DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

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

Facility Name: **Beazer East, Inc. Site (Formerly Koppers Company, Inc.)**
Facility Address: **Maritime and Tyler Streets, Port Newark, Essex County, New Jersey**
Facility EPA ID#: **NJD000542282**

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) to track changes in the quality of the environment. The two EIs developed to date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

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

Duration / Applicability of EI Determinations

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

Facility Information

The Beazer East, Inc. (Beazer) site, located in the city of Newark, New Jersey, is approximately eight acres in size. It is located between the Port Newark Channel to the north, and Elizabeth Channel to the south, both of which are connected to Newark Bay. The site is bounded by Maritime Street on the west and the former Weyerhauser facility to the north. An active rail line is located south of the site just north

of Tyler Street. In addition, an inactive rail line is located east of the site, adjacent to the New Jersey Port Authority. The land use in this area is primarily industrial with limited commercial use.

The American Lumber and Treating Company operated the facility from 1940 until 1954. In 1954, the wood treating facility was transferred to Koppers Company, Inc. (Koppers). The facility treated wood poles with creosote or chromated copper arsenate (CCA) from 1940 until operations ceased in 1991. All former wood treating structures have been demolished and removed, and the property is currently paved, fenced, and vacant. The site is slated for future use as a container (cargo) storage facility.

Koppers submitted a RCRA Part A (NJD000542282) application in 1980 for storing hazardous waste at its container (cargo) storage facility. In 1988, Koppers merged with BNS, Inc. (BNS), the parent company of Beazer. Due to the merger, the New Jersey Department of Environmental Protection (NJDEP) issued an administrative consent order (ACO) to both Koppers and BNS in June 1988 under Industrial Site Recovery Act [ISRA] Case #88286 and pursuant to the NJ Environmental Cleanup and Responsibility Act (ECRA). This ACO required delineation and remediation of contamination related to facility activities. Investigations performed at the site to date include a Preliminary Assessment (PA) (July 1989), an ECRA Site Assessment (April 1990), a Remedial Investigation (RI) (May 1993) which presented results of investigations completed pursuant to the June 1990 Groundwater Quality and RI Phase II Sampling Plans, a Phase III RI (May 1995), and the Supplemental RI (January 1998). A Remedial Action Work Plan (RAWP) for the site was submitted in March 1999 and conditionally approved by NJDEP in July 1999. Three addenda to the RAWP were subsequently submitted to address NJDEP and USEPA comments and concerns.

As indicated in the Remedial Action Report (RAR) from August 2002, remedial activities were initiated in November 2000, and construction was complete in June 2002. Remedial actions implemented at the Beazer site include:

- Installation of monitoring wells on and off site
- Demolition of on-site structures and removal of subsurface obstructions (e.g., building foundations, process piping, wood pilings) that could act as pathways of contaminant migration
- Excavation of off-site impacted soils
- In-situ stabilization of shallow and deep source area soil (both on and off site), and stabilization of the top two feet of soil across the entire site area, with a cement and soil mixture approved by NJDEP following treatability testing in September 1997 and May 2000
- Installation of an asphalt cover system and security fencing over/around the entire property
- Installation and start-up of a pilot study recovery well system to capture and remove dense nonaqueous phase liquid (DNAPL) from the groundwater
- Implementation of a monitoring program for groundwater impacted by dissolved phase contamination.

Quarterly groundwater monitoring and free product recovery operations under the pilot study are ongoing at this time, and the pilot study operations may be expanded if necessary for full scale site remediation. A Classification Exception Area/Well Restriction Area (CEA/WRA) was established in 1999 to outline the area of groundwater impacted by site-related contamination and prevent future exposure. A deed notice outlining the residual soil contamination at the site above the New Jersey Residential Direct Contact Soil Cleanup Criteria (NJ RDCSCC) was also submitted to NJDEP in draft form as part of the RAWP. Formal execution of the deed notice by the current site owner (the City of Newark) is pending.

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 #8 and enter "IN" (more information needed) status code.

Summary of Historical Operations and AOCs: The operational areas associated with the former wood treating facility included an office building, process treatment building, foam house, boiler house, lumber storage area, drip track, non-hazardous process waste containment area, non-hazardous storage pad, and aboveground creosote tank farm. The locations of these operational areas are shown in Figure 1-2 of the RAWP (Ref. 3). In addition to the operational areas, four waste management areas were identified in the Final Draft PA Report (Ref. 1). Former waste management areas at the Beazer site included a container storage facility, truck unloading area, unlined dike, and a CCA Tank Farm. Each of these areas is described below.

Container Storage Area (TSD Facility): The container storage area was located in the northern portion of the former wood treatment facility adjacent to the lumber storage area. This area was used to store K001, D004, and D007 hazardous waste in 55-gallon drums. A RCRA Part A permit application was initially submitted to EPA on November 12, 1980 for this area, and resubmitted on March 9, 1981 (Ref. 1). A RCRA closure plan was submitted and approved by NJDEP for this area in 1988 and 1989, respectively. According to the available file materials, this area was closed in 1991 (Ref. 2). Available documentation does not indicate when this area was clean closed or if the closure was approved. Despite the lack of historic information, any residual contamination in this area would have been addressed in subsequent site-wide investigations and remedial activities (e.g., surface soil stabilization and asphalt capping).

Truck Unloading Area: The exact location of this area is not documented in the available file materials. The truck unloading area was used to unload wood poles. NJDEP noted spills in this area during a 1986 site inspection. The magnitude of such spills was not documented, but soil in and around the unloading area is suspected to have been contaminated with CCA and/or creosote (Ref. 1). Additional information regarding the truck unloading area was not available in the file materials. Despite the lack of historic information, any residual contamination in this area would have been addressed in subsequent site-wide investigations and remedial activities (e.g., surface soil stabilization and asphalt capping).

Unlined Dike Area: The exact location of this area is not documented in available file materials. NJDEP gave a Notice of Violation to Koppers on September 29, 1986 for discharging creosote and/or CCA to the unlined dikes (Ref. 1). Additional historical information regarding the dikes is not available in the file materials. Despite the lack of historic information, any residual contamination in this area would have been addressed in subsequent site-wide investigations and remedial activities (e.g., surface soil stabilization and asphalt capping).

CCA Tank Farm: This area was located in the southwestern portion of the former wood treatment facility adjacent to the former process treatment building. During a 1986 site inspection, NJDEP observed stained soil (Ref. 1), potentially due to operational losses and/or spills, in this area. Removal and remediation of the tank farm was initiated in 1986 (Ref. 1). Available file materials do not indicate when the cleanup activities were completed in this area. Despite the lack of historic information, any residual contamination in this area would have been addressed in subsequent site-wide investigations and remedial activities (e.g., surface soil stabilization and asphalt capping).

