

**DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION**  
Interim Final 2/5/99  
**RCRA Corrective Action**  
**Environmental Indicator (EI) RCRIS code (CA750)**  
**Migration of Contaminated Groundwater 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 the groundwater media, 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 "Migration of Contaminated Groundwater Under Control" EI**

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

**Relationship of EI to Final Remedies**

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

**Duration / Applicability of EI Determinations**

EI 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).

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**Facility History**

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 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 organic compounds 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 its RCRA Corrective Action obligations will be met.

BRLP recently completed a cleanup at the site which included the excavation and disposal of approximately 44,000 tons of soils contaminated with chlorinated organic compounds, polycyclic aromatic hydro-carbons (PAHs), polychlorinated biphenyls (PCBs), pesticides and arsenic. All soils at the site that exhibited contaminant concentrations greater than PADEP's Act 2 Residential Medium Specific Concentrations (MSCs) have been removed from the site.

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

- ✓ If yes - continue after identifying key contaminants, citing appropriate “levels,” and referencing supporting documentation.  
If no - skip to #8 and enter “YE” status code, after citing appropriate “levels,” and referencing supporting documentation to demonstrate that groundwater is not “contaminated.”  
If unknown - skip to #8 and enter “IN” status code.

**Rationale and Reference(s):**

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 Delaware River. Depths to competent bedrock range from approximately 10 to 14 feet below the ground surface (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. The Canal, a man-made extension of the Delaware River measuring approximately 800 feet long by 60 feet wide, was installed in the early 1900s. The Canal empties and fills during the day with the Delaware River, which is tidally influenced. Groundwater flow direction in the bedrock aquifer is towards the Delaware River and is not likely influenced by the Canal. Before the cleanup, the pumping of two sumps located within Building B-3 may have affected the natural groundwater flow gradient, possibly drawing water from beneath the Former Retention Ponds away from the Delaware River and towards Building B-3. These pumps were removed with the demolition of Building B-3 in the winter of 2007 and the natural groundwater flow gradient is expected to have returned.

There have been several groundwater investigations at the facility since 1985. The first four monitoring wells were installed as part of an investigation of the retention pond area in 1985. The sampling results indicated the presence of trichloroethylene (TCE), tetrachloroethylene (PCE), methylene chloride, trans-1,2-dichloroethylene (trans-1,2-DCE), and toluene in a well located downgradient of the retention ponds.

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

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Between January 1997 and March 1998, five new monitoring wells and three replacement wells were installed at the site. In February 1997, monitoring well MW-4 (formerly MW-4R), was sampled for target compound list (TCL) volatile organic compounds (VOCs). PCE (1,210 ug/l), 1,1-DCE (32 ug/l), TCE (577 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 but 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), as well as nickel (254 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.

Five new monitoring wells and eleven new temporary monitoring wells were installed as part of the 2004 Remedial Investigation. Eleven existing wells were chosen in addition to the new wells (27 wells total) to comprise the 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. 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.

A second round of sampling at the 27 monitoring wells was completed in May 2004. The May 2004 groundwater sampling results again indicate the highest concentrations of chlorinated solvents (PCE (620 ug/l), TCE (330 ug/l), cis-1,2-dichloroethylene (1,900 ug/l), 1,1-DCE (14 ug/l) and vinyl chloride (1,000 ug/l)) were detected in MW-4D. Monitoring well MW-4 was also found to contain chlorinated organics in line with historical sampling data (PCE (23 ug/l), TCE (71 ug/l), cis-1,2-DCE (500 ug/l) and vinyl chloride

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(410 ug/l)). The samples collected from the other wells correlated well with the samples collected in December 2003 and February 2004 from the same locations.

The November 2004 Final Characterization included the collection of six grab groundwater samples using a Geoprobe direct push drilling rig. The analytical results associated with the grab groundwater sampling documented that the VOC plumes located northwest of the Retention Ponds and in the vicinity of monitoring well MW-7 near the Canal were separate.

A background well was installed into the saprolite aquifer in September 2006 and sampled for volatile organic compounds in October 2006. The results of this sampling event indicated that no TCL VOCs were detected. Also, in October 2006 a groundwater sample was collected from the former production well, a 198-foot deep well installed into the bedrock aquifer and located within the basement of Building B-2. The following VOCs were detected in the sample collected from the former supply well: PCE (1,000 ug/l), cis-1,2-DCE (17 ug/l), trichlorofluoromethane (11 ug/l) and TCE (490 ug/l). A caliper log of the former production well was completed in December 2006 which indicated potential fractures in the bedrock at four separate depths. Low flow samples were collected at each of the four depths on January 8, 2007.

Maximum VOC concentrations were found in the sample collected at a depth of 192 feet and included PCE (4,500 ug/l) and TCE (390 ug/l).

After documenting the contamination in the former production well, three new bedrock monitoring wells (one upgradient and two downgradient) were installed at the site in January 2007 and were sampled in February 2007. No VOCs were detected in the background well and only trace concentrations below the MSCs of cis-1,2-DCE and 1,1-DCA were found in downgradient well MW-17. The sample collected from downgradient well MW-16 was found to contain elevated concentrations of PCE (220 ug/l) and TCE (59 ug/l).

