 J	37 J	100 J	21000 J	19000 J	--	-
Anthracene*	-	-	230 J	150 J	3500 J	270 J	110 J	-	-	22 J	6000 J	4500 J	100,000	-
Fluoranthene*	-	270 J	4300 J*	1900 J	36000 J*	2500 J	2200 J	220 J	170 J	430 J	56000 J*	38000 J*	10,000,000	-
Pyrene*	-	220 J	4200 J*	1700 J	25000 J	2500 J	1700 J	200 J	150 J	380 J	49000 J*	32000 J*	10,000,000	-
Benzo(a)anthracene**	-	140 J	2200 J	1100 J	16000 J	1600 J	1400 J	97 J	82 J	250 J	32000 J	25000 J	4,000	-
Chrysene**	-	150 J	2300 J	1100 J	16000 J	1600 J	1300 J	140 J	120 J	280 J	32000 J	25000 J	40,000	-
bis(2-Ethylhexyl)phthalate	-	-	-	-	-	-	-	-	-	-	-	-	210,000	13
Benzo(b)fluoranthene**	-	180 J	2400 J	1400 J	21000 J	1700 J	2200 J	150 J	160 J	340 J	23000 J	24000 J	4,000	-
Benzo(k)fluoranthene**	-	160 J	2300 J	1100 J	23000 J	1600 J	1600 J	160 J	120 J	310 J	30000 J	24000 J	4,000	-
Benzo(a)pyrene**	-	130 J	2500 J	1000 J	16000 J	1700 J	1500 J	130 J	100 J	230 J	32000 J	24000 J	660	-
Indeno(1,2,3-cd)pyrene**	-	87 J	1500 J	500 J	8500 J	1200 J	810 J	110 J	61 J	150 J	22000 J	16000 J	4,000	-
Dibenzo(a,h)anthracene**	-	29 J	400 J	200 J	2400 J	510 J	270 J	38 J	-	64 J	9500 J	4800 J	660	-
Benzo(g,h,i)perylene**	-	93 J	1700 J	520 J	6000 J	1300 J	530 J	120 J	68 J	170 J	23000 J	17000 J	--	-
Tentatively Identified Compounds (TICs)	17170 JN	1480 JN	11900 JN	8870 JN	126000 JN	9100 JN	11400 JN	2400 JN	1650 JN	2570 JN	210000 JN	126000 JN		100 JN
Total Organics	17,262	2,969	36,790	20,363	321,990	26,690	25,344	3,658	2,718	5,516	566,000	381,800	10,000,000	113
Pesticides/PCBs (ug/kg)														
4,4'-DDE	3.0 J	-	-	-	-	-	-	-	3.9 J	-	-	-	9,000	-
4,4'-DDT	3.8 J	-	-	-	-	-	-	-	2.9 J	-	-	-	9,000	-
Aroclor-1242	-	-	440 J	-	-	-	-	42 J	-	50 J	-	-	2,000	-
Aroclor-1254	-	-	-	-	-	-	-	-	-	47 J	-	-	2,000	-
Inorganics (mg/kg)														
Metals:														(ug/l)
Arsenic	-	-	-	-	-	-	-	-	-	-	1.00 J	-	20	-
Beryllium	0.16 B	0.22 B	0.21 B	0.15 B	0.22 B	-	-	0.15 B	0.16 B	0.24 B	0.43 B	0.18 B	1	1.10 B
Cadmium	0.83 J	0.68 J	0.69 J	0.42 J	-	-	-	0.70 J	0.78 J	0.73 J	-	-	100	-
Chromium	4.9	9.2	9.3	7.6	9.9	4.5	5.4	4.8	7.5	14.2	9.5	7.1	--	-
Copper	3.10 B	4.0 B	4.1 B	3.4 B	7.1	2.7 B	3.9 B	9.6	21.9	43.4	7.6	10.1	600	-
Lead	14.7	2.3	5.6	2.9	11.4	4.3	3.9	4.6	9.9	16.3	13.1	15.6	600	-
Mercury	0.09 B	0.08 B	0.09 B	0.08 B	0.13	0.07 B	0.06 B	0.12	0.11	0.15	0.1 B	0.1 B	270	-
Nickel	4.40 B	2.6 B	3.9 B	4.1 B	5.5 B	-	2.0 B	-	3.8 B	4.1 B	4.1 B	5.1 B	2400	-
Selenium	-	-	-	-	-	-	-	-	-	-	-	-	3100	1.80 B
Silver	0.65 B	-	-	-	-	-	-	-	2.4	1.3 B	-	1.2 B	4,100	-
Zinc	15.8	8.6	6.2	2.8 B	15.2	3.60 B	4.7	9.6	57.7	28.0	13.9	22.2	1,500	-
Cyanide, Total	-	-	-	-	-	-	-	2.2	0.61	1.2	-	-	21,000	-
Phenol	0.17	0.12	0.11	0.12	0.30	0.14	0.16	0.10	0.19	0.30	0.24	0.26		-
Total Organic Carbon	12800	2300	NA	NA	NA	NA	NA	1390	NA	NA	NA	3160		NA
% Solids	85.6 %	92.6 %	93.9 %	91.6 %	90.4 %	94.1 %	93.8 %	90.1 %	88.7 %	84.5 %	79.7	76.2 %		NA

"-" - Analyte not detected or cleanup criteria not established.
"NA" - Sample not analyzed for this parameter.
"*" - Polynuclear aromatic hydrocarbon (PAH)
"**" - Carcinogenic PAHs

Data Qualifiers:
"J" - Reported result is quantitatively estimated.
"J*" - Reported result was determined from a separate analysis of the sample after diluting by twice the factor noted for the sample.
"JN" - Presumptive evidence for the presence of the analyte(s) at an estimated concentration.
"B" - Reported value is less than the Contract Required Detection Limit but greater than the Instrument Detection Limit (inorganics only).

