DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

RCRA Corrective Action
Environmental Indicator (EI) RCRAInfo code (CA750)
Migration of Contaminated Groundwater Under Control

Facility Name: International Flavors and Fragrances
Facility Address: 800 Rose Lane, Union Beach, New Jersey, 07735
Facility EPA ID#: NJD002194843

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While final remedies remain the long-term objective of the RCRA Corrective Action program, the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993 (GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated groundwater and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration / Applicability of EI Determinations

EI Determination status codes should remain in the RCRAInfo national database ONLY as long as they remain true (i.e., RCRAInfo status codes must be changed when the regulatory authorities become aware of contrary information).

Facility Information

The International Flavors and Fragrances (IFF) site occupies approximately 105 acres in Union Beach, New Jersey, of which 41 acres was developed and utilized for chemical manufacturing. The developed portion of the IFF site ranges from 10 to 15 feet above sea level, and is surrounded by land at lower elevations that includes wetlands associated with East Creek, Thorns Creek, and Natco Lake to the west, east, and south, respectively. Raritan Bay borders the IFF site to the north, and tidal wetlands are present along the shoreline. Surrounding land uses are primarily undeveloped wetlands within one-quarter mile of the site, except for residences adjacent to the southwestern part of the site along Rose Lane. A New Jersey Railroad line also borders the southern edge of the IFF property, connecting to the rail spur at the former unloading area at the western part of the site.

IFF manufactured specialty organic chemicals for use as flavors and fragrances at the Union Beach facility from 1951 through 1997, when the site was closed. Prior to operation of the IFF facility, ceramic tiles were manufactured at the site by the National Brick and Tile Company. Discarded tiles and bricks from this operation were used as fill at the northwest part of the site. Manufacturing processes performed at the IFF site included chemical processing, formulation, distillation, and packaging. The IFF facility includes approximately 40 buildings used for chemical manufacturing, storage and offices; drum storage areas; surface impoundments; storage tanks; a sludge disposal area; and a parking area. The 41-acre manufacturing area is fenced and gated.

Contamination was first detected at the site in 1979 when the United States Coast Guard observed seepage of contaminated groundwater from the site into Raritan Bay. The Coast Guard ordered IFF to install an interceptor trench to recover contaminated groundwater and treat the contamination to prevent discharge to Raritan Bay.

IFF signed an Administrative Consent Order (ACO) with the New Jersey Department of Environmental Protection (NJDEP) to expand and test a recovery trench to control the seepage to Raritan Bay on October 14, 1982. Groundwater monitoring and operation of the recovery trench has been performed since 1982. The facility applied for a RCRA permit to store and treat hazardous wastes in 1985, and submitted a revised permit application to NJDEP and EPA in 1986. NJDEP and IFF signed a second ACO in October 1986 that required completion of a site-wide Remedial Investigation/Feasibility Study (RI/FS) and implementation of remedial action. A RCRA permit for hazardous waste management was issued to IFF in 1989, renewed in 1994, and reissued in 1996 for container storage only. NJDEP also issued a Discharge to Groundwater (DGW) Permit to IFF in 1990 for the operation of unlined surface impoundments in the wastewater treatment system. The facility also was permitted for industrial discharges to the Bayshore Regional Sewage Authority under New Jersey Pollutant Discharge Elimination System (NJPDES) Permit NJ0001082.

The site-wide RI identified soil and groundwater contamination throughout the site. Based on the results of the RI, NJDEP issued the Final Decision Document that specified the preferred remedies for the site in October 1995. The selected remedy for soil and wetland soil contamination involved excavation and off-site disposal of polychlorinated biphenyl (PCB) contaminated soil to the relevant cleanup level (i.e., 100 mg/kg where asphalt capping was used, 50 mg/kg where soil/vegetative capping was used, 0.75 mg/kg in wetland soil areas). Soil remedial actions were undertaken in 1999 and completed in 2000. The Decision Document also specifies continued operation of the groundwater collector trench that included a slurry wall addition in 1997 and 1999. NJDEP has also required IFF to perform effectiveness monitoring for operation of the collector trench. The first annual report for ongoing operation of the trench system is due at the end of 2001. A Deed Notice is in place for this site to restrict the property to non-residential use only and identify areas of impacted soil. A Classification Exception Area (CEA) has also been submitted to NJDEP and the Borough of Union Beach to outline impacted groundwater areas at the site.

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

_X_ If yes - check here and continue with #2 below.

____ If no - re-evaluate existing data, or

____ If data are not available skip to #6 and enter IN (more information needed) status code

Summary of Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs): A RCRA Facility Assessment (RFA) was performed in 1988 and identified numerous SWMUs and AOCs at the IFF site, which are briefly described below. The subsequent RI/FS, however, did not focus on specific SWMU and AOC areas, but rather on site-wide soil and groundwater. In general, soil and groundwater contamination has not been identified at or related to SWMU or AOC source areas. Rather, the FS and Final Decision Document indicated that cleanup at the site would focus on PCB Soil Contamination Areas. Where possible, SWMUs/AOCs have been correlated with PCB Soil Contamination Areas in the descriptions below. However, PCB Soil Contamination Areas do not encompass all SWMUs/AOCs at the site. Remedial actions associated with the PCB Soil Contamination Areas were completed in 2000 and documented in the June 2001 Remedial Action Report (RAR), which was approved by NJDEP on September 6, 2001 (Ref. 16). SWMU and AOC locations are presented on Attachment 1.

SWMU 1, Oil/Water Separator #1 and SWMU 2, Oil/Water Separator #2: SWMU 1 was an 18-foot diameter steel tank with a fiberglass cover, located near the wastewater treatment system in the southeast part of the site. SWMU 2 was a 16-foot by 16-foot in-ground masonry tank that was also located nearby the wastewater treatment system in the southeast part of the site (Ref. 2). Solvent-contaminated wastewaters flowed to the units from the drum storage areas (SWMU 6, AOC E) and from the process buildings. Waste solvents collected in the units included benzene, toluene, ethylbenzene, and xylene (BTEX), chlorobenzene, and methylene chloride. Waste solvent was removed from influent wastewater by gravity separation and was pumped from the separator to a waste solvent holding tank (SWMU 9). Effluent wastewater from the units flowed to the equalization basin (SWMU 3) in the wastewater treatment system. The oil/water separators were located in a paved area. NJDEP did not recommend any sampling at either of these units because of their construction; however, a site-wide evaluation of soil contamination was performed as part of the RI/FS. These units were not included as part of any PCB Soil Contamination Areas. Both units were taken out of service upon shutdown of manufacturing operations at the site in December 1997. This area is currently covered by asphalt (Ref. 15).

SWMU 3, Equalization Basin: This unit was an unlined surface impoundment that was constructed in the natural clay underlying the site (Ref. 2). The equalization basin had lateral dimensions of 70 feet by 110 feet and a depth of 12 feet. The impoundment was used to store effluent from the oil/water separators (SWMUs 1 and 2) prior to treatment in the primary clarifier (AOC B). The equalization basin was replaced by an aboveground tank when the unit was decommissioned in 1991 (Ref. 5). The basin was backfilled and capped in 1991; the decommissioning has been approved by NJDEP (Ref. 5). This unit is not located within a PCB Soil Contamination Area. Historical waste management activities in this area likely contributed to groundwater impacts beneath the site. Groundwater monitoring in this area is ongoing as part of the site-wide groundwater monitoring program. The most recent groundwater monitoring data (May 2001) from the site indicates that benzene is present in groundwater at the aeration basin at 280 µg/L, and chlorobenzene is present at 5,200 µg/L at well AR-1, both of which exceed New Jersey Ground Water Quality Criteria (NJ GWQC) (Ref. 14).

SWMU 4, Aeration Basin: The aeration basin was an unlined surface impoundment utilized for biological treatment of wastewater and contaminated groundwater at the IFF site. The unit measured 280 feet by 120 feet, with a depth of 14 feet. The basin received discharges from the primary clarifier (AOC B), and provided biological treatment of organic contaminants. The effluent was discharged to the final clarifiers (AOC C). The aeration basin was decommissioned under requirements of the NJ DGW Permit in April 1988; the decommissioning has been approved by NJDEP (Ref. 5). Soil sampling conducted during decommissioning detected PCB concentrations up to 28 mg/kg, which is above the New Jersey Non-Residential Direct Contact Soil Cleanup Criteria (NJ NRDCSCC) of 2.0 mg/kg. The basin was backfilled with soil excavated from areas throughout the site, capped with a geomembrane liner, covered by 14 inches of clean fill and 4 inches of topsoil, and then seeded. Historical waste management activities in this area likely contributed to groundwater impacts beneath the site. Groundwater monitoring in this area is ongoing as part of the site-wide groundwater monitoring program. The most recent groundwater monitoring data (May 2001) from the site indicates that benzene is present in groundwater in the vicinity of this unit at 280 µg/L and chlorobenzene is present at 5,200 µg/L at well AR-1, both of which exceed NJ GWQC (Ref. 14).

