

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: Stackpole Corporation
Facility Address: 201 Stackpole Street, St. Marys, PA 15857
Facility EPA ID #: PAD063652820

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?

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

If no - re-evaluate existing data, or

if data are not available skip to #6 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

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

Definition of "Current Human Exposures Under Control" EI

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

Relationship of EI to Final Remedies

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

Duration / Applicability of EI Determinations

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

Facility Background

Stackpole conducted manufacturing activities from 1906 to 1992 at the St. Mary's, PA facility. The company produced carbon and graphite products, organic bonded and ceramic resistors for electric operations, and soft ferrite magnetic cores for various electronic devices. The site was heavily developed with a large portion of the land area covered by administrative, manufacturing and materials storage buildings, and roadways. Many of the buildings were demolished or rehabilitated after North Central Enterprises took control of Stackpole Center in 1995. Stackpole has become an economic development resource for the City of St. Marys. Currently, Stackpole Center is occupied by approximately 22 businesses with a combined total of about 300 employees. Stackpole transferred its obligations for management of environmental conditions at the site to EMSOURCE St. Marys, LLC (ESM) in December 2003.

An Act 2 "Buyer-Seller" CO&A was developed to remediate Stackpole Center to "site specific" standards. The property has been divided into a Northeast Area and a Southwest Area. Separate Remedial Investigation and Risk Assessment Reports have been completed or will be completed for each of the areas. An Act 2 Final Report for the Northeast Area was submitted to PADEP in February 2005. Much of the information contained in this EI determination was obtained from a draft risk assessment for the Southwest Area, provided to EPA by EMSOURCE. The results of this EI determination may change pending EPA's or PADEP's review of the final risk assessment document.

From 1974 through 1984, Stackpole utilized 3 ferrite lagoons to treat various waste streams, at least one of which (Kane grinding sludge) was a D005 (barium) and D008 (lead) hazardous waste. The lagoons underwent formal RCRA closure under Pennsylvania Department of Environmental Protection (PADEP) supervision. Groundwater is monitored quarterly with results submitted to PADEP. There is no suspected release from this unit that could pose a risk of human exposure and therefore this unit is not further discussed in this EI determination.

From 1967 through 1986, Stackpole operated two surface impoundments used to treat electroplating wastewater and dispose of hazardous wastes designated as listed F006, F007 and F008 (plating bath residues and sludges from electroplating operations). The surface impoundments were clean closed with the contaminated soils and wastes disposed of in an engineered on-site disposal cell. Groundwater is monitored annually. No releases from the disposal cell have been documented and therefore this unit is not further discussed in this EI determination.

Stackpole formerly stored containerized hazardous waste at a facility designated as the Liquid Waste Storage Compound (LWSC) which sits atop closed portions of the old Tannery Landfill. The old tannery waste lagoons were used by the Armour Leather Company in leather tanning and dyeing operations which included the use and disposal of aniline and other residual wastes. PADEP approved a closure plan in 1991 for an in-place closure for the Tannery Landfill that included the LWSC. The entire site is vegetated. Chlorinated organics have been found in groundwater beneath the site since a groundwater assessment was performed in 1990. A groundwater pump and treat system was put in place in January 1992 and was taken out of service in 1996. Groundwater monitoring in this area continues currently. There are no suspected releases that could pose a risk of human exposure from this waste unit and therefore this unit is not further discussed in this EI determination.

Prior to 1993, Stackpole Center manufacturing activities included a process that used coal tar. A coal tar storage tank and its associated handling equipment were once located adjacent to Building 33 in the Southwest Area's Open Area. Coal tar spills were known to have occurred in October 1988 and July 1989. After both instances, Stackpole excavated and disposed of coal tar liquids and contaminated soils in the area and backfilled the area with clean fill.

Another area of concern is the recently discovered VOC contamination in the subsurface soils and groundwater at the former location of the Specialty Purpose Resistor (SPR) Building. The former SPR Building was located approximately 100 feet northeast of the intersection of John and Stackpole Streets. Operations at this location involved the use of chlorinated organics such as tetrachloroethylene (PCE) and trichloroethylene (TCE). The groundwater plume in the lower aquifer system emanating from this area is directed to the west toward off-site commercial and residential properties. However, samples collected from the upper aquifer in the vicinity of the residential properties have revealed very little to no contamination. Stackpole began monitoring the wells associated with the SPR Building plume on a quarterly basis in the summer of 2003 and is currently evaluating the plume's stability and whether natural attenuation is occurring within the plume.

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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)?

	<u>Yes</u>	<u>No</u>	<u>?</u>	<u>Rationale / Key Contaminants</u>
Groundwater	<u>X</u>	___	___	volatile organics, lead
Air (indoors) ²	<u>X</u>	___	___	volatile organics, lead
Surface Soil (e.g., <2 ft)	<u>X</u>	___	___	volatile organics
Surface Water	<u>X</u>	___	___	volatile organics, PAHs
Sediment	<u>X</u>	___	___	benzo(a)pyrene, lead
Subsurf. Soil (e.g., >2 ft)	<u>X</u>	___	___	volatile organics, PAHs
Air (outdoors)	___	<u>X</u>	___	none

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

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

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

Rationale and Reference(s):

See Following Pages

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

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

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Groundwater

The site is underlain by three different types of unconsolidated deposits including, fill material, natural unconsolidated deposits and weathered bedrock. The combined thickness of the unconsolidated deposits generally ranges between 10 and 18 feet, although a thickness of only 4 to 6 feet exists in the vicinity of monitoring well MW-13D in the southern portion of the Northeast Area. The uppermost bedrock units beneath the site are the shales and siltstones of the Pennsylvanian-age Pottsville Group.

The uppermost groundwater flow zone occurs in the natural silt and clay deposits and the underlying weathered bedrock. Depth to groundwater in the uppermost aquifer ranges from 1 to 10 feet. In the Northeast Area, groundwater flow in the unconfined aquifer is to the west-southwest toward Elk Creek and North Elk Creek. The direction of groundwater flow in the unconfined aquifer in the Southwest Area is also toward Elk Creek, predominantly in a westerly direction.

Northeast Area

Nineteen monitoring wells have been installed in the Northeast Area, including 15 that monitor the shallow groundwater zone and four that monitor groundwater in the upper bedrock. The wells were sampled in 1994/1995 and 2001.

Several VOCs, primarily chlorinated hydrocarbons, were detected in samples collected from monitoring wells tapping the shallow groundwater zone. Ten different VOCs