DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA725)
Current Human Exposures Under Control

Facility Name: **Solutia Inc. Delaware River Plant (formerly Monsanto)**
Facility Address: **NJ State Highway Route 130, Bridgeport, New Jersey 08014**
Facility EPA ID#: **NJD001700707**

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 EIs 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 "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no unacceptable human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all 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 objectives of the RCRA Corrective Action program, the EIs are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993 (GPRA). The "Current Human Exposures Under Control" EI is for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and does not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration / Applicability of EI Determinations

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

Facility Information

The Solutia facility (formerly known as the Monsanto Delaware River Plant) is located on 461 acres in Bridgeport, New Jersey. The facility is bounded by the east bank of the Delaware River to the north and northwest, Shell Oil Company to the east, the Logan Cogeneration Plant to the west, and U.S. Highway Route 130 to the south. Sun Oil and BP Oil operate petroleum refineries directly across the Delaware

River in Pennsylvania. Birch Creek bisects the property from south to north and drains to the Delaware River. Historic manufacturing and waste disposal operations have been limited to approximately 220 acres of Solutia property situated on the western side of Birch Creek; another 167 acres of undeveloped Solutia property sits east of Birch Creek. The northern half of the site is located on fill silt and clay dredged from the Delaware River by the Army Corp of Engineers from 1915 through the 1950s. All land surrounding the site is zoned for industrial uses, but much of it to the east and south is currently being leased for agricultural purposes. Several residences are located within one-half mile of the site, but the overall area remains sparsely populated; an estimated 5,400 people live within four miles of the site.

Manufacturing operations began at the Solutia site in 1961. Solutia manufactured plasticizers, flame retardants, organic industrial chemicals, and dyes. Raw materials used in production processes have included phenol, toluene, naphthalene, benzyl chloride, butanol, chlorine, and xylene, among other chemical constituents. Throughout the facility's operating history, Solutia/Monsanto has been using three production wells to draw groundwater from the deeper aquifer beneath the site inward and upward for plant production processes and non-community potable water use.

Investigation and corrective action efforts have been in progress at Solutia since 1983. Solutia's New Jersey Pollutant Discharge Elimination System-Discharge to Groundwater (NJPDES-DGW) permit from September 1988 requires ongoing monitoring of both shallow and deep groundwater. Solutia's final Hazardous and Solid Waste Amendments (HSWA) permit (1994) includes requirements for corrective action at 14 solid waste management units (SWMUs) and areas of concern (AOCs). The RCRA Facility Investigation (RFI) for Past Disposal Area (PDA) No. 1 was completed and approved in 1983. A site-wide RCRA Facility Assessment (RFA) was conducted at Solutia in 1987. Solutia conducted site-wide Phase I RFI activities in 1997. Based on previous investigations, Solutia has recommended no further action for most of the identified SWMUs and AOCs. During 1998 and 1999, Phase II investigation activities were conducted at SWMUs 2, 3, and 4. Additional corrective measures are still required at several SWMUs and AOCs, as discussed in Question No. 1. A semiannual monitoring program is and will remain in effect, and Solutia plans to implement a Deed Notice and is in the process of implementing a groundwater Classification Exception Area (CEA).

In October 2000, Ferro Corporation purchased 293 acres of the 461 acre site from Solutia, which included the production area. Ferro continues to manufacture the same products, with the exception of the dyes. Solutia continues to be responsible for all contaminated areas of the site. Since the Solutia property historically included the entire 461 acre site, all SWMUs (including those now under the ownership of Ferro) have been considered in this evaluation.

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): Fourteen SWMUs and AOCs were identified in the HSWA Permit for Solutia (Ref. 2), and each is discussed in detail below. A map showing the location of SWMUs and AOCs is provided at Figure 9 in the Description of Current Conditions Report (Ref. 4).

SWMU 1, PDA No. 1: This unit consists of a 3.5-acre unlined landfill, located in the northwest corner of the site approximately 150 feet from the Delaware River. The landfill was used from 1961 to 1970 for disposal of benzyl chloride residues, polychlorinated biphenyl (PCB) materials, benzyl chloride, and a toluene/benzyl chloride mixture. The wastes were buried in drums and as free liquids. Hydrogeologic investigations have shown that groundwater in the vicinity of PDA No. 1 is contaminated with PCBs, benzaldehyde, benzyl chloride, and benzyl alcohol. An Administrative Consent Order (ACO), signed by the New Jersey Department of Environmental Protection (NJDEP) and the facility in December 1983, required interim remedial measures for organic and inorganic constituents in this area. To eliminate the possibility that impacted groundwater would discharge off site into the adjacent Delaware River, Monsanto installed a slurry wall in 1983. To hasten remediation of the area and prevent contaminants from moving beyond the slurry wall, a subsoil flushing system was tested and installed in 1986. Pumping wells removed contaminated groundwater from the subsurface for treatment at the on-site waste treatment plant, followed by reinjection of clean water within the slurry wall. The system was modified in 1992 in response to new land disposal restrictions, and extracted groundwater was sent off site for treatment and discharge, rather than being reinjected into the aquifer. According to documentation provided by Monsanto, concentrations of soluble contaminants within the slurry wall had been reduced by approximately 70 percent by May 1992 (Ref. 1), but contaminant removal rates had leveled off due to limitations of pump and treat remedial systems and low contaminant concentrations in extracted groundwater (Ref. 3). As a result, the pump and treat system has been discontinued in 1994. A geocomposite clay cap was placed over the disposal area in 1994. Recent groundwater monitoring in this area (November 2001) indicates elevated concentrations of benzene (22 µg/L) and toluene (1,700 µg/L) above the New Jersey Ground Water Quality Criteria (NJ GWQC) (1.0 µg/L and 1,000 µg/L, respectively) in one well (MW-53-1). As required by the HSWA permit, a corrective measures study (CMS) is being prepared and submitted. The HSWA permit indicates that no additional investigation activities are required (Ref. 13).

SWMU 2, PDA No. 2: This unit consists of a seven-acre unlined landfill in the northwestern corner of the site near PDA Nos. 1 and 3. This unit was a non-RCRA regulated unit used for disposal of phthalic anhydride pitch, nonhazardous plant solid waste, and wastewater treatment plant (WWTP) sludge from 1970 to 1978. A 30-mil polyvinyl chloride (PVC) cap and an 18-inch thick layer of soil were installed over PDA No. 2 in 1980 with NJDEP approval. The HSWA permit required completion of an RFI for

soil, soil gas, groundwater, surface water, and sediment at this SWMU. During this sampling, one surface soil sample (S2-7) showed a concentration of hexachlorobenzene (4.07 mg/kg) that exceeded the New Jersey Non-Residential Direct Contact Soil Cleanup Criteria (NJ NRDCSCC) (2.0 mg/kg) but was below the New Jersey Impact to Groundwater Soil Cleanup Criteria (NJ IGWSCC). Contamination in soil gas, surface water, and sediment was not identified. USEPA and NJDEP required additional evaluation of possible hexachlorobenzene contamination in surface soil. Supplemental surface soil samples were collected to delineate possible soil contamination in the area during the second quarter of 1999. None of the samples contained elevated levels of hexachlorobenzene (Ref. 9). Solutia estimated the extent of hexachlorobenzene contamination was limited (maximum of 59 cubic yards) and, thus, proposed to excavate all impacted soil and remediate this area to the NJ NRDCSCC (Ref. 13). This area is located in a remote area of the site that is thickly vegetated with common reed. Solutia indicates that the restricted access of the property and the remote location of SWMU 2 make the potential for direct worker exposure to soil minimal. Recent groundwater monitoring in this area (May 2001) indicates elevated concentrations of benzene (2.04 µg/L) above the NJ GWQC (1.0 µg/L) in one well (MW-50-S).