Shading indicates exceedance of New Jersey Soil Cleanup Criteria.

TABLE 19

COMPARISON OF HISTORIC GROUND WATER VOC ANALYTICAL RESULTS - AREA R

SAMPLE IDENTIFICATION																											NJ PQLs (ppb)
SAMPLE DEPTH:														R-MW1 17-27													
SAMPLE ANALYSIS*	VOA	VOA					LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW +3	LCW	LCW +3	LCW +3	LCW +3	LCW +3	LCW +3	LCW +3	LCW +3	LCW +3	LCW +3	LCW +3	LCW +3	
SAMPLING ROUND**	1/90	1/90	3/90	1/92	1/93	1/93	1/93	2/94	5/94	8/94	12/94	1/95	2/95	10/95	2/96	5/96	8/96	2/96	3/97	6/97	9/97	12/97	2/98	4/98	7/98	10/98	1/99	
VOLATILE ORGANICS (ppb)																												
ACETONE				46					23	11			4J															-
BENZENE				2J	3J	3J	2		3	2	3	2	2	1	1J	2J	2J	2J	2J	2J	0.2J	2J	2J	1J	0.9J	1	1J	1
ETHYLBENZENE	24	14	9	7	16	52	4		15	18	14	48	20	12	4	14	23	19	23	30	0.8J	16	19	34	22	22	16	5
TOLUENE																										0.1J		5
TOTAL XYLENES						18	1	5	5	12	29	1	0.1J	0.4J	0.9J	6	11	12	28	0.2J	1J	2J	6	0.5J				2
1,1-DICHLOROETHANE																				0.2J		1J						-
TETRACHLOROETHENE																										0.3J		1
CIS-1,2-DICHLOROETHENE				2J	2J		1	2 J	2	2	2	1	0.5J	1J	2J	2J	2J	2J	1J	0.1J	1		1J	0.6J	1			2
CHLOROFORM													1							5				0.5J				1
2-BUTANONE				330E										9J														-
CHLOROBENZENE	9	42	35	36	56	110	24	54	41	47	75	59	76	38	73	83	68	65	73	8	64	50	47	58	75	74		2
1,3-DICHLOROBENZENE													0.2J					0.3J			0.3J				0.4J	0.4J		5
1,2-DICHLOROBENZENE			2	2J	4	5	2	3	3	3	4	3	3	2	3J	4J	4J	3	4J	0.4J	4	3J	4	4	5	5		5
1,4-DICHLOROBENZENE		13	5	5	8	15	3	7	8	7	13	9	12	6	10	9	11	10	10	2	9	6	7	12	15	17		5
ADDITIONAL VOA PEAKS	20	63		82J	68J	56J	44J	29 J	35J	69J	224J	26J	3J		49J	58J	10J	103J	53J		86J		72J	18J	59J			-

SAMPLE IDENTIFICATION																												NJ PQLs (ppb)
SAMPLE DEPTH:														R-MW2														
SAMPLE ANALYSIS*	VOA	VOA	VOA	VOA	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW +3	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW +3	LCW +3	LCW +3	LCW +3	LCW +3	LCW +3	
SAMPLING ROUND**	1/90	1/90 DUP	3/90	1/92	1/93	1/93	1/93	2/94	5/94	8/94	12/94	1/95	2/95	10/95	2/96	5/96	8/96	12/96	3/97	6/97	9/97	12/97	2/98	4/98	7/98	10/98	1/99	
VOLATILE ORGANICS (ppb)																												
VINYL CHLORIDE						2		3			2	2	1	3						2		0.1J		0.8J		0.5J	2	5
CHLOROETHANE														0.4J														-
CARBON DISULFIDE																		0.5J										-
ACETONE									4J																		4J	-
BENZENE						0.7J	1	1			2	1	0.6J	2				0.3J	1	0.1J		0.1J	0.3J	0.6J		0.5J	2	1
ETHYLBENZENE	24	21												0.3J					0.5J					0.4J		0.4J	0.2J	5
TOLUENE														0.2J														5
1,1-DICHLOROETHANE														0.1J										0.1J			0.4J	-
CIS-1,2-DICHLOROETHENE						2	3	3		0.5J	3	2	1	2			0.2J	0.7J	2	0.2J		0.3J	0.3J	0.8J		1	2	2
CHLOROFORM					0.7J				2						4	1		0.2J	0.1J	1	1		0.6J	4	7	0.1J		1
CHLOROBENZENE			18	12	0.5J	6	11	21		51	8	13	7	50		2	0.5J	4	22	2	0.4J	2	4	6	1	6	22	2
1,3-DICHLOROBENZENE						0.5J	2	1			2	2	2	0.4J			0.3J	0.6J	0.5J			0.4J	0.4J	0.3J		1	2	5
1,2-DICHLOROBENZENE				2		1	3	3		4	3	3	2	5		0.2J	0.2J	0.7J	3	0.3J		0.4J	0.7J	1	0.2J	1	4	5
1,4-DICHLOROBENZENE	5			9		8	20	13		9	18	15	10	21		0.9J	0.7J	7	20	2	0.7J	4	6	5	1	15	27	5
TOTAL XYLENES										6															0.2J			2
ADDITIONAL VOA PEAKS	49	30	95			2J	8 J	13J		84J	37J	20J												2J		3J		-