Both the operational and waste management areas at the site are believed to have historically contributed to site-wide soil and groundwater contamination. To facilitate comprehensive assessment of environmental conditions however, historic investigations of the site (e.g., the phased RI effort and the recent Supplemental RI) were performed on a site-wide basis. Consequently, identified environmental impacts are not easily associated with specific former operational or waste management areas in the available documentation. (For this reason, residual contamination will be differentiated in this EI only by its location on or off site.) All buildings and operational areas at the site have been demolished, and none of the former waste management areas remain in place. Soil contamination at the site has been addressed via stabilization, and the entire site is now paved with asphalt.

In addition to the operational and waste management areas discussed above, groundwater has been identified as an area of concern (AOC) for the Beazer site. Two water-bearing hydrostratigraphic units are present beneath the site: a shallow fill unit and a deeper glacial sand unit. These groundwater units are separated by a continuous layer of organic clay and peat, and are not hydraulically connected (Ref. 3). Arsenic, semi-volatile organic compounds (SVOCs), and volatile organic compounds (VOCs) have historically been detected in both groundwater units above the New Jersey Ground Water Quality Criteria (NJ GWQC) for Class II-A potable groundwater. In addition, DNAPL comprised of free product creosote has been detected in the shallow fill and glacial sand units both on and off site. As required by the approved RAWP, an ongoing quarterly groundwater monitoring program is in place to evaluate concentration trends and monitor migration of dissolved phase contamination (Ref. 7). To address dissolved phase and DNAPL contamination in the shallow fill unit, Beazer has stabilized soil down to the clay peat layer (approximately 10-15 feet below the ground surface [bgs]). In areas where stabilization was not technically feasible (e.g., areas immediately surrounding the active railroad tracks), the facility implemented a monitored natural attenuation program as the remedy for shallow fill groundwater (Ref. 7). A DNAPL recovery well system has also recently been installed to monitor and remove DNAPL in the glacial sand unit (Ref. 7). Impacted groundwater is being actively remediated and monitored at this time.

References:

1. Final Draft Preliminary Assessment. Prepared by NUS Corporation. Dated July 21, 1989.
2. USEPA Fact Sheet. Dated October 1998.
3. Remedial Action Workplan. Prepared by Key Environmental, Inc. Dated March 1999.
4. DNAPL Delineation Report. Prepared by Key Environmental, Inc. Dated May 2000.
5. Baseline Groundwater Sampling Report. Prepared by Key Environmental, Inc. Dated April 27, 2001.
6. Letter from Mitchell Brourman, Beazer East, Inc. to Barry Tornick, USEPA, re: Beazer East, Inc. Dated January 10, 2002.

7. Remedial Action Report. Prepared by Key Environmental, Inc. Dated August 2002.

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

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

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

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

Rationale:

Hydrogeological Conditions and Groundwater Movement

The Beazer site is located within the Hackensack Meadows tidal marshland region of the New Jersey Lowlands section of the Piedmont physiographic province (Ref. 1). Hydrogeologic characteristics specific to the Beazer site have been identified to a depth of approximately 80 feet bgs, as shown in Table 1 below and discussed in Ref. 1. These geological features appear to be generally uniform across the site and in adjacent off-site areas.

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

Table 1 - Site-Specific Hydrogeological Detail

Depth	Description	Groundwater
0-10 ft bgs	Heterogeneous fill consisting of sand, gravel, and lesser amounts of brick, cinders, ballast, and wood chips. Believed to be associated with placement of dredge and fill during construction of the Port Authority Marine Terminals.	Shallow fill unit
10-20 ft bgs	Clay with some organic, fibrous peat material observed between 10 and approximately 15 feet bgs. The vertical permeability of this layer ranges between $4.0x10^{-6}$ and $6.5x10^{-8}$ centimeters per second (cm/sec). Based on these low permeability values, the clay and peat layer (which is present continuously across the site) is believed to act as an aquitard to potential migration of contamination from the fill unit to deeper zones.	None
20-40 ft bgs	Glacial sand, medium to fine grained, with some clayey silt and occasional lenses of clay, especially in the lower portions of this layer.	Glacial sand unit
40-65 ft bgs	Varved clay consisting of silty clay and traces of fine sand. In combination with low permeability clay lenses in the overlying unit, this layer is expected to serve as a basal confining unit for DNAPL or dissolved phase contamination in the glacial sand unit (Ref. 3).	None
65-80 ft bgs	Glacial sand and till consisting of coarse to fine grained sand, silty clay, and traces of fine gravel.	None
>80 ft bgs	Bedrock – red brown siltstone.	Unknown

As indicated in Table 1, two water-bearing hydrostratigraphic units are present beneath the site: a shallow fill unit and a deeper glacial sand unit. These groundwater zones are not hydraulically connected (Ref. 2). Horizontal flow of groundwater has been evaluated using water level elevation measurements from across the site. Prior to remedial operations at the site, a potentiometric mound had been identified in the shallow fill unit, trending from southeast to northwest across the site (see Figure 2 from Ref. 5). The presence of this mound historically caused shallow groundwater beneath the northern portion of the site to flow north toward and into the Port Newark Channel, and groundwater beneath the southern portion of the site to flow south-southwest toward and into the Elizabeth Channel. After shallow soil was stabilized and capped as part of the approved remedial action, shallow groundwater flow direction shifted, and is now predominantly westward over a majority of the site, with a component of flow to the north in the northeast portion of the site (Ref. 7). Hydraulic gradient values for groundwater in the shallow fill unit range from 0.0031 to 0.0059 feet per foot (ft/ft), corresponding to an average seepage velocity of 5.98 feet per year (Ref. 9). Although the groundwater flow direction has been altered due to on-site remedial activities, these changes are localized by nature, and no shallow groundwater production wells have been identified in the area surrounding the site which would further pull groundwater away from the tidal zones. Consequently, shallow groundwater is still expected to flow regionally toward the Port Newark and Elizabeth Channels. Groundwater flow in the deeper glacial sand unit beneath the Beazer site has historically been and remains relatively flat but generally northward (Refs. 5 and 7). Hydraulic gradient values for groundwater in the glacial sand range from 0.00028 to 0.00039 ft/ft, corresponding to an average seepage velocity of only 0.09 feet per year (Ref. 9).

