DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION
Interim Final 2/5/99
RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA725)
Current Human Exposures Under Control

Facility Name: **Carbone of America Industries – The Benzinger Site (Formerly Stackpole Carbon)**
Facility Address: **1032 Trout Run Road, St. Mary's, Elk County, Pennsylvania 15857**
Facility EPA ID #: **PAD000739631**

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

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

☐ If no - re-evaluate existing data, or

☐ If data are not available, skip to #8 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

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

Definition of "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration / Applicability of EI Determinations

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

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

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

	Yes	No	?	Rationale / Key Contaminants
Groundwater	X			Volatile Organic Compounds (VOCs), Metals – see rationale below.
Air (indoors)[2]		X		See rationale below.
Surface Soil (e.g., <2 ft)	X			VOCs, Metals – see rationale below
Surface Water	X			VOCs, Metals – see rationale below
Sediment	X			VOCs, Metals – see rationale below
Subsurf. Soil (e.g., >2 ft)	X			VOCs, Metals – see rationale below
Air (outdoors)		X		No known or reasonably suspected impacts above risk-based levels.

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

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

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

Rationale and Reference(s):

General Facility Information

The Benzinger Site occupies approximately 56-acres and is located near the intersection of Brusselles Street (State Route 120) and Trout Run Road within the eastern city limits of the City of St. Mary's in Elk County, Pennsylvania. Site operations date back to 1902 when the property was owned by the Pennsylvania Fireproofing Company, a manufacturer of clay pipes. In 1940, the property was purchased by Stackpole Corporation, now known as The Hall Corporation (Hall), and used to manufacture carbon and carbon graphite products. Subsequent to 1990, the contiguous track of land that comprised the Benzinger Site was subdivided by Hall into a number of parcels, one of which is the 36.8-acre Carbon Graphite Plant. Carbone of America Corporation (Carbone) purchased the Carbon Graphite Plant from Hall in November 1991 and continues to manufacture carbon and carbon graphite products. To the north of the Carbon Graphite Plant is the 6.7-acre Cycle Mix Landfill Lot and the adjoining 2.5-acre Parking Area Lot, both of which were transferred from Hall to Carbone in September 2009. The remaining parcels of land have been sold to various third parties.

Soil and groundwater contamination was first discovered at the Benzinger Site in November 1990 during a Phase I/Phase II environmental liability assessment performed as a precondition of the sale of the Carbon Graphite Plant to Carbone. Since that time, the vertical and lateral extent of contamination at the Benzinger Site has been defined by the installation of approximately 140 monitoring wells, piezometers, and well points, and by sampling/analysis of soil, groundwater, wetland surface water and sediment, seeps, soil vapor, and indoor air. The primary source of soil and groundwater contamination at the Benzinger Site is within the impregnation area of the Carbon Graphite Plant, where historical solvent use resulted in releases of volatile organic compounds (VOCs), primarily trichloroethene (TCE), 1,2-dichloroethane (1,2-DCA), and 1,2-dichloroethene (1,2-DCE). Other VOCs detected in soil and groundwater above appropriately risk-based levels include tetrachloroethene (PCE), vinyl chloride, 1,1,2-trichloroethane, and methylene chloride. From the impregnation area, a VOC plume has migrated with groundwater flow to the north/northwest, extending as far as Elk Creek in the upper semi-confined groundwater system, and several hundred feet beyond the downgradient property boundary in the lower semi-confined groundwater system. TCE, 1,2-DCA, and 1,2-DCE are also the primary VOCs detected in the surface water and

sediment of the small wetland (about 0.85 acres) located at the subject site, which is immediately south of Elk Creek and west/northwest of the Cycle Mix Landfill.

