DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA725)

Current Human Exposures Under Control

Facility Name: **Bensalem Redevelopment L.P. (Formerly Elf Atochem North America)**
Facility Address: **2375 State Road, Bensalem Township, PA 19020**
Facility EPA ID #: **PAD002290823**

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.

BACKGROUND

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 "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 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 "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do 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 Determinations status codes should remain in 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 Background

The approximately 25-acre site property located along the Delaware River shoreline in Cornwells Heights, Bensalem Township, PA was first developed by a concrete shipbuilding company in 1917. This company reportedly went out of business shortly after World War I. The next known operator at the site was the Penn Salt Refining Company, which purchased the property in 1940 and used it primarily for warehousing of its products. From 1943 through the end of World War II, the U.S. Government owned the facility and used the property for sulfuric acid, hydrogen fluoride and cryolite production, as well as aluminum refining. Penn Salt, which later became the Pennwalt Corporation, repurchased the property from the U.S. Government shortly after the war.

Site operations under the Pennwalt Corp. included the blending of chemicals for cleaning and lubricating agents used in the laundry and metal working industries, and the repackaging of bulk materials such as refrigerants and hydrochloric acid. These activities continued from the 1950s through the 1990s. In December 1989, Atochem became the owner of the property after a merger with Pennwalt and another company, M&T Chemicals. In 1997, all manufacturing operations were terminated, equipment was removed from the property and the buildings were decommissioned.

A pH neutralization treatment system was installed at the facility in 1972 to treat the process wastewater that was previously pumped into two retention ponds in the undeveloped portion of the property. The ponds, constructed in approximately 1950 with no engineered liners, did not have a discharge point so any liquids pumped into the ponds were allowed to evaporate or percolate into the ground. Prior to the construction of the ponds, process wastewater was discharged into an Infiltration Ditch, located along the western property boundary.

Other areas of concern identified by former employees at the facility or from previous site investigations include a Storm Water Drainage Channel, Surface Depression Area, Railroad Spurlines, two Transformer Areas, a Former Sulfur Storage Area, two former Underground Storage Tank (UST) Areas, a Former Aboveground Storage Tank (AST) Area, Former Hydrofluoric Acid Loading Platform, Former Septic Field, Former Forane Storage/Loading Area, Building Nos. 2 and 3, the canal located along the eastern property boundary, and two hot spot areas containing high concentrations of chlorinated organics in groundwater.

The site is currently owned by Bensalem Redevelopment, LP (BRLP), which plans to redevelop the property into residential and commercial space. BRLP is seeking a release of environmental liability under the Pennsylvania Department of Environmental Protection's (PADEP) Act II Land Recycling Program and has entered into a Facility Lead Agreement with EPA to ensure that all of its RCRA Corrective Action obligations will be met.

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)?

	Yes	No	?	Rationale / Key Contaminants
Groundwater	X			Chlorinated solvents and other contaminants have been detected above EPA RBCs and PADEP MSCs.
Air (indoors)[2]	X			Several VOCs in soils and groundwater are potential problems per site specific modeling.
Surface Soil (e.g., <2 ft)	X			Some chlorinated solvents, PAHs, PCBs and arsenic were detected above the EPA RBCs and State MSCs
Surface Water		X		Analytical results from samples collected in the canal and preliminary modeling results do not indicate contamination above a protective risk-based level.
Sediment		X		Sediment samples collected within the canal did not contain contamination above protective risk-based levels for human health.
Subsurf. Soil (e.g., >2 ft)	X			Some chlorinated solvents, PAHs, PCBs and arsenic were detected above the EPA RBCs and State MSCs.
Air (outdoors)		X		A release of contaminants from source areas to the air above risk-based levels is not suspected.

_____ 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 and Reference(s):

See Following Pages

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

The site is located near the boundary of the Atlantic Coastal Plain and Piedmont Plateau. The site is not believed to overlie the Coastal Plain, which is a wedge-shaped sequence of unconsolidated to semi-consolidated sedimentary deposits that thicken towards the Atlantic Ocean. Therefore, groundwater contamination at the site is not believed to impact the Coastal Plain's Potomac-Raritan-Magothy (PRM) aquifer system, an important source of drinking water for southern New Jersey.

The site is underlain by silty sand beneath surficial fill or topsoil with natural organic material. Thin silty clay layers were encountered at various locations throughout the site. A sand and gravel unit is found in most areas beneath the silty sand and silty clay. The lithology of this unit is generally consistent with the Trenton Gravel Formation. Beneath the Trenton Gravels is a weathered and micaceous bedrock saprolite which varies in thickness from 2.5 feet to 21 feet across the site. The bedrock beneath the site is believed to be part of the Wissahickon Schist Formation. Outcrops of this formation are apparent along the edge of the riverbed. Depths to competent bedrock at the site range from approximately 10 to 14 feet BGS on the northwest side of the site to 30 feet BGS in the wooded flood plain portion of the site.