SWMU 3, PDA No. 3: This unit was a non-RCRA regulated unit and the original solid waste landfill for the plant and had been used from 1961 to 1970. The unit was used for disposal of the facility's solid waste, including phthalic anhydride pitch, phthalic anhydride heads, laboratory wastes, trash, naphthalene, lime grits, activated carbon, phosphate ester filter waste, and spill cleanup material. A railroad spur has been constructed on the northern edge of the disposal area. When this unit closed, solid waste was buried north of the railroad tracks at PDA No. 2. This unit covers approximately three acres, is unlined, has been capped with a soil cover, and is now re-vegetated. Solutia submitted a request for permanent capping of PDA No. 3 to NJDEP in 1988, but the plan has not yet been implemented. The HSWA permit required completion of an RFI for soil, soil gas, groundwater, surface water, and sediment at this SWMU. With the exception of surface soil, Solutia found no significant contamination in any of these media during the 1997 field investigation. In surface soil, PCBs were reported above the NJ NRDCSCC and the NJ IGWSCC; hexachlorobenzene was also reported at elevated levels. Five rounds of supplemental sampling were conducted between 1999 through 2001 and confirmed widespread hexachlorobenzene (up to 306 mg/kg in sample S3-4) and PCB (up to 736 mg/kg in sample S3-4) contamination in surface soil in the vicinity of SWMU 3. Solutia proposed to install a permanent capping system at the SWMU 3 unit (including the PDA 3 landfill and PCB contamination extending beyond the PDA 3 boundaries) to achieve final closure and minimize long-term risk for contact with contaminated soil and groundwater (Ref. 13). Solutia indicates that this portion of the property is flat and completely vegetated with common reeds and grass. In addition, Solutia indicates that the restricted access of the property and the remote location of SWMU 3 make the potential for direct worker exposure to soil minimal. Recent groundwater monitoring in this area (May 2001) indicated elevated concentrations of vinyl chloride (58.7 µg/L) above the NJ GWQC (5.0 µg/L) in one well (MW-27-D); however, this well was re-sampled in November 2001, and vinyl chloride was not detected.

SWMU 4, Phenol Equalization Lagoon (PEL): From 1975 to 1978, two separate sludge lagoons were operated west of PDA No. 3 in the area now covered by the PEL. The two lagoons were consolidated and now maintain dimensions of 330 feet long by 100 feet wide by 11 feet deep. Beginning in 1978, the PEL was used for equalization of wastewater containing phenol at concentrations up to 5,000 parts per million (ppm). In the 1980s, the PEL was designated a RCRA-regulated lagoon due to an assumption that the material contained within would have pH level that might classify the waste as RCRA hazardous for corrosivity. However, subsequent investigation determined that the pH levels did not qualify the material as RCRA hazardous; thus, this PEL should not have been a RCRA-regulated lagoon. In 1990, the lagoon stopped operating, and the contents were removed for off-site disposal. The equalization of wastewater containing phenol is now managed in an aboveground tank. The HSWA permit required completion of an

RFI for soil, soil gas, and groundwater at this SWMU. Solutia found no significant contamination in soil gas or groundwater during the 1997 field investigation, but phenol was detected above the NJ IGWSCC in subsurface soil. Supplemental soil samples were collected in 1999 to 2001. Sample results indicated that no constituents were detected in surface soil surrounding the PEL. However, subsurface soils beneath the liner within the PEL and at two sample locations beneath the eastern dike have been impacted with phenol above the NJ IGWSCC. Phenol concentrations were not reported above the NJ RDCSCC and/or NJ NRDCSCC. Solutia has proposed to remove and dispose of the residual sludge, liner materials, and sand bedding materials beneath the liner and consolidate these materials in the East Landfill. The lagoon dikes will be removed and a permanent capping system will be installed across the PEL area. Dense non-aqueous phase liquid (DNAPL) was also identified in well MW-63-1 in 1998; however, upon further investigation Solutia concluded that the construction of this well provided a vertical migration pathway for product material that had been released from the lagoon at the northeast corner. Wells MW-63-1 and MW-101S were replaced with double-cased wells to eliminate the potential vertical migration pathway. Solutia indicates that the DNAPL found in well MW-63-1 is a localized impact area. Recent groundwater monitoring in this area (May and November 2001) show no contaminants above NJ GWQC.

SWMUs 5 and 6, Sludge Lagoon Nos. 3 and 4: These units received a combination of primary and secondary sludge from the on-site WWTP. Lagoon No. 3 was approximately 370 feet by 340 feet by 12 feet deep. Lagoon No. 4 was approximately 350 feet by 180 feet by 12 feet deep. Both are located in the northwest corner of the site, bounded by the three PDA SWMUs. Thickened sludge from both lagoons was regularly removed for placement in the East Landfill. The units ceased operation in 1986 and were closed in 1987. During closure, all remaining sludge was excavated, and unit liner materials were removed for final disposal in the East Landfill. Analysis of the sludge during closure revealed the presence of benzene, toluene, ethylbenzene, and xylene (BTEX) compounds, chlorobenzene, phenol, and di-n-butyl phthalate. The HSWA permit required completion of an RFI for soil, soil gas, and groundwater at these SWMUs. Solutia found no significant contamination in soil gas or groundwater during the 1997 field investigation, but phenol (476 mg/kg) and total xylenes (53.3 mg/kg) were detected above the NJ IGWSCC (50 mg/kg and 10 mg/kg, respectively) in subsurface soil (54 to 60 inches below ground surface [bgs]) in the southern portion of SWMU 5. Clean fill caps at SWMUs 5 and 6 prevent direct exposure to contaminated media. Recent groundwater monitoring in this area (May and November 2001) showed no contaminants above NJ GWQC. NJDEP approved these SWMUs for no further action in October 1998 (Ref. 7).

SWMU 7, Raw Waste Equalization Lagoon (RWEL): This unit is located on the western edge of the Solutia property, directly south of the PDAs and lagoons (SWMUs 1, 2, 3, 4, 5 and 6). The lagoon has a single polyolefin liner and is approximately 250 feet by 230 feet by 10 feet deep. The RWEL was originally used as an off-specification wastewater lagoon for the WWTP. In 1978, it was converted to an on-line equalization lagoon for wastewater from the WWTP primary clarification step. The lagoon stopped operating in 1990, and the contents were disposed off site. The process formerly performed in the RWEL is now conducted in an aboveground equalization tank. The HSWA permit required completion of an RFI for soil, soil gas, and groundwater at this SWMU. Solutia found no significant contamination in any of these media during the 1997 field investigation. Recent groundwater monitoring in this area (May and November 2001) showed no contaminants above NJ GWQC. This SWMU was approved for no further action in October 1998 (Ref. 7).

SWMU 8, Process Sewer System (PSS): The PSS collects and conveys all wastewater generated at the plant to the on-site WWTP. Sources discharging to the sewer system include surface water runoff collected from the production areas of the plant, cooling and process water from production operations,

and surface water runoff from the hazardous waste storage pad and storage tank containment areas. Early groundwater monitoring revealed several organic constituents in shallow groundwater near a damaged process sewer manhole; these constituents included BTEX, tetrachloroethene (PCE), and trichloroethene (TCE). The manhole was repaired in February 1985, and major upgrading of portions of the sewer system was completed in 1992 and 1993. To assess the effectiveness of this work in mitigating the potential source area, the HSWA permit required completion of an RFI for soil, soil gas, and groundwater at this SWMU. Solutia found no significant contamination in soil gas or groundwater during the 1997 field investigation. Acetone (308 mg/kg), ethylbenzene (290 mg/kg), and total xylenes (4,150 mg/kg) were found in subsurface soil (60 to 66 inches bgs) above their respective NJ IGWSCC (100 mg/kg, 100 mg/kg, and 10 mg/kg, respectively) in the vicinity of the former damaged manhole; however, groundwater data suggest that this contamination is not adversely impacting groundwater quality. Direct exposure to contaminants is not a concern. This SWMU was approved for no further action in October 1998 (Ref. 7), but sewer lines must continue to be regularly monitored and may need to be upgraded in the future.