Vertical movement of groundwater beneath the Beazer site and adjacent off-site areas is limited by low permeability geological features. The shallow fill and deeper glacial sand groundwater zones are separated by a ten-foot thick continuous layer of organic clay and peat (Ref. 1). As indicated in Table 1 and the Supplemental RI Report (Ref. 1), the permeability of this layer ranges from $4.0x10^{-6}$ to $6.5x10^{-8}$ cm/sec. Downward migration of groundwater and associated contamination would therefore be minimal under natural conditions. However, manmade structures (e.g., wood pilings, building foundations) penetrated the clay and peat layer and presented a pathway for downward migration of dissolved phase and DNAPL contamination from the shallow fill unit to the deeper glacial sand layer. As part of the approved remedial action, these subsurface structures were removed, surrounding soil was stabilized with concrete, and pathways for vertical migration were thereby eliminated (Ref. 8). Consequently, continued vertical migration of impacted groundwater from the shallow fill unit is not expected. Vertical migration of impacted groundwater and DNAPL already in the deeper groundwater has been delineated and appears to be limited by intermittent lenses of clay observed in lower sections of the glacial sand layer and the underlying 15-foot thick layer of varved clay (Refs. 3 and 4), as well as the overall affinity exhibited by DNAPLs for small pore spaces.

Dissolved Phase Groundwater Contamination

Groundwater beneath the Beazer site and adjacent off-site areas has historically been impacted by VOCs, SVOCs, and arsenic. Exceedances of applicable NJ GWQCs have been reported in both shallow fill and glacial sand groundwater units.

Arsenic, VOC, and SVOC contamination was reported above applicable NJ GWQC during a baseline groundwater sampling event conducted in September 2000 (Ref. 5). Exceedances were reported in both shallow fill and glacial sand units, but the areal extent of contamination was limited. Arsenic appears to be the most widespread constituent of concern in both the shallow fill and glacial sand groundwater, with the highest concentrations measured in the eastern portion of the site (within approximately 40 feet of the railroad tracks) at shallow well MW-10A and deep well MW-10B. Benzene, xylene, and several SVOCs were also detected in shallow groundwater, but only at MW-14A (located adjacent to railroad tracks south of the Beazer site); no such exceedances were reported in MW-15A (located further off site and somewhat downgradient of MW-14A). In the glacial sand unit, elevated concentrations of benzene and phenanthrene were detected only in wells MW-6B and MW-9B, respectively.

The most current groundwater data for the Beazer site was obtained during two quarterly groundwater monitoring events performed in March and June of 2002, following implementation of soil and groundwater remedial actions (Refs. 7 and 9). Table 2 lists the post-remedial concentration maximums and areal distribution information for exceedances in groundwater.

Table 2 - Maximum Contaminant Concentrations and Distribution of NJ GWQC Exceedances in 2002 [1] (µg/L)

Contaminant	NJ GWQC[2]	First Quarter 2002		Second Quarter 2002	
		Max. Conc.	Wells Exceeding NJ GWQC[3]	Max. Conc.	Wells Exceeding NJ GWQC[3]
Shallow Fill Unit					
Benzo(a)anthracene[4]	0.2	3J	**MW-11A**	ND	None
Benzo(a)pyrene[4]	0.2	2J	**MW-11A**	ND	None
Benzo(k)fluoranthene[4]	1	3J	**MW-11A**	ND	None
Chrysene[4]	5	6J	**MW-11A**	ND	None
Arsenic	8	2,810	**MW-10A**, MW-11A, MW-18A	1,550	MWR-9A, **MW-10A**, MW-11A, MW-15A, MW-16A, MW-17A, MW-18A
Glacial Sand Unit					
Arsenic	8	51.9B[5]	**MW-10B**, MW-11B	52.7	MW-5B, MW-6B, MW-9B, **MW-10B**, MW-11B
Benzene	1	14	**MW-6B**	13	**MW-6B**
Naphthalene[4]	300	350	**MW-6B**	BS	None

[1] Data excerpted from the First and Second Quarter 2002 Groundwater Monitoring Reports (Refs. 7 and 9). Note that NJ GWQC exceedances attributed to non-site-related sources (i.e., benzene in well MW-16A and TCE in wells MW-10A and MW-9B) are not included in the table.

[2] NJ GWQC is the higher of the GWQC or the Practical Quantitation Limit (PQL).

[3] Well locations where maximum detected concentrations were found are in **Bold.**

[4] NJ GWQC are interim specific criteria (Ref. 6).
J: Concentration is estimated; ND: Constituent not detected; BS: Concentration below standards

[5] B: Constituent was also present in the field and/or trip blank sample

Based on results of the baseline sampling round, and confirmed by the two subsequent quarterly monitoring rounds, only limited and sporadic organic contamination remains in groundwater beneath the Beazer site. During the March 2002 sampling round, several SVOC exceedances were reported in two upgradient shallow wells, but downgradient shallow wells were not similarly impacted. No SVOC exceedances were reported in shallow groundwater during the June 2002 sampling event. No site-related VOC exceedances were reported in shallow groundwater during either of the two quarterly sampling events. [Beazer attributes benzene contamination in well MW-16A to well damage caused by contractors working to refurbish railroad tracks along Tyler Street and subsequent introduction of gasoline-related contamination from the surface (Refs. 7 and 9). Similarly, in the Quarterly Groundwater Monitoring Report (Ref. 7), Beazer attributes trichloroethylene (TCE) contamination in shallow well MW-10A during the first sampling round to off-site sources because this constituent was not detected during the baseline sampling event and the well is situated so close to the upgradient facility boundary. NJDEP has yet to

review and approve these conclusions. Nevertheless, as will be discussed with regard to contamination which is attributable to the Beazer site in the response to Question 5, it should be noted that none of the detected benzene or TCE concentrations attributed to off-site sources exceeded ten times the applicable New Jersey Surface Water Quality Criteria (NJ SWQC) and, as such, is not expected to be significant in terms of potential discharge to local surface water bodies.]

Benzene and naphthalene, at concentrations above the NJ GWQC, were reported in upgradient glacial sand well MW-6B during the March 2002 sampling event, but no similar contamination was observed in downgradient deep well MW-9B. In June 2002, benzene was again reported above the NJ GWQC only in deep well MW-6B, but no SVOC exceedances were reported for the glacial sand groundwater. [TCE reported at the NJ GWQC of 1 μg/L in deep well MW-9B during the March 2002 sampling round has been attributed to off-site sources for the reasons outlined above (Ref. 7). Since this concentration also does not exceed ten times the applicable NJ SWQC, this contamination is not expected to be significant with regard to eventual discharge to local surface water bodies.]