Groundwater in the unconsolidated deposits is not considered to be a significant source of water, but can be developed where the sand and gravel lenses are sufficiently thick. Groundwater is also present in the saprolite and consolidated Wissahickon Schist Formation below the overburden. No continuous confining layer has been identified between the overburden, saprolite, or bedrock aquifers.

Groundwater flow direction in the overburden and saprolite is generally towards the Delaware River or the Canal along the northern site property boundary. It appears that the pumping of two sumps located within Building B-3 may be affecting the natural groundwater flow gradient, possibly drawing water from beneath the Former Retention Ponds away from the Delaware River and towards Building B-3.

There have been several groundwater investigations at the facility since 1985. The first four monitoring wells were installed as part of an investigation focused on the retention pond area by AWARE, Inc. in 1985. The sampling results indicated the presence of trichloroethylene (TCE), tetrachloroethylene (PCE), methylene chloride, trans-1,2-dichloroethylene, and toluene in a well located downgradient of the retention ponds. Five additional wells were installed in December 1993 to determine groundwater quality in the vicinity of the former 1,000-gallon and 20,000 gallon underground storage tanks (USTs). On March 13, 1995, eight temporary wells (8 feet deep each) were installed between the former retention ponds and the Delaware River. No concentrations of volatile organic compounds (VOCs) or semi-volatile organic compounds (SVOCs) were detected above the available standards in any of the temporary wells. Aroclor-1254 was detected above the corresponding EPA maximum contaminant level (MCL) and EPA tap water risk based concentration (RBC) in two of the temporary wells. Several metals, including aluminum, antimony, barium, beryllium, cadmium, copper, lead, manganese, nickel, sodium, vanadium and zinc were found at elevated concentrations in the wells, however, the metals concentrations are believed to be related to particulates in the unfiltered samples.

Between January 1997 and March 1998, five new monitoring wells and three replacement wells were installed at the site. The temporary wells installed in 1995 were abandoned. In February 1997, monitoring well MW-4 (formerly MW-4R), was sampled for TCL VOCs. The compounds 1,1-DCE (32 ug/l), TCE (577 ug/l), PCE (1,210 ug/l) and vinyl chloride (1,900 ug/l) were detected at concentrations above their respective RBCs and PADEP medium specific concentrations (MSCs). In October 1997 groundwater samples were collected from existing wells MW-4, MW-8, MW-9 and all of the newly installed wells. MW-4 contained vinyl chloride (3,000 ug/l), 1,1-DCE (14 ug/l), TCE (270 ug/l) and PCE (400 ug/l). MW-1S contained PCE (13 ug/l) and trace concentrations of other chlorinated solvents at concentrations below the PA Act 2 Residential Groundwater MSC. MW-2S contained PCE at the MSC concentration of 5 ug/l.

MW-7 contained PCE (67 ug/l) and MW-9 contained TCE (14 ug/l). MW-3 contained quantified concentrations of vinyl chloride (4J ug/l) and methylene chloride (4J ug/l) slightly above their respective MSCs. Aluminum, iron and manganese were found in all of the samples analyzed for total metals at concentrations greater than the Act 2 MSCs. These inorganic constituents were not historically used at the facility and are ubiquitous in nature. Beryllium was found in MW-3 at a quantified concentration of 4.4 J ug/l, slightly above the MSC of 4 ug/l. Nickel was found at 269 ug/l in MW-4.

In March 1998, the same wells sampled in October 1997 were resampled. MW-4 continued to exhibit elevated concentrations of vinyl chloride (1,800 ug/l), 1,1-DCE (19 ug/l), TCE (530 ug/l) and PCE (940 ug/l). MW-1S contained PCE (6 ug/l) and trace concentrations of other chlorinated solvents at concentrations below the PA Act 2 MSCs. MW-1D contained PCE (8 ug/l). MW-7 contained TCE (13 ug/l) and PCE (1,800 ug/l). PCE (6 ug/l) was also found in MW-2S. Beryllium was found in MW-3 at the MSC of 4 ug/l. Nickel was found at 254 ug/l in MW-4.

As part of the most recent site investigation, five new monitoring wells and eleven new temporary monitoring wells were installed in January 2004. Eleven existing wells were chosen in addition to the new wells (27 wells total) to comprise the current groundwater monitoring program at the site. Of the 27 wells, 21 are screened into the overburden and six are screened into the saprolite aquifer. The eleven existing wells were sampled in December 2003. The results from this sampling event were used to decide the locations of the new temporary and permanent monitoring wells. The five new monitoring wells and eleven new temporary monitoring wells were sampled in February 2004.

The December 2003 and February 2004 sampling results indicate the highest concentrations of chlorinated solvents (PCE (680 ug/l), TCE (380 ug/l), 1,1-dichloroethylene (50 ug/l), cis-1,2-dichloroethylene (1800 ug/l), vinyl chloride (850 ug/l)) were detected in MW-4D, located downgradient of the Former Retention Ponds. Interestingly, the chlorinated solvent contamination historically seen in overburden monitoring well MW-4 was not detected in this round of groundwater sampling. Elevated concentrations of chlorinated organics were also detected in samples collected from monitoring wells adjacent to Building Nos. B-2/B-3 and B-5, as well as in water samples collected within the North and South sumps within Building No. B-3. A groundwater sample from temporary Well No. TW-10 located adjacent to the canal exhibited a PCE concentration of 200 ug/l indicating that the contaminant plume was most likely discharging into the canal water at elevated concentrations. PCE, TCE, vinyl chloride and cis-1,2-DCE were all found at concentrations above the tap water RBC and PADEP residential used aquifer groundwater MSC but below the PADEP residential non-used aquifer MSC in several of the wells located near the bank of the Delaware River.