SWMU 9, Stormwater Drainage Ditch (SWDD): The SWDD drained portions of the property encompassing the three PDAs, chemical manufacturing areas, and waste storage areas. The SWDD consisted of a series of earthen channels throughout the site that combined to form a single main channel prior to discharge to the Delaware River at permitted outfall 002A. In 1985, the earthen drainage channels were replaced with corrugated metal stormwater pipes and a concrete retention basin. Much of the sediments and soil lining the main channel were excavated and deposited in the East Landfill during the upgrading process, but no soil quality data are available for the excavated material or surrounding soil. To determine if any other leaks had occurred, the HSWA permit required completion of an RFI for soil at this SWMU. PCBs (16.5 mg/kg) were found in one surface soil (0-6 inches bgs) sample above the NJ NRDCSCC (2 mg/kg) value but below the NJ IGWSCC during the 1997 field investigation. This area is covered with grass, and there is little or no potential for direct exposure to soil. This SWMU was approved for no further action in October 1998 (Ref. 7).

AOC 10, Dock Area: This AOC encompasses the area previously occupied by Solutia's deep water dock. Incoming raw materials and outgoing finished products were transported by tanker ship via this dock. Two releases of molten naphthalene were documented in this area; between 3,000 and 5,000 pounds were released on December 15, 1982, and approximately 500 pounds were released on November 7, 1983. The majority of the spilled product solidified on the dock and was recovered, but a total of approximately 250 pounds of naphthalene entered the river as a result of the spills. NJDEP was notified immediately after each event, and USEPA investigated the spill area for residual contamination. In a report dated April 20, 1987, USEPA recommended no further action. Nevertheless, the HSWA permit required completion of an RFI for soil, soil gas, and shoreline sediment at this AOC. Solutia found no significant contamination in any of these media during the 1997 field investigation, and this AOC was approved for no further action in October 1998 (Ref. 7).

AOC 11, Rail Loading Area: This AOC encompasses the area where raw materials (anhydrous ammonia and phosphoric acid) and finished products are loaded and unloaded from railroad tank cars. During the 1988 NJDEP visual site inspection (VSI), stained gravel and elevated soil gas readings indicated the possibility of contamination related to spills in this area. The HSWA permit required completion of an RFI for soil at this AOC. Two constituents, di-n-octylphthalate (183 mg/kg) and bis(2-ethylhexyl)phthalate (up to 4,700 mg/kg), were found in two different surface soil (0 to 6 inches bgs) samples. Bis(2-ethylhexyl)phthalate was detected above the NJ NRDCSCC (210 mg/kg), while di-n-octylphthalate and bis(2-ethylhexyl)phthalate were both detected above the NJ IGWSCC (100 mg/kg for

both constituents). The ground surface at this area is covered by up to two feet of railroad ballast, and direct exposure to contaminated soil is unlikely. This AOC was approved for no further action in October 1998 (Ref. 7). This SWMU now belongs to Ferro.

SWMU 12, Three Aboveground Storage Tanks (ASTs): The AST area is located at the east end of the plant process area. Three RCRA-regulated ASTs in this area are used to store hazardous wastes generated at the site, including benzyl chloride and still bottoms. The tanks are situated on diked concrete pads that drain to the plant sewer system and the WWTP. The area is paved and diked, but records indicate that deficiencies in the secondary containment system may have allowed runoff to escape before the pads were upgraded. The RCRA permit for the ASTs in this location was renewed in January 1994. The HSWA permit also addressed this SWMU by requiring completion of an RFI for soil in exposed areas surrounding the pads. TCE (1.41 mg/kg) was found in one surface soil sample above the NJ IGWSCC (1.0 mg/kg) but below the NJ NRDCSCC (54 mg/kg). Because TCE has not been reported recently in groundwater, this contamination does not appear to be negatively impacting other media. Furthermore, surface soil at SWMU 12 is covered with gravel and not exposed at the ground surface. This SWMU was approved for no further action in October 1998 (Ref. 7). This SWMU now belongs to Ferro.

AOC 12A, One Removed Aboveground Process Tank: This tank was included in the original RCRA permit issued by NJDEP in June 1988 for four ASTs in the production area. This AST was removed from the permit when it was renewed in January 1994 because it was classified as a process tank rather than a storage tank. The AST is situated within a concrete secondary containment basin in the area of SWMU 12. The bottom of the basin is set approximately 3.5 feet bgs. The HSWA permit required completion of an RFI for soil in exposed areas surrounding the basin. No impacted soil was identified during the 1997 field investigation, and this AOC was approved for no further action in October 1998 (Ref. 7). This SWMU now belongs to Ferro.

SWMU 13, Drum Storage Area: This unit is a RCRA-regulated paved drum storage pad covering 1,160 square feet with a capacity of 420 55-gallon drums. The Drum Storage Area was sold to Ferro in 2000 and is no longer part of the Solutia property. However, since it was historically part of Solutia, it has been considered in this evaluation. Hazardous wastes stored in this unit include spent benzyl chloride, phthalic anhydride, and waste oil. The pad is located on a portion of the central plant area that was paved in 1970. When cracks were found in the paved surface in 1981, the pad was resurfaced with an additional layer of asphalt, a spill containment curb was constructed, and a spill drainage collection system was installed. It is unclear whether secondary containment was provided for the unit before these upgrading steps were implemented. Although no soil gas readings were detected in the exposed sandy soil around the pad during NJDEP's 1988 VSI, the HSWA permit required completion of an RFI for soil around the pad's perimeter. Hexachlorobenzene (5.56 mg/kg) was detected in one surface soil sample at a concentration exceeding the NJ NRDCSCC (2.0 mg/kg) but below the NJ IGWSCC (100 mg/kg). According to approved documentation, there is little or no potential for direct exposure to soil at SWMU 13 (Ref. 5). Recent groundwater monitoring in this area (May and November 2001) show no contaminants above NJ GWQC. This SWMU was recommended for no further action in October 1998 (Ref. 7). This SWMU now belongs to Ferro.

SWMU 14, Hazardous Waste Landfill: This RCRA-regulated unit, commonly known as the East Landfill, was constructed on top of the dredge spoils fill in the northeastern corner of the site (but still on the western side of Birch Creek). The landfill operated from August 21, 1978 until 1987 under NJDEP Certificate of Registration for Facility 0809F issued on June 2, 1978 (Ref. 13). The nine-acre landfill was

constructed with a double clay liner and leachate collection system. Primary and secondary WWTP sludges and solid chemical wastes were deposited in this unit. The landfill is currently capped with wood chips and a vegetated soil cover. Solutia continuously maintains this temporary cap condition with periodic surface grading and removal of stormwater trapped within the wood chip layer. Due to the subsidence of the East Landfill, Solutia has proposed to install a lightweight cap that would be replaced as necessary (possibly every ten to 15 years). Fifteen shallow monitoring wells are sampled semiannually along with four deep wells as part of closure/post-closure groundwater monitoring required under the NPDES-DGW permit (Ref. 13). Recent groundwater monitoring in this area (May and November 2001) showed no contaminants above NJ GWQC.

In summary, a majority of the SWMUs and AOCs at the Solutia site require no further action. Additional corrective measures and remedies have been proposed for several SWMUs, including SWMU 2 (excavation of residual hexachlorobenzene contamination), SWMU 3 (installation of permanent capping system), and SWMU 4 (remove and of residual materials, removed lagoon dikes, and install permanent capping system). According to available documentation, a CMS is also being prepared for SWMU 1.