In addition to VOCs, metals have been detected in surface soil (0-5 feet deep), subsurface soil (5-22 feet deep), sediment, surface water, and groundwater at the subject site. Metals detected in surface soils above Pennsylvania's Department of Environmental Protection (PADEP) soil-to-groundwater medium specific concentrations (MSCs) include antimony, silver, cadmium, lead, copper, nickel, and zinc, with cadmium and lead also exceeding their respective direct-contact MSCs. Based on the sample analysis, surface soil contamination at the subject site where metal concentrations exceeded PADEP's soil-to-groundwater and/or direct contact MSCs is limited to only a few areas. Metals detected in subsurface soils at the subject site above PADEP's soil-to-groundwater MSCs include lead, antimony, arsenic, and nickel. Again, based on the sample analysis, subsurface soil contamination at the subject site where metal concentrations exceeded PADEP's soil-to-groundwater MSCs is limited to only a few areas. With respect to metals in groundwater, lead, beryllium and nickel have also been detected in the upper semi-confined and lower semi-confined groundwater systems at the subject site above PADEP's groundwater MSCs. Metals, including arsenic, barium, beryllium, cadmium, chromium, copper, lead, and selenium were also detected above appropriately risk-based levels in sediment from the small on-site wetland.

On July 7, 2005, Hall submitted a Notice of Intent to Remediate (NIR) for the Benzinger Site, in accordance with the provisions of the Pennsylvania Land Recycling and Environmental Remediation Standards Act (Act 2). For the purposes of applying Act 2 Chapter 250, Sections 250.302(a) and 250.407(a) to the Benzinger Site, the "property boundary" is the hydraulically downgradient boundary of the entire tract of land owned by Hall in November 1990 at the time the contamination within the Carbon Graphite Plant was discovered. In December 2007, Hall submitted a "Combined Remedial Investigation Report/Final Report" to the Pennsylvania Department of Environmental Protection (PADEP) for approval and a release of liability for the remediation of contamination identified at the Benzinger Site.

Contaminated Media
Groundwater:
During the period from October 1990 through January 2005, a total of 140 groundwater monitoring wells, piezometers, and well points were installed at the Benzinger Site. As of March 2006, seven of the wells had been removed or destroyed as a result of construction activities at the Carbon Graphite Plant. Of the 133 that remained, 71 wells are located within the Carbon Graphite Plant, 29 wells are on the Cycle Mix Landfill Lot and the Parking Area Lot, 22 wells are located on other parcels (mainly downgradient areas), 4 well points are located within the wetland area, and 7 wells are at off-property locations. VOCs, particularly TCE, 1,2-DCA and, to a lesser extent, 1,2-DCE, were identified as the primary constituents of concern. Two groundwater systems have been identified at the Benzinger Site: the Upper Semi-Confined Groundwater System (USCGS or Upper System) and the Lower Semi-Confined Groundwater System (LSCGS or Lower System).

Wells and piezometers within the USCGS are within the uppermost bedrock and weather rock zone and range from 9 to 27 feet deep. Groundwater flow within the USCGS is to the north/northwest to Elk Creek, which is the recipient of discharge from the Upper System. By this relationship, Elk Creek acts as a barrier, limiting the extent of the VOC plume in the USCGS. The small wetland area to the south of Elk Creek (west/northwest of the Cycle Mix Landfill) is also interpreted to receive shallow groundwater discharge. The LSCGS exists within the more competent bedrock underlying the Upper System. Flow within the LSCGS is to the north/northwest and is thought to be influenced by Elk Creek, which is the primary drainage feature in the area. The flow direction in the Lower System may also be influenced by the geologic structure beneath the area, by which the rock strata dip at about 2 to 3 degrees to the northwest. Wells monitoring the Lower System are assigned letter designations D, E, F, and G (e.g., GM-4D, GM-4E, GM-4F, GM-4G), indicating progressively greater depths.