Surface and Subsurface Soil:

In addition to the groundwater investigation, fifteen areas of concern (AOCs) were investigated as part of the most recent site characterization that occurred in the winter of 2004. The only known AOCs not investigated were the two former transformer stations at the facility. The soils in these two areas will be characterized after the removal of the transformers from the property. A discussion of the evaluated AOCs is below.

Infiltration Ditch
Prior to the construction of two retention ponds in 1950, wastewaters from the Dry Blends Sump, North Sump and South Sump were discharged into the Infiltration Ditch located along the southwestern portion of the site. Soil samples were collected from the ditch in March 1995 and January 2004. The analytical results indicated elevated concentrations above the PADEP Direct Contact MSC for a PCB (aroclor-1254), dieldrin and arsenic in the upstream samples. It is unclear whether the arsenic concentrations detected are

significantly above background. BRLP has proposed the collection of 24 samples from 12 background locations to determine a true site specific background concentration for arsenic. Several PAHs were detected at concentrations above their corresponding EPA RBC, but below the PADEP MSCs. BRLP is planning to collect four additional soil samples in this area to assess the lateral extent of the soil contamination along the Infiltration Ditch.

Stormwater Drainage Channel
This drainage channel is used for the collection of on-site and off-site storm water and is located along the western boundary of the site property. The channel enters the site property underground and emerges approximately 275 feet downstream about150 feet west of Building No. B-2. The drainage channel may have been used as a discharge point for rinse waters from caustic bin and tank washing operations once conducted outside Building No. B-2. Four soil samples were collected from the Stormwater Drainage Channel in January 2004. Arsenic was the only contaminant detected above PADEP's Direct Contact MSC, although it is unclear whether the arsenic concentrations detected are significantly above background. A site specific background arsenic concentration will be developed. Several PAHs, dieldren, and aroclor-1254 were detected in the channel soils at concentrations exceeding EPA's RBCs but below PADEP's MSCs.

Former Retention Ponds
From 1950 through 1972, two retention ponds located east of the plant manufacturing area received wastewaters from the Dry Blends Sump, the North Sump and the South Sump. The ponds each measured about 195 feet by 100feet and were bermed to a height of five feet above the original ground surface. The ponds had no engineered liners and were emptied via evaporation or percolation into the ground. After 1972, wastewaters from the above sumps were discharged to an on-site pH Neutralization Treatment Plant. Once out of service, the retention ponds were backfilled with soil and trash/debris such as railroad ties, pallets, plastic, crushed drums, gas cylinders and general scrap iron. Several test pits were installed and soil samples collected during two investigations of the Former Retention Ponds in 1995 and 2003. The 1995 investigation indicated the presence. Results of the two investigations indicate that 1,1-dichloroethane, alpha-BHC, aroclor-1254, arsenic, lead and nickel were found in various samples at various depths in both the east and west ponds at concentrations exceeding the corresponding PADEP Direct Contact MSC. Several other contaminants including benzo(a)pyrene, aroclor-1260, aluminum, iron, mercury, manganese, antimony, thallium, vanadium and zinc were detected in various samples at concentrations exceeding EPA RBCs but below PADEP MSCs.

Surface Depression Area
The Surface Depression Area is located on the southern portion of the property and was reportedly used for the burning of facility trash. Soils in this area were sampled in 1995 and January 2004. Arsenic and iron were found in surface soil samples at concentrations exceeding their corresponding PADEP Direct Contact MSCs. Arsenic was also detected in subsurface soil samples at concentrations above EPA's RBC but below all PADEP MSCs. It is unclear whether the arsenic concentrations detected are significantly above a site-specific background. Because trash was allegedly burned in this area, the January 2004 samples in this area were additionally analyzed for dioxin. No samples were found to contain dioxin at concentrations above either PADEP MSCs or the EPA RBC.

Railroad Spur Lines
Two railroad spur lines, believed to have been installed in the early 1900s, exist on the central and western portions of the site property. In January 2004, soil samples were collected directly beneath the ballast at 15 separate locations along the spur lines. The sampling results indicated exceedances of the PADEP Direct Contact MSC for aroclor-1254 at two locations and benzo(a)pyrene at three additional locations. Benzo(a)pyrene and a few other PAHs were detected at concentrations exceeding EPA's RBCs but below PADEP's MSCs at several other sample locations. Arsenic and iron were detected above the RBC but

below State MSCs in the only Railroad Spur Line sample analyzed for metals. It is unclear whether the arsenic concentration detected is significantly above a site-specific background.