Elevated levels of arsenic have routinely been detected in groundwater beneath the Beazer site and adjacent areas. During the March 2002 sampling event for shallow groundwater, arsenic was reported above the NJ GWQC of 8 μg/L only in the upgradient wells. However, both upgradient and downgradient shallow wells indicated arsenic exceedances in the June 2002 sampling round. Arsenic exceedances have also been reported in upgradient and downgradient deep glacial sand wells, with the highest concentrations found in deep well MW-10B during both sampling events. Arsenic appears to be the most widespread constituent of concern for groundwater at Beazer. However, as discussed in the NJDEP-approved RAWP (Ref. 2), hydrogeologic data and information regarding fill placement in the Port Newark area suggests that arsenic in site soil and groundwater may be attributable to background conditions and/or sources other than the former wood treating operations conducted on the property. The overall lack of copper or recent chromium exceedances in groundwater -- which would also have been expected if arsenic was solely attributable to use of CCA for former wood treating operations at Beazer -- also supports the theory of elevated arsenic background concentrations. Finally, although not specific to the Beazer site, a joint study conducted by the United States Geological Survey (USGS) and NJDEP in 2000 and 2001 concluded that arsenic may occur naturally at concentrations greater than 50 μg/L in the groundwaters of New Jersey (Ref. 9). Based on these considerations, it appears possible that at least some reported exceedances of the NJ GWQC actually represent background levels for this constituent. Nevertheless, until site-specific background data become available, arsenic concentrations in groundwater continue to be monitored.

DNAPL Impacts in Groundwater

The use of creosote during former operational activities at the site has impacted both the shallow fill unit and the glacial sand unit. DNAPL consisting of free product creosote has been detected in the shallow fill unit on site (primarily in the southwestern portion of the site) and in two off-site areas to the south-southwest (Ref. 3). DNAPL in the shallow fill unit has been stabilized and no longer presents a concern for the site (Ref. 8). Furthermore, available data obtained during the March 2000 Rapid Optical Screening Tool (ROST) soil investigation do not indicate the presence of any DNAPL in the organic peat and clay layer that separates the shallow fill unit from the glacial sand. DNAPL within the glacial sand unit is restricted laterally to the southwestern and west-central portion of the property in an area that corresponds to the former wood treating process and storage tank farm areas. Figure 6 from Ref. 4 presents a map of the inferred DNAPL impact area in the deep glacial sand unit.

According to the RAR (August 2002), DNAPL impacts at the Beazer site and adjacent areas have been delineated horizontally and vertically to known clean points using monitoring well data, laser-induced fluorescence (LIF) and rapid optical screening tool (ROST) techniques, and soil boring evaluation for confirmation (Refs. 3 and 8). Prior to implementation of recent remedial actions, DNAPL migrated from the shallow fill unit to the glacial sand unit via manmade conduits such as monitoring wells and wood pilings (Ref. 3). Because subsurface structures penetrating the peat and clay layer have been removed, and because DNAPL source areas in shallow soil have been stabilized, continuing downward DNAPL migration into the glacial sand unit is not expected to occur (Ref. 8). Cross-sections depicting vertical distribution of free product in the glacial sand unit show that DNAPL impacts have also not yet reached the sand and varved clay interface at approximately 40 feet bgs (see Figures 4 and 5 from Ref. 4). Instead, the DNAPL exists as thin lenses within the upper and central portions of the glacial sand unit.

Monitoring results from the first half of 2002 indicate that DNAPL in the glacial sand unit remains within Beazer property boundaries and has not expanded beyond the previously delineated horizontal extent. To date, monitoring wells bounding the free product impact area (i.e., deep wells MW-5B, MW-6B, and MW-19B through MW-25B as shown of Figure 3-2 from Ref. 9) show no detectable DNAPL (Refs. 7 and 9). The vertical extent of DNAPL impacts has not been reassessed, but the plume is not expected to have migrated significantly in a vertical direction given the reduced permeabilities of clay lenses in the bottom section of the glacial sand unit and the underlying varved clay unit (Ref. 4).

References:

1. Supplemental RI Report. Prepared by Key Environmental, Inc. Dated January 1998.
2. Remedial Action Workplan. Prepared by Key Environmental, Inc. Dated March 1999.
3. DNAPL Delineation Report. Prepared by Key Environmental, Inc. Dated May 2000.
4. RAWP Addendum No. 3 (Revision 1): Glacial Sand Zone DNAPL Remediation Plan. Prepared by Key Environmental, Inc. Dated November 2000.
5. Baseline Groundwater Sampling Report. Prepared by Key Environmental, Inc. Dated April 27, 2001.
6. Letter from Bryan Moore, NJDEP, to Mitchell Brourman, Beazer East, Inc., re: Koppers Company Inc. Dated February 7, 2002.
7. Quarterly Groundwater Monitoring Report – First Quarter 2002. Prepared by Key Environmental, Inc. Dated May 2002.
8. Remedial Action Report. Prepared by Key Environmental, Inc. Dated August 2002.
9. Quarterly Groundwater Monitoring Report – Second Quarter 2002. Prepared by Key Environmental, Inc. Dated September 2002.

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

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

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

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

Rationale:

Hydrogeological Factors Inhibiting Contaminant Migration

Several natural hydrogeological conditions inhibit continuing contaminant migration in the subsurface at Beazer. These factors were previously discussed in the response to Question 2. Horizontal contaminant migration is limited by relatively flat hydraulic gradients in both the shallow fill and glacial sand unit and correspondingly low average flow velocities. Vertical movement of dissolved contaminants and DNAPL beneath the Beazer site and adjacent off-site areas is limited by several low permeability geological zones including the ten-foot thick continuous layer of organic clay and peat between the shallow and deep water-bearing units, intermittent lenses of clay observed in lower sections of the glacial sand layer, and the underlying 15-foot thick layer of varved clay (Ref. 1). Contaminant migration in the subsurface is also limited to some degree by natural adsorption to soils, capillary forces, and other geophysical mechanisms.