NOTE: ONLY CONCENTRATIONS THAT ARE ANALYTICALLY VALID AND ABOVE THE DETECTION LIMIT ARE SHOWN.

* - CONSTITUENTS DETECTED IN R-MW5S DURING THE 12/93 SAMPLING ROUND WERE NOT REPORTED DUE TO LABORATORY CROSS-CONTAMINATION.

** - REVIEW OF THE HISTORIC GROUND WATER RESULTS DATA SETS FOR WELLS R-MW2S AND R-MW5S INDICATE THAT DURING THE FEBRUARY 1996 SAMPLING ROUND, THE SAMPLE IDENTIFICATION OF THESE WELLS WAS REVERSED.

SAMPLE ANALYSIS: VOA - Volatile Organic Analysis, EPA CLP (3/90 SOW)

LCW - EPA Low Concentration Water Volatile Organic Analysis (CLP SOW OLC 02.1)

LCW+3 - LCW plus Acrolein, Acrylonitrile, and 2-Chloroethylvinylether

TABLE 19 (Continued)

COMPARISON OF HISTORIC GROUND WATER VOC ANALYTICAL RESULTS - AREA R

SAMPLE IDENTIFICATION																									NJ PQLs (ppb)
SAMPLE DEPTH:																									
SAMPLE ANALYSIS	VOA	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	
SAMPLING ROUND:	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	8/94	11/94	2/95	[illegible]	10/95	2/96	5/96	9/96	12/96	3/97	6/97	9/97	12/97	2/98	4/98	7/98	10/98	1/99	
VOLATILE ORGANICS (ppb)																									
CARBON DISULFIDE				2																					-
DIBROMOCHLOROMETHANE																					0.1J				1
BROMOFORM																					0.3J				0.8
TOLUENE											0.1J							0.1J							5
CHLOROFORM		13	10	8	11	15	12	14	22	8	9	10	17	18	17	23	18	7	12	15	12	5	11	6	1
TOTAL XYLENES																		0.1J				0.4J			2
ADDITIONAL VOA PEAKS	13																								-

SAMPLE IDENTIFICATION																									NJ PQLs (ppb)
SAMPLE DEPTH:																									
SAMPLE ANALYSIS	VOA	VOA	LCW	LCW	LCW	LCW	LCW	LCW	LCW+3	LCW+3	LCW+3	LCW+3	LCW+3	LCW+3	LCW+3	LCW+3	LCW+3	LCW+3	LCW+3	LCW+3	LCW+3	LCW+3	LCW+3	LCW+3	
SAMPLING ROUND:	10/89	11/92	5/93	10/93	11/93	2/94	5/94	8/94	11/94	2/95	7/95	10/95	2/96	5/96	9/96	12/96	3/97	6/97	9/97	12/97	2/98	4/98	7/98	10/98	1/99	
VOLATILE ORGANICS (ppb)																									
CHLOROFORM			0.9J				0.9J				0.8J	0.5J	0.6J	2	0.5J	0.7J	0.7J	0.4J	0.4J		0.9J		0.3J	0.4J	0.6J	1
ADDITIONAL VOA PEAKS									3J																	-

NOTE: ONLY CONCENTRATIONS THAT ARE ANALYTICALLY VALID AND ABOVE THE DETECTION LIMIT ARE SHOWN.

* - CONSTITUENTS DETECTED IN R-MW5S DURING THE 12/93 SAMPLING ROUND WERE NOT REPORTED DUE TO LABORATORY CROSS-CONTAMINATION.

** - REVIEW OF THE HISTORIC GROUND WATER RESULTS DATA SETS FOR WELLS R-MW2S AND R-MW5S INDICATE THAT DURING THE FEBRUARY 1996 SAMPLING ROUND, THE SAMPLE IDENTIFICATION OF THESE WELLS WAS REVERSED.