Former Sulfur Storage Area
The 400 feet by 100 feet Former Sulfur Storage Area is located in the northeast corner of the site and is partially covered with an asphalt pad. As the name implies, this area was used for the storage of raw sulfur. Raw sulfur and soils were excavated from this area and disposed off-site in July 1994, although recent observations show that some residual sulfur remains in the area The asphalt pad was believed to be used for the storage of equipment, gas cylinders and drummed wastes. In January 2004, soil samples were collected from 13 locations within the Former Sulfur Storage Area. Three samples were collected from along the centerline of the asphalt pad and analyzed for VOCs, SVOCs, sulfite, sulfide and sulfate. One other sample (FSSA-SS-6) was analyzed for the same parameters. The remaining samples were analyzed solely for sulfite, sulfide and sulfate. While no contaminants were detected above any of the PADEP MSCs, sample no. FSSA-SS-6 did contain benzo(a)pyrene (0.47 mg/kg) above EPA's RBC for that contaminant (0.087 mg/kg). While sulfate concentrations in the samples ranged from 170 mg/kg to 21,000 mg/kg, these levels do not present an unacceptable risk for human health.

Former Underground Storage Tank Areas
In 1992, three USTs were removed from the site, including a 20,000-gallon No.4/No. 6 fuel oil tank located to the east of Building No. B-4, a 1,000-gallon gasoline tank located adjacent to the northwest corner of Building No. B-5 and a 2,000-gallon No. 2 fuel oil tank located to the northwest of Building No. B-4. While there was no observed contamination of soils around the 2,000-gallon UST excavation, impacted soils were removed around the 20,000-gallon and 1,000-gallon USTs. To confirm the effectiveness of the remedial activities completed at the former No. 4/6 fuel oil UST and gasoline UST excavations, and to confirm that soils adjacent to the former No. 2 fuel oil tank excavation were not impacted, in January 2004 eight soil borings were installed in the vicinity of the former tank locations. One of the soil samples collected in the former location of the gasoline UST fuel dispenser contained benzene (6.4 mg/kg) at a concentration above PADEP's residential used aquifer soil to groundwater MSC and 1,2-dichloroethane (0.32 mg/kg) at a concentration above the direct contact MSC. One sample collected in the vicinity of the former No. 4/6 fuel oil tank location contained benzo(a)pyrene (0.13 mg/kg) at a concentration above EPA's RBC but below the PADEP MSCs for that contaminant.

In October 1997, a 13,500-gallon tank embedded in the southwestern wall of the canal located along the northeastern edge of the property was removed from the site. The tank had not been used for many years and Atochem employees suspected that it may have stored fuel oil for fueling barges at the canal launch point in the early to mid 1900s. Approximately 4,800 pounds of sludge was removed from the tank prior to its disposal. Analysis of the sludge indicated it contained 8,800 mg/kg of total petroleum hydrocarbons (TPH) but did not contain detectable concentrations of any of the BTEX. (benzene, toluene, ethylbenzene, xylenes). (benzene, toluene, ethylbenzene, xylenes) compounds. Observations of the areas surrounding the tank indicated no signs of contamination and consequently, no sampling of the surrounding soils occurred. The embankment was restored with 80 tons of rip-rap.

Former Aboveground Storage Tank Areas
This AOC includes an area southwest of Building No. B-3 where as many as four aboveground storage tanks (ASTs) were formerly located as well as an abandoned pipeline believed to be used to convey PCE from the AST area for use in Building B-3. In addition to PCE, the tanks in the AST area were used for the storage of dichloroethene, kerosene, mineral seal oil and refined oil. The tanks were at that location from the early 1950s through the mid 1990s and ranged in capacity from 1,500 to 9,900 gallons.

Surface and subsurface soil samples were collected from three locations within the Former AST Area in January 2004. One of the surface soil samples contained trans-1,2-dichloroethylene (19 mg/kg), cis-1,2-

dichloroethylene (70 mg/kg), 1,3-dichloropropene (9.5 mg/kg) and PCE (1.9 mg/kg) at concentrations above PADEP's residential used aquifer soil to groundwater MSC. Benzo(a)pyrene (0.68 mg/kg) and aroclor-1260 (10 mg/kg) were detected in subsurface soils at concentrations above EPA's RBCs but below the PADEP MSCs.

Attempts to locate the abandoned PCE pipeline through the installation of six test pits were unsuccessful, although other types of pipes were observed such as stormwater pipes, former septic system pipes and pipes used by the No. 4/6 fuel oil UST. Soil samples in this area were intended to be collected from beneath the mid-point and terminus of the PCE pipeline. Since the pipeline was not located and is presumed to have been removed from the site, soil samples were collected from area that exhibited elevated PID/FID readings. The analytical results associated with the four soil samples collected in this area indicate that no contaminants were detected at concentrations above either the EPA RBCs or State MSCs.