Active Stabilization of Contaminant Migration in Groundwater

In addition to naturally stabilizing hydrogeological factors, contaminant migration in groundwater beneath the Beazer site has been stabilized through a combination of active remedial actions and placement of institutional controls on the site. A quarterly groundwater monitoring program is also in place to monitor stabilization and assess any changes in the hydrogeological regime, contaminant concentrations, and/or areal extent of impacts. Specific remedial actions implemented to stabilize groundwater contamination include stabilization and capping of DNAPL-impacted shallow soil on site to prevent continuing migration of DNAPL and dissolved phase contaminants from potential source areas; excavation of DNAPL-impacted shallow soil off site to the maximum extent practicable for incorporation into the on-site stabilization and capping remedy; and construction and ongoing operation of a recovery well system on

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

site to capture and remove DNAPL from the deep glacial sand unit (Ref. 11). The effectiveness of these measures in controlling contaminant migration is detailed below based on data from a network of monitoring wells and piezometers installed across the site. Periodic monitoring of dissolved phase contamination and DNAPL will be conducted as outlined in the response to Question 7. The effectiveness of these stabilization measures will be assessed based on concentrations of dissolved phase contaminants, thickness of observed DNAPL, and changes in areal extent of groundwater impacts over time.

Institutional Controls Implemented for Groundwater at the Beazer Site

Institutional controls, including a CEA and WRA, have been established for the site to prevent future exposures to or withdrawal of impacted groundwater. The CEA and WRA were presented in the approved RAWP and address site-related impacts in the shallow fill and glacial sand units on site and in immediate off-site areas to the south and west (Ref. 2). See Figure E-2 in the RAWP for a map of the CEA/WRA boundaries. The duration of the CEA and WRA is ten years for organic contaminants and indeterminate for inorganic parameters of concern, of which only arsenic remains above applicable NJ GWQC (Ref. 3). No monitoring is required for the CEA or WRA, as contaminant concentrations will be periodically and adequately documented as part of the ongoing groundwater monitoring program described in the response to Question 7.

Dissolved Phase Contamination Trends

In September 2000, groundwater samples were collected from the Beazer property and immediately adjacent impacted areas to document contaminant concentrations present in shallow and deep groundwater prior to implementation of remedial activities, and to allow for later comparison against post-remedial groundwater quality. A review of the established baseline and early post-remedial concentrations suggests an overall reduction in or stabilization of contaminant concentrations in groundwater. However, it should also be noted that some of contaminant concentrations observed during the first quarter of 2002 (immediately following remedial action implementation) were higher than those measured during the baseline sampling round, and that stabilization of groundwater impacts is ongoing. Preliminary examples of the suggested stabilizing trends are presented in Table 3 for key site-related contamination.

Data from wells furthest downgradient at the Beazer site indicate no current NJ GWQC exceedances for site-related VOC and SVOC contaminants. Thus, significant organic contamination is expected to remain within the current impact area in both shallow and deep groundwater zone. Arsenic exceedances have been reported in both upgradient and downgradient wells at the Beazer site, but only the highest detections may be of concern with regard to contaminant stabilization. As discussed in the NJDEP-approved RAWP (Ref. 2), a joint USGS and NJDEP study concluded that New Jersey groundwater naturally contains elevated arsenic concentrations (up to and beyond 50 μg/L in some cases). Consequently, lower level exceedances observed in downgradient wells (and several of the upgradient wells) may be attributable to background levels rather than to former wood treating operations. The highest arsenic concentrations, such as those seen in upgradient well MW-10A, may indeed be due in part to former facility operations. Based on the slow rate of groundwater movement and the lack of similar concentrations in downgradient wells, these concentrations are expected to remain within the current impact area (as defined by the established CEA and WRA) for the foreseeable future.

Table 3 - Comparison of Baseline and Post-Remedial Contaminant Concentrations [1] (µg/L)

Contaminant	Well	NJ GWQC[2]	Baseline September 2000 Conc.	First Quarter 2002 Conc.	Second Quarter 2002 Conc.
Shallow Fill Unit					
Arsenic	MW-10A (upgradient)	8	1,520	2,810	1,550
	MW-11A (upgradient)		152	124	31.6
	MW-15A (downgradient)		24	ND[4]	12.6
	MW-17A (downgradient)		21.6	ND[4]	16.6
Glacial Sand Unit					
Arsenic	MW-5B (upgradient)	8	61.2	ND[4]	12.4
	MW-10B (upgradient)		68.1	51.9	52.7
	MW-11B (downgradient)		42.2	43.7	40.7
Benzene	MW-6B (upgradient)	1	3	14	13
Phenanthrene[3]	MW-9B (downgradient)	100	120	140	59

[1] Data excerpted from Refs. 8, 10, and 12.

[2] NJ GWQC is the higher of the GWQC or the PQL.

[3] NJ GWQC are interim specific criteria (Ref. 9).

[4] These arsenic results have been reported as nondetect. However, during these analyses, the laboratory used an elevated detection limit of 34.8 µg/L which exceeds the applicable NJ GWQC of 8 µg/L. Based on historic exceedances of arsenic in these wells, it is likely that the nondetect results are associated with improper laboratory quality assurance protocols, and that arsenic was actually present in groundwater from the affected wells during the first quarterly sampling round in 2002, but only at levels below 34.8 µg/L (Ref. 10).

Trends in DNAPL Thickness and Accumulation Rates

DNAPL impacts in the glacial sand unit cover an area of approximately 160 feet by 230 feet (Refs. 4 and 5). To address this potential source material, Beazer has implemented a passive recovery system whereby DNAPL flows via gravity drainage into five recovery wells. Each of the recovery wells has been screened across the inferred lower limit of DNAPL impacts and has a storage capacity of approximately 40 gallons (Refs. 6 and 7). Monthly DNAPL measurements are collected from the network of wells and piezometers in the delineated DNAPL impact area, and the recovery wells are checked to determine DNAPL accumulation rates. As it sinks into a solid wall sump at the base of each recovery well, free product is physically separated from groundwater. The collected DNAPL is pumped out the sumps as frequently as needed to ensure continued optimal system operation (approximately once every twenty weeks). The resulting contaminated water is sent off site for proper treatment, and the relatively moisture-free DNAPL product is shipped off site for reuse, recycling, or proper disposal (Ref. 6).

Passive DNAPL recovery operations will be continued as a pilot study and potential full-scale remedial effort until no more product can be removed from the glacial sand unit beneath the Beazer site. As indicated in a letter from NJDEP to the facility, recovery operations will continue until statistical analyses of well-specific DNAPL monitoring data (including total volume recovered over time, free product accumulation rates, and thickness of product in the immediate area) indicate that no recoverable DNAPL remains in place (Ref. 7). Beazer has also committed to installing additional recovery wells in case DNAPL in the glacial sand unit migrates beyond the current impact area. However, because the recovery wells were placed along the leading edge of the DNAPL pool, it is unlikely that the free product will migrate significantly further downgradient (Ref. 6). Instead, as the DNAPL plume shrinks and narrows near the existing recovery wells, it may be necessary to move recovery operations further into the delineated DNAPL impact area to ensure that the pool is being addressed to the maximum extent practicable and in a timely fashion.