SAMPLE ANALYSIS: VOA - Volatile Organic Analysis, EPA CLP (3/90 SOW)
LCW - EPA Low Concentration Water Volatile Organic Analysis (CLP SOW OLC 02.1)
LCW+3 - LCW plus Acrolein, Acrylonitrile, and 2-Chloroethylvinylether

TABLE 19 (Continued)

COMPARISON OF HISTORIC GROUND WATER VOC ANALYTICAL RESULTS - AREA R

SAMPLE IDENTIFICATION																									NJ PQLs (ppb)
SAMPLE DEPTH																									
SAMPLE ANALYSIS	VOA	VOA	VOA	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	
SAMPLING ROUND	10/89	1/92	[illegible]	[illegible]	2/94	5/94	8/94	11/94	[illegible]	7/95	10/95	2/96	5/96	9/96	12/96	3/97	6/97	9/97	12/97	2/98	4/98	7/98	10/98	1/99	
VOLATILE ORGANICS (ppb)																									
VINYL CHLORIDE												2													5
ACETONE							4J																		-
CHLOROFORM			7	5		4	6	7	4	3	5	2		6	7	3	5	9	3	5	4		6	8	4	1
BENZENE													1													1
TOLUENE													0.1J													5
CHLOROBENZENE		1		0.6J								1	25													2
ETHYLBENZENE													0.2J													5
CIS-1,2-DICHLOROETHENE												0.2J	1													2
1,3-DICHLOROBENZENE												0.2J	0.3J													5
1,2-DICHLOROBENZENE												0.3J	3													5
1,4-DICHLOROBENZENE				0.6J								1	12													5

SAMPLE IDENTIFICATION																									NJ PQLs (ppb)
SAMPLE DEPTH																									
SAMPLE ANALYSIS	VOA	VOA	VOA	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	LCW	
SAMPLING ROUND	10/89	5/93	8/93	11/93	2/94	5/94	8/94	11/94	2/95	5/95	10/95	2/96	5/96	9/96	12/96	3/97	6/97	9/97	12/97	2/98	4/98	7/98	10/98	1/99	
VOLATILE ORGANICS (ppb)																									
ACETONE							5																		-
CHLOROFORM	9	6	6	7	3	6	4	7	5	6	8	5	8	9	7	8	11	3	6	4	6	5	5	8	1
TOTAL XYLENES									0.9J																2
TETRACHLOROETHENE																				0.2J			0.2J		1
1,4-DICHLOROBENZENE																							0.1J		5

NOTE: ONLY CONCENTRATIONS THAT ARE ANALYTICALLY VALID AND ABOVE THE DETECTION LIMIT ARE SHOWN.

* - CONSTITUENTS DETECTED IN R-MW5S DURING THE 12/93 SAMPLING ROUND WERE NOT REPORTED DUE TO LABORATORY CROSS-CONTAMINATION.

** - REVIEW OF THE HISTORIC GROUND WATER RESULTS DATA SETS FOR WELLS R-MW2S AND R-MW5S INDICATE THAT DURING THE FEBRUARY 1996 SAMPLING ROUND, THE SAMPLE IDENTIFICATION OF THESE WELLS WAS REVERSED.

SAMPLE ANALYSIS: VOA - Volatile Organic Analysis, EPA CLP (3/90 SOW)
LCW - EPA Low Concentration Water Volatile Organic Analysis (CLP SOW OLC 02.1)
LCW+3 - LCW plus Acrolein, Acrylonitrile, and 2-Chloroethylvinylether

TABLE 6-2

TEST PIT & SURFACE SOIL SAMPLES
AREA S

SAMPLE ID	DATE TAKEN	NEW JERSEY GRID COORDINATES N	E	DEPTH (FT)	ANALYSIS	NOTES
S-TP4	08/16/89	225,410	2,018,075	1.0-1.3	PP+40	TEST PIT 4 - DARK LAYER FROM 1.0-1.3
S-TP9	08/16/89	224,960	2,018,030	4.0	PP+40	TEST PIT 9 - SAND IMMEDIATELY BENEATH REFUSE PILE
S-TP11	08/16/89	225,495	2,018,990	1.0-1.5	PP+40	TEST PIT 11 - BLACK SAND (STAINING ON 1960 AIR PHOTO?)
S-TP12	08/16/89	225,830	2,018,760	2.0-2.5	PP+40	TEST PIT 12 - WITHIN CONSTRUCTION DEBRIS
S-SS1	08/16/89	225,170	2,018,450	0-2	PP+40	SURFACE SOIL NEAR S-TP8
S-SS2	08/16/89	225,960	2,018,065	0-2	PP+40	SURFACE SOIL NEAR S-TP9
S-SS99	08/16/89	225,960	2,018,065	0-2	PP+40	DUPLICATE OF S-SS2
S-FB1	08/16/89	--		--	PP+40	FIELD BLANK
S-TB1	08/16/89	--		--	VOA	TRIP BLANK

ANALYSIS CODES:

PP+40	PRIORITY POLLUTANTS PLUS 40 ADDITIONAL PEAKS
VOA	VOLATILE ORGANIC ANALYSIS

TABLE 6-3

CONSTITUENTS DETECTED IN TEST PIT & SURFACE SOIL SAMPLES -- AREA S

	TEST PIT SAMPLES				SURFACE SOIL			
SAMPLE IDENTIFICATION:	S-TP4	S-TP9	S-TP11	S-TP12	S-SS1	S-SS2	S-FB1 BLANK	S-TB1 BLANK
SAMPLE DEPTH (FT):								
SAMPLE ANALYSIS:	PP+40	PP+40	PP+40	PP+40	PP+40	PP+40	PP+40	VOA
****** VOA (PPB) ********								
METHYLENE CHLORIDE.....	24	19	27	19	20	16	7	8
ADDITIONAL VOA PEAKS.....				7			6 (1)	27 (1)
***** BNA (PPB) *******								
FLUORANTHENE.....	420							
PYRENE.....	560							
BIS(2-ETHYLHEXYL)PHTHALATE.....						2300		
ADDITIONAL BNA PEAKS.....	19800	14800	7600	3100	19800	31400		
***** PEST/PCB (PPB) *****								
***** METALS (PPM) ******								
CR.....	4.7			3.8	2.9	3.4		
CU.....	8.4			8.8				
HG.....				0.22				
PB.....	19	4	5.8	5.7	5.2	18.9		
ZN.....	27.1	8.6		14.1	8.2	18	0.0236	
CYANIDE (PPM).....								
PHENOL (PPM).....	0.19	0.31	0.2	0.56	0.42	0.47		