Former Hydrofluoric Acid Loading Platform
The Former Hydrofluoric Acid (HF) Loading Platform, located to the southeast of Building No. B-3 was once used for the distribution and repackaging of HF product. Two ASTs containing HF and one AST containing hydraulic oil used by the weighing scale were situated on concrete saddles within an earthen bermed area. Six surface soil and five subsurface soil samples were collected around the perimeter of the Former HF Loading Platform in January 2004. No contaminants were detected in any of the samples at concentrations greater than any of the corresponding PADEP MSCs. However, benzo(a)pyrene was detected at concentrations above the EPA RBC in five of the six soil samples and PCBs (aroclor-1254 and aroclor-1260) were found at concentrations above EPA's RBCs in both the surface and subsurface soil samples collected at two of the sample locations.

Former Septic Field
Prior to connection with the public sewer system, an on-site septic system was used for sanitary wastes. The septic system's leach field was located in the southwest portion of the facility to the west of the Former Retention Ponds. Six test pits were installed in this area in January 2004 to identify the extent of the leach field laterals and to access soil beneath the laterals for sampling. Soil samples were collected from seven locations directly below the septic system lateral lines and above the water table. Arsenic was detected at concentrations above the PADEP residential direct contact MSC at three of the locations and above the EPA RBC at all seven locations. It is unclear whether the arsenic concentrations detected are significantly above background. A site specific background arsenic concentration will be developed. The PCB, aroclor-1254, was found at three locations at concentrations above the EPA RBC but below State MSCs. Iron and vanadium were also detected in a few of the samples at concentrations above the EPA RBCs but below PADEP MSCs.

Former Forane Storage/Loading Area
The Former Forane Storage/Loading Area is located adjacent to the eastern end of Building B-2 and was used for the storage of refrigerated gases previously manufactured by Atochem at that location including 1,1-dichloro-1-fluoroethane (R141B), 1,1,1,2-tetrafluoroethane (R134A) and chlorodifluoromethane (R22). There were eight ASTs in this area ranging in size from 14,000 to 18,000 gallons. The tanks were removed from the site in July 2001. In the mid-1990s, the ASTs were reportedly sandblasted and repainted. Because of the sandblasting, there was the concern that some residual lead contamination may still exist at this location. Eight soil samples were collected from four boring locations beneath a concrete pad in this area, which was observed to be up to 18 inches thick. The samples were analyzed for VOCs and lead. Lead (1,400 mg/kg) was found in one sample at a concentration greater than the corresponding PADEP MSC.

Building No. B-1
Building No. B-1 was formerly used for administrative offices and laboratory facilities. Visual inspection of this building identified several sinks and floor drains in the laboratory space as well as a sump located in

the compressor room of the building. A total of less than 30 gallons of accumulated sludge was removed from the compressor room sump in December 2003. Following this removal dye tests were conducted at each of the five existing floor drains to confirm the hydraulic connection between the drains and the compressor room sump. Results of the testing confirmed the hydraulic connection. Further dye testing confirmed that the sump contents are discharged to the on-site wastewater treatment plant. Since the floor drains and sump are hydraulically connected to the treatment plant, there is no need for further investigation at this AOC.

Building Nos. B-2 and B-3
Building Nos. B-2 and B-3 actually comprise one large structure and were historically used as the main batch processing and manufacturing area for the site. Two sumps (North and South) are located within Building B-3 and a third sump (Dry Blends Sump) is located outside Building B-2 near its western corner. The sumps, which are now connected to the on-site wastewater treatment plant, were once used for the collection of process wastewater, and historically discharged wastewater to either the Infiltration Ditch or the Former Retention Ponds. The North and South Sumps within Building B-3 are currently used to pump groundwater that seeps into the basement to the on-site wastewater treatment plant (WWTP). Roughly one million gallons of water are pumped from these every quarter. The Dry Blends sump located outside the building has not contained water since the manufacturing process ceased at the plant. Sludge removed from the three sumps at the time that the plant was decommissioned failed the Toxicity Characteristic Leaching Procedure (TCLP) for TCE and PCE and subsequently was shipped off-site as a hazardous waste.

The soils around the perimeter of Building Nos. 2 and 3 were characterized in January 2004 with the installation of eleven soil borings. Some of the boring locations were biased based on historical information indicating releases had occurred. Two soil borings were installed in an area where Triton (a surfactant primarily composed of alcohol) had reportedly routinely been discharged to the ground surface. Two soil borings were installed in separate areas to the west and south of Building Nos. B-2/B-3 where caustic rinsewaters were historically discharged. The rest of the borings were installed at representative locations around the perimeter of the buildings.

Two soil samples (surface and subsurface) were collected from each of the borings, except in the Triton Area, where only surface soil samples were collected (see below). The samples collected from the Triton Area did not exhibit any contaminant concentrations above EPA RBCs or PADEP MSCs. The surface soil sample collected at one of the two caustic discharge locations was found to contain benzo(a)pyrene and arsenic above the corresponding PADEP residential direct contact MSCs. Four of the surface soil samples and one subsurface soil sample around the buildings contained PAHs at concentrations above EPA's RBCs. PCBs (aroclor-1254 and aroclor-1260) were also found at three sample locations at concentrations above the EPA RBCs and at one location above the State residential direct contact MSC (aroclor-1260 at sample location B2/3-SS-5 located on the east side of Building B-3).