-Upper Semi-Confined Groundwater System:
VOCs: Based on water-quality data collected from 2000 through 2004, the primary VOCs detected in the USCGS above PADEPs used-aquifer MSCs are TCE, 1,2-DCA, and 1,2-DCE. TCE and 1,2-DCA contamination are related to past chlorinated solvent use, particularly within the impregnation area of the Carbon Graphite Plant, and 1,2-DCE is a degradation product of TCE. These VOCs exist within a defined plume that originates in the impregnation area and extents about 1,300 feet north/northwest toward Elk Creek and the small wetland area. Other VOCs, such as methylene chloride, vinyl chloride, 1,1,1-TCA, and 1,1,2-TCA, have also been detected sporadically and at concentrations exceeding PADEPs used-aquifer MSCs; however, these VOCs are secondary contaminants compared to TCE, 1,2-DCA and 1,2-DCE, and are not definable plumes.

Throughout the main body of the VOC plume, TCE and 1,2-DCA substantially exceed their PADEP used-aquifer MSC of 5 µg/L. Concentrations of TCE in the immediate vicinity of the impregnation area commonly exceed 1,000 µg/L, and in some cases 10,000 µg/L. In the downgradient direction, TCE concentrations in the USCGS decrease to typically less than 1,000 µg/L near the northern boundary of the Carbon Graphite Plant. Near Elk Creek, TCE concentrations in the Upper System range from non-detect to 25 µg/L in most wells, with higher concentrations at GM-19 (up to 1,000 µg/L) and well points WP-2 and WP-3 (up to 1,300 µg/L and 380 µg/L, respectively). The cause of the higher VOC concentrations observed at the wetland wellpoints is interpreted to be upwelling of groundwater from the D aquifer horizon.

Metals: Cadmium, lead, beryllium, and nickel were detected at concentrations exceeding PADEPs used-aquifer MSCs in the USCGS. Cadmium was detected at concentrations ranging from 7 µg/L to 42 µg/L, which exceeds PADEPs used-aquifer MSC of 5 µg/L, in one sample collected from monitoring wells MW-2, MW-3, MW-5S, MW-8, MW-9, GSC-2, and GSC-4S. However, cadmium analyses of one or more additional samples collected from 5 of the above referenced wells reported either non-detectable cadmium or concentrations below the PADEP used-aquifer MSC. Lead, which also has a used-aquifer MSC of 5 µg/L, was detected in the USCGS at concentrations ranging from 6.8 µg/L to 14 µg/L in monitoring wells GSC-6, GSC-9, GSC-12, and GM-22, and at a concentration of 77 µg/L in monitoring well GSC-13 and at 160 µg/L in monitoring well GSC-2. Beryllium was detected in monitoring wells GSC-2, GM-8, and GM-22 from 4.4 µg/L to 10 µg/L, exceeding its PADEP used-aquifer MSC of 4 µg/L. Nickel, which has a used-aquifer MSC of 100 µg/L, was detected at concentrations ranging from 110 µg/L to 310 µg/L in samples collected from monitoring wells GSC-2, GSC-4S, GSC-5, GSC-7, GSC-11, GSC-13, and GM-21.

-Lower Semi-Confined Groundwater System:

VOCs: The primary VOCs detected in the LSCGS are TCE and 1,2-DCA, with the plume originating in the impregnation area. 1,2-DCE is also detected in some wells, but the detections tended to be sporadic, commonly preceded and followed by non-detects. The TCE component of the plume extends about 2,200 feet to the northwest, near Brusselles Street. The 1,2-DCA component of the plume extends about 2,550 feet to the northwest, several hundred feet beyond Brusselles Street. Beneath and downgradient of the impregnation area, within the boundaries of the Carbon Graphite Plant, TCE is generally the dominant VOC. Concentrations of TCE detected since 2000 beneath the impregnation area (at MW-5D) have ranged from 3,100 µg/L to 50,000 µg/L. Further downgradient, along the southern side of Elk Creek and the small wetland, TCE concentrations typically range from a few tens to several hundred µg/L, with the higher values (up to 1,300 µg/L) reported at the GM-21D well. Within this downgradient area of the plume, 1,2-DCA values are typically less than 100 µg/L and consistently less than 200 µg/L. Further downgradient, near Brussells Street, 1,2-DCA is the dominant VOC, with detections ranging from 5 µg/L to 19 µg/L at monitoring wells GM-29E and GM-30E. At the furthest downgradient monitoring wells (GM-33 D&E), located about 400 feet downgradient of the properly boundary, no VOCs were detected in GM-33D, and only 1,2-DCA was detected in GM-33E at 3 µg/L, below the PADEP used-aquifer MSC of 5 µg/L.