SWMU 5, Sludge Lagoon: The sludge lagoon was an unlined surface impoundment used for storage of wastewater treatment sludges generated at the primary and final clarifiers (AOCs B and C). The impoundment measured 170 feet by 240 feet, and 11 feet deep. Water decanted from the sludge was returned to the treatment process and the sludge was disposed off site as a non-hazardous industrial waste. Waste sludges may have contained hazardous constituents, including BTEX, metals, and methylene chloride. The sludge basin was taken out of service in 1991, concurrently with the equalization basin. The basin was filled in and capped at that time; the decommissioning has been approved by NJDEP (Ref. 5). The unit was not located within a PCB Soil Contamination Area identified in the FS. The most recent groundwater monitoring data (May 2001) from the site indicates that benzene is present in groundwater at the aeration basin at 280 µg/L and chlorobenzene is present at 5,200 µg/L at well AR-1, both of which exceed NJ GWQC (Ref. 14).

SWMU 6, Drum Storage Area: This unit consisted of a 167-foot by 74-foot concrete storage pad that was used to store drums of waste solvents and other waste liquids, including toluene, xylenes, methylene chloride, and alcohols. This unit was located outdoors at the southeast corner of the site. Although the concrete pad was not bermed, the floor sloped toward two drains that discharged to the oil/water separators (SWMUs 1 and 2). The pad was installed in 1980. Documentation indicates that inspections performed by USEPA prior to 1980 noted leaking drums stored directly on the ground at this area. In addition, inspections by NJDEP noted discolored soil at this area after the installation of the concrete pad. Characterization and remediation of the drum storage area was incorporated into the site-wide RI/FS. Soil sampling results indicated that volatile organic compounds (VOCs) were not detected in soil. Semi-volatile organic compounds (SVOCs) were detected at levels below NJ NRDCSCC. The storage area was closed per RCRA requirements in 2000, and the pad was taken out of service and decontaminated. The

RCRA Closure for this unit has been approved by NJDEP (Ref. 13). This unit was located within PCB Soil Contamination Area 2.

SWMU 7, Waste Solvent Tank 320A and SWMU 8, Waste Solvent Tank 320B: Tanks 320A and 320B are aboveground steel tanks with capacities of 5,000-gallons and 10,000-gallons, respectively. The tanks were used to store waste solvents and both were built on concrete pads adjacent to building 320 with secondary containment that drained back to the oil/water separators (SWMUs 1 and 2). Waste solvents stored at the tanks were burned in an on-site boiler or were shipped off site for disposal. One documented spill of 220 gallons of waste solvents occurred at Tank 320A in 1974. Available documentation indicates that some of the spilled waste reached the stormwater system and discharged to Raritan Bay. Soil sampling conducted during tank closure detected PCBs in the area of both tanks at concentrations from 5.5 to 12 mg/kg, which is above the NJ NRDCSCC of 2.0 mg/kg (Ref. 3). These tanks were closed under RCRA requirements in 1991, including decontamination and removal of the tank; however, according to available documentation, RCRA clean closure has not been achieved and RCRA post-closure care requirements have not been determined. Any remaining soil and groundwater contamination was to be addressed by the site-wide RI/FS conducted at the facility. These units are not part of any PCB Soil Contamination Areas identified in the FS. This area is currently covered with asphalt, thus preventing direct exposure to impacted soil above NJ NRDCSCC (Ref. 15).

SWMU 9, Waste Solvent Holding Tank: This unit was an aboveground tank located next to the oil/water separators (SWMUs 1 and 2). The tank was constructed of carbon steel with a capacity of 5,000 gallons. The tank was used to store immiscible organic liquids, primarily solvents, separated from the wastewater in the oil/water separators (SWMUs 1 and 2). The waste solvent was burned in the incinerator (SWMU 16) or transferred to Tanks 320A and 320B (SWMUs 7 and 8) for shipment off site for disposal. The tank was located on a concrete pad with a drain that discharged back to the wastewater treatment system. This tank was decommissioned as part of the closure of the wastewater treatment system required under the NJ DGW Permit (Ref. 8). Investigation and actions for soil and groundwater at these tanks was incorporated in the site-wide RI/FS. This unit was not part of any PCB Soil Contamination Areas identified in the FS. This area is currently covered with asphalt, thus preventing direct exposure to impacted soil above NJ NRDCSCC (Ref. 15).

SWMUs 10 through 13, Acid Chromium Storage Tanks: Four 2,500-gallon steel tanks were used to store waste acetic acid that contained chromium while the facility was in operation (Ref. 2). These tanks were constructed of steel and built on concrete pads with secondary containment. No releases of chromium-bearing waste from these tanks was documented while the facility was in operation. The tanks were located at the eastern part of the site, immediately south of Building 360. Chromium acetic acid waste was accumulated in the tanks for less than 90 days and then shipped off site for disposal. The tanks were taken out of service when facility operations ceased in 1997. Investigation and actions for soil and groundwater at these tanks was incorporated in the site-wide RI/FS. This unit was not part of any PCB Soil Contamination Areas identified in the FS. This area is currently covered by asphalt, thus preventing direct exposure to impacted soil above NJ NRDCSCC (Ref. 15).

SWMU 14, Waste Transfer Area: This unit consisted of a partially unpaved area next to Tank 320B (SWMU 8) that was used to store approximately 10 to 20 drums of waste, including waste solvent, toluene, and xylenes (Ref. 6). The contents of the drums were historically pumped into Tank 320B. Any releases from this area would have resulted in soil and groundwater contamination, or would have discharged to the stormwater system and then possibly to Raritan Bay. Soil sampling conducted during the RI/FS at this area of the site detected VOCs in soil, but all concentrations were below NJ NRDCSCC. This area was incorporated in PCB Soil Contamination Area 4 in the RI/FS because soil sampled contained up to 35 mg/kg PCBs.

SWMU 15, Underground Storage Tank T-32: This unit was an underground carbon steel tank that was used for storage of waste solvents that were either shipped off site for disposal, or transferred to Tanks 320A and 320B (SWMUs 7 and 8) (Ref. 2). Waste solvents stored in the tank included xylenes and toluene. This tank was taken out of service in 1985 and closed in 1991. The tank was removed and contaminated soil was excavated during the tank closure. During closure, several VOCs were detected in residual soil below NJ NRDCSCC. PCBs were not detected above the NJ NRDCSCC of 2 mg/kg at the time the unit was closed. According to available documentation, RCRA clean-closure for this unit has not yet been achieved and RCRA post-closure requirements for this unit have not yet been established (Ref. 13).

SWMU 16, Incinerator: This unit was located on a 50-foot by 50-foot concrete pad, with a diked area in the center that drained to two 5,000-gallon underground storage tanks that were considered integral parts of the incinerator system (Ref. 2). The burn chamber was constructed of concrete walls lined with three courses of fire brick. Drums of waste were drained into the pit that flowed to the underground tanks. Wastes were pumped from the tanks to the burn chamber and ignited. The unit was constructed in 1969, and taken out of service in 1985. Wastes burned in this unit included distillation wastes from chemical manufacturing processes, which contained xylenes, mineral oil, methanol, methyl ethyl ketone, ethanol, and toluene. The unit was closed in 1991 when the incinerator structure and the associated tanks were decontaminated and removed from the site. Soil contamination detected in the immediate vicinity of the incinerator location was excavated and removed during the closure of the unit (Ref. 3). PCBs were detected in all soil samples collected during closure of the incinerator, ranging in concentration from 9.3 to 290 mg/kg, which is above the NJ NRDCSCC of 2.0 mg/kg. Because of the elevated PCB concentrations detected in soil at the incinerator, this area was included with PCB Soil Contamination Area 2 in the FS. According to available documentation, RCRA clean-closure for this unit has not yet been achieved and RCRA post-closure requirements for this unit have not yet been established (Ref. 13).

SWMU 17, Sludge Disposal Area: In 1976, sludge from the wastewater treatment system was disposed in an area approximately 20 feet by 50 feet and several feet deep next to the final clarifier (AOC C) near the western property boundary (Ref. 2). Because the sludge was buried without a liner present, this disposal possibly resulted in soil and groundwater contamination from VOCs and metals in the wastewater treatment sludge. Soil contamination at the unit was investigated as part of the site-wide RI/FS, and groundwater contamination that may have occurred due to sludge disposal was evaluated as part of the groundwater remedial action for the site. This area was incorporated as part of PCB Soil Contamination Area 1.

SWMU 18, Stormwater Weir Box #1: Three in-ground concrete weir boxes were used for the management of stormwater collected in catch basins located throughout the manufacturing area of the site. Each weir box contained three chambers. The first chamber was a sump that contained a pump used to transfer accumulated stormwater to the wastewater treatment system (Ref. 2). The overflow from the first compartment discharged to the second and then third compartments in each weir box. When stormwater flows exceeded the capacity of the sump pumps at the weir boxes, the overflow from the third unit discharged onto the ground (Ref. 1).

Overflows and discharges of contaminated stormwater containing oils and solvents have been documented at Weir Box #1. Discharges from Weir Box #1 resulted in contamination in the brick and tile fill area at the north-central part of the site that has discharged to Raritan Bay. During the remediation of site soil contamination, the flow from Weir Box #1 was redirected to Weir Box #2 by a pipeline that was installed at the site to eliminate discharge of stormwater to the brick and tile fill area. The storm water now discharges from one location at the site, east of Weir Box #2. Contaminated soil was also excavated from the site during the Weir Box #1 removal, and remaining soil contamination at this unit was included with PCB Soil Contamination Area 6.