NOTE: ONLY CONCENTRATIONS ABOVE THE DETECTION LIMITS ARE SHOWN
METHYLENE CHLORIDE WAS ALSO DETECTED IN METHOD BLANK

(1) Additional VOA peaks due entirely to the presence of acetone.

TABLE 6-4

SOIL BORING SAMPLES
AREA S

SAMPLE ID	DATE TAKEN	NEW JERSEY GRID COORDINATES N	E	DEPTH (FT)	ANALYSIS	NOTES
S-B1-4	09/12/89	225,410	2,018,075	6-10	PP+40	VOA 6-8, PP+40 8-10
S-B2-3	09/12/89	225,830	2,018,760	4-6	PP+40	
41-FB3	09/12/89	--		--	PP+40	FIELD BLANK
41-TB1	09/12/89	--		--	VOA	TRIP BLANK

ANALYSIS CODES:

PP+40	PRIORITY POLLUTANTS PLUS 40 ADDITIONAL PEAKS
VOA	VOLATILE ORGANIC ANALYSIS

TABLE 6-5

CONSTITUENTS DETECTED IN SOIL BORING SAMPLES -- AREA S

SAMPLE IDENTIFICATION:	S-B1-4	S-B2-3	41-FB3	41-TB1
SAMPLE DEPTH (FT):	6 - 10	4 - 6	BLANK	BLANK
SAMPLE ANALYSIS:	PP+40	PP+40	PP+40	VOA
****** VOA (PPB) ********				
METHYLENE CHLORIDE.....	17	20	5	7
ADDITIONAL VOA PEAKS.....	180	50	25 (1)	
***** BNA (PPB) *******				
DI-N-BUTYLPHTHALATE.....	3100	3900		
BIS(2-ETHYLHEXYL)PHTHALATE.....		390		
ADDITIONAL BNA PEAKS.....	4300	5100		
***** PEST/PCB (PPB) *****				
***** METALS (PPM) ******				
PB.....	0.96	2.7		
ZN.....		25.5	0.0234	
CYANIDE (PPM).....				
PHENOL (PPM).....	0.24	0.2		

NOTE: ONLY CONCENTRATIONS ABOVE THE DETECTION LIMITS ARE SHOWN
METHYLENE CHLORIDE AND DI-N-BUTYLPHTHALATE WERE ALSO DETECTED IN METHOD BLANK

(1) Additional VOA peaks due entirely to the presence of acetone.

TABLE 6-6

GROUND WATER SAMPLES
AREA S

SAMPLE ID	DATE TAKEN	NEW JERSEY GRID COORDINATES N	E	DEPTH (FT)	ANALYSIS	NOTES
S-MW1S	10/17/89	226,035	2,019,112	10-30	PP+40	CLEAR SAMPLE
S-MW2S	10/17/89	225,043	2,018,500	4-24	PP+40	SLIGHTLY SILTY SAMPLE
S-MW3S	10/17/89	225,024	2,017,759	4-24	PP+40	CLEAR SAMPLE
41-FB1	10/17/89	--		--	PP+40	FIELD BLANK
41-TB1	10/17/89	--		--	VOA	TRIP BLANK

ANALYSIS CODES:

PP+40 PRIORITY POLLUTANTS PLUS 40 ADDITIONAL PEAKS
VOA VOLATILE ORGANIC ANALYSIS

TABLE 6-7

CONSTITUENTS DETECTED IN GROUND WATER - AREA S

SAMPLE IDENTIFICATION:	S-MW1S	S-MW2S*	S-MW3S	FB-1	TB-1
SAMPLE DEPTH (FT):	10-30	4-24	4-24	BLANK	BLANK
SAMPLE ANALYSIS:	PP+40	PP+40	PP+40	PP+40	VOA
****** VOA (PPB) ********					
METHYLENE CHLORIDE.....				6	9
ADDITIONAL VOA PEAKS.....		26			
***** BNA (PPB) *******					
***** PEST/PCB (PPB) *****					
***** METALS (PPB) ******					
CR.....					
PB.....		30.4			
ZN.....			88.4		
CYANIDE (PPB).....					
PHENOL (PPB).....		9.1			
PH (STANDARD UNITS).....	5	4.9	5.3		
CONDUCTIVITY (MICROMHOS/CM).....	31	30	30		
TEMPERATURE (CELSIUS).....	17	18	18		

NOTE: ONLY CONCENTRATIONS ABOVE THE DETECTION LIMITS ARE SHOWN
METHYLENE CHLORIDE WAS DETECTED IN METHOD BLANK

* THE BNA FRACTION FOR S-MW2S WAS RE-EXTRACTED.