References:

1. Fax from Don Hoegel, Monsanto Delaware River Plant, to Agathe Nadai, USEPA, re: PDA No. 1 Background. Dated May 4, 1992.
2. HSWA Permit issued to the Monsanto Company Delaware River Plant, Bridgeport, New Jersey. Prepared by USEPA. Dated December 5, 1994.
3. Remediation Plan for Final Closure of PDA-1, Monsanto Delaware River Plant, Bridgeport, New Jersey. Prepared by DuPont Environmental Remediation Services. Dated March 1, 1995.
4. Description of Current Conditions Report. Prepared by Smith Technology Corporation. Dated January 1997.
5. SWMU/AOC Sampling and Analysis Report, Solutia Delaware River Plant, Bridgeport, New Jersey. Prepared by BCM Engineers. Dated January, 1998.
6. Letter from Barry Tornick, USEPA, to Donald Hoegel, Solutia, re: EPA ID No. NJD001700707. Dated July 17, 1998.
7. Letter from Barry Tornick, USEPA, to Donald Hoegel, Solutia, re: EPA ID No. NJD001700707. Dated October 1998.
8. Letter from Charles Evans, Solutia, to Agathe Nadai, USEPA, re: Solutia Delaware River Plant. Dated December 3, 1998.
9. Quarterly Progress Report No. 18, Solutia Delaware River Plant, Bridgeport, New Jersey. Prepared by BCM Engineers. Dated June 28, 1999.
10. Personal Communication between Michele Benchouk, Booz Allen Hamilton, and Agathe Nadai, USEPA, re: Current Status of Solutia Delaware River Plant as it Pertains to Achievement of the Environmental Indicator for Groundwater. March 28, 2001.
11. Letter from Glenn Randall, URS Corporation, to Gregory Zalaskus, NJDEP, re: Results of Second-Half 2000 Semi-Annual Groundwater Monitoring Program. Dated March 30, 2001.
12. Personal Communication between Michele Benchouk, Booz Allen Hamilton, and Agathe Nadai, USEPA, re: Current Status of Solutia Delaware River Plant as it Pertains to Achievement of the Environmental Indicator for Groundwater. April 18, 2001.
13. Sampling and Analysis Report for Phase II RFI and Corrective Measures Evaluation. Prepared by URS Corporation. Dated December 2001.
14. Letter from Glenn Randall, URS Corporation, to Elizabeth Butler, USEPA, re: Quarterly Progress Report 28 (Reporting Period Ending December 31, 2001). Dated January 17, 2002.

15. Letter from Glenn Randall, URS Corporation, to Gregory Zalaskus, NJDEP, re: Classification Exception Area Designation Request. Dated March 19, 2002.
16. Letter from Glenn Randall, URS Corporation, to Elizabeth Butler, USEPA, re: Quarterly Progress Report 29 (Reporting Period Ending March 31, 2002). Dated April 3, 2002.
17. Letter from Glenn Randall, URS Corporation, to Sameh Abdellatif, USEPA, re: Quarterly Progress Report 31 (Reporting Period Ending December 31, 2002). Dated January 20, 2003.
18. Letter from Larry Adams, Solutia, to Barry Tornick, USEPA, re: Groundwater Exceedance Analysis. Dated February 11, 2003.
19. Letter from Raymond Pinkstone, NJDEP, to Glenn Randall, URS Corporation, re: Classification Exception Area Designation Request (March 19, 2002). Dated February 25, 2003.
20. Letter from Raymond Pinkstone, NJDEP, to Sameh Abdellatif, USEPA, re: Results of First Half Semi-Annual Groundwater Monitoring Program (November 2002). Dated February 25, 2003.

2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be "**contaminated**"[1] above appropriately protective risk-based levels (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

Media	Yes	No	?	Rationale/Key Contaminants
Groundwater	X			Benzene, Toluene, Vinyl Chloride
Air (indoors)[2]		X		
Surface Soil (e.g., <2 ft)	X			PCBs, Hexachlorobenzene, Bis(2-ethylhexyl)phthalate
Surface Water		X		
Sediment		X		
Subsurface Soil (e.g., >2 ft)	X			PCBs, Hexachlorobenzene
Air (Outdoor)		X		

____ If no (for all media) - skip to #6, and enter YE, status code after providing or citing appropriate levels, and referencing sufficient supporting documentation demonstrating that these levels are not exceeded.

__X__ If yes (for any media) - continue after identifying key contaminants in each contaminated medium, citing appropriate levels (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

____ If unknown (for any media) - skip to #6 and enter IN status code.

Rationale:

There are two distinct water-bearing units below the Solutia site. Water table groundwater at the site is encountered at depths of 1.5 to 14 feet bgs in the Cape May sands and dredge fill material. The water table aquifer is effectively separated from a deeper confined aquifer by the Raritan-Magothy Formation, which appears to be continuous across the site. The deeper aquifer is comprised of two zones separated by a layer of low permeability. The upper zone is approximately 50 feet thick at the plant site and contains fresh water. The lower zone contains brackish water.

[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 appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

[2] Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

Groundwater in the water table aquifer moves in three general directions at the Solutia site: easterly toward Birch Creek, westerly toward the site's western property boundary, and north to the Delaware River. The dividing line between easterly and westerly water table flow appears to be located just west of Birch Creek.

Under natural conditions, groundwater flow in the Raritan-Magothy Formation was likely toward the Delaware River. However, Solutia has three production wells (West Production Well [MW-30D], East Production Well [MW-31D], and Production Well No. 3 [MW-37D]) that pump from the upper portion of this deeper aquifer at a permitted rate of 1,800 gallons per minute (Ref. 1). The location of these production wells is depicted on Figure 9 in the Description of Current Conditions Report (Ref. 1). As a result of sustained on-site pumping, groundwater in this unit now moves radially inward from all directions around the withdrawal wells. The cone of depression associated with pumping at Solutia appears to extend as much as two miles beyond the site property, drawing groundwater toward the site from adjacent and nearby properties (Ref. 1). Data indicate that the pumping of this unit has no observable effect on the water table aquifer. Because overall flow in this unit is from the property boundary inward, the possibility of groundwater moving off site in the confined aquifer is remote as long as pumping continues (Ref. 1).

A total of 60 groundwater wells are currently included in the site groundwater monitoring program and are being monitored on a semi-annual basis as part of the NJPDES-DGW permit. Semiannual sampling is performed in May and November. All wells included in the program are targeted for sampling in May, while a smaller set is sampled in November. The wells primarily are focus to monitor seven SWMUs: SWMU 1, SWMU 2, SWMU 3, SWMU 4, SWMU 7, SWMU 13, SWMU 14.

Monitoring Wells Network - 2001 and 2002*
Sampled in May Semiannual Event
MW-1S, MW-1D, MW-2S, MW-3S, MW-6S, MW-6SS, MW-7S, MW-8S, MW-9S, MW-12S, MW-12M, MW-13S-1, MW-14S, MW-18D, MW-21S, MW-23S, MW-23D, MW-24S, MW-27S, MW-27D, MW-28D, MW-30S-1, MW-30D, MW-31S, MW-31D, MW-32S, MW-34D, MW-36D, MW-37D, MW-39, MW-39S, MW-40S, MW-42-1, MW-42-2, MW-43, MW-45, MW-50S, MW-52-1, MW-52-2, MW-53-1, MW-53-2, MW-57, MW-59, MW-61-1, MW-61-2, MW-63, MW-101, MW-102, MW-103, MW-104, MW-104, MW-106, MW-107S, MW-108, MW-109, MW-110, MW-111, MW-112, MW-113, MW-114
Sampled During November Semiannual Event
MW-1S, MW-2S, MW-3S, MW-6S, MW-6SS, MW-7S, MW-8S, MW-9S, MW-12S, MW-12M, MW-13S1, MW-14S, MW-21S, MW-23S, MW-24S, MW-27S, MW-27D, MW-31S, MW-39, MW-39S, MW-40S, MW-43, MW-45, MW-50S, MW-53-1, MW-57, MW-59, MW-101, MW-102, MW-103, MW-104, MW-105, MW-106, MW-107S, MW-109, MW-110, MW-111, MW-112, MW-113, MW-114

*Wells with an S or -1 designation monitor the shallow aquifer. Wells with a D, -2, or M designation monitor the deeper aquifer.