SWMU 19, Stormwater Weir Box #2: Weir box #2 was constructed in a similar manner to Weir Box #1, and the unit is still present at the northwest part of the site (Ref. 2). Discharges from Weir Box #2 resulted in contamination to East Creek along the western site boundary. Impacted soil was removed and capped at the area of the site where Weir Box #2 is located within PCB Soil Contamination Area 12 (Ref. 7).

SWMU 20, Stormwater Weir Box #3: Weir box #3 was constructed in the same manner as the other weir boxes at the site and is located in the northern central part of the site (Ref. 2). Based upon available documentation it is unclear whether this unit is still in place at the site. Discharges from this unit contributed to soil contamination at the northern central part (PCB Soil Contamination Area 7) of the site and off-site areas (PCB Soil Contamination Area 7A). This unit is located within PCB Soil Contamination Area 7 and 7a.

AOC A, Railroad Transfer Area: A rail spur from the New Jersey Railroad ran through the western side of the site to the rail unloading area at the northwest part of the manufacturing area. This area was used for unloading of raw materials from rail cars from 1953 through 1983 (Ref. 6). Materials handled at this area included hydrochloric acid, ethylene oxide, and fragrance oils. There were no releases documented from rail transfer activities at the IFF site. The railroad ballast at the transfer area was investigated as part of the RI/FS. BTEX, polycyclic aromatic hydrocarbons (PAHs), and phthalate esters were detected in soil, but at levels below NJ NRDCSCC. No PCBs were detected in soil at the railroad transfer area.

AOC B, Primary Clarifier: The primary clarifier was a 40-foot diameter circular steel aboveground storage tank that was used for treatment of wastewater by removal of settled solids. The primary clarifier received inflow from the equalization basin, and discharged the wastewater decanted from the unit to the aeration basin. Sludge from this unit was discharged to the sludge lagoon. The unit was taken out of service when facility operations ceased in December 1997. Any soil or groundwater contamination associated with the unit was included in the site-wide RI/FS. This area is located within PCB Soil Contamination Area 4.

AOC C, Final Clarifiers: The final clarifiers consisted of two circular steel aboveground treatment tanks that were 30 and 400 feet in diameter. The units were located in the southeast part of the site near the equalization basin. The unit received discharges from the aeration basin and provided the final treatment for wastewater prior to discharge to the Bayshore Regional Sewage Authority. Sludges from the final clarifiers were discharged to the sludge basin. The clarifiers were taken out of service when facility operations ceased in December 1997. Any soil or groundwater contamination associated with the unit was included in the site-wide RI/FS (Ref. 6). This area is located within PCB Soil Contamination Area 1 (Ref. 7).

AOC D, Drum Wash Area: The drum wash area was located inside Building 133, in the northwest part of the site, near Weir Box #2 (SWMU 19). Used drums were rinsed with a water-detergent solution, and the water, detergent and residual drum contents were discharged to the wastewater treatment system through the underground effluent pipeline (AOC F) that traverses the site. No releases were documented from this area. Soil samples were collected during the RI/FS at the area surrounding Building 133 and no hazardous constituents were detected above NJ NRDCSCC (Ref. 6). This area is located within PCB Soil Contamination Area 12.

AOC E, Temporary Drum Storage Areas: Ten drum storage areas were identified in the site-wide RI/FS conducted at the site. The drum storage areas were unpaved or partially paved. Releases from these areas may have resulted in soil and groundwater contamination, and could have discharged to the stormwater system, thus possibly discharging to Raritan Bay. The investigation of the drum storage areas during the RI/FS identified contamination primarily of PCBs, but also VOCs and PAHs at several locations in the manufacturing area of the plant, that exceeded NJ NRDCSCC. Based on the extent of PCB contamination in soil at the site delineated during the RI/FS, NJDEP determined that it was not practicable to address the limited non-PCB soil contamination. NJDEP determined that excavating and capping PCB soil contamination areas at the site, along with other access controls in place at the site, would be protective for any potential soil exposures to non-PCB contamination. Based upon the selected remedial action, specific locations where non-PCB contamination remains above NJ NRDCSCC could not be identified. Remedial actions associated with PCB contamination at the site were completed in 2000, and documented in the June 2001 RAR. The RAR was approved by NJDEP on September 6, 2001 (Ref. 16). Thus, all PCB-impacted areas at the site have been excavated and capped. In addition, a majority of the site is capped by either asphalt, concrete, buildings, or a soil/vegetative cover, thus preventing exposure to any on-site residual contamination. There are several grassy areas (seven major areas) at the site that have not been capped during historic remedial activities. Soil samples collected during the Phase I and II RI within these grassy areas did not detect contamination above the NJ RDCSCC or NJ NRDCSCC.

AOC F, Underground Effluent Pipeline: The underground effluent pipeline system was used to transport wastewater from the process buildings located throughout the manufacturing area to the wastewater treatment system at the southeastern part of the site (Ref. 6). The discharge line was taken out of service in 1990. Soil contamination was discovered during construction near the cold storage box and maintenance shed (Buildings 512 and 513) in 1996. Investigation of this unit was incorporated into the site-wide RI/FS. Toluene and xylene were detected in soil samples, but concentrations were below NJ NRDCSCC. Based upon available documentation, it is unclear which PCB Soil Contamination Areas included these piping areas. Despite this fact, a majority of the site is capped by either asphalt, concrete, buildings, or a soil/vegetative cover, thus preventing exposure to any on-site residual contamination. There are several grassy areas (seven major areas) at the site that have not been capped during historic remedial activities. Soil samples collected during the Phase I and II RI within these grassy areas did not detect contamination above the NJ RDCSCC or NJ NRDCSCC.

PCB Soil and Wetlands Contamination Areas: Eleven primary areas of PCB contamination in soil and wetlands soil have been identified during previous investigations (Phase I and II RI/FS) conducted at the site. Nine of these areas of soil/wetlands contamination were delineated and determined to contain PCBs above NJ NRDCSCC (2.0 mg/kg) and the site-specific wetlands soil criterion (0.75 mg/kg). Table 1 identifies the PCB Soil Contamination Areas, their approximate location at the site, and the remedial action taken at each area. The areas are located throughout the site and are depicted in Attachment 2.

Table 1 - PCB Soil Contamination Areas and Relevant Actions Taken

PCB Area[1]	Area Description	Remedial Action
1	B-127 and B-127 Area (along the east fence line)	Excavated to a cleanup level of 50 mg/kg, backfilled, and soil/vegetative cover installed.
2	Southeast Corner Area	Excavated to a cleanup level of 50 mg/kg, backfilled, and soil/vegetative cover installed.
3	MW-106 Area	Delineated and determined not to require remediation. All delineation samples less than 2.0 mg/kg.
4	Transformer Area	Excavated to a cleanup level of 100 mg/kg. Capped with three inches of crushed concrete blocks which was covered by three more inches of asphalt.
5	MW-103 Area	Capped by existing asphalt roadway. PCB concentration are less than 100 mg/kg.
6	MW-113 Area	Excavated to a cleanup level of 100 mg/kg. Capped with three inches of crushed concrete blocks which was covered by three more inches of asphalt.
7	Northern Property Area South of Fence Line	Excavated to a cleanup level of 50 mg/kg, backfilled, and soil/vegetative cover installed.
7a	Wetlands Area North of Fence Line	Excavated to a cleanup level of 0.75 mg/kg, backfilled, and soil/vegetative cover installed.
8	MW-201 area	Hot spot excavation area. Excavated to a cleanup level of 50 mg/kg, backfilled, and soil/vegetative cover installed.
9	Test Pit-4A (outside eastern fence)	Delineated and determined not to required remediation. All delineation samples less than 2.0 mg/kg.
10	Test Boring-204 (west side of site)	Non-wetland portion excavated to a cleanup level of 50 mg/kg. Wetlands portion excavated to a cleanup level of 0.75 mg/kg (or to saturated zone). Each area backfilled and soil/vegetative cover installed.
12	MW-6 (South west area)	Excavated to a cleanup level of 0.75 mg/kg, backfilled, and soil/vegetative cover installed.

[1] PCB Soil Contamination Areas and boundaries have been altered several times during investigation. This EI utilizes only the most recent PCB Soil Contamination Area designation as presented in the FS and RAR. Because of the extent of PCB contamination above NJ NRDCSCC, PCB Soil Contamination Areas grew and conglomerated during remedial actions. The final remedial approach and actions used are depicted in Attachment 3.
Note: No area identified as No. 11
(Refs. 6, 12)

Soil remedial actions were undertaken in 1999 and completed in 2000. The June 2001 RAR was approved by NJDEP on September 6, 2001. During the excavation of PCB-impacted soil, many of the PCB Soil Contamination Area boundaries grew as achievement of relevant cleanup standards was sought. Thus, the final extent of the remedial actions taken at the site were much more extensive than originally planned (see Attachment 3). In addition, throughout the site there were many localized or single sample locations that detected PCBs in soil in excess of 50 mg/kg. Each of these hot spot areas was excavated to achieve a cleanup level of less than 50 mg/kg and capped with clean topsoil and vegetative cover. In addition to all PCB Remedial Actions, a majority of the site has been covered by either clean fill, asphalt roadways, and/or buildings to ensure that no residual non-PCB soil contamination is exposed at the site. There are several grassy areas (seven major areas) at the site that have not been capped during historic remedial activities (Ref. 15). Soil samples collected during the Phase I and II RI within these grassy areas did not detect contamination above the NJ RDCSCC or NJ NRDCSCC.