Canal
The canal, located on the northeastern portion of the site, was used for constructing ships in the early 1900s. The canal is approximately 60 feet wide and 800 feet long and discharges into the Delaware River. The canal receives surface water runoff from the site and offsite locations and is tidally influenced, reportedly totally emptying out during low tides. The canal sediments were characterized in a September 2002 sampling event. The analytical results of that sampling event are discussed in the Sediment section below.

Potential "Hot Spot" Areas
Historical groundwater data has indicated the presence of elevated concentrations of vinyl chloride and PCE in samples collected from well nos. MW-4 (east of the Former Retention Ponds) and MW-7 (south of Building B-5). To determine whether there was a source for this contamination in the soils in the vicinity of those wells, surface and subsurface soil samples were collected from the borings drilled during the

installation of new wells MW-4D and MW-10. MW-4D was installed adjacent to MW-4 and MW-10 was installed approximately 60 feet south of MW-7. While no contaminants were detected above EPA RBCs or PADEP MSCs at the MW-4D location, PCE (33 mg/kg) was detected in the surface soil sample collected at the MW-10 location at a concentration above both the EPA RBC and the PADEP residential soil to groundwater MSC.

Surface Water:
Stormwater runoff from the site and groundwater beneath the site discharge directly into the Delaware River or into the canal located in the northeastern portion of the site. The canal and river also receive stormwater and groundwater from off-site sources and the canal itself, being tidally influenced, receives water from the Delaware River as well. Therefore, it is difficult to attribute any contamination found in these water bodies solely to a particular former facility related operation. The Delaware River is used as a source of drinking water by the Philadelphia Water Department (PWD) at its Samuel Baxter Water Treatment Plant located approximately 3.5 miles downstream of the facility. This treatment plant provides drinking water to roughly 60% of the residents of Philadelphia as well as some Lower Bucks County residents.

Surface water in the canal was characterized through the collection of five samples in January 2004. While laboratory estimated concentrations of several VOCs including TCE, PCE and 1,1-DCE were detected primarily in the two most upstream samples, none of the contaminants were detected above EPA's maximum contaminant levels (MCLs). TCE and PCE were detected at concentrations greater than EPA's tap water RBCs but below PADEP's Surface Water Criteria for Human Health (SWCHH) at the two most upstream sample locations. The only contaminants detected at concentrations greater than the PADEP SWCHH in the canal water were zinc and bis-(2-ethylhexyl)phthalate. The bis-(2-ethylhexyl)phthalate detection is most likely due to laboratory contamination as the field blank associated with the surface water sampling event also contained this contaminant at a similar concentration. Zinc has not been identified as a contaminant of concern at the site as a result of the extensive amount of environmental sampling that has occurred so it's presence in the canal is not likely attributable to historical site activities.

Although surface water samples have not been collected from the Delaware River along the shoreline of the facility property, the trace concentrations of VOCs found in groundwater samples from wells along the shoreline are not believed to have an impact on the Delaware River. Preliminary modeling using the SWLOAD5 and PENTOXSD models indicate that even the maximum concentrations of all contaminants detected in groundwater historically at the site would not cause an exceedance of any applicable surface water criteria in the Delaware River.

Sediment:
To assess sediment quality at the site, five sediment samples were collected from the canal in September 2002. Several VOCs, PAHs, pesticides, a PCB (aroclor-1254), and inorganic constituents were detected in the sediment samples. The analytical results were compared to the EPA residential soil RBCs multiplied by a factor of 10, the current practice being utilized by EPA Region III for screening purposes for human health direct contact. No contaminants in any of the sediment samples were detected at a concentration above the modified residential soil RBCs. While it appears that the observed contaminants do not pose an unacceptable risk to human health, several analytes were detected at concentrations that may pose an ecological risk that will have to be further investigated. Sediment quality along the shoreline of the Delaware River has not been physically characterized but is not expected to be impacted to a greater extent than the canal sediments.

Air (indoor)

Several contaminants of indoor air quality concern have been detected in soil and groundwater samples collected at the site. A contractor for the Bucks County Redevelopment Authority completed an initial study of the potential exposure to indoor air contamination in May 2004 as part of a Remedial Investigation/Risk Assessment Report. The study used the procedures contained in PADEP's "Vapor Intrusion into Buildings from Groundwater and Soil under the Act 2 Statewide Health Standard," a final document dated January 24, 2004.

For the vapor intrusion evaluation for soil, the contractor assumed a residential exposure scenario and conservatively used the maximum historical concentration of VOCs and SVOCs detected in soil samples collected at the site. Site specific modeling using the EPA approved Johnson & Ettinger Model was used for all constituents that had maximum concentrations above the PADEP residential soil to groundwater used aquifer MSC and below that MSC but above the PADEP Default Residential Volatilization to Indoor Air Screening Value contained in Table 4 of the State Guidance. The results of the site specific modeling indicated that the following soil contaminants could pose an unacceptable indoor air vapor intrusion risk to human health: benzene, 1,1-dichloroethane, trans-1,2-dichloroethylene, cis-1,2-dichloroethylene, 1,3-dichloropropene, ethylbenzene, PCE, vinyl chloride and xylenes (total).