TABLE 6-8

SURFACE WATER & SEDIMENT SAMPLES
AREA S

SAMPLE ID	DATE TAKEN	DEPTH (FT)	ANALYSIS	NOTES
S-SW1	08/16/89	0.5	PP+40	LARGE POND IN SW OF SITE
S-SW2	10/16/89	0-0.5	VOA	100' ABOVE AREA S CONFLUENCE
S-SW3	10/16/89	0-0.5	VOA	IMMEDIATELY BELOW CONFLUENCE
S-SD1	08/16/89	0-0.5	PP+40	40 FT DOWNSTREAM OF S-SD2
S-SD2	08/16/89	0-0.5	PP+40	S.BRANCH AT CONFLUENCE WITH AREA S DRAINAGE
S-SD3	10/16/89	0-0.5	VOA	S. BRANCH - 100' ABOVE AREA S CONFLUENCE
S-SD4	10/16/89	0-0.5	VOA	S. BRANCH - 50' ABOVE AREA S CONFLUENCE
S-SD5	10/16/89	0-0.5	VOA	S. BRANCH (SD 2 LOCATION)
S-SD6	10/16/89	0-0.5	VOA	S. BRANCH (SD 1 LOCATION)
S-FB1	08/16/89	--	PP+40	FIELD BLANK
S-TB1	08/16/89	--	VOA	TRIP BLANK
S-FB2	10/16/89	--	VOA	FIELD BLANK

ANALYSIS CODES:

PP+40	PRIORITY POLLUTANTS PLUS 40 ADDITIONAL PEAKS
VOA	VOLATILE ORGANIC ANALYSIS

TABLE 6-9

CONSTITUENTS DETECTED IN SURFACE WATER - AREA S

SAMPLE IDENTIFICATION:	S-SW1	S-SW2	S-SW3	S-FB1	S-FB2	S-TB1
SAMPLE DEPTH (FT):				BLANK	BLANK	BLANK
SAMPLE ANALYSIS:	PP+40	VOA	VOA	PP+40	VOA	VOA
****** VOA (PPB) ********						
METHYLENE CHLORIDE.....	6			7	180	8
CHLOROFORM.....					12	
ADDITIONAL VOA PEAKS.....(1)	13	6	6	6	29	27
***** BNA (PPB) *******						
***** PEST/PCB (PPB) *****						
***** METALS (PPB) ******						
CU.....	50.7					
ZN.....	20.2			23.6		
CYANIDE (PPB).....						
PHENOL (PPB).....						

NOTE: ONLY CONCENTRATIONS ABOVE THE DETECTION LIMITS ARE SHOWN
METHYLENE CHLORIDE WAS DETECTED IN THE METHOD BLANK

(1) All additional VOA peaks due to the presence of acetone

TABLE 6-10
CONSTITUENTS DETECTED IN SEDIMENT SAMPLES — AREA S

SAMPLE IDENTIFICATION:	S-SD1	S-SD2	S-SD3	S-SD4	S-SD5	S-SD6	S-FB1	S-TB1	FB-2
SAMPLE DEPTH (FT):	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	BLANK	BLANK	BLANK
SAMPLE ANALYSIS:	PP+40	PP+40	VOA	VOA	VOA	VOA	PP+40	VOA	VOA
****** VOA (PPB) ********									
METHYLENE CHLORIDE.....	120	220	38	110	170	76	7	8	180
TOLUENE.....	95			5700					
CHLOROFORM.....									12
ADDITIONAL VOA PEAKS.....		70	170		664	370	6 (1)	27 (1)	29
***** BNA (PPB) *******									
ADDITIONAL BNA PEAKS.....	324000	190000							
***** PEST/PCB (PPB) *****									
***** METALS (PPM) ******									
PB.....	61.8	48.8							
ZN.....	58.1	26.6							
CYANIDE (PPM).....							0.0236		
PHENOL (PPM).....	0.29	0.28							

NOTE: ONLY CONCENTRATIONS ABOVE THE DETECTION LIMITS ARE SHOWN
METHYLENE CHLORIDE WAS ALSO DETECTED IN METHOD BLANK

(1) The concentration of additional VOA peaks were due to the presence of acetone.

TABLE 7 - 3
FAA TECHNICAL CENTER
NO ACTION AREA INVESTIGATIONS SAMPLE SUMMARY
AREA S - EXCAVATED AREA WEST OF TILTON ROAD