Metals: Beryllium and cadmium were detected at concentrations exceeding PADEPs used-aquifer MSCs in the LSCGS. Beryllium was detected at 12 µg/L in GM-5D, 5 µg/L in GM-22E, and 8.6 µg/L in GM-23E, exceeding its PADEP used-aquifer MSC of 4 µg/L. However, a second sample from monitoring wells GM-22E and GM-23E showed beryllium below its MSC. Cadmium was detected slightly above its PADEP used-aquifer MSC of 5 µg/L in monitoring wells GM-13D and OB-1D at 5.6 µg/L.

Indoor Air:

Because the primary source of VOC soil and groundwater contamination at the Benzinger Site is within the impregnation area of the Carbon Graphite Plant, the indoor air quality in Buildings 62 and 86 was evaluated for intrusion of soil vapor containing VOCs. The indoor air quality was evaluated by both the collection of soil-vapor samples from beneath the concrete floor slabs and by direct measurement of indoor-air VOC concentrations. The sub-slab soil-vapor data were compared to PADEPs non-residential MSCs for soil gas (MSC_{SG}). The only VOC exceeding its MSC_{SG} was TCE which was detected in soil-vapor from 3.5 mg/m^3 to 100 mg/m^3 (TCE MSC_{SG} = 4.8 mg/m^3). The Johnson and Ettinger (J&E) Model was then applied to the soil-vapor data to evaluate the potential for intrusion of VOCs into Buildings 62 and 86. The results of the J&E modeling and risk assessment concluded that concentrations of VOCs detected in the sub-slab soil-vapor samples would not cause indoor-air concentrations posing unacceptable risks to Plant workers. The findings of the J&E modeling and risk assessment were confirmed by the analysis of indoor-air samples collected from Buildings 62 and 86 which showed concentrations of VOCs to be consistently below PADEPs Indoor Air Quality (IAQ) Guidance non-residential MSC_{IAQ}.

Soil:
Most of the historical soil data for the Benzinger Site were collected in 1990 and 1991 during site environmental assessments associated with the sale of the Carbon Graphite Plant. Sampling tended to focus on potential or suspected areas of contamination based on historical practices and/or visual observations. To confirm the representativeness of the historical soil-quality data, supplemental soil samples were collected in December 2004, under the direction of PADEP, at eleven locations in the vicinity of the 1990/1991 soil samples. The December 2004 soil samples were analyzed for VOCs, metals, PAHs, and PCBs. For VOCs, the December 2004 supplemental results showed that VOC concentrations in soils have substantially decreased compared to the VOC concentrations detected at the Site in 1990/1991. The concentrations of metals detected in soil as a result of the December 2004 soil sampling were generally comparable to the 1990/1991 historical soil sampling results. None of the concentrations of VOCs, metals, PAHs, and PCBs detected in December 2004 exceeded their respective PADEP non-residential direct-contact MSCs. With the exception of several VOCs, the reported concentrations were also below PADEPs non-residential soil-to-groundwater MSCs applicable for a used aquifer.