Groundwater: Groundwater has generally been investigated on a site-wide basis, rather than on a unit-specific or area-specific basis. Historical activities at the IFF site have impacted the non-potable shallow water table aquifer beneath the site. Previous investigations have confirmed that activities conducted at the IFF site have not impacted the deeper aquifers (lower Magothy and Raritan Formations) in the area of the site.

Groundwater investigations began in 1979 when the Coast Guard documented seepage of groundwater contamination from the brick and tile fill area at the northwest part of the site into Raritan Bay. Subsequent sampling of the discharge seeps, water collected in the trench system, and wells in the brick and tile fill area have identified groundwater contamination due to the presence of BTEX compounds, 1,2-dichloroethane (DCA), and methylene chloride. Groundwater contamination has also been detected at the area of the fire pond, located in the south-central part of the site. Contaminants detected in groundwater at this part of the site include chlorobenzene and dichlorobenzene. High concentrations of groundwater contaminants have also been detected at the northeast area of the site, including perchloroethylene, tetrachloroethylene (TCE), and trans-1,2-dichloroethene (DCE) (Ref. 6). Contaminants present at the western part of the site include benzene, chlorobenzene, xylenes, and TCE in the area of the former wastewater surface impoundments. During the most recent two monitoring events (November 2000, May 2001) benzene, chloroform, chlorobenzene, 1,2-DCA, ethylbenzene, toluene, and xylene were detected above NJ GWQC at well locations throughout the site.

An interceptor trench system was originally installed in 1979 and updated in 1997. The trench extracts shallow groundwater from the northeast, north, and northwest perimeter of the site. Water is pumped from collection sumps located at several locations along the trench system to the treatment system. The extracted groundwater is treated by granular activated carbon adsorption, and is discharged to the sanitary sewer. In 1999, a slurry wall was constructed along the northern perimeter of the collection system to control infiltration of water from Raritan Bay into the collection system. During November 2000 and May 2001 semi-annual groundwater monitoring, benzene, chloroform, and 1,2-DCA were detected at concentrations above NJ GWQC at locations downgradient of the trench collection system and slurry wall at wells MW-W1 and MW-6 (Refs. 11, 15). Contaminated groundwater is also present at areas of the site which are not within the zone of influence of the trench system (primarily in the southern and southwestern portion of the site); however, recent groundwater monitoring data (November 2000, May 2001) indicate that contaminated groundwater detected in these wells is not reaching the off-site, downgradient well located just south of the site (MW-108S/D). NJDEP has approved the final remedy for groundwater at the site based on the very low hydraulic conductivity and minimal groundwater flow rates in the shallow aquifer in the southern section of the site.

Groundwater monitoring is performed on a semi-annual basis per an NJDEP-approved groundwater monitoring program. A CEA has also been prepared for this site and transmitted to both NJDEP and the Borough of Union Beach.

As the site is no longer an active chemical manufacturing facility, most of the SWMUs and AOCs have been decommissioned and/or closed. The Stormwater Weir Box #2 is the only documented unit still in place at the site. Despite the fact that numerous SWMUs and AOCs were identified in the 1988 RFA, remedial investigations and actions have not focused on identified SMWUs and AOCs at the site. Rather, a site-wide RI/FS was performed to identify contaminants of concern above NJ NRDCSCC, per the 1986 ACO. Investigations were performed on groundwater, soil, surface water, and sediment. Based upon the results of the RI/FS, PCB Soil Contamination Areas were identified and have been remediated as described in the June 2001 RAR. Groundwater actions have been ongoing and have included the installation of an interceptor trench, slurry wall, and the performance of semi-annual groundwater monitoring. In addition, a Deed Notice is in place that restricts the site to non-residential use and prevents disturbance of the caps currently in place at the site. IFF has also prepared a CEA that outlines areas of impacted groundwater related to the IFF site.

References:

1. Memorandum from Randy England, NJDEP to Ed Stevenson, NJDEP, re IFF Industrial Survey Site Visit. Dated June 18, 1981.
2. Letter from Neil Jiorle, NJDEP to Barry Tornick, USEPA, re: RCRA Facility Assessment, IFF Facility. Dated September 23, 1988.
3. Letter from Ronald Senna, IFF to Anthony Findley, NJDEP, re: RI/FS Fragrance Ingredients Plant RCRA Closure Activities. Dated March 11, 1991.
4. Memorandum from Edward Putnam, NJDEP, to Dennis Hart, NJDEP, re: Confirmation on Issues Discussed at the Internal IFF Meeting. Dated June 24, 1991.
5. Letter from Paul Harvey, NJDEP to Ronald Senna, IFF, re: Department Approval of Lagoon Closure Certifications. Dated July 12, 1991.
6. IFF RI/FS Phase I/Phase II RI Report. Prepared by Tams Consultants, Inc. Dated May 1992.
7. Final Decision Document, IFF Site, Union Beach, Monmouth County, New Jersey. Prepared by New Jersey Department of Environmental Protection Site Remediation Program. Dated October 1995.
8. Letter from Paul Harvey, NJDEP to Ronald Senna, IFF, re: Aeration Basin Closure Plan. Dated June 9, 1998.
9. IFF Inc. Union Beach, Monmouth County, New Jersey, Classification Exception Area Request. Prepared by Camp Dresser and McKee. Dated March 1999.
10. Letter from Brian Kiel, IFF to Paul Harvey, NJDEP, re: Groundwater Monitoring Program Semi-Annual Report, Year 2000. Dated September 8, 2000.
11. Letter from Brian Kiel, IFF to Paul Harvey, NJDEP, re: Groundwater Monitoring Program November 2000 Sampling Event. Dated April 20, 2001.
12. RAR for Phase II Excavation of PCB Contaminated Soil/Wetland Areas, Capping and Aeration Basin Closure. Dated June 2001.
13. Letter from Anthony Fontana, NJDEP to Brian Kiel, IFF, re: Closure of RCRA Regulated Units. Dated August 3, 2001.
14. Letter from Brian Kiel, IFF to Paul Harvey, NJDEP, re: Groundwater Monitoring Program May 2001 Sampling Event. Dated August 31, 2001.
15. Letter from Ronald Senna, IFF, to Alan Straus, USEPA, re: Your Request for Site Plan. Dated September 5, 2001.
16. Letter from Paul Harvey, NJDEP, to Ronald Senna, IFF, re: Remedial Action Report for Phase II Soils dated June 2001, Plant Site, IFF, Union Beach. Dated September 6, 2001.

2. Is **groundwater** known or reasonably suspected to be "**contaminated**"[1] above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

_X_ If yes - continue after identifying key contaminants, citing appropriate "levels," and referencing supporting documentation.

___ If no - skip to #8 and enter "YE" status code, after citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated."

___ If unknown - skip to #8 and enter "IN" status code.

Rationale:

Hydrogeology

The IFF site is located on the shore of Raritan Bay in the northern part of the coastal plain in Monmouth County, New Jersey (Ref. 4). The IFF site is located in a relatively flat area; elevations across the site range from approximately 8 to 20 feet above sea level. The surrounding areas are at lower elevations, and are primarily occupied by surface waters and wetlands associated with Raritan Bay, East Creek, Thorns Creek, and Natco Lake, located north, west, east, and south of the IFF site, respectively.

The IFF site is underlain by unconsolidated surficial sediments that include silty sand and artificial fill. The fill material is composed of discarded brick and tile fragments that were placed at the site during the operation of the National Brick Company facility from the early 1900s to 1951, prior to the construction of the IFF facility (Ref. 4). The fill is present primarily in the western and northwestern parts of the site, adjacent to the wetlands associated with East Creek in the vicinity of wells MW-5 and MW-6, and in the northwestern part of the site. Brick and tile fill has not been found at the central, eastern, and southern parts of the site. Silty sand to medium-grained sand underlies some of the fill material, and is the uppermost geologic unit at the eastern, central, and southern parts of the site. The sand thickens to the southeast, increasing in thickness to a maximum of 11 feet at the southeastern part of the site.

Although the sandy surficial sediment present in the central and southeastern part of the site is permeable, it is above the water table across most of the IFF site. The lower part of the surficial sand extends to depths below the water table at the southeastern part of the site, where the sand unit is up to 20 feet thick. Throughout the central, southwestern and northeastern parts of the site, the water table is below the surficial brick and tile fill and sandy sediments that are the uppermost geologic unit at the site. Where the water table is below the bottom of the fill and sand units, the underlying clay deposits of the upper Woodbury Clay are the uppermost water-saturated unit beneath the site.

The Cretaceous Woodbury Clay unit is approximately 50 feet thick beneath the site, and is underlain by the Merchantville Formation. The Merchantville Formation is also a silty clay and clay of Cretaceous age that is 50 feet thick beneath the IFF site. Throughout most of the IFF site, the water table occurs in the upper part of the Woodbury Clay. The uppermost clay bed in the Woodbury Clay unit is 25 to 30 feet

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[1] "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

thick beneath the site. This upper clay is underlain by a silt unit that is 15 to 21 feet thick. Most of the shallow monitoring wells installed at the site are completed in the upper portion of the Woodbury Clay, except for wells screened in or partly within the overlying brick and tile fill or sand units. Aquifer tests of wells completed in the upper clay indicate the unit has a horizontal hydraulic conductivity of 3×10^{-3} to 3×10^{-5} feet per day. Groundwater within the brick and tile fill may have flow velocities ranging up to several feet per day. Data from deeper monitoring wells completed in the silt unit of the Woodbury indicate that there is a downward hydraulic gradient from the overlying clay and fill units at the western part of the site, and an upward hydraulic gradient southwest of the site, near Natco Lake. The horizontal hydraulic conductivity of the silt bed in the Woodbury clay is approximately 0.1 feet per day. Groundwater quality monitoring data from wells completed in the silt bed within the Woodbury Clay have not detected any contaminants during the RI or subsequent monitoring events.