For the vapor intrusion evaluation for groundwater, the contractor assumed a residential exposure scenario and conservatively used the maximum historical concentration of VOCs and SVOCs detected in groundwater samples collected at the site. All of the compounds with maximum concentrations below the PADEP residential used aquifer MSCs were screened out of the vapor intrusion pathway as the maximum concentrations were also found to be below the PADEP Default Nonresidential Volatilization to Indoor Air Screening Values contained in Table 1 of the State Guidance. For those contaminants with maximum concentrations greater than the PADEP residential used aquifer MSCs, site specific modeling using the Johnson & Ettinger Model was employed. The results of the site specific modeling indicated that the following groundwater contaminants could pose an unacceptable indoor air vapor intrusion risk to human health: cis-1,2-dichloroethylene, PCE, TCE, and vinyl chloride.

Air (Outdoor)

A release of contaminants from source areas to the air above a risk-based level is not suspected. The concentrations of VOCs observed at the site do not warrant a concern for a release to the atmosphere.

Ref.: Report of Remedial Investigation Activities, Former Retention Ponds, Elf Atochem North America, prepared by McLaren/Hart Environmental Engineering Corp., August 22, 1996; Interim Report of Site Characterization Program at the Elf Atochem North America, Inc. Cornwells Heights Facility, prepared by McLaren/Hart, Inc., November 25, 1998; Act 2 Plus Remedial Investigation/Risk Assessment Work Plan, Former Elf Atochem North America, Inc. Facility, prepared by Environmental Resources Management, October 1, 2001; Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils, USEPA, November 2002; Results for Atofina Phase II Environmental Site Characterization, prepared by Gilmore & Associates, Inc., March 31, 2003; Act 2 Plus Remedial Investigation/Site Characterization Work Plan, Former Elf Atochem North America Facility, prepared by Penn E&R, June 16, 2003; Land Recycling Program Technical Guidance Manual - Section IV.A.4. Vapor Intrusion into Buildings from Groundwater and Soil under the Act 2 Statewide Health Standard, January 24, 2004; Remedial Investigation/Risk Assessment Report for the Property Located at 2375 State Road, Cornwell Heights, Bucks County, PA, prepared by Penn E&R, May 13, 2004.

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	Trespassers	Recreation	Food[3]
Groundwater	No	No	No	No			No
Air (indoors)	No	No	No				
Soil (surface, e.g., <2 ft)	No	No	No	No	No	No	No
~~Surface Water~~	____	____			____	____	____
~~Sediment~~	____	____			____	____	____
Soil (subsurface e.g., >2 ft)				No			No
~~Air (outdoors)~~	____	____	____	____	____		

Instructions 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 ("___"). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

X	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).
_____	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 and Reference(s):

See Following Pages

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

Groundwater
As described in the rationale for Question No. 2 above, several VOCs, PCBs, and a few inorganic constituents have been detected at elevated concentrations in various groundwater sampling events that have occurred at the facility over the past 19 years. The most common contaminants observed in the groundwater include chlorinated solvents such as TCE, PCE, DCE and vinyl chloride and the greatest concentrations of these contaminants are focused in the central portion of the site between the Former Retention Ponds, Building B-3 and Building B-5.

There are currently no workers at the site. There are no known groundwater springs located on the site property. While there are many monitoring wells on the site property, production wells were never used to supply water to any of the manufacturing processes that historically operated at the plant and no potable wells were ever installed on the property. Any workers involved with further site characterization, remediation or construction will be properly trained and equipped to prevent potential exposures to contaminated groundwater.

The site and surrounding community obtain their drinking water from Aqua America, the local municipal water supply system, which obtains a majority of its supply from a Philadelphia Water Department surface water intake on the Delaware River located 3.5 miles downstream of the site. A well search conducted by a contractor for BCRA in April 2004 identified five wells in New Jersey and 40 wells in Pennsylvania within a 1.0-mile radius of the site. The wells in New Jersey all were found to tap into the Potomac Raritan Magothy Aquifer System which is not hydraulically connected to the aquifers beneath the site. Of the 40 wells identified in Pennsylvania, 21 have been listed as destroyed and 12 have been listed as unused. The status of the remaining seven wells is unclear. A contractor for EPA is currently attempting to clarify the status of those wells and is performing a more extensive well search within 2,500 feet of the site in Pennsylvania. Nevertheless, it appears that due to the site's location on the Delaware River and the groundwater flow direction towards the river and canal, all of the identified wells will likely be determined to be hydraulically upgradient or cross-gradient from the site.

It is also highly unlikely that any site-related groundwater contamination that is discharged into the river or canal will have any impact of the surface water intake located 3.5 miles downstream of the site property. Preliminary modeling using the SWLOAD5 and PENTOXSD models indicate that the discharge to surface water of even the maximum concentrations of all contaminants detected in groundwater historically at the site would not cause an exceedance of any applicable surface water criteria in the Delaware River.