-Surface Soil (0-5 feet deep):
VOCs: TCE, PCE, 1,2-DCA, and 1,2-DCE exceeded the PADEP non-residential soil-to-groundwater MSC in one or more of the surface soil samples. With the exception of TCE in the SS-016 sample (0.78 mg/kg) collected within the Cycle Mix Landfill area, all VOC concentrations exceeding the PADEP soil-to-groundwater MSCs for surface soil were reported for samples collected in the impregnation area; sampling locations STP-6, STP-6 (dup.), SS-001, SS-003, OB-1, OB-2, OB-3, OB4, HMI-1, HM-3, HMI-4, HMI-5, HMI-6, and HMI-7. TCE also exceeded its PADEP non-residential surface-soil direct-contact MSC of 970 mg/kg. Above-MSC values were reported for three samples (STP-6, STP-6(dup.), and SS-001), all of which were collected in the impregnation area in 1990/1991. The reported concentrations in these samples were 970 mg/kg, 1,000 mg/kg, and 7,700 mg/kg, respectively. Analyses of the eleven December 2004 surface soil samples did not detect any VOCs exceeding direct-contact MSCs.

Metals: In 1990/1991, antimony was detected at 39 mg/kg at soil sample location GSC-6 (located west of the maintenance/repair shop), which was above its PADEP soil-to-groundwater MSC of 27 mg/kg (generic value); silver was detected at 220 mg/kg at soil sample location GSC-2 (located north of the car kilns), above its respective PADEP soil-to-groundwater MSC of 84 mg/kg (generic value); and, at soil sample location GSC-1 (located in the northeastern part of the Carbon Graphite Plant), cadmium (470 mg/kg), lead (2,440 mg/kg), copper (40,800 mg/kg), nickel (790 mg/kg), and zinc (13,800 mg/kg) exceeded their respective PADEP generic soil-to-groundwater MSCs, with cadmium and lead also exceeding their respective PADEP direct-contact MSCs. Analyses of the December 2004 surface soil samples did not report concentrations of any metal exceeding its PADEP soil-to-groundwater or direct-contact MSCs.

-Subsurface Soil (5-22 feet deep):
VOCs: TCE, 1,2-DCA, PCE, 1,2-DCE, 1,1-DCE, and vinyl chloride exceeded their respective PADEP soil-to-groundwater MSCs in one or more of the subsurface samples. All but 5 of the 39 samples in which TCE exceeded the soil-to-groundwater MSC were collected at locations within or near the impregnation area (i.e., SS-001, SS-002, SS-003, SS-010, SS-011, SS-012, GSC-6, GSC-10, OB-1, OB-3, OB-4, OB-6, OB-7, OB-8, MW-5d, GM-8, HMI-1, HMI-2, HMI-3, HMI-4, HMI-5, HMI-7). The other 5 sampling locations (i.e., SS-016, GSC-4, FB-17, HMI-8, HMI-10) were in the area of the Cycle Mix Landfill. At these locations, the subject TCE concentrations ranged from 0.78 mg/kg to 18 mg/kg. TCE also exceeded its PADEP non-residential subsurface soil direct-contact MSC of 1,100 mg/kg at 3 soil sample locations (SS-002, 8'-10'; SS-010, 6'-8'; and OB-1, 6'-8'), all of which were collected in the impregnation area during the 1990/1991 sampling event. The reported TCE concentrations in these samples were 1,800 mg/kg, 3,600 mg/kg, and 1,600 mg/kg, respectively. Analyses of the eleven December 2004 subsurface soil samples did not report VOC concentrations exceeding PADEPs direct-contact MSC.

Metals: As a result of the 1990/1991 subsurface soil sampling at the Benzinger Site, several metals were detected above their respective PADEP soil-to-groundwater MSCs. At sample location GSC-1 (4'-6'), located in the area now covered by the warehouse/shipping building at the Carbon Graphite Plant, antimony (MSC 2.7 mg/kg) was detected at 5.9 mg/k and lead (MSC 45 mg/kg) at a concentration of 55 mg/kg. Antimony (5.8 mg/kg) and lead (51 mg/kg) were also detected above their respective PADEP soil-to-groundwater MSCs in soil sample GB-3 (10'-12'), which was collected near the southern edge of the Cycle Mix Landfill. Arsenic (16 mg/kg) was also detected above its PADEP soil-to-groundwater MSC of 15 mg/kg in soil sample GB-3. In the GB-2 sample (12'-14'), also collected near the Cycle Mix Landfill, nickel was detected at 110 mg/kg, exceeding its PADEP soil-to-groundwater MSC of 65 mg/kg. None of the metal concentrations reported for the 1990/1991 subsurface soil sample exceeded the PADEP direct-contact MSCs. Analyses of the eleven December 2004 subsurface soil samples for metals did not report concentrations exceeding either the PADEP soil-to-groundwater MSCs or the direct-contact MSCs.