Water table elevations range from about 13 feet above sea level in a mound at the central and west-central parts of the site in the vicinity of wells AR-1 and MW-105, to 1 to 3 feet above sea level in the northern, eastern, southeastern, and southwestern parts of the site. This indicates groundwater flow from the west-central part of the site radially towards the surrounding surface water bodies. Water table elevations and well locations are shown on the maps included as Attachment 4 and Attachment 7.

Hydraulic testing of the Merchantville Formation was not performed during the investigations at the IFF site; however, regional hydrogeologic information indicates that the Merchantville Formation has similar hydraulic properties to the Woodbury Clay, and that the two formations act as a regional confining unit that does not allow significant groundwater migration in this part of the New Jersey Coastal Plain.

The Merchantville Formation is underlain by the Magothy and Raritan Formations. These units are older Cretaceous deposits, and they contain more sand and gravel in the middle and lower portions of the sequence. The Magothy and Raritan Formations have a combined thickness of approximately 350 feet in the area of the IFF site. These coarse grained deposits have much higher water yields than any of the overlying deposits, and are used as regional supply aquifers. Three production wells were used at the IFF site, and they were completed in coarse-grained beds of the Raritan Formation at depths ranging from 310 to 326 feet below land surface. These deposits have high hydraulic conductivity; well yields ranging from 450 to over 1,000 gallons per minute for wells completed in the Raritan aquifer (Ref. 3). The Raritan Formation is underlain by crystalline basement rocks with very low hydraulic conductivities which are not used as a water source in the area of the IFF site.

The most recent documented well survey occurred in 1988 and identified a total of 13 wells present within 3 miles of the site, including the production wells at IFF. Two wells located approximately 1 mile southeast of the site are domestic wells that have total depths of 35 and 50 feet, and yields of 10 gallons per minute or less. All of the other wells are constructed with total depths greater than 300 feet and withdraw water from the Raritan and Magothy Formations.

Background

NJDEP and IFF signed a second ACO in October 1986 that required completion of a site-wide RI/FS and implementation of remedial action (Ref. 2). The RI was completed in two phases from 1987 to 1991. The RI identified groundwater contamination throughout the site, primarily due to BTEX, chlorobenzene, and trichloroethene (TCE) concentrations above NJ GWQC in shallow groundwater at the site. Other VOCs, SVOCs, and inorganic compounds were also detected above NJ GWQC in shallow groundwater at the site. No contaminants were detected in the deeper wells completed in the silt bed within the Woodbury Clay. The maximum contaminant concentrations detected during the RI are summarized in Table 2.

The RI identified a number of contaminants above their respective NJ GWQC at several areas across the site. Because of the low hydraulic conductivity of the clay deposits that are the uppermost water-saturated unit across the site, high contaminant concentrations detected at certain locations have not migrated and commingled to form contaminant plumes across the site. Contaminants have been detected at the northwestern part of the site that reflect migration of contaminated groundwater through the brick and tile fill where that material occurs below the water table.

Table 2. Maximum Contaminant Concentrations Detected During the RI (μg/L)

Contaminant	Well	Concentration	NJ GWQC
Benzene	MW-112	97,000	2
Ethylbenzene	MW-102	1,500	700
Toluene	MW-102	190,000	1,000
Xylenes	MW-102	2,600	40
Vinyl Chloride	SI-1	14	5
Methylene Chloride	MW-109	210	2
1,2-DCA	MW-2S	1,700	2
1,1-DCE	MW-4	410	2
Methyl ethyl ketone	MW-103	1,000	300
TCE	MW-4	1,600	1
1,1,2,2-Tetrachloroethene	MW-4	400	2
Chlorobenzene	MW-12	560	4
1,3-Dichlorobenzene	MW-12	430	600
1,4-Dichlorobenzene	MW-12	1,200	75
1,2-Dichlorobenzene	MW-12	1,700	600
bis(2-ethylhexyl)phthalate	MW-3S	130	30
Arsenic	MW-15	310	8
Beryllium	SI-3	51	20
Cadmium	MW-15	39	4
Chromium	SI-3	924	100
Copper	MW-15	7,700	1,000
Lead	SI-3	1,630	10
Mercury	MW-15	1.8	2
Zinc	MW-2D	35,200	5,000

High concentrations of BTEX compounds, aromatic hydrocarbons, and other VOCs were detected at MW-102 and MW-112, which are both located near the former western and central weir boxes at the northwest and north-central part of the site. High levels of aromatic hydrocarbons were also detected at MW-2S during the RI (22,000 µg/L benzene, 13,000 µg/L toluene). The contamination observed at MW-2S probably represents preferential groundwater contaminant migration through the brick and tile fill where this material occurs below the water table at the northwestern part of the site. This area is located near the shore of Raritan Bay where contaminated seeps were observed discharging into Raritan Bay while the facility was in operation.

Benzene contamination was also found in groundwater at concentrations exceeding NJ GWQC at monitoring wells MW-104S (190 µg/L) and MW-103 (45 µg/L), near former container storage areas at the central and east-central parts of the production area, respectively. Methyl ethyl ketone was also detected at MW-103 at 1,000 µg/L during the RI.

Chlorinated solvents, including TCE, 1,2-DCA, vinyl chloride and 1,1,2,2-tetrachloroethane were detected above NJ GWQC at several locations at the IFF site during the RI, including MW-4 (TCE at 1,600 µg/L), MW-106 (1,2-DCA at 1,700 µg/L), and MW-2S (1,2-DCA at 1,800 µg/L). The chlorinated organic compounds present at MW-4 and MW-106 probably reflect the impacts of releases at or near former container storage areas at the northeast and south-central parts of the production areas of the facility. As discussed previously, contamination at MW-2S probably reflects migration of contaminated groundwater through the brick and tile fill at the northwest part of the site.

SVOCs detected in groundwater included dichlorobenzenes at MW-12 (1,2-dichlorobenzene at 1,700 µg/L; 1,3-dichlorobenzene at 430 µg/L; and 1,4-dichlorobenzene at 1,200 µg/L) and phthalate esters detected at MW-3S (bis(2-ethylhexyl)phthalate 270 µg/L). These compounds were not detected at other parts of the site.

Metals were detected at most of the wells sampled during the RI. Metals present at concentrations exceeding NJ GWQC included arsenic, beryllium, cadmium, chromium, lead, and zinc. The highest metals concentrations were detected at wells MW-15 (at the northeast part of the site) and at SI-3 (at the east-central part of the site near the former aeration basin). The maximum zinc concentration was detected at MW-2D during the RI. It was noted during the sampling events that the wells yielded highly turbid groundwater samples, and suspended solids in the samples may have contributed to the elevated metals concentrations. The wells were resampled during the RI and filtered samples were analyzed. The filtered samples contained arsenic and lead above the NJ GWQC in one sample for each metal.

Current Conditions

After the RI was completed, a number of remedial actions were implemented to address soil contamination at the IFF site. Remedial actions included excavation of PCB impacted soil in several areas to a cleanup level of 100 mg/kg and subsequent capping with asphalt, excavation of PCB-impacted soil in other areas to a cleanup level of 50 mg/kg and subsequent capping with clean fill and a soil/vegetative cover, and excavation of PCB-impacted wetlands soil to a cleanup level of 0.75 mg/kg and subsequent capping with clean fill and soil/vegetative cover. In addition, the groundwater extraction trench was extended in 1997 and a slurry wall was installed in 1999 on the downgradient side of the trench to reduce the infiltration of surface water into the trench. These actions have reduced the sources of contamination present in the subsurface, decreased infiltration of recharge into the subsurface, and continued the extraction and treatment of contaminated groundwater. As part of the final remedy for the site, groundwater monitoring is performed to assess the performance of the groundwater extraction system (Refs. 5, 6).

Water level data collected at the site indicate that the groundwater extraction system provides hydraulic control for contamination across the northern two-thirds of the site, but does not control contaminant migration south of the groundwater divide, where groundwater flow is to the southwest and southeast. The Final Decision Document did not require control of this contamination, as groundwater flow calculations indicate that less than one percent of the groundwater flow at the site is towards the south, southeast, and southwest. The CEA and well exclusion area have been implemented to prevent contact with contamination and use of contaminated groundwater at the site. The boundaries of the CEA are shown on Attachment 5. Significant contaminant concentrations are still present in shallow groundwater at the site. The results of the most recent groundwater monitoring event (May 2001) are listed in Table 3 (Ref. 8).