Based upon the most recent sample monitoring events conducted in May and November 2002, benzene, toluene, vinyl chloride were all detected above NJ GWQC. Benzene was detected in well MW-53-1 (22 µg/L) during the November event, above both the NJ GWQC (1 µg/L) and the EPA maximum contaminant level (MCL) (5 µg/L). Benzene was also detected in Well MW-50S (2.04 µg/L) during the May event above the NJ GWQC (1 µg/L) only. Toluene was detected in well MW-53-1 during both the May (4,220 µg/L) and November (1,700 µg/L) events above the NJ GWQC and EPA MCL (both 1,000 µg/L). Vinyl chloride was detected at Well MW-27D (58.7) during the May sampling event above both

the NJ GWQC (5 µg/L) and the EPA MCL (5 µg/L); however, vinyl chloride was not detected above criteria in the November sampling event. Chloride and total dissolved solids were also detected in various wells during 2002, however, these parameters are not a concern relative to the CA725 EI Evaluation.

Indoor Air

Soil and groundwater contamination is generally not located in the portion of the facility that has been purchased by Ferro, which is the only portion of the facility that maintains on-site industrial buildings. For instance, all wells with groundwater exceedences in 2002 (MW-53-1, MW-50S, MW-27D, MW-63, MW-105) are located in the northwest quadrant of the site, away from the active portion of the facility now maintained by Ferro.

Regardless, the concentrations detected in shallow groundwater in 2002 were compared to the State of Connecticut Industrial/Commercial Volatilization Criteria (CT I/C VC). Results showed all volatile constituents detected in shallow groundwater were below the CT I/C VC (benzene = 3,800 µg/L, toluene 50,000 µg/L); thus, there is no concern for potential migration of contaminants in shallow groundwater into enclosed structures at the facility.

In addition to the analysis performed as part of development of this EI, Solutia also utilized a photoionization detector (PID) during soil sampling conducted in September 1997 to screen soil samples for organic vapors. Results showed subsurface gas was either not present or is present at relatively low concentrations (below 20 units) in all SWMUs/AOCs where screening was performed (SWMUs 5 and 6, AOC 11, SWMU 12, SWMU 13, SWMU 14). SWMU 8 (Process Sewer System) was the only location with approximately 2,500 units between 24 and 96 inches bgs. Solutia indicates that there is a potential for subsurface gas to be present; however, no potential receptors, such as basements in residential dwellings or industrial buildings where human exposure might occur are present near the potential sources (Ref. 2).

Surface and Subsurface Soil

Residual contamination is present in soil at several SWMUs/AOCs at the Solutia site above relevant NJ standards, as outlined below (Ref. 1, 2, and 4):

> ***SWMU 1, PDA No. 1*** - This unit was used from 1962 to 1970 to dispose liquid wastes of benzyl chloride residues, PCB materials, benzyl chloride, phenol, hexachlorobenzene, and a toluene/benzyl chloride mixture. Based upon available information, no soil characterization has been performed at this SWMU, thus no contaminant concentrations are documented. However, monitoring well data in the vicinity of this unit have shown PCBs, benzaldehyde, benzyl chloride, and benzyl alcohol; thus, it is likely these contaminants are present in waste material and soil within the SWMU area.
>
> ***SWMU 2, PDA No. 2*** - Hexachlorobenzene contamination has been detected in one surface soil at a concentration of 4.07 mg/kg, which is above the NJ NRDCSCC of 2.0 mg/kg. The extent of contamination has been estimated to be up to 59 cubic yards.
>
> ***SWMU 3, PDA No. 3*** - Hexachlorobenzene (up to 306 mg/kg) and PCBs (up to 736 mg/kg) have been detected in surface soil in and surrounding the SWMU 3 area above the NJ NRDCSCC of 2.0 mg/kg (for both contaminants).

SWMU 4, Phenol Equalization Lagoon - Phenol has been detected in subsurface soil above the NJ IGWSCC, but below the NJ RDCSCC and NJ NRDCSCC. Given that phenol is not present above a direct contact screening criteria, SWMU 4 is not considered a "contaminated" SWMU for purposes of this EI Determination as contaminant concentrations are below applicable human health direct contact criteria.

SWMU 5, Sludge Lagoon No. 3 - Phenol and total xylenes were detected in subsurface soil above the NJ IGWSCC, but below the NJ RDCSCC and the NJ NRDCSCC. Given that phenol and total xylene are not present above a direct contact screening criteria, SWMU 5 is not considered a "contaminated" SWMU for purposes of this EI Determination as contaminant concentrations are below applicable human health direct contact criteria.

SWMU 8, Process Sewer System - Acetone, ethylbenzene, and total xylenes were detected in subsurface soil above the NJ IGWSCC, but below the NJ RDCSCC and the NJ NRDCSCC. Given that the contaminants are not present above a direct contact screening criteria, SWMU 8 is not considered a "contaminated" SWMU for purposes of this EI Determination as contaminant concentrations are below applicable human health direct contact criteria.

SWMU 9, Stormwater Drainage Ditch (SWDD) - PCBs (15.6 mg/kg) were detected in one surface soil sample above the NJ NRDCSCC (2.0 mg/kg).

AOC 11, Rail Loading Area - Bis(2-ethylhexyl)phthalate (up to 4,700 mg/kg) was detected in two surface soil sample above the NJ NRDCSCC (210 mg/kg). Di-n-octylphthalate was also detected in surface above the NJ IGWSCC, but below the NJ RDCSCC and the NJ NRDCSCC.

SWMU 12, Three ASTs - TCE was detected in one surface soil sample above the NJ IGWSCC, but below the NJ RDCSCC and NJ NRDCSCC. Given that TCE is not present above a direct contact screening criteria, SWMU 12 is not considered a "contaminated" SWMU for purposes of this EI Determination gas contaminant concentrations are below applicable human health direct contact criteria.

SWMU 13, Drum Storage Area - Hexachlorobenzene (5.56 mg/kg) was detected in one surface soil sample above the NJ NRDCSCC (2.0 mg/kg).

SWMU 14, Hazardous Waste Landfill - This landfill was utilized to receive both hazardous and non-hazardous waste in segregated sections from 1978 to 1987. The southern portion of the landfill (approximately 2 acres) consists of inerts from flaker operations, waste phthalic anhydride (U190), distillation bottoms from phthalic anhydride production (K024), phosphate esters, tetrachlorophthalic anhydride flaker waste, and miscellaneous laboratory waste. The remaining portion of the landfill received non-hazardous WWTP sludge. Similar to SWMU 1, no soil characterization data is available for this waste management unit, thus no soil contaminant concentrations are documented.

Surface Water

The Delaware River forms the site boundary to the north and northwest and drains a large area in New York, New Jersey, and Pennsylvania prior to passing the Solutia site. The Delaware River is tidally influenced in the vicinity of the site and river water is fresh/brackish along the property boundary. The

river channel is approximately 6,000 feet wide and a dredged channel bottom is maintained to a depth of 40 feet. River flow rate in the area of the Solutia site has been estimated at approximately 13,000 cubic feet (Ref. 4). The Birch Creek also bisects the property from south to north and drains to the Delaware River. The creek is also tidally influenced. None of the site area east of Birch Creek is developed.

Based upon available documentation, groundwater in the shallow Cape May aquifer (1.5 feet to 14 feet bgs) is connected to the surface water regime of the Delaware River. Groundwater in the lower Raritan-Magothy aquifer is not connected to the local surface water bodies (Ref. 1).

Solutia maintains two NJPDES permitted (NJPDES Permit No. NJ0005045) outfalls (001A and 002A) which discharge treated wastewater effluent and stormwater runoff into the Delaware River. Surface water samples are collected as part of the NJPDES monitoring program and monthly compliance reports are prepared and submitted to USEPA, NJDEP, and the Delaware River Basic Commission (DRBC). These discharges are not the subject of corrective action; thus, they will not be evaluated as part of the EI Determination.