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; 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; Remedial Investigation/Risk Assessment Report for the Property Located at 2375 State Road, Cornwells Heights, Bucks County, PA, prepared by Penn E&R, May 13, 2004, Final Characterization Report for the Property Located at 2375 State Road, Cornwells Heights, Bucks County, PA, prepared by Penn E&R, November 23, 2004; Statement of Basis for the Former Elf Atochem North America Facility, prepared by EPA, September 13, 2006; Results from the New Monitoring Well (MW-14) and Former Supply Well Sampling, prepared by Penn E&R, November 22, 2006; Results from New Bedrock Monitoring Wells (MW-15, MW-16 and MW-17) and Final Former Production Well Sampling, prepared by Penn E&R, May 16, 2007.

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3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within “existing area of contaminated groundwater”<sup>2</sup> as defined by the monitoring locations designated at the time of this determination)?

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

If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the “existing area of groundwater contamination”<sup>2</sup>) - skip to #8 and enter “NO” status code, after providing an explanation.

If unknown - skip to #8 and enter “IN” status code.

**Rationale and Reference(s):**

Groundwater flow direction in the overburden and saprolite is generally towards the Delaware River or the Canal along the northern site property boundary. Groundwater flow direction in the bedrock aquifer is towards the Delaware River and is not likely influenced by the Canal.

BRLP recently completed a cleanup at the site which included the excavation and disposal of approximately 44,000 tons of soils contaminated with chlorinated organic compounds, polycyclic aromatic hydro-carbons (PAHs), polychlorinated biphenyls (PCBs), pesticides and arsenic. All soils at the site that exhibited contaminant concentrations greater than PADEP's Act 2 Residential Medium Specific Concentrations (MSCs) have been removed from the site. The removal of these sources of contamination assures that groundwater quality beneath the site will not be further impacted by contaminants in the subsurface soils; however, groundwater containing significant concentrations of chlorinated organic compounds is still believed to be discharging into the Canal and Delaware River.

The chlorinated organic plumes located in the central portion of the site in both the overburden and saprolite aquifers have not exhibited much mobility since groundwater investigations began at the site in the mid-1980s. Also, a good degree of natural attenuation has taken place and is expected to continue to occur at these locations, as evidenced by the presence of many of the daughter products of PCE found in those plumes (i.e., TCE, cis-1,2-DCE, vinyl chloride). Therefore, based on the recent history, it appears that these plumes have stabilized and/or are lessening over time.

Although there currently are no on-site structures, BRLP is planning to redevelop the site as a mixed residential/commercial community. Under a Bensalem Township ordinance, any new structures must be supplied drinking water from the local municipal water supply system. It should be noted that while the migration of contaminated water appears to have stabilized at the site, the concentrations of several of the chlorinated VOCs would be indicative of a potential indoor air vapor intrusion problem for on-site

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

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structures. Therefore, engineering controls will be installed on all structures to be built on the redeveloped site that will provide an effective vapor barrier between any remaining VOC contamination in groundwater and the indoor air of those structures. The engineering plans for the controls will be submitted to both EPA and PADEP for approval prior to construction.

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; 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, Final Characterization Report for the Property Located at 2375 State Road, Cornwell Heights, Bucks County, PA, prepared by Penn E&R, November 23, 2004; Statement of Basis for the Former Elf Atochem North America Facility, prepared by EPA, September 13, 2006; Results from the New Monitoring Well (MW-14) and Former Supply Well Sampling, prepared by Penn E&R, November 22, 2006; Results from New Bedrock Monitoring Wells (MW-15, MW-16 and MW-17) and Final Former Production Well Sampling, prepared by Penn E&R, May 16, 2007; Final Report for Site Remediation for the Property Located at 2375 State Road, Cornwell Heights, Bucks County, PA, prepared by Penn E&R, November 7, 2007.

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

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

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

If unknown - skip to #8 and enter “IN” status code.

**Rationale and Reference(s):**

Groundwater in the overburden and saprolite aquifers discharge to the Delaware River along the eastern property boundary or the Canal along the northern site property boundary. Groundwater in the overburden aquifer in the vicinity of former building no. B-5 containing elevated concentrations of PCE does appear to be discharging into the Canal. 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 overburden and saprolite wells located along the Delaware River shoreline. One bedrock well located near the Delaware River, MW-16, contained elevated concentrations of PCE and TCE that may be discharging into the Delaware River.

Ref.: Remedial Investigation/Risk Assessment Report for the Property Located at 2375 State Road, Cornwells Heights, Bucks County, PA, prepared by Penn E&R, May 13, 2004, Final Characterization Report for the Property Located at 2375 State Road, Cornwells Heights, Bucks County, PA, prepared by Penn E&R, November 23, 2004; Statement of Basis for the Former Elf Atochem North America Facility, prepared by EPA, September 13, 2006; Results from the New Monitoring Well (MW-14) and Former Supply Well Sampling, prepared by Penn E&R, November 22, 2006; Results from New Bedrock Monitoring Wells (MW-15, MW-16 and MW-17) and Final Former Production Well Sampling, prepared by Penn E&R, May 16, 2007; Final Report for Site Remediation for the Property Located at 2375 State Road, Cornwells Heights, Bucks County, PA, prepared by Penn E&R, November 7, 2007.