Surface Water:

-Wetland Surface Water:

The small wetland (about 0.85 acres) at the Benzinger Site is located immediately south of Elk Creek and west/northwest of the Cycle Mix Landfill. During the period from March 2002 to May 2003, surface water quality in the wetland area was investigated. Water samples were collected at four locations within the wetland and at the drainage culvert that enters the wetland and analyzed for VOCs and selected metals. The primary VOCs detected in wetland surface water (i.e., at sampling locations SW-0, SW-1, SW-3, and SW-4) are TCE, 1,2-DCE, and 1,2-DCA. TCE was detected in 16 of the 17 wetland water samples at concentrations ranging from 4 µg/L to 65 µg/L; 1,2-DCE was detected in 13 of the samples at concentrations ranging from 7 µg/L to 250 µg/L; and, 1,2-DCA was detected in 14 of the samples at concentrations ranging from 5 µg/L to 39 µg/L. Vinyl chloride was also detected in 3 of the 17 wetland water samples at concentrations ranging from 3 µg/L to 93 µg/L. The presence of VOCs in wetland surface water is attributed to groundwater discharges (primarily upwelling from the D aquifer zone).

-Elk Creek:

Elk Creek has been interpreted to be the discharge point for groundwater flowing in the USCGS beneath the Benzinger Site. In November 1990, two surface-water samples were collected from Elk Creek; one upstream to the east of Trout Run Road (SW-1), and one downstream (within the Site) to the west and downstream of the Cycle Mix Landfill and wetland area (SW-2). VOCs detected in the upstream surface-water sample (SW-1) included TCE (24 µg/L), 1,2-DCA (12 µg/L), 1,2-DCE (2 µg/L), acetone (4 µg/L), and chloroform (1 µg/L). Whereas, in the downstream surface-water sample (SW-2), the only VOCs detected were TCE (2 µg/L), 1,1,1-TCA (0.9 µg/L), and acetone (3 µg/L). The results of such samples indicate an upstream source or sources, unrelated to the Benzinger Site, are contributing VOCs to Elk Creek. With respect to TCE, 1,1,1-TCA, and acetone detected in sample SW-2, the reported values for each of these compounds were substantially below the Criteria Continuous Concentrations (450 µg/L, 610 µg/L, and 86,000 µg/L, respectively) and the Criteria Maximum Concentrations (2,300 µg/L, 3,000 µg/L, and 450,000 µg/L, respectively) specified in 25 PA Code Chapter 93, Water Quality Standards. TCE and acetone were also below the Chapter 93 human health criteria of 2.5 µg/L and 3,500 µg/L, respectively. No human health criterion is listed in Chapter 93 for 1,1,1-TCA.

-Seepages:

Three seepage areas have been identified at the Benzinger Site; seepage at the SW-5 location (immediately south of Elk Creek toward Trout Run Road), seepage at the SW-6 location (near storm-water catchment CB-7A and west of Building 55), and seepage in the area to the north of Building 157. Seepages SW-5 and SW-6 were sampled and analyzed for VOCs in 2002 and 2004. At SW-5, TCE was typically the only VOC detected at concentrations ranging from below detection to 15 µg/L. As for SW-6, TCE was detected at 9 µg/L to 174 µg/L and 1,2-DCE ranged from below detection up to 121 µg/L. Seepage at SW-6 occurs primarily following periods of relatively high precipitation. During construction activities in the area of Building 157 performed by Carbone during late spring of 2008, seepage of water in the area of an abandoned catch basin was identified. Carbone collected samples of the seepage in June 2008 which showed TCE at concentrations ranging from 6 µg/L to 114 µg/L. Additional samples of the seepage were collected in August 2008 and April 2009 and showed TCE concentrations in the immediate vicinity of the former catch basin ranging from 9.8 µg/L to 31 µg/L. With distance of flow away from the catch basin, TCE concentrations decreased, with non-dectects consistently reported for samples collected inside the fence line of the Carbone facility.