Based upon available information, no surface water sampling data from the Delaware River has been collected as part of Solutia investigations. Thus, groundwater concentrations at the Solutia site were assessed to determine whether current groundwater contaminant concentrations may cause impact to the Delaware River upon discharge. Based upon current available groundwater data, there are only several exceedences of NJ GWQC in wells at the Solutia site. These constituents include benzene and toluene in well MW-53-1 (perimeter well), benzene in well MW-50S (SWMU No. 2), and vinyl chloride in well MW-27D (SWMU No. 3). Well MW-27D extends into the deeper Raritan-Magothy aquifer and is therefore not a concern for groundwater discharge to surface water. Given that the concentrations of benzene in wells MW-53-1 (22 µg/L) and well MW-50-S (2.04 µg/L), and the concentration of toluene in well MW-53-1 (1,700 µg/L) are all below the relevant New Jersey Surface Water Quality Criteria (NJ SWQC) for saline coastal and saline estuary waterways (benzene = 71 µg/L, toluene = 200,000 µg/L), there is no concern that the current groundwater concentrations would cause adverse impact to the Delaware River if they were to discharge to the river at their detected levels. In addition, the large flow of the Delaware River provides for significant dilution of constituents that reach it via groundwater discharge, surface runoff, or wastewater discharge. According to Solutia, the dilutional effects, in conjunction with this diurnal variation in flow direction and the substantial number of discharges to the river (upstream and downstream), make it difficult to determine the impact on the river from the Solutia site individually, if at all (Ref. 2). Because of the substantial number of discharges and the natural variations of the Delaware River in the vicinity of the site, Solutia has historically attempted to evaluate potential impacts to the local surface water bodies without collecting surface water samples directly from the Delaware River or Birch Creek. Despite this lack of data, surface water is not being considered an impacted medium in this EI Determination based upon a review of all available information.

Sediment

Historical sediment sampling was performed by former property owners (Monsanto) in 1979. No subsequent sediment sampling was performed or required until August 1997 as part of the SWMU/AOC Sampling and Analysis Report (Ref. 4). As part of the SWMU/AOC Sampling and Analysis Report, sediment samples were collected in the Delaware River in the vicinity of AOC 10 due to two historic releases of naphthalene from this area (December 1982 and November 1983). Samples collected in August 1997 showed no concentrations of naphthalene above the practical quantitation level (PQL). No other sediment sampling has been required. Thus, based upon available information, sediment does not

appear to be impacted by site-related operations and is not being considered an impacted media for purposes of this EI Determination.

Outdoor Air

Based upon a review of available information, most of the impacted soil areas are either covered with soil and/or synthetic caps, asphalt, ballast, and/or gravel, thus emissions of volatiles and/or particulates are not expected (Ref. 2). Also, given the concentrations and limited detected of volatiles in groundwater, migration of volatile contaminants from groundwater into outdoor air at significant levels is not currently a concern at the Solutia site.

References:

1. Description of Current Conditions Report. Prepared by Smith Technology Corporation. Dated January 1997.
2. SWMU/AOC Sampling and Analysis Report, Solutia Delaware River Plant, Bridgeport, New Jersey. Prepared by BCM Engineers. Dated January, 1998.
3. Letter from Glenn Randall, URS Corporation, to Gregory Zalaskus, NJDEP, re: Results of Second-Half 2000 Semi-Annual Groundwater Monitoring Program. Dated March 30, 2001.
4. Sampling and Analysis Report for Phase II RFI and Corrective Measures Evaluation. Prepared by URS Corporation. Dated December 2001.
5. Letter from Glenn Randall, URS Corporation, to Gregory Zalaskus, NJDEP, re: Classification Exception Area Designation Request. Dated March 19, 2002.
6. Letter from Larry Adams, Solutia, to Barry Tornick, USEPA, re: Groundwater Exceedance Analysis. Dated February 11, 2003.
7. Letter from Raymond Pinkstone, NJDEP, to Glenn Randall, URS Corporation, re: Classification Exception Area Designation Request (March 19, 2002). Dated February 25, 2003.

3. Are there **complete pathways** between "contamination" and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table
*Potential **Human Receptors** (Under Current Conditions)*

"Contaminated" Media	Residents	Workers	Day-Care	Construction	Trespasser	Recreation	Food[3]
Groundwater	No	No	No	Yes	–	–	No
~~Air (indoor)~~							
Surface Soil (e.g. < 2 ft)	No	No	No	Yes	No	No	No
~~Surface Water~~							
Sediment			–	–			
Subsurface Soil (e.g., > 2 ft)	No	No	No	No	No	No	No
~~Air (outdoors)~~							

Instruction for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors' spaces for Media which are not "contaminated" as identified in #2 above.

2. Enter "yes" or "no" for potential "completeness" under each "Contaminated"Media Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential "Contaminated" Media - Human Receptor combinations (Pathways) do not have check spaces. These spaces instead have dashes ("–"). While these combinations may not be probable in most situations, they may be possible in some settings and should be added as necessary.

____ If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

__X__ If yes (pathways are complete for any "Contaminated" Media - Human Receptor combination) - continue after providing supporting explanation.

____ If unknown (for any "Contaminated" Media - Human Receptor combination) - skip to #6 and enter "IN" status code

Rationale:

[3] Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

Groundwater

As mentioned previously, shallow groundwater at the site is encountered at depths of 1.5 to 14 feet bgs in the Cape May sands and dredge fill material. Thus, there is a potential for on-site construction workers to come in direct contact with impacted groundwater in the water table while conducting intrusive activities at the site.

Groundwater in the water table aquifer moves in three general directions at the Solutia site: easterly toward Birch Creek, westerly toward the site's western property boundary, and north to the Delaware River. The dividing line between easterly and westerly water table flow appears to be located just west of Birch Creek. As mentioned in Question No. 2, the water table aquifer is effectively separated from a deeper confined aquifer by the Raritan-Magothy Formation, which appears to be continuous across the site. The deeper aquifer is comprised of two zones separated by a layer of low permeability. The upper zone is approximately 50 feet thick at the plant site and contains fresh water. The lower zone contains brackish water. A CEA was submitted for the Solutia property on March 19, 2002; however, NJDEP indicated that the CEA required significant revision in a February 25, 2003 letter. Despite this, the areas of impact identified in Question No. 2 are located in the shallow Cape May Formation. The Cape May Formation is not utilized for potable use at the Solutia site or in the surrounding areas. Thus, exposure to contaminants in shallow groundwater through potable use both on- and off-site are not potentially complete exposure pathways.

Ferro currently maintains three production wells (formerly utilized by Solutia) that pump from the upper portion of the deeper aquifer at a permitted rate of 1,800 gallons per minute (Ref. 1). The wells are identified as West Production Well (MW-30D), East Production Well (MW-31D), and Production Well No. 3 (MW-37D). As a result of sustained on-site pumping, groundwater in this unit now moves radially inward from all directions around the withdrawal wells. The cone of depression associated with pumping at Solutia appears to extend as much as two miles beyond the site property, drawing groundwater toward the site from adjacent and nearby properties. Because overall flow in this unit is from the property boundary inward, the possibility of groundwater moving off site in the confined aquifer is remote as long as pumping continues.

Vinyl chloride (58.7 µg/L) was detected in well MW-27D in May 2001, which extends into the deeper confined Raritan-Magothy Formation, above the NJ GWQC (5 µg/L). Given that this the vinyl chloride was detected in this deeper unit, and given that the well is located approximately 700 feet away from the West Production Well and within the cone of depression, there is a concern that elevated concentrations of vinyl chloride may be reaching this production well. The three production wells are utilized by Ferro and provide water for plant production processes and non-community potable water use (Ref. 1). However, based upon available information, these wells are included in the site groundwater monitoring program (sampled in May each year), and recent data indicate no exceedences in these wells. It should also be noted that samples historically collected from each of the three production wells (e.g., May and August of 1994) showed no constituents above either the MCL or the NJ GWQC. The CEA application also indicates that Ferro's potable water is tested regularly and conforms with the non-community drinking water standards, and NJDEP did not raise issue with this statement (Ref. 5). Also, well MW-27D was sampled in November 2001, and vinyl chloride was **not** detected during this subsequent round of groundwater sampling. Thus, based upon current available information, on-site worker exposure to deeper groundwater is not considered a potentially complete exposure pathway.