Sample Identification	Sample Type	Date Sampled	New Jersey Grid Coordinates N	New Jersey Grid Coordinates E	Ground Surface Elevation[1] (ft)	Sample Depth[2] (ft)	Well Screened Interval[2] (ft)	Analysis[3]
S-SS3	Surface Soil	10/21/92	225,130.14	2,018,388.17	58.06	0.5-1.0	-	PPVOA+20
S-SS4	Surface Soil	10/22/92	224,933.08	2,018,107.70	55.65	0.5-1.0	-	PPVOA+20
S-SS5	Surface Soil	10/21/92	225,338.70	2,018,125.18	55.68	0.5-1.0	-	PPVOA+20
S-SS6[4]	Surface Soil	10/21/92	225,423.28	2,018,949.29	62.51	0.5-1.0	-	PPVOA+20
SD-7	Sediment	10/22/92	224,656.45	2,017,591.13	51.32	0.0-0.5	-	PPVOA+20
SD-8[4]	Sediment	10/22/92	224,714.07	2,017,531.60	51.09	0.0-0.5	-	PPVOA+20
SD-9	Sediment	10/22/92	224,857.89	2,017,196.88	51.48	0.0-0.5	-	PPVOA+20
SD-10[5]	Sediment	10/22/92	224,656.45	2,017,591.13	51.32	0.0-0.5	-	PPVOA+20
S-B3	Soil Boring	10/30/92	225,330.74	2,018,116.66	56.15	4-6	-	PPVOA+20
S-B4[4]	Soil Boring	10/30/92	225,776.36	2,018,763.49	57.07	4-6	-	PPVOA+20
S-B5	Soil Boring	10/30/92	225,429.25	2,018,958.37	61.98	12-14	-	PPVOA+20
S-MW1S	Ground Water	11/05/92	226,034.64	2,019,112.21	67.54	-	10-30	PPVOA+20
S-MW2S	Ground Water	11/05/92	225,042.97	2,018,499.98	58.77	-	4-24	PPVOA+20
S-MW3S	Ground Water	11/05/92	225,024.48	2,017,758.89	56.90	-	4-24	PPVOA+20
S-MW1S	Ground Water	7/10/95	226,034.64	2,019,112.21	67.54	-	10-30	LCW+3
S-MW2S	Ground Water	7/10/95	225,042.97	2,018,499.98	58.77	-	4-24	LCW+3
S-MW3S	Ground Water	7/10/95	225,024.48	2,017,758.89	56.90	-	4-24	LCW+3
S-MW4S[4]	Ground Water	7/10/95	224,802.39	2,018,122.56	56.07	-	4.5-14.5	PP+40
S-MW5S	Ground Water	7/10/95	224,892.84	2,018,508.05	58.50	-	7-17	PP+40
S-MW6S	Ground Water	7/10/95	225,073.31	2,018,856.33	61.97	-	10-20	PP+40
S-MW7S[6]	Ground Water	7/10/95	224,892.84	2,018,508.05	58.50	-	7-17	PP+40
FB-102192	Field Blank	10/21/92	-	-	-	-	-	PPVOA+20
FB-102292	Field Blank	10/22/92	-	-	-	-	-	PPVOA+20
FB-103092	Field Blank	10/30/92	-	-	-	-	-	PPVOA+20
TB-110592	Trip Blank	11/05/92	-	-	-	-	-	PPVOA+20
FB-071095	Field Blank	07/10/95	-	-	-	-	-	PP+40
TB-071095	Trip Blank	07/10/95	-	-	-	-	-	LCW+3

Notes:
1 Ground Surface Elevation in Feet Above Mean Sea Level
2 Sample Depth and Well Screened Interval in Feet Below Ground Surface
3 PPVOA+20 - Priority Pollutant Volatile Organic Analysis Plus 20 Peaks; PP+40 - Priority Pollutants plus 40 peaks;
LCW+3 - EPA Low Concentration Water Volatile Organic Analysis (10/92 SOW SAM) plus Acrolein, Acrylonitrile, and 2-Chloroethyl vinyl ether
4 Matrix Spike and Matrix Spike Duplicate (MS/MSD) samples collected
5 Duplicate Sample of SD-7
6 Duplicate Sample of S-MW5S

TABLE 7–4
FAA TECHNICAL CENTER
NO ACTION AREA INVESTIGATIONS
SEDIMENT ANALYTICAL RESULTS
AREA S – EXCAVATED AREA WEST OF TILTON ROAD

Sample Identification:	SD–7	SD–8	SD–9	SD–10	FB–102292
Sample Depth (ft):	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5	FIELD BLANK
Sample Analysis:	PPVOA + 20	PPVOA + 20	PPVOA + 20	PPVOA + 20	PPVOA + 20
VOA (ppb)					
Methylene Chloride			23 U	25 U	7J
Trichlorofluoromethane		5 J			

J – Analyte present. Reported value may not be accurate or precise.
U – Not detected substantially above the level reported in laboratory or field blanks.

TABLE 7-5
FAA TECHNICAL CENTER
NO ACTION AREA INVESTIGATIONS
SURFACE SOIL ANALYTICAL RESULTS
AREA S – EXCAVATED AREA WEST OF TILTON ROAD

Sample Identification:	S-SS3	S-SS4	S-SS5	S-SS6	FB-102192	FB-102292
Sample Depth (ft):	0.5-1.0	0.5-1.0	0.5-1.0	0.5-1.0	FIELD BLANK	FIELD BLANK
Sample Analysis:	PPVOA + 20	PPVOA + 20	PPVOA + 20	PPVOA + 20	PPVOA + 20	PPVOA + 20
VOA (ppb)						
Methylene Chloride					4J	7J
Toluene	1 J	2 J		1 J		
Tentatively Identified Compounds (TICs)	120 C 112 J		8 J			

J – Analyte present. Reported value may not be accurate or precise.
C – Response factor from daily standard

TABLE 7-6
FAA TECHNICAL CENTER
NO ACTION AREA INVESTIGATIONS
SOIL BORING ANALYTICAL RESULTS
AREA S – EXCAVATED AREA WEST OF TILTON ROAD