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

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

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

If unknown - enter “IN” status code in #8.

**Rationale and Reference(s):**

The PCE concentration in monitoring well TW-10 adjacent to the Canal was 200 ug/l in a sample collected in February 2004 and 91 ug/l in a sample collected in May 2004. The MCL for PCE is 5 ug/l. PCE was also detected in a sample collected from monitoring well MW-16 along the Delaware River at a concentration of 220 ug/l. The MW-16 groundwater sample also exhibited a TCE concentration of 59 ug/l, which is likewise more than 10 times the MCL concentration for that contaminant (5 ug/l). None of the contaminants detected in the overburden or saprolite wells along the Delaware River shoreline were observed at levels greater than 10 times their respective MCL.

Ref.: Remedial Investigation/Risk Assessment Report for the Property Located at 2375 State Road, Cornwells Heights, Bucks County, PA, prepared by Penn E&R, May 13, 2004, Final Characterization Report for the Property Located at 2375 State Road, Cornwells Heights, Bucks County, PA, prepared by Penn E&R, November 23, 2004; Statement of Basis for the Former Elf Atochem North America Facility, prepared by EPA, September 13, 2006; Results from the New Monitoring Well (MW-14) and Former Supply Well Sampling, prepared by Penn E&R, November 22, 2006; Results from New Bedrock Monitoring Wells (MW-15, MW-16 and MW-17) and Final Former Production Well Sampling, prepared by Penn E&R, May 16, 2007; Final Report for Site Remediation for the Property Located at 2375 State Road, Cornwells Heights, Bucks County, PA, prepared by Penn E&R, November 7, 2007.

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

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6. Can the **discharge** of “contaminated” groundwater into surface water be shown to be “**currently acceptable**” (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented<sup>4</sup>)?

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

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

If unknown - skip to 8 and enter “IN” status code.

**Rationale and Reference(s):**

The May 2004 Remedial Investigation/Risk Assessment assessed the impact of contaminated groundwater discharging from beneath the site into the Delaware River. The SWLOAD5B and PENTOXSD models were used to calculate the maximum average concentration and plume flow for each of the contaminants of concern. As a conservative measure, groundwater concentrations two times higher than the maximum historic concentrations were utilized as input data into the models. In addition, the maximum on-site groundwater concentrations occur in the central portion of the site and are at least an order of magnitude greater than the contaminant concentrations observed in groundwater samples collected along the Canal or Delaware River. The output of the models indicate that even at those conservative contaminant concentrations, the surface water criteria for the Delaware River would not be exceeded due to the discharge of groundwater from beneath the site.

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

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

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7. Will groundwater **monitoring** / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the “existing area of contaminated groundwater?”
- ✓ If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the “existing area of groundwater contamination.”

If no - enter “NO” status code in #8.

If unknown - enter “IN” status code in #8.

**Rationale and Reference(s):**

A long term groundwater monitoring program has been developed and will begin immediately after site development has been completed. The groundwater monitoring program will be comprised of the eight (8) existing wells located along the Canal and Delaware River: MW-2D, MW-2S, MW-11D, MW-12D, TW-6, TW-7, TW-10 and TW-11. The monitoring frequency will be quarterly sampling for the first year following site redevelopment, biannual sampling for the second year and one final round of groundwater sampling at the end of the third year. The groundwater samples will be analyzed for PCE, TCE, vinyl chloride, beryllium, cadmium, lead, nickel and thallium and the analytical results will be compared to the PADEP Act 2 residential, non-use aquifer MSCs. Groundwater monitoring will continue for those contaminants, if any, that continue to exceed the above MSCs at the end of the three-year period.

Ref.: Statement of Basis for the Former Elf Atochem North America Facility, prepared by EPA, September 13, 2006; Final Report for Site Remediation for the Property Located at 2375 State Road, Cornwells Heights, Bucks County, PA, prepared by Penn E&R, November 7, 2007.

**Migration of Contaminated Groundwater Under Control  
Environmental Indicator (EI) RCRIS code (CA750)**

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

- ✓ YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the **Bensalem Redevelopment, L.P. (Former Elf Atochem North America)** facility, EPA ID # **PAD002290823**, located at **2375 State Road, Cornwells Heights, PA 19020**. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

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

\_\_\_\_\_ IN - More information is needed to make a determination.

Completed by    (signature) \_\_\_\_\_ Date 1/09/08  
                          (print)     Andrew Clibanoff  
                          (title)     RCRA Project Manager

Supervisor        (signature) \_\_\_\_\_ Date \_\_\_\_\_  
                          (print)     Paul Gotthold  
                          (title)     Chief, PA Operations Branch  
                          (EPA Region or State) \_\_\_\_\_

**Locations where References may be found:**

US Environmental Protection Agency, Region III  
1650 Arch Street  
Philadelphia, PA 19103-2029  
Waste and Chemicals Management Division

**Contact telephone and e-mail numbers:**

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