In addition to the three production wells at the Solutia site, there are two potable water supply wells located immediately west of the site that are operated by U.S. Generating Company (Ref. 1). Both wells

are also completed in the upper portion of the Raritan-Magothy Formation. However, as stated previously, these wells are within the cone of depression of the three production wells on the Solutia site and, thus, these wells are not a concern relative to releases from the Solutia site. No other potable water supply wells are known within one mile of the site (Ref. 1).

Surface and Subsurface Soil

The active portion of the facility now utilized by Ferro is completely fenced and monitored by security personnel. Access to the inactive portion of the facility is fenced along the western, southern (along the active Ferro portion), and the eastern portion of the facility. The northern boundary, which borders the Delaware River, is not fenced; however, access to the property from the Delaware River is extremely difficult and unlikely for several reasons. First, dense woods bound the site along the north. Second, a tidal flat area is located along the shoreline of the Delaware River to the north of the site, making access to the facility difficult. Also, the Delaware River is a large river with relatively high flow and large heavy traffic in the area of the facility. Thus, it is unlikely that a trespasser or recreator would gain access to the facility from the northern boundary of the site. Thus, trespassing on the Solutia site is not considered a concern for exposure to surface soil.

With the exception of SWMU 3, only limited areas of impacted exposed surface soil were identified at the Solutia site. Impacted soils at grade were detected at only one sample location at each of two SWMUs (SWMU 2 and SWMU 9), and at each of these two sample locations only one constituent was detected above the NJDEP criterion. The ground surface at each of these locations is covered with thick grass and common reeds. Impacted surface soils were also identified at one sampling location at each of SWMUs 12 and 13, and at two sampling locations at AOC 11. However, surface soils at these SWMUs are covered with gravel, or in the case of AOC 11, with railroad ballast, and are therefore not exposed at ground surface.

SWMU/AOC specific exposure pathways are outlined below:

> ***SWMU 1, PDA No. 1*** - In 1994, a final cap consisting of a geocomposite clay (sodium bentonite and geotextile) was installed over PDA 1 with the approval of NJDEP (Ref. 1). The area is also covered by thick vegetation. Thus, there is no concern for direct exposure to contaminated waste material and soil at this SWMU. Given that this final capping mechanism has been installed, no potentially complete exposure pathways are being considered.
>
> ***SWMU 2, PDA No. 2*** - Hexachlorobenzene (4.07 mg/kg) was detected in one surface soil sample location only slightly above the NJ NRDCSCC (2.0 mg/kg). This sample location is covered by thick grass and common reeds. In addition, this SWMU is located in the inactive portion of facility; thus, direct exposure for an on-site worker to contaminated soil at this sample location is not considered a potentially complete exposure pathway. Although unlikely (given that this unit is a former disposal area containing synthetic membranes), the potential for construction worker (e.g., remedial workers) exposure to contaminated soil when performing activities in the inactive portion of the facility is being considered a potentially complete exposure pathway.
>
> ***SWMU 3, PDA No. 3*** - Surface soil is impacted with hexachlorobenzene and PCB in the area of SWMU 3. A request for permanent capping of PDA No. 3 has been submitted to NJDEP; however, according to the available file materials (Ref. 1) NJDEP has not yet responded to this plan. SWMU 3 is located in the inactive portion of facility; thus, direct exposure for an on-site

worker to contaminated soil at this sample location is not likely a potentially complete exposure pathway. The potential for construction worker (e.g., remedial worker) exposure to contaminated soil when performing activities in the inactive portion of the facility is being considered a potentially complete exposure pathway. This potential exposure pathway is being considered because additional activities are necessary at this SWMU to achieve final closure.

SWMU 9, Stormwater Drainage Ditch - The drainage ditch is comprised of a corrugated metal pipe overlain with soil and thick vegetation. Only one sample location at this SWMU detected PCBs (15.6 mg/kg) above the NJ NRDCSCC (2.0 mg/kg). Given that this one elevated sample is located in the inactive portion of the facility and is located in an area covered by thick grass, there is little or no potential for on-site worker direct exposure to soils at this SWMU. However, there is a potential that construction workers (e.g., remedial workers) could come in contact with contaminated soil when performing activities in the inactive portion of the facility.

AOC 11, Rail Loading Area - Surface soil at AOC 11 is covered with up to two feet of railroad ballast and is therefore not exposed at the surface. Thus, even though this AOC is located in the active portion of the facility operated by Ferro, there is little or no potential for on-site workers to come in direct contact with bis(2-ethylhexyl)phlate contaminated soil at the two soil sample locations where the contaminant was detected above the NJ NRDCSCC. However, the potential for on-site construction workers to come in contact with contaminated soil when performing intrusive activities at the site is considered a potentially complete exposure pathway.

SWMU 13, Drum Storage Area - Hexachlorobenzene (5.56 mg/kg) was detected in one surface soil sample slightly above the NJ NRDCSCC (2.0 mg/kg). This SWMU is located in a portion of the facility that is now utilized by Ferro. This area has been covered with gravel, thus direct exposure to on-site workers in this location is unlikely. However, there is a potential for on-site construction workers to come in contact with contaminated soil when performing intrusive activities at the site.

SWMU 14, Hazardous Waste Landfill - Although this former hazardous waste landfill likely contains elevated concentrations of hazardous constituents, given that it received various types of hazardous materials, there is no concern for on-site worker exposure as the landfill is located in the inactive portion of the facility. The landfill is also currently capped with wood chips overlain by a vegetated soil cover. Solutia maintains this cap with periodic surface grading and removal of stormwater trapped within the wood chip layer. Thus, given this routine maintenance and the fact that a final capping mechanism will be installed in the future, potential construction worker (e.g., remedial worker) exposure to contaminated soil/waste material within the landfill is considered a current potentially complete exposure pathway.

References:

1. Description of Current Conditions Report. Prepared by Smith Technology Corporation. Dated January 1997.
2. SWMU/AOC Sampling and Analysis Report, Solutia Delaware River Plant, Bridgeport, New Jersey. Prepared by BCM Engineers. Dated January, 1998.
3. Letter from Glenn Randall, URS Corporation, to Gregory Zalaskus, NJDEP, re: Results of Second-Half 2000 Semi-Annual Groundwater Monitoring Program. Dated March 30, 2001.

4. Sampling and Analysis Report for Phase II RFI and Corrective Measures Evaluation. Prepared by URS Corporation. Dated December 2001.
5. Letter from Glenn Randall, URS Corporation, to Gregory Zalaskus, NJDEP, re: Classification Exception Area Designation Request. Dated March 19, 2002.
6. Letter from Larry Adams, Solutia, to Barry Tornick, USEPA, re: Groundwater Exceedance Analysis. Dated February 11, 2003.
7. Letter from Raymond Pinkstone, NJDEP, to Glenn Randall, URS Corporation, re: Classification Exception Area Designation Request (March 19, 2002). Dated February 25, 2003.

4. Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **significant**[4] (i.e., potentially "unacceptable" because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable "levels" (used to identify the "contamination"); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable "levels") could result in greater than acceptable risks?

__X__ If no (exposures cannot be reasonably expected to be significant (i.e., potentially "unacceptable") for any complete exposure pathway) - skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

____ If yes (exposures could be reasonably expected to be "significant" (i.e., potentially "unacceptable") for any complete exposure pathway) - continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

____ If unknown (for any complete pathway) - skip to #6 and enter "IN" status code.

Rationale:

Groundwater

As discussed in response to Question No. 3, the potential for on-site construction workers (e.g., remedial workers) to come in direct contact with contaminated groundwater is being considered a potentially complete exposure pathway. All groundwater contamination is currently identified within the inactive portion of the facility; thus, intrusive activities conducted in this area are limited to remedial work. Remedial workers are expected to perform work under health and safety plans following strict Occupational Health and Safety Administration (OSHA) guidelines. Personal protective equipment (PPE) would be used during any intrusive activities in this area of the site, thus minimizing the potential for

[4] If there is any question on whether the identified exposures are "significant" (i.e., potentially "unacceptable") consult a human health Risk Assessment specialist with appropriate education, training and experience.

direct exposure to impacted groundwater. Therefore, any potential exposures that may occur for on-site construction workers (e.g., remedial workers) are not expected to be significant.