Wetland Sediment:

A total of 10 sediment samples (WLS-1 through WLS-10) were collected from the small wetland at the Benzinger Site in July 2002. Constituents of concern identified in the sediment samples included arsenic, barium, beryllium, cadmium, chromium, copper, lead, selenium, silver, 2-butanone, and 1,2-dichloroethene.

References:

(1) Combined Remedial Investigation Report/Final Report, The Benzinger Site, Revised December 2007.
(2) Final Environmental Indicator Inspection Report for Carbone of America Industries, January 2003.

Footnotes:

[1] "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

[2] Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that

unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

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

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

Summary Exposure Pathway Evaluation Table

Potential **Human Receptors** (Under Current Conditions)

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

Instructions for Summary Exposure Pathway Evaluation Table:

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

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

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

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

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

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

Rationale and Reference(s):
Incomplete Pathways
The Benzinger Site's current and future use will be for industrial purposes only. With respect to the groundwater beneath and downgradient from the Benzinger Site, it is not used for either domestic or industrial supply. The area affected by ground-water contamination at the Benzinger Site is served by the St. Mary's Area Joint Water Authority public water supply system. During August and September 2004, the Hall Corporation conducted a door-to-door survey within the area extending 1,000 feet downgradient from the property boundary, and confirmed that all developed properties are connected to the St. Mary's public water supply system and that no private or industrial water supply wells are used or known to exist at any of the properties. In addition, environmental restrictions and easements, including groundwater use restrictions, have been recorded for the Prechtl truck terminal and the other subdivided lots that Albert Prechtl purchased from the Hall

Corporation after November 1990. Also, environmental covenants in the form prescribed by the Uniform Environmental Covenants Act (UECA Covenants) have been prepared and submitted to the PADEP for review and approval for the Carbon Graphite Plant, Lots No. 2 and 3, and the three Prechtl lots covered by the previously recorded environmental restrictions and easements. Furthermore, the Pennsylvania Uniform Construction Code, as well as certain St. Mary's existing governmental codes, rules, and regulations, require that any newly-constructed or altered buildings connect to the public water supply system where it is available. Therefore, complete exposure pathways to contaminated groundwater do not exist for residents, daycares, recreation, trespassers, and food due to current and future site use as industrial, the availability of a public water supply in the area, and institutional controls prohibiting the use of groundwater.

Complete Pathways

-Outdoor Plant Worker:

Outdoor plant workers could be exposed to constituents in surface soil and seepages in those areas of the Site not covered by buildings or paved surfaces. The primary exposure pathway for an outdoor plant worker would be through dermal contact, inhalation of both VOCs and particulates, and through incidental ingestion.

-Construction/Excavation Worker:

Current and future Site activities may include excavation work (e.g., foundation construction, utility installation/replacement), which could result in the exposure of excavation workers to constituents in soil, shallow groundwater, and/or seepages containing VOCs and/or metals through dermal contact, incidental ingestion, and inhalation of vapors or dust.

-Trespasser:

A trespasser could be exposed to constituents in surface soil, surface water (wetland surface water, seepages), and wetland sediments through dermal contact, inhalation of both VOCs and particulates, and through incidental ingestion.