Surface and Subsurface Soil:
As described in the rationale for Question No. 2 above, there are many AOCs that currently contain contaminants at concentrations above risk based levels or promulgated standards. Unlike the groundwater results, chlorinated solvents were not frequently detected above the screening criteria in the surface and subsurface soil samples. The most common contaminants encountered in the site soils were certain PAHs, PCBs and arsenic, although much of the observed arsenic contamination may not be significantly above the local background arsenic concentration.

There are currently no workers at the site. Any workers involved with further site characterization, remediation or construction will be properly trained and equipped to ensure that the soil exposure pathway remains incomplete or that the exposure risks are minimized to acceptable levels.

There is no evidence to support that site-related activities ever resulted in the contamination of any off-site soils. This eliminates the resident, day care and food human receptors from the list of potential complete soil exposure pathways. Furthermore, no known recreational activities occur onsite and access to the site property is restricted by a chain link fence which surrounds the site except along the Delaware River, thereby limiting the potential for trespassers to gain access to the property.

As mentioned earlier in this document, BRLP is planning to redevelop this site into residential and commercial property. As such, BRLP is committed to ensuring that the site meets all of EPA and PADEP's residential health based requirements. This will generally be accomplished through removal actions at several locations where soil contamination has been observed. It is the goal of both EPA and BRLP to ensure that the soil exposure pathway remains an incomplete pathway.

Air (indoor)

As described in the rationale for Question 2 above, through site specific modeling, at least nine VOCs in soils and four VOCs in groundwater pose a potential problem for vapor intrusion into buildings on the site property. However, both the PADEP January 24, 2004 Vapor Intrusion Guidance Manual and the EPA November 29, 2002 Vapor Intrusion Draft Guidance screen out sites that do not contain inhabited buildings located near (100 feet) subsurface contaminants of indoor air concern. As previously discussed, there are currently no workers on the site or within any of its five buildings. The structures will eventually be demolished as part of the redevelopment activities.

The only remaining issue is the potential for off-site groundwater contamination migration to impact the indoor air quality of neighboring properties. The only neighboring property within 100 feet of an area of known or suspected groundwater contamination is northeast of the site. This property is physically separated from the facility property and the groundwater contamination seen in well TW-10 (PCE - 200 ug/L, TCE - 1 ug/l) by the on-site canal. The contaminated groundwater in the vicinity of well TW-10 discharges directly into the canal, which serves in effect as a barrier that prevents further groundwater migration to the neighboring property. Therefore, an indoor air vapor intrusion impact to the building(s) on the property located northeast of the site is not suspected.

BRLP is planning to collect several soil gas samples to further characterize the potential for indoor air vapor intrusion at the site. Actual data will provide a clearer picture of the magnitude of the indoor air quality issues. BRLP had stated that all future construction at the site will be designed to ensure that the indoor air exposure pathway will not be complete. All structures will be slab-on-grade (no basements) with some type of a geosynthetic fabric that will intercept any organic vapors beneath the buildings.

Ref.: Report of Remedial Investigation Activities, Former Retention Ponds, Elf Atochem North America, prepared by McLaren/Hart Environmental Engineering Corp., August 22, 1996; Interim Report of Site Characterization Program at the Elf Atochem North America, Inc. Cornwells Heights Facility, prepared by McLaren/Hart, Inc., November 25, 1998; Act 2 Plus Remedial Investigation/Risk Assessment Work Plan, Former Elf Atochem North America, Inc. Facility, prepared by Environmental Resources Management, October 1, 2001; Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils, USEPA, November 2002; Results for Atofina Phase II Environmental Site Characterization, prepared by Gilmore & Associates, Inc., March 31, 2003; Act 2 Plus Remedial Investigation/Site Characterization Work Plan, Former Elf Atochem North America Facility, prepared by Penn E&R, June 16, 2003; Land Recycling Program Technical Guidance Manual - Section IV.A.4. Vapor Intrusion into Buildings from Groundwater and Soil under the Act 2 Statewide Health Standard, January 24, 2004; Remedial Investigation/Risk Assessment Report for the Property Located at 2375 State Road, Cornwell Heights, Bucks County, PA, prepared by Penn E&R, May 13, 2004.

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)?

_____ If no (exposures can not 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 and Reference(s):

[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.

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 and Reference(s):

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 **Bensalem Redevelopment L.P. (Formerly Elf Atochem North America)** facility, EPA ID #**PAD002290823**, located at **2375 State Road, Cornwells Heights, Bensalem Township, PA** 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 _____/s/_____ Date: 8/13/04
Andrew Clibanoff
RCRA Project Manager

Supervisor _____/s/_____ Date: 8/13/04
Paul Gotthold
PA Operations Branch Chief
EPA, Region 3

Locations where References may be found: Facility RCRA Project File
EPA, Region 3
1650 Arch Street
Philadelphia, PA 19103-2029

Contact telephone and e-mail numbers:

(name)	Andrew Clibanoff
(phone #)	215-814-3391
(e-mail)	clibanoff.andrew@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.