Table 3. Groundwater Monitoring Results, May 2001 Semi-Annual Sampling Event (μg/L)

Well	1,1-DCA	1,1-DCE	cis1,2-DCE	Chloroform	1,2-DCA	Benzene	Toluene	Chlorobenzene	Ethylbenzene	Xylenes
NJ GWQC	**70**	**2**	**10**	**6**	**2**	**1**	**1,000**	**4**	**700**	**40**
MW-6	—	—	—	—	—	7.6	—	0.8	—	—
MW-102	—	—	—	—	—	7,300	210,000	—	1,100	3,100
MW-202	1.8	—	—	—	—	0.6	—	—	—	—
MW-W1	—	2.0	—	2.8	6.8	58	—	—	—	—
MW-3SR	17	—	—	—	—	790	8.4	—	6.3	5.4
AR-1	—	—	—	—	—	280	—	5,200	—	—
F-3	—	—	—	—	—	0.8	—	—	—	—

— Not Detected
No contaminants were detected at wells MW-8R, MW-16, MW-109, MW-111, MW-112, MW-130, MW-131, MW-W2.

References:

1. Memorandum from Peter Patterson, NJDEP to Director Schiffman, NJDEP, re: International Flavors and Fragrances, Inc., Union Beach, New Jersey. Dated December 4, 1981.
2. Administrative Consent Order, In the Matter of International Flavors and Fragrances, Inc. Dated October 30, 1986.
3. IFF Interim Background Investigation Report. Prepared by Tams Consultants, Inc. Dated May 11, 1988.
4. International Flavors and Fragrances Remedial Investigation/Feasibility Study Phase I/Phase II Remedial Investigation Report. Prepared by Tams Consultants, Inc. Dated May 1992.

5. Letter from Anthony Findley, NJDEP to Ronald Senna, IFF, re: International Flavors and Fragrances Feasibility Study and Decision Document. Dated July 6, 1994.
6. Letter from Brian Kiel, IFF to Paul Harvey, NJDEP, re: Groundwater Monitoring Program Semi-Annual Report, Year 2000. Dated September 8, 2000.
7. Letter from Brian Kiel, IFF to Paul Harvey, NJDEP, re: Groundwater Monitoring Program November 2000 Sampling Event. Dated April 20, 2001.
8. Letter from Brian Kiel, IFF to Paul Harvey, NJDEP, re: Groundwater Monitoring Program May 2001 Sampling Event. Dated August 31, 2001.

3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"[2] as defined by the monitoring locations designated at the time of this determination)?

_X_ If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"[2].

___ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"[2]) - skip to #8 and enter "NO" status code, after providing an explanation.

___ If unknown - skip to #8 and enter "IN" status code.

Rationale:

Groundwater monitoring has been conducted at the site since 1982 to monitor performance of the groundwater recovery trench, and to assess impacts on groundwater quality from the surface impoundments at the site. Groundwater contamination was initially detected through observation of contaminated seepage from the brick and tile fill area in the northwest corner of the site into Raritan Bay. This contamination was delineated at wells MW-W1 MW-8R, MW-3SR. Contamination in the silt zone of the Woodbury Clay was not detected at MW-3D in this area. Groundwater monitoring wells installed at the site detected additional contamination in the north-central part of the site (MW-102, MW-113). Contamination was also detected in the western part of the site (MW-130, MW-5, MW-6), in the eastern part of the site (MW-4, MW-103, MW-105, AR-1, SI-5, MW-15), and in the southern part of the site (MW-12, F-1). Contamination characterization efforts continued through the completion of the RI at the site in 1992. Ongoing groundwater monitoring has been performed while the final remedies were developed and constructed at the site (including excavation and capping of PCB contaminated soil, soil hot spot excavations, decommissioning and removal of tanks and surface impoundments, extension of the groundwater recovery trench, and installation of the slurry wall). In order to provide performance monitoring data on the groundwater recovery trench and slurry wall, NJDEP has specified 15 monitoring wells that must be monitored on a semi-annual basis. These wells include MW-6, MW-8R, MW-16, MW-102, MW-109, MW-111, MW-112, MW-130, MW-131, MW-202, MW-W1, MW-W2, MW-3SR, AR-1, and F-3. The performance monitoring well locations are shown on the map included as Attachment 7, and are also discussed in Question 7. Historical groundwater quality monitoring data from MW-3D, MW-104D, MW-107D, MW-108D have shown that downward migration of the contaminants to the deeper groundwater zone in the Woodbury Clay is not occurring at the site. In addition, sampling of

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[2] "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

the three production wells at the site during the RI did not detect any contamination in the Raritan aquifer. Thus, the only aquifer impacted by site-related contaminants is the shallow groundwater zone.

The excavation and capping of contaminated soil at the site has reduced contaminant sources, while the recovery trench provides hydraulic control of the contaminated groundwater at the northern part of the site. Water level measurements from MW-112, MW-8R, MW-3SR, MW-102, MW-104S, MW-111, MW-112, F-3, AR-1, and MW-131 show that the recovery trench provides hydraulic containment for the northern two-thirds of the site. The interceptor trench recovered over 6.2 million gallons of contaminated groundwater during 2000 (Ref. 4). Performance monitoring wells downgradient of the trench show that contamination was not detected at a number of locations outside the trench in 2000 and 2001 (MW-130, MW-W2, MW-202, MW-109, MW-16) (Refs. 3, 4, 5). At locations where groundwater contamination is present downgradient of the trench at concentrations above NJ GWQC, the observed concentrations are within the ranges of previously observed concentrations (MW-6, MW-W1). Data from 1999 through May 2001 indicate that benzene was detected at MW-W1 at a maximum concentration of 58 µg/L (See Tables 3 and 4). Benzene was detected at MW-6 during this period at a maximum concentration of 21 µg/L (Refs. 3, 4, 5). During the RI, benzene was detected at MW-6 at a concentration of 90 µg/L. Thus, elevated contaminant concentrations downgradient of the interceptor trench and slurry have decreased since the installation of the recovery system. The decreasing contaminant concentrations downgradient of the wall reflect the control of contaminant migration provided by the slurry wall and recovery trench system upgradient of these locations. However, the contaminated groundwater downgradient of the slurry wall and trench system discharges to adjacent surface water. The potential impacts of these discharges are addressed in Questions 4 and 5.

Water level measurements at the southern, southeastern, and southwestern part of the site indicate that the recovery trench system does not provide hydraulic containment in these areas, which are monitored by MW-7, MW-11, MW-12, MW-13, MW-14, MW-107S, and F-1. The recent monitoring results only show contaminant concentrations above NJ GWQC in MW-12, MW-107S, and F-1, which are located near the southern and southwestern boundaries of the site (Refs. 3, 4, 5). No contaminants have been detected above NJ GWQC in MW-7, MW-11, MW-13, and MW-14 (Refs. 3, 4, 5). Data from well F-1 show decreasing benzene concentrations during 2000, with results from the November 2000 sampling event at 6.3 µg/L, below the observed range of 9.1 to 30 µg/L detected during 1999. Similarly, the November 2000 results at MW-12 detected chlorobenzene at 300 µg/L, while in July 1999 chlorobenzene was detected at 360 µg/L at this monitoring location. Data from 1999 through May 2001 indicate that 1,2-DCA is present at MW-107S at up to 21 µg/L (Table 4) (Refs. 3, 4, 5). During the RI, 1,2-DCA was detected at MW-107S at 88 µg/L. Water level data from MW-107S indicates that groundwater in this area of the site is outside the zone of influence of the slurry wall and trench system and discharges to adjacent surface water. The potential impacts of this discharge are addressed in Questions 4 and 5. In addition, the groundwater monitoring results downgradient of MW-12 and F-1 are discussed below.

Along the eastern property boundary, MW-15 is also located outside the zone of influence of the slurry wall and trench system. However, no contaminants have been recently detected in MW-15 above the NJ GWQC (Refs. 3, 4, 5). Thus, off-site migration of groundwater in this area is not of concern.

Calculated groundwater flow velocities are very low for the southern portions of the site. This is based on the very low hydraulic conductivity of the clay deposits, which have been measured at up to 3 x 10^{-3} feet per day. Calculated flow volumes indicate that less than 100 gallons per day discharge from the site to the south, southeast, and southwest, representing less than one percent of the total groundwater flow at the site. Water level measurements in the shallow groundwater zone indicate that groundwater flow velocities of less than one foot per year are present across this part of the site (Ref. 3). The low groundwater flow velocities and natural attenuation processes, including adsorption and degradation of contaminants, result in effectively no expansion of the lateral or vertical extent of contamination (Ref. 1). The lack of contaminant migration at this part of the site is also shown by monitoring results at MW-108S and MW-108D, which are downgradient of MW-12, MW-13, and F-1, where no contaminants have been detected. The lack of contamination in MW-108S and MW-108D, which are just upgradient of Natco Lake located south of the site, also indicates that contamination at this part of the site is not reaching Natco Lake.

Site-wide groundwater quality data from 1999 through May 2001 show some fluctuations in groundwater quality; however, contaminant concentrations remain within similar ranges from year to year, and decreasing concentrations have been observed over time at over half of the monitoring wells across the site (Refs. 3, 4, 5). During 2000 through May 2001, individual increases in contaminant concentrations were observed at specific locations; however, the concentrations were within the previously observed concentration ranges at these locations. These fluctuations were observed at wells with high contaminant concentrations (MW-102 and AR-1), which are located within the capture zone of the groundwater recovery trench operated at the site. At MW-102, the concentration of toluene increased from 180,000 µg/L to 210,000 µg/L from November 2000 to May 2001. At AR-1,the concentration of chlorobenzene increased from 3,700 µg/L to 5,200 µg/L from November 2000 to May 2001. Other detected contaminant concentrations also increased at these locations, including benzene, ethylbenzene and xylenes at MW-102, and benzene at AR-1. Contaminant concentrations decreased at most locations from 1995 through May 2001, with an average decrease in contaminant concentrations of 40 percent for all wells monitored at the site (Refs. 3, 4, 5). These concentration trends show no evidence of generally increasing concentrations at the site, and support the conclusion that the vertical and horizontal extent of contamination has stabilized.