References:

(1) Combined Remedial Investigation Report/Final Report, The Benzinger Site, Revised December 2007.
(2) Final Environmental Indicator Inspection Report for Carbone of America Industries, January 2003.
(3) Human Health and Ecological Risk Assessment, May 2007

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

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

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

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

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

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

Rationale and Reference(s):

Remediation:

Remediation activities within the Carbon Graphite Plant have been performed pursuant to a remedial plan approved by a Consent Order and Agreement dated November 25, 1991 between Hall and PADEP. Remediation was first initiated during 1993 and 1994 to remove VOCs from the soil using soil-vapor extraction (SVE) and vacuum-enhanced recovery (VER), and from the groundwater by pumping of recovery wells. As of December 2007, a total of seven groundwater recovery wells were being pumped; REC-1 through REC-5, which are located in the impregnation area, and REC-11 and REC-12, located downgradient from the impregnation area. Groundwater is also collected by an automated sump installed in one of the Building 62 pits (located in impregnation area), and by a shallow collection drain/sump system that collects seepage in the northwest area of the Carbon Graphite Plant. SVE was operated until 2005 and was typically applied at four of the impregnation-area collector trenches at a given time. VER has been applied at groundwater recovery wells REC-1 through REC-5.

Surface Soil Direct-Contact Exposure Pathway:

To ensure that exposures from direct-contact with contaminated surface soil were not reasonably expected to be significant, this exposure pathway was evaluated using a Human Health and Ecological Risk Assessment (Risk Assessment). Although open areas at the Benzinger Site not covered by buildings or paved surfaces are relatively small and are not located in areas where activity occurs on a frequent or regular basis, and within the primary area of soil contamination (i.e., the impregnation area), all surfaces are paved, for purposes of the Risk Assessment, it was assumed that building floor slabs and paved surfaces (i.e., exposure pathway barriers) were not present. In addition, the Risk Assessment utilized 1990/1991 soil analytical data that were collected prior to any remediation activities at the Site and are biased toward worst-case conditions. Based on these factors, the Risk Assessment concluded that there is not an unacceptable cumulative risk to Plant workers, construction workers, or trespassers from exposure to contaminated surface soil at the Benzinger Site.

Groundwater Exposure Pathway:

The groundwater exposure pathway for construction workers is complete; however, workers are expected to control exposure using protective gear and following a site-specific health and safety plan, in addition to plant safety procedures. In addition, a Risk Assessment was conducted to ensure that exposure to contaminated groundwater by construction workers was not unacceptable. The results of the Risk Assessment concluded that risks were within acceptable levels for reasonably foreseeable exposure scenarios.

Surface Water/Sediment Exposure Pathway:
It was assumed that a youth (age 9 to 18) trespasses on to the Benzinger Site in the area of the wetland once each week from April to October and is exposed to surface water and sediment in the wetland by incidental ingestion of surface water and sediment, dermal contact with surface water and sediment, and inhalation of VOCs from surface water. The risk associated with exposure to contaminated surface water and sediment was evaluated via a Risk Assessment. The Risk Assessment concluded that the potential for adverse health effects to the trespassing youth was not unacceptable. The risked posed to plant and/or construction workers at the Site who may come into contact with contaminated seepages was also evaluated by the Risk Assessment. The results of the Risk Assessment indicated that such exposure to contaminated seepages by plant and/or construction workers would not be significant.

References:

(1) Combined Remedial Investigation Report/Final Report, The Benzinger Site, Revised December 2007.
(2) Final Environmental Indicator Inspection Report for Carbone of America Industries, January 2003.
(3) Human Health and Ecological Risk Assessment, May 2007

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

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

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

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

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

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

Rationale and Reference(s):

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

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

X YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the Carbone of America Industries – The Benzinger Site facility, EPA ID No. PAD000739631, located at 1032 Trout Run Road, St. Mary's, Pennsylvania 15857 under current and reasonably expected conditions. This determination will be re-evaluated if the Agency becomes aware of significant changes at the facility.

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

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

Completed by (signature) _____ Date 10/12/2010
(print) Jeanna R. Henry
(title) Remedial Project Manager

Supervisor (signature) _____ Date 10/19/2010
(print) Paul Gotthold
(title) Associate Director
Office of Pennsylvania Remediation
EPA Region 3

Locations where References may be found:

US EPA Region III
Land & Chemicals Division
1650 Arch Street
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