Surface and Subsurface Soil

As discussed in response to Question No. 3, the potential for on-site construction workers (e.g., remedial workers) to come in direct contact with contaminated surface and subsurface soil at the site is being considered a potentially complete exposure pathway. A majority of the residual contamination is located in the inactive portion of the site that is maintained by Solutia. Thus, intrusive activities conducted in this area would be limited to remedial work. As mentioned above, remedial workers are expected to perform work under health and safety plans following strict OSHA guidelines. PPE would be used during any remedial activities in this area of the site, thereby minimizing the potential for direct exposure to impacted soil. Therefore, any potential exposures that may occur for on-site construction workers (e.g., remedial workers) are not expected to be significant.

With regards to soil contamination present within the active portion of the Solutia site (currently owned by Ferro), exposure is also expected to be insignificant for several reasons. First, the extent of contamination is extremely minimal (e.g., only two sample locations in AOC 11, and only one sample location in SWMU 13). Contamination in AOC 11 is located under ballast material along a railroad track area, thus it is unlikely that intrusive activities would be performed in this area as the integrity of the railroad tracks may be threatened. Contamination in SWMU 13 has been covered by gravel as a control mechanism to prevent exposure; thus, it is not expected that intrusive activities would be performed in this area to disturb the cover materials. In addition, although Solutia is responsible for all the contamination at the site and is performing the remedial activities at both the inactive portion of the site and the portion currently owned and maintained by Ferro, Solutia has notified Ferro of the contamination at the site. Thus, it is expected that Ferro would utilize their health and safety procedures if activities needed to occur in any impacted areas. Therefore, based upon all available information, exposure for on-site construction workers to contaminated soil is not expected to pose significant exposures.

References:

1. Description of Current Conditions Report. Prepared by Smith Technology Corporation. Dated January 1997.
2. SWMU/AOC Sampling and Analysis Report, Solutia Delaware River Plant, Bridgeport, New Jersey. Prepared by BCM Engineers. Dated January, 1998.
3. Sampling and Analysis Report for Phase II RFI and Corrective Measures Evaluation. Prepared by URS Corporation. Dated December 2001.
4. Letter from Larry Adams, Solutia, to Barry Tornick, USEPA, re: Groundwater Exceedance Analysis. Dated February 11, 2003.

5. Can the "significant" **exposures** (identified in #4) be shown to be within acceptable limits?

____ If yes (all "significant" exposures have been shown to be within acceptable limits) - continue and enter "YE" after summarizing and referencing documentation justifying why all "significant" exposures to "contamination" are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

____ If no (there are current exposures that can be reasonably expected to be "unacceptable")- continue and enter "NO" status code after providing a description of each potentially "unacceptable" exposure.

____ If unknown (for any potentially "unacceptable" exposure) - continue and enter "IN" status code

Rationale:

This question is not applicable. See response to question #4.

6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

_X_ YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the Solutia Inc. Delaware River Plant, EPA ID# NJD001700707, located at NJ State Highway Route 130 in Bridgeport, New Jersey under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

___ NO - "Current Human Exposures" are NOT "Under Control."

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

Completed by: _____ Date:_____

Kristin McKenney
Risk Assessor
Booz Allen Hamilton

Reviewed by: _____ Date:_____

Kathy Rogovin
Senior Risk Assessor
Booz Allen Hamilton

Also Reviewed by: _____ Date:_____

Sameh Abdellatif, Remedial Project Manager
RCRA Programs Branch
USEPA Region 2

_____ Date:_____

Barry Tornick, Section Chief
RCRA Programs Branch
USEPA Region 2

Approved by: _____ Date:_____

Adolph Everett, Acting Chief
RCRA Programs Branch
USEPA 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: Sameh Abdellatif, USEPA RPM
(212) 637-4103
abdellatif.sameh@epa.gov

FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.

Attachments

The following attachments have been provided to support this EI determination.

- Attachment 1 - Summary of Media Impacts Table

Attachment 1 - Summary of Media Impacts Table

Solutia Inc., Delaware River Plant (formerly Monsanto), NJ State Highway 130, Bridgeport, New Jersey

AOC	GW	AIR (Indoors)	SURFACE SOIL	SURFACE WATER	SEDIMENT	SUBSURFACE SOIL	AIR (Outdoors)	CORRECTIVE ACTION MEASURE	KEY CONTAMINANTS
SWMU 1. PDA No. 1	Yes	No	No	No	No	Yes	No	▸ Slurry wall installed ▸ Subsoil flushing system ▸ Geocomposite clay cap ▸ Ongoing groundwater monitoring	▸ PCBs, benzaldehyde, benzyl chloride, benzyl alcohol in groundwater
SWMU 2. PDA No. 2	Yes	No	Yes	No	No	No	No	▸ 30-mil PVC cap and 18-inch thick layer of soil installed over unit ▸ Ongoing groundwater monitoring ▸ Excavation of residual contaminated soil (proposed)	▸ Benzene in groundwater ▸ Hexachlorobenzene in soil
SWMU 3. PDA No. 3	Yes	No	Yes	No	No	No	No	▸ Vegetative soil cover ▸ Ongoing groundwater monitoring ▸ Permanent capping system (proposed)	▸ Vinyl chloride in groundwater ▸ PCBs and hexachlorobenzene in soil
SWMU 4. Phenol Equalization Lagoon	Yes	No	No	No	No	Yes	No	▸ Removed lagoon material and disposed off site ▸ Ongoing groundwater monitoring ▸ Permanent capping system (proposed)	▸ DNAPL ▸ Phenol in subsurface soil
SWMUs 5 and 6. Sludge Lagoon Nos. 3 and 4.	No	No	No	No	No	Yes	No	▸ Clean fill caps installed ▸ Ongoing groundwater monitoring	▸ Phenol and total xylenes in soil
SWMU 7. Raw Waste Equalization Lagoon	No	No	No	No	No	No	No	▸ Unit closed and contents disposed off site ▸ Ongoing groundwater monitoring	▸ None

AOC	GW	AIR (Indoors)	SURFACE SOIL	SURFACE WATER	SEDIMENT	SUBSURFACE SOIL	AIR (Outdoors)	CORRECTIVE ACTION MEASURE	KEY CONTAMINANTS
SWMU 8. Process Sewer System	No	No	No	No	No	Yes	No	▸ Damaged sewer manhole repaired and portions of system upgraded ▸ Additional upgrades will be performed if necessary	▸ Acetone, ethylbenzene, total xylenes in soil
SWMU 9. Stormwater Drainage Ditch.	No	No	Yes	No	No	No	No	▸ Earthen channels replaced with corrugated metal piping ▸ Sediments and soil lining channel excavated and placed in East Landfill	▸ PCBs in soil
AOC 10. Dock Area.	No	No	No	No	No	No	No	▸ Spilled product recovery conducted	▸ None
AOC 11. Rail Loading Area	No	No	Yes	No	No	No	No	▸ Area covered by railroad ballast	▸ Di-n-octylphthalate and bis(2-ethylhexyl)phthalate in soil
SWMU 12. Three Aboveground ASTs	No	No	Yes	No	No	No	No	▸ Area covered by gravel	▸ TCE in soil
SWMU 13. Drum Storage Area.	No	No	Yes	No	No	No	No	▸ Area covered by gravel ▸ Ongoing groundwater monitoring	▸ Hexachlorobenzene in soil
SWMU 14. Hazardous Waste Landfill (East Landfill)	No	No	No	No	No	Yes	No	▸ Capped with wood chips and vegetated cover ▸ Lightweight capping system (proposed) ▸ Ongoing groundwater monitoring under NPDES-DGW permit	▸ Disposed waste materials (soil samples not available)