References:

1. Letter from Anthony Findley, NJDEP to Ronald Senna, IFF, re: International Flavors and Fragrances Feasibility Study and Decision Document. Dated July 6, 1994.
2. Final Feasibility Study Task 4 and 5 Final Report International Flavors and Fragrances Site. Union Beach, New Jersey. Prepared by TAMS Consultants. Dated February 1995.
3. Letter from Brian Kiel, IFF to Paul Harvey, NJDEP, re: Groundwater Monitoring Program Semi-Annual Report, Year 2000. Dated September 8, 2000.
4. Letter from Brian Kiel, IFF to Paul Harvey, NJDEP, re: Groundwater Monitoring Program November 2000 Sampling Event. Dated April 20, 2001.
5. Letter from Brian Kiel, IFF to Paul Harvey, NJDEP, re: Groundwater Monitoring Program May 2001 Sampling Event. Dated August 31, 2001.

4. Does "contaminated" groundwater **discharge** into **surface water** bodies?

_X_ If yes - continue after identifying potentially affected surface water bodies.

___ If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination"does not enter surface water bodies.

___ If unknown - skip to #8 and enter "IN" status code.

Rationale:

Prior to installation of the recovery trench and slurry wall, shallow groundwater flowed radially from a groundwater mound beneath the west-central part of the site, at the vicinity of wells AR-1 and AR-2. The greatest groundwater flow velocities and contaminant transport occurred to the north and northwest, in the water-saturated brick and tile fill beneath this part of the site. This migration pathway was responsible for the visible discharges to Raritan Bay observed in the 1970s. Groundwater flow from the mound to the east, west, and south occurred more slowly, because the hydraulic conductivity of the clayey sediments beneath these parts of the site was considerably less than the hydraulic conductivity of the brick and tile fill. However, some contamination may have migrated in other directions prior to installation and expansion of the interceptor trench and slurry wall. The recovery trench intercepts groundwater flow from the mound that migrates west, north and northeast from the site towards East Creek, Raritan Bay and Thorn's Creek, respectively. Because the interceptor trench is located relatively close to these surface water bodies, a significant amount of water collected by the trench system historically infiltrated into the system from these surface waters until the slurry wall, which limits surface water collection by the trench system and increases the effectiveness of the groundwater interceptor trench, was installed in 1999.

Groundwater contamination has been detected in monitoring wells downgradient of the groundwater recovery system (MW-W1, MW-6) and at wells outside the zone of influence of the recovery system (MW-107S) at concentrations that exceed NJ GWQC (Refs. 1, 2). Monitoring wells MW-6 and MW-107S are located along the western boundary of the site, approximately 100 feet east of East Creek. Monitoring well MW-W1 is located at the northwest part of the site, approximately 75 feet from the shore of Raritan Bay. Because these wells are immediately upgradient of surface water bodies, some of the contamination likely discharges to East Creek and Raritan Bay. The hydraulic relationship of groundwater in these areas is also demonstrated by the water levels and chloride concentrations measured at these wells. Each of the wells typically have static water levels between two and four feet above sea level, which indicates the wells are upgradient of the water bodies, which are tidally influenced. Tidal interchange of water between the surface waters and groundwater at these parts of the site is also shown by the elevated chloride concentrations in these wells. Based on the latest monitoring data, contaminants discharging to East Creek include benzene from the area of MW-6, and 1,2-DCA from the area of MW-107S. Chloroform and benzene are present in groundwater upgradient of Raritan Bay at MW-W1 (Refs. 1, 2). The latest available monitoring data from these wells is presented in Table 4.

References:

1. Letter from Brian Kiel, IFF to Paul Harvey, NJDEP, re: Groundwater Monitoring Program November 2000 Sampling Event. Dated April 20, 2001.
2. Letter from Brian Kiel, IFF to Paul Harvey, NJDEP, re: Groundwater Monitoring Program May 2001 Sampling Event. Dated August 31, 2001.

5. Is the **discharge** of "contaminated" groundwater into surface water likely to be **"insignificant"** (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or ecosystems at these concentrations)?

_X_ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration[3] of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgement/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or ecosystem.

___ If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration[3] of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations[3] greater than 100 times their appropriate groundwater "levels," the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

___ If unknown - enter "IN" status code in #8.

Rationale:

The groundwater extraction trench and slurry wall controls migration of most of the contamination at the site. However, because the slurry wall installed along the outside of the trench prevents capture of contamination and infiltration of surface water downgradient of the trench, groundwater downgradient of the slurry wall likely discharges to the adjacent surface water bodies. The slurry wall also effectively prevents additional contaminant migration from the site to the areas west, north, and east of the areas of high contaminant concentrations. Therefore, the contamination observed in wells downgradient of the slurry wall are most likely associated with residual contamination and reflect migration that occurred prior to the installation of the slurry wall in 1999 to further limit migration to surface water. Because the slurry wall acts as a hydraulic barrier, groundwater contaminant concentrations from wells downgradient of the wall will potentially discharge to adjacent surface water bodies at those portions of the site.

Contaminants have recently been detected above NJ GWQC at two wells (MW-6, MW-W1) downgradient of the slurry wall and trench system and one well (MW-107S) outside the zone of influence of the trench system (Refs. 1, 2, 4). Monitoring data from these wells have consistently shown that the

[3] As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

contaminant concentrations do not exceed the relevant NJ Surface Water Quality Criteria (SWQC) for each contaminant. The surface water bodies adjacent to the IFF property are classified as FW2-NT/SE1 (fresh water-nontrout/saline water of estuaries) (Ref. 3). Thus, the relevant surface water quality standards for the site are the carcinogenic-effect based health criteria for saline estuaries and coastal saline waters, as presented in the NJ SWQC (N.J.A.C. 7:9B, April 1998). The maximum concentrations of contaminants detected during the most recent sampling events (November 2000, May 2001) at areas that discharge to adjacent surface water bodies, and the relevant NJ SWQC are listed in Table 4 (Refs. 2, 4).

Table 4. Contaminant Concentrations in Groundwater that Discharges to Surface Water and Applicable NJ SWQC (µg/L)

Well Number	Contaminant	Concentration May 2001	Concentration November 2000	NJ SWQC
MW-W1	Benzene	58	46	71
MW-W1	Chloroform	2.8	7.6	470
MW-W1	1,2-DCA	6.8	ND	99
MW-6	Benzene	7.6	21	71
MW-107S	1,2-DCA	NS	21	99

The monitoring data from these locations indicates the groundwater quality at areas where groundwater discharges to surface water near the site. Because none of the detected contaminant concentrations in these areas exceed applicable SWQC, the discharges of contaminated groundwater to the surface water bodies do not have an adverse impact on surface water quality.

References:

1. Letter from Brian Kiel, IFF to Paul Harvey, NJDEP, re: Groundwater Monitoring Program Semi-Annual Report, Year 2000. Dated September 8, 2000.
2. Letter from Brian Kiel, IFF to Paul Harvey, NJDEP, re: Groundwater Monitoring Program November 2000 Sampling Event. Dated April 20, 2001.
3. Remedial Action Report for Phase II Excavation of PCB Contaminated Soil/Wetland Areas, Capping and Aeration Basin Closure, International Flavors and Fragrances, Incorporated, Union Beach, New Jersey. Dated June 2001.
4. Letter from Brian Kiel, IFF to Paul Harvey, NJDEP, re: Groundwater Monitoring Program May 2001 Sampling Event. Dated August 31, 2001.

6. Can the **discharge** of "contaminated" groundwater into surface water be shown to be "**currently acceptable**" (i.e., not cause impacts to surface water, sediments or ecosystems that should not be allowed to continue until a final remedy decision can be made and implemented[4])?

___ If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and ecosystems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR 2) providing or referencing an interim-assessment[5], appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialist, including an ecologist) adequately protective of receiving surface water, sediments, and ecosystems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

___ If no - (the discharge of "contaminated" groundwater can not be shown to be "**currently acceptable**") - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or ecosystem.

___ If unknown - skip to 8 and enter "IN" status code.

Rationale:

This question is not applicable. See response to question #5.

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[4] Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

[5] The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.

7. Will groundwater **monitoring** / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

  X   If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."

___ If no - enter "NO" status code in #8.

___ If unknown - enter "IN" status code in #8.

Rationale:

Groundwater quality monitoring is performed at the facility under direction of NJDEP as required by the final remedy at the site (Ref. 1). The approved groundwater monitoring plan requires semi-annual monitoring of the 15 performance monitoring wells in the vicinity of the slurry wall and groundwater extraction trench, and annual monitoring of an additional 11 wells across the site for perimeter monitoring. Thus, a total of 26 wells are actively monitored at least once a year to assess groundwater conditions at the entire site. The monitoring events are conducted in the second (performance monitoring only) and fourth (performance and perimeter monitoring) quarters of each calendar year. The monitoring wells and their program status are identified in Table 5. The well locations are shown on the map included as Attachment 7. The facility is remediating the site under an ACO issued by NJDEP. The ACO requires the facility to operate the active remedial systems at the site, monitor wells at the facility, and report groundwater monitoring data to NJDEP on an ongoing basis. The ACO requirements for operation and maintenance of the groundwater recovery system, performance monitoring, and perimeter monitoring must be met by IFF until the site-specific cleanup goals specified in the final decision document have been attained.