Prior to commencement of recovery operations and completion of other remedial actions for the site, Beazer assessed the potential rate of passive DNAPL accumulation from the glacial sand unit. Based on year-long DNAPL level monitoring and recovery operations conducted at MW-3B, "pre-remedial" free product accumulation rate was estimated between approximately 0.14 and 0.28 gallons per day (Refs. 6 and 10). By measuring the change in apparent DNAPL thickness since the commencement of DNAPL monitoring activities on December 10, 2001, Beazer has also been able to estimate DNAPL accumulation rates for each recovery well over the first and second quarters of 2002 (Refs. 10 and 12). As shown in Table 4, the "post-remedial" accumulation rates are significantly lower than those established prior to shallow soil stabilization and asphalt capping. Thus, full DNAPL recovery is expected to require a longer period of time than originally anticipated (assuming system operating parameters remain unchanged). As indicated in the recent Quarterly Groundwater Monitoring Reports (Refs. 10 and 12), decreased DNAPL accumulation rates in the recovery wells indicate that stabilization of DNAPL in the shallow fill unit has reduced the pool pressure acting on DNAPL in the glacial sand unit, thereby minimizing the potential for future DNAPL migration and reducing the quantity of recoverable DNAPL in the deeper water-bearing unit. Thus, it appears that free product in the subsurface has been stabilized and will not move beyond the currently delineated impact area.

Table 4 - Estimated DNAPL Accumulation and Recovery Rates in the Glacial Sand Unit in Gallons Per Day

Recovery Well	Pre-Remedial Rate	First Quarter 2002	Second Quarter 2002
RW-1	Ranging from 0.14 - 0.28 (measured in well MW-3B)	0.12	0.07
RW-2		0.03	0.05
RW-3		0.12	negligible
RW-4		0.08	negligible
RW-5		0.18	negligible

Source: Refs. 10 and 12.

References:

1. Supplemental RI Report. Prepared by Key Environmental, Inc. Dated January 1998.
2. Remedial Action Workplan. Prepared by Key Environmental, Inc. Dated March 1999.
3. Letter from Wayne Howitz, NJDEP, to Steven Radel, Beazer East, Inc., re: Remedial Action Workplan and Replacement Monitoring Well Installation and Groundwater Sampling Letter Report. Dated July 30, 1999.
4. DNAPL Delineation Report. Prepared by Key Environmental, Inc. Dated May 2000.
5. Letter from Bryan Moore, NJDEP, to Mitchell Brourman, Beazer East, Inc., re: DNAPL Report and Glacial Sand Zone DNAPL Remediation Plan. Dated July 20, 2000.
6. RAWP Addendum No. 3 (Revision 1): Glacial Sand Zone DNAPL Remediation Plan. Prepared by Key Environmental, Inc. Dated November 2000.
7. Letter from Bryan Moore, NJDEP, to Mitchell Brourman, Beazer East, Inc., re: RAWP Addendum No. 3 (revision 1: Glacial Sand Zone DNAPL Remediation Plan). Dated January 29, 2001.
8. Baseline Groundwater Sampling Report. Prepared by Key Environmental, Inc. Dated April 27, 2001.
9. Letter from Bryan Moore, NJDEP, to Mitchell Brourman, Beazer East, Inc., re: Koppers Company Inc. Dated February 7, 2002.
10. Quarterly Groundwater Monitoring Report – First Quarter 2002. Prepared by Key Environmental, Inc. Dated May 2002.
11. Remedial Action Report. Prepared by Key Environmental, Inc. Dated August 2002.
12. Quarterly Groundwater Monitoring Report – Second Quarter 2002. Prepared by Key Environmental, Inc. Dated September 2002.

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

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

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

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

Rationale:

No surface water bodies are located within the Beazer property boundaries or in immediately adjacent areas. However, as shown on Figure 1-1 from Ref. 3, the Port Newark Channel is situated approximately 1,000 feet north of the site, and the Elizabeth Channel is located less than 2,500 feet south of the site. Both channels are utilized heavily for industrial shipping and are routinely dredged to a depth greater than 45 feet to accommodate large ships. The Port Newark and Elizabeth Channels empty into Newark Bay east of the site. Newark Bay is classified as a SE3 waterway – a saline estuary maintained to support secondary contact recreation (i.e., boating) and migration of fish populations (Ref. 2).

Prior to implementation of remedial actions for the site, a potentiometric ridge was present in the shallow fill unit, trending from southeast to northwest across the site. Groundwater in the shallow fill unit flowed laterally to the northeast and southwest from this ridge, moving toward the Port Newark Channel from the northern portion of the site and toward the Elizabeth Channel from the southern portion of the site. Stabilization of shallow fill unit soil and placement of an asphalt cap across the site have eliminated the ridge effect and altered the shallow groundwater regime such that flow is now predominately westward, with a small component of flow to the north in the northeast portion of the site (see Figure 3-1, Ref. 3). However, these changes are localized by nature, and no shallow groundwater production wells have been identified in the area surrounding the site that would further pull groundwater away from the tidal zones. Consequently, shallow groundwater is still expected to flow regionally toward the Port Newark and Elizabeth Channels.

Deep groundwater flow in the glacial sand unit has historically been northward into the Port Newark Channel (Ref. 1). The direction of flow in this unit has not been altered by on- or off-site remedial actions implemented to date (Ref. 3). Therefore, deep groundwater from the Beazer site continues to discharge into the Port Newark Channel.

References:

1. Supplemental RI Report. Prepared by Key Environmental, Inc. Dated January 1998.
2. Baseline Groundwater Sampling Report. Prepared by Key Environmental, Inc. Dated April 27, 2001.
3. Quarterly Groundwater Monitoring Report – Second Quarter 2002. Prepared by Key Environmental, Inc. Dated September 2002.

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

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

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

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

Rationale:

As discussed in the response to Question 4, prior to implementation of remedial actions for the site, a potentiometric ridge was present in the shallow fill unit, trending from southeast to northwest across the site. Groundwater in the shallow fill unit flowed laterally to the northeast and southwest from this ridge, moving toward the Port Newark Channel from the northern portion of the site and toward the Elizabeth Channel from the southern portion of the site. Stabilization of shallow fill unit soil and placement of an asphalt cap across the site have eliminated the ridge effect and altered the shallow groundwater regime such that flow is now predominately westward, with a small component of flow to the north in the northeast portion of the site. However, these changes are localized by nature, and no shallow groundwater production wells have been identified in the area surrounding the site that would further pull groundwater away from the tidal zones. Consequently, shallow groundwater is still expected to flow regionally toward the Port Newark and Elizabeth Channels.