Sample Identification:	S-B3	S-B4	S-B5	FB-103092
Sample Depth (ft):	4-6	4-6	12-14	FIELD BLANK
Sample Analysis:	PPVOA + 20	PPVOA + 20	PPVOA + 20	PPVOA + 20
VOA (ppb)				
Methylene Chloride				3 J
Tentatively Identified Compounds (TICs)	450 C 10 J			

J – Analyte present. Reported value may not be accurate or precise.
C – Response factor from daily standard

TABLE 7-7
FAA TECHNICAL CENTER
NO ACTION AREA INVESTIGATIONS
GROUND WATER ANALYTICAL RESULTS
AREA S – EXCAVATED AREA WEST OF TILTON ROAD

Sample Identification:	S-MW1S	S-MW2S	S-MW3S	TB-110592
Sample Depth (ft):	10-30	4-24	4-24	TRIP BLANK
Sample Analysis:	PPVOA + 20	PPVOA + 20	PPVOA + 20	PPVOA + 20
VOA (ppb)				
Methylene Chloride				4J

J – Analyte present. Reported value may not be accurate or precise.

TABLE 7 – 8
FAA TECHNICAL CENTER
GROUND WATER ANALYTICAL RESULTS
SUPPLEMENTAL "NO ACTION" AREA INVESTIGATION
AREA S – EXCAVATED AREA WEST OF TILTON ROAD
July 10, 1995

SAMPLE IDENTIFICATION: SAMPLE DEPTH (FT): SAMPLE ANALYSIS:	S–MW1S 10 – 30 LCW + 3	S–MW2S 4 – 24 LCW + 3	S–MW3S 4 – 24 LCW + 3	S–MW4S 4.5 – 14.5 PP + 40*	S–MW5S 7 – 17 PP + 40*	S–MW6S 10 – 20 PP + 40*	S–MW7S Dup. of MW5S PP + 40*	FB–071095 Field Blank PP + 40*	TB–071095 Trip Blank LCW + 3	NJ PQLs* (ppb)
VOLATILE ORGANICS (ppb)										
Chloroform	4	–	–	0.1 J	0.2 J[1]	–	0.2 J	–	–	1
Toluene	–	–	–	–	–	–	–	0.1 J	–	5
SEMI–VOLATILES (ppb)	NA	NA	NA						NA	
Butylbenzylphthalate				–	1 J	–	–	–		20
TICs				5 J	173 J	10 J	8 J	–		–
PESTICIDES/PCBs (ppb)	NA	NA	NA	–	–	–	–	–	NA	–
INORGANICS (ppb)	NA	NA	NA						NA	
<u>Metals – Unfiltered:</u>										
Chromium				10.5	5.7 B	8.1 B	4.9 B	–		10
Lead				6.8 J[2,3,5]	18.0 J[2,3,4]	4.1 J[2,3]	17.2 J[2,3,4]	2.4 J[2,3]		10
Nickel				9.0 B	9.4 B	11.5 B	13.1 B	–		10
Copper				8.0 B	7.6 B	14.7 B	4.8 B	2.0 B		1000
Zinc				28.6 R	47.9 R	82.9 R	34.3 R	23.4 J[3]		30
CYANIDE	NA	NA	NA	–	–	–	–	–	NA	–
PHENOL	NA	NA	NA	–	–	–	–	–	NA	–

NOTES:

J – Estimated value.
J[1] – Estimated value due to high surrogate recovery.
J[2] – Estimated value due to matrix spike recovery below the lower control limit.
J[3] – Estimated value due to the duplicate analysis outside the control limit.
J[4] – Estimated value due to the MSA below 0.995 but greater than 0.990.
J[5] – Estimated value due to low recovery during GFAA spiking.
B – Greater than instrument detection limit but less than Contract Required Detection Limits (CRDL).
R – Rejected Value due to contamination below 5X the field blank contamination.
NA – Sample not analyzed for specified analytes.

ANALYSIS:

LCW + 3 – EPA Low Concentration Water Volatile Organic Analysis (10/92 SOW) plus Acrolein, Acrylonitrile and 2–chloroethyl vinyl ether.
PP + 40* – Priority Pollutants plus 40 peaks (VOC fraction analyzed for LCW + 3).

ROD FACT SHEET

SITE

Name : FAA Technical Center
Location/State : Atlantic County, NJ
EPA Region : II
HRS Score (date): 39.65 (12/09/88)
Site ID # : NJ9690510020

ROD

Date Signed: EPA - 09/28/99
Remedy/ies: Institutional control, ground water monitoring
Operating Unit Number: OU-11
Capital cost: N/A
Construction Completion: N/A
O & M: N/A
Present worth: N/A

LEAD

Remedial/Enforcement Federal Facility Agreement
EPA/State/PRP: EPA Federal Facilities
Primary contact: Keith Buch, FAA (609-485-6644)
Secondary contact: Julio F. Vazquez, EPA (212-637-4323)
Main PRP(s): Federal Aviation Administration Tech Center
PRP Contact: Keith Buch, FAA (609-485-6644)

WASTE

Type: Volatile Organic Compoundss
Medium: Ground water
Origin: disposal activities, landfill operations
Est. quantity: unknown

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