Table 5. Program Status of IFF Monitoring Wells

Perimeter Monitoring Wells Monitored on an ANNUAL Basis	Performance Monitoring Wells Monitored on a SEMI-ANNUAL Basis
MW-7, MW-11, MW-12, MW-13, MW-14, MW-15, MW-107S, MW-107D, MW-108S, MW-108D, F-1	MW-6, MW-8R, MW-16, MW-102, MW-109, MW-111, MW-112, MW-130, MW-131, MW-202, MW-W1, MW-W2, MW-3SR, AR-1, F-3

References:

1. Letter from Paul Harvey, NJDEP, to Ronald Senna, IFF, re: Revised Groundwater Performance Monitoring Plan. Dated March 7, 2000.

8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

_X_ YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the International Flavors and Fragrances, EPA ID # NJD002194843, located at 800 Rose Lane, Union Beach, New Jersey. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

___ NO - Unacceptable migration of contaminated groundwater is observed or expected.

___ IN - More information is needed to make a determination.).

Completed by: ______________________________ Date:____________________

Stuart Strum
Hydrogeologist
Booz·Allen & Hamilton

Reviewed by: ______________________________ Date:____________________

Robert Rau
Hydrogeologist
Booz·Allen & Hamilton

______________________________ Date:____________________

Alan Straus, RPM
RCRA Programs Branch
EPA Region 2

______________________________ Date:____________________

Barry Tornick, Section Chief
RCRA Programs Branch
EPA Region 2

Approved by: Original signed by: Date: 5/10/2002

Raymond Basso, Chief
RCRA Programs Branch
EPA Region 2

Locations where references may be found:

References reviewed to prepare this EI determination are identified after each response. Reference materials are available at the USEPA Region 2, RCRA Records Center, located at 290 Broadway, 15th Floor, New York, New York, and the New Jersey Department of Environmental Protection Office located at 401 East State Street, Records Center, 6th Floor, Trenton, New Jersey.

Contact telephone and e-mail numbers:

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Attachment - Summary of Media Impacts Table[1]
International Flavors and Fragrances

AEC	AIR (Indoors)	SURF SOIL	SURF WATER	SED	SUB SURF SOIL	AIR (Outdoors)	CORRECTIVE ACTION MEASURE	KEY CONTAMINANTS
SWMU 1. Oil/Water Separator #1	No	No	No	No	No	No	(1) Site-wide RI/FS (2) Unit removal (3) Area covered by site-wide cap (4) Deed Notice	NA
SWMU 2. Oil/Water Separator #2	No	No	No	No	No	No	(5) Site-wide RI/FS (6) Unit removal (7) Area covered by site-wide cap (8) Deed Notice	NA
SWMU 3. Equalization Basin	No	No	No	No	No	No	(9) Site-wide RI/FS (10) Unit decommissioned (11) Basin backfilled and capped (12) Deed Notice	NA
SWMU 4. Aeration Basin	No	Yes	No	No	Yes	No	(13) Site-wide RI/FS (14) Unit decommissioned (15) Basin backfilled, geomembrane liner installed, capped with topsoil (16) Deed Notice	PCBs
SWMU 5. Sludge Lagoon	No	No	No	No	No	No	(17) Site-wide RI/FS (18) Unit decommissioned (19) Lagoon backfilled, capped (20) Deed Notice	NA
SWMU 6. Drum Storage Area	No	Yes	No	No	Yes	No	(21) Site-wide RI/FS (22) Closed under RCRA (23) Area covered by site-wide cap (24) Deed Notice	Ethylbenzene
SWMU 7. Waste Solvent Tank 320 A	No	Yes	No	No	Yes	No	(25) Site-wide RI/FS (26) Closed under RCRA (27) Area covered by site-wide cap (28) Deed Notice	PCBs

AEC	AIR (Indoors)	SURF SOIL	SURF WATER	SED	SUB SURF SOIL	AIR (Outdoors)	CORRECTIVE ACTION MEASURE	KEY CONTAMINANTS
SWMU 8. Waste Solvent Tank 320 B	No	Yes	No	No	Yes	No	(29) Site-wide RI/FS (30) Closed under RCRA (31) Area covered by site-wide cap (32) Deed Notice	PCBs
SWMU 9. Waste Solvent Holding Tank	No	No	No	No	No	No	(33) Site-wide RI/FS (34) Unit decommissioned (35) Area covered by site-wide cap (36) Deed Notice	NA
SWMUs 10 through 13. Acid Chromium Storage Tanks	No	No	No	No	No	No	(37) Site-wide RI/FS (38) Unit decommissioned (39) Area covered by site-wide cap (40) Deed Notice	NA
SWMU 14. Waste Transfer Area	No	Yes	No	No	Yes	No	(41) Site-wide RI/FS (42) Unit decommissioned (43) Area covered by asphalt (44) Deed Notice	PCBs
SWMU 15. Underground Storage Tank T-32	No	Yes	No	No	Yes	No	(45) Site-wide RI/FS (46) Closed under RCRA (47) Soil excavated and area capped with soil/vegetative cover (48) Deed Notice	Xylene
SWMU 16. Incinerator	No	Yes	No	No	Yes	No	(49) Site-wide RI/FS (50) Closed under RCRA (51) Soil excavated (52) Area covered by site-wide cap (53) Deed Notice	PCBs
SWMU 17. Sludge Disposal Area	No	Yes	No	No	Yes	No	(54) Site-wide RI/FS (55) Area covered by site-wide cap (56) Deed Notice	PCBs
SWMU 18. Stormwater Weir Box #1	No	Yes	No	No	Yes	No	(57) Site-wide RI/FS (58) Unit removed (59) Soil excavated (60) Capped with asphalt (61) Deed Notice	PCBs

AEC	AIR (Indoors)	SURF SOIL	SURF WATER	SED	SUB SURF SOIL	AIR (Outdoors)	CORRECTIVE ACTION MEASURE	KEY CONTAMINANTS
SWMU 19. Stormwater Weir Box #2	No	Yes	No	No	Yes	No	(62) Site-wide RI/FS (63) Soil excavated (64) Capped with clean soil/vegetative cover (65) Deed Notice	PCBs
SWMU 20. Stormwater Weir Box #3	No	Yes	No	No	Yes	No	(66) Site-wide RI/FS (67) Soil excavated (68) Capped with clean soil/vegetative cover (69) Deed Notice	PCBs
AOC A. Railroad Transfer Area	No	No	No	No	No	No	(70) Site-wide RI/FS (71) Area incorporated in site-wide cap (72) Deed Notice	NA
AOC B. Primary Clarifier	No	Yes	No	No	Yes	No	(73) Site-wide RI/FS (74) Soil excavated (75) Capped with clean soil/vegetative cover (76) Deed Notice	PCBs
AOC C. Final Clarifiers	No	Yes	No	No	Yes	No	(77) Site-wide RI/FS (78) Soil excavated (79) Capped with clean soil/vegetative cover (80) Deed Notice	PCBs
AOC D. Drum Wash Area	No	No	No	No	No	No	(81) Site-wide RI/FS (82) Area covered by site-wide cap (83) Deed Notice	NA
AOC E. Temporary Drum Storage Areas	No	Yes	No	No	Yes	No	(84) Site-wide RI/FS (85) Soil excavated (86) Capped with clean soil/vegetative cover or asphalt cover (87) Deed Notice	PCBs, VOCs, PAHs

AEC	AIR (Indoors)	SURF SOIL	SURF WATER	SED	SUB SURF SOIL	AIR (Outdoors)	CORRECTIVE ACTION MEASURE	KEY CONTAMINANTS
AOC F. Underground Effluent Pipeline	No	No	No	No	No	No	(88) Site-wide RI/FS (89) Area covered by site-wide cap (90) Deed Notice	NA
PCB Soil and Wetlands Contamination Areas	No	Yes	No	No	Yes	No	(91) Site-wide RI/FS (92) Soil excavation to appropriate cleanup level (93) Capping with either soil/vegetative cover or asphalt (94) Deed Notice	PCBs
Groundwater[2]							(95) Site-wide RI/FS (96) Installed slurry wall (97) Installed interceptor trench and extraction system (98) Perform semi-annual groundwater monitoring (99) Implemented CEA	Benzene, Chloroform, Chlorobenzene, 1,2-DCA, Ethylbenzene, Toluene, and Xylene

1. An RFA was performed in 1988 which identified numerous SWMU/AOCs at the site. However, per the 1986 ACO, the site moved into a site-wide RI/FS investigation which did not correlate media investigations to particular SWMUs and AOCs. Thus it is difficult to determine, with the information currently available, what media have been impacted at the various AOCs. When possible, specific media impacts have been documented in the table above. However, the site has generally been investigation on a site-wide investigation focusing on PCB-contaminated Soil and Wetlands Areas.
2. Groundwater has been evaluated on a site-wide basis and has not been specifically related back to specific SWMUs and AOCs at the site.

NA - Not applicable