Although groundwater from beneath the Beazer site flows into local shipping channels, no sampling events have been conducted to document any potential site-related impacts to off-site surface water or sediment. Based on current EI assessment practices however, contaminant concentrations in groundwater

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

discharging to surface water can generally be considered insignificant if they are less than the associated NJ SWQC or less than ten times greater than the associated NJ GWQC. This comparison to the NJ GWQC allows for dilution of the groundwater contamination prior to discharge to surface water.

As presented in the response to Question 2, site-related contamination in shallow fill groundwater includes arsenic and several SVOCs. Groundwater impacts in the deep glacial sand unit currently include arsenic, benzene, and naphthalene (Ref. 6). Table 5 presents a comparison between post-remedial groundwater contaminant concentrations and the corresponding NJ GWQCs and NJ SWQCs for SE3 waterways.

Table 5 - Comparison of Maximum Groundwater Contaminant Concentrations and Applicable NJ Standards for Surface Water Protection [1] (µg/L)

Contaminant	NJ GWQC[2]	NJ SWQC	Maximum Groundwater Concentration	
			First Quarter 2002	Second Quarter 2002
Shallow Fill Unit				
Benzo(a)anthracene[3]	0.2	0.031	3J	ND
Benzo(a)pyrene[3]	0.2	0.031	2J	ND
Benzo(k)fluoranthene[3]	1	0.031	3J	ND
Chrysene[3]	5	0.031	6J	ND
Arsenic (maximum)[4]	8	0.136	2,810	1,550
Arsenic (downgradient)[4]	8	0.136	ND[5]	30.7
Glacial Sand Unit				
Benzene	1	71	14	13
Naphthalene[3]	300	NA	350	BS
Arsenic	8	0.136	51.9B[6]	52.7

[1] Data excerpted from Refs. 4 and 6.

[2] NJ GWQC is the higher of the GWQC or the PQL.

[3] NJ GWQC are interim specific criteria (Ref. 3).
J: Concentration is estimated

[4] Maximum arsenic concentrations reported in upgradient well MW-10A. Wells considered in determining the maximum downgradient boundary arsenic concentration included MWR-9A, MW-15A, MW-16A, and MW-17A.

[5] Result nondetected at an elevated laboratory detection limit of 34.8 µg/L, but even this detection limit is less than ten times the associated NJ GWQC.
NA: Not available; ND: Not detected; BS: Below standards

[6] B: Constituent was also present in the field and/or trip blank sample

Based on the data in Table 5, none of the current groundwater contaminants appears to present a significant risk to surface water quality in the Port Newark or Elizabeth Channels. None of the SVOC concentrations recently measured in shallow fill groundwater exceeded ten times the associated NJ GWQCs. Although the maximum arsenic concentrations in shallow fill groundwater is significantly greater than ten times the NJ GWQC of 8 µg/L, these concentrations were both reported in upgradient

well MW-10A. However, maximum arsenic concentrations reported at the downgradient site boundary (as indicated by wells MWR-9A, MW-15A, MW-16A, and MW-17A) were nondetect and 30.7 μg/L during the first and second quarters of 2002, respectively. Based on current groundwater flow information, these data more closely reflect concentrations of arsenic being discharged into surface water than concentrations measured in upgradient wells. Because the downgradient level of 30.7 μg/L is less than ten times the applicable NJ GWQC, arsenic discharges from shallow fill groundwater to nearby surface water are not expected to present significant environmental concerns. Even the most recent concentrations of benzene (46 μg/L) and TCE (2 μg/L) in shallow fill groundwater (which Beazer contends are not site-related) are below their respective NJ SWQC, and, for TCE, is less than ten times the applicable NJ GWQC.

Dissolved phase groundwater impacts in the glacial sand unit are also not expected to present a concern with regard to surface water quality. Neither of the recent benzene concentrations exceeded the NJ SWQC for an SE3 waterway (71 μg/L). While naphthalene has no established NJ SWQC for comparison, neither of the reported concentrations for naphthalene exceeded ten times the interim NJ GWQC of 300 μg/L. In addition, these two organic constituents were observed only in well MW-6B during the last two sampling rounds, and downgradient deep groundwater concentrations closer to the channel are non-detected or below NJ GWQCs. None of the arsenic concentrations reported in deep glacial sand groundwater during the recent sampling events exceeded the NJ GWQC (8 μg/L) by a factor of ten.

Several other considerations suggest that discharges of dissolved phase contamination from the Beazer site into Port Newark Channel are unlikely to be significant. For example, the Newark Bay area (including the Port Newark and Elizabeth Channels) has been impacted by regional industrial activities. Associated impacts to Newark Bay are well documented and have resulted in classification of the Bay as a Class SE3 surface water body and the posting of fish advisories in the area (Ref. 2). Numerous heavy industrial sources have caused impact to the Port Newark Channel. If surface water samples were collected and elevated dissolved phase concentrations were detected, it would be extremely difficult to determine if the exceedances were directly related to impacted deep groundwater emanating from the Beazer site. Also, although not specific to the Beazer site, a joint USGS and NJDEP study concluded that elevated arsenic levels may be present as a natural condition in New Jersey groundwater. Consequently, reported concentrations at Beazer may be indicative of background rather than impacts from former wood treating operations (Ref. 6). As such, elevated arsenic concentrations would historically have been discharging into the channel, and continued discharge would not further degrade the surface water body.

Potential DNAPL migration from groundwater to surface water and sediment in the Port Newark and/or Elizabeth Channels is also not a concern at this time. DNAPL in the shallow fill unit has been stabilized with a cement and soil mixture approved by NJDEP following treatability testing in September 1997 and March 2000. DNAPL in the glacial sand unit remains bounded by clean on-site wells MW-5B, MW-6B, and MW-19B through MW-25B (Refs. 1 and 6). Furthermore, even if migration of DNAPL were allowed to continue unmitigated in the glacial sand unit, it is unlikely that the Port Newark Channel would be significantly impacted given: (1) the average rate of groundwater flow in the glacial sand unit, which has been documented at only 0.09 feet per year; (2) the expectation that movement of free product in the subsurface would be even slower due to capillary forces; and (3) the large distance over which the DNAPL would have to travel to reach the channelway (estimated at approximately 1,000 feet from the site). The current ongoing program of DNAPL recovery from the glacial sand unit makes it even more unlikely that DNAPL will migrate toward and into surface water in Port Newark Channel (Ref. 5).

References:

1. DNAPL Delineation Report. Prepared by Key Environmental, Inc. Dated May 2000.
2. NJDEP Fish and Crab Consumption Advisories Based on PCBs, Dioxin, or Chlordane Contamination. Dated January 30, 2002. http://www.state.nj.us/dep/dsr/fish-crab.htm.
3. Letter from Bryan Moore, NJDEP, to Mitchell Brourman, Beazer East, Inc., re: Koppers Company Inc. Dated February 7, 2002.
4. Quarterly Groundwater Monitoring Report – First Quarter 2002. Prepared by Key Environmental, Inc. Dated May 2002.
5. Remedial Action Report. Prepared by Key Environmental, Inc. Dated August 2002.
6. Quarterly Groundwater Monitoring Report – Second Quarter 2002. Prepared by Key Environmental, Inc. Dated September 2002.

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

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

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

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

Rationale:

Question not applicable. See response to Question #5.

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

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

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

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

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

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

Rationale:

A system of shallow and deep groundwater monitoring wells has been installed on the Beazer property and in adjacent areas. A quarterly groundwater monitoring program has been established to evaluate dissolved phase contamination trends in shallow and deep groundwater on and off site. The monitoring program is also intended to confirm that natural attenuation is adequately addressing remaining shallow groundwater contamination in off-site areas that could not be stabilized. The first two quarterly groundwater sampling events were conducted in March and June 2002. Although at least six quarterly rounds have yet to be completed and/or documented for the Beazer site, NJDEP has recommended that the facility conduct a preliminary evaluation of dissolved phase contamination trends after the first four quarterly sampling rounds (Ref. 2). Monthly DNAPL thickness measurements are also being collected from select wells in the deep groundwater zone to assess the effectiveness of ongoing DNAPL recovery operations in the deep glacial sand source area and to monitor any continuing DNAPL migration in the subsurface (Ref. 4). Wells and analytical parameters included in the quarterly groundwater monitoring program are detailed in Table 6.

Table 6 -- Groundwater Monitoring Program Parameters for the Beazer Site

Class of Contaminant	Wells Monitored	Frequency	Parameters of Interest
Dissolved Phase	Shallow Wells: MW-9A, MW-10A, MW-11A, MW-15A, MW-16A, MW-17A, MW-18A Deep Wells: MW-5B, MW-6B, MW-9B, MW-10B, MW-11B	Quarterly	• TCL VOCs • TCL SVOCs • Total arsenic and chromium • General field chemistry parameters
DNAPL	Deep Wells: MW-3B, MW-5B, MW-6B, MW-19B, MW-20B, MW-21B, MW-22B, MW-23B, MW-24B, MW-25B Deep Piezometers: PZ-1A, PZ-1B, PZ-2A, PZ-2B, PZ-3A, PZ-3B, PZ-3C, PZ-3D, PZ-3E, PZ-3F, PZ-3G, PZ-3H, PZ-3I, PZ-4A, PZ-4B, PZ-5A, PZ-5B Recovery Wells: RW-1, RW-2, RW-3, RW-4, RW-5	Monthly	• Presence or absence of DNAPL to assess areal extent • Thickness of DNAPL and accumulation rate to assess effectiveness of remedy

Source: Refs. 1, 5, and 6.

References:

1. Remedial Action Workplan. Prepared by Key Environmental, Inc. Dated March 1999.
2. Letter from Wayne Howitz, NJDEP, to Steven Radel, Beazer East, Inc., re: Remedial Action Workplan and Replacement Monitoring Well Installation and Groundwater Sampling Letter Report. Dated July 30, 1999.
3. DNAPL Delineation Report. Prepared by Key Environmental, Inc. Dated May 2000.
4. RAWP Addendum No. 3 (Revision 1): Glacial Sand Zone DNAPL Remediation Plan. Prepared by Key Environmental, Inc. Dated November 2000.
5. Quarterly Groundwater Monitoring Report – First Quarter 2002. Prepared by Key Environmental, Inc. Dated May 2002.
6. Quarterly Groundwater Monitoring Report – Second Quarter 2002. Prepared by Key Environmental, Inc. Dated September 2002.

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

_X_ YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the Beazer East, Inc. site (EPA ID# NJD000542282), located at Maritime and Tyler Streets in Port Newark, Essex County, New Jersey. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater." This determination will be re-evaluated if the Agency becomes aware of significant changes at the facility.

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

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

Completed by: _____ Date:_____
Michele Benchouk
Engineering Consultant
Booz Allen Hamilton

Reviewed by: _____ Date:_____
Pat Shanley
Geologist
Booz Allen Hamilton

Also reviewed by: _____ Date:_____
Alan Straus, RPM
RCRA Programs Branch
USEPA Region 2

_____ Date:_____
Barry Tornick, Section Chief
RCRA Programs Branch
USEPA Region 2

Approved by: __original signed by:_____ Date:___1/3/2003_____
Adolph Everett, Acting Chief
RCRA Programs Branch
USEPA Region 2

Locations where references may be found:

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

Contact telephone and e-mail numbers: Alan Straus, USEPA RPM
(212) 637-4160
straus.alan@epa.gov

Attachments

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

- Attachment 1 - Summary of Media Impacts Table

Attachment 1 - Summary of Media Impacts Table
Beazer East, Inc., Port Newark, Essex County, New Jersey

AOC [1]	GW	AIR (Indoors)	SURFACE SOIL	SURFACE WATER	SEDIMENT	SUBSURFACE SOIL	AIR (Outdoors)	CORRECTIVE ACTION MEASURE	KEY CONTAMINANTS
On Site	NA	No	Yes	No	No	Yes	No	▸ Stabilization of surface soil (0-2 ft. bgs) ▸ Four-inch asphalt cap ▸ Deed notice	DNAPL, metals, SVOCs, VOCs
Off site	NA	No	No	Unknown	Unknown	Yes	No	▸ Stabilization of surface soil (0-2 ft. bgs) ▸ Four-inch asphalt cap ▸ Deed notice	DNAPL, metals, SVOCs
Site-Wide Ground water	Yes							▸ Monitored natural attenuation for shallow fill unit ▸ DNAPL recovery system for glacial sand unit ▸ CEA/WRA ▸ Stabilization of surface soil (0-2 ft. bgs) ▸ Four-inch asphalt cap	DNAPL, arsenic, SVOCs, VOCs

[1]Soil and groundwater have been investigated on a site-wide basis, not on an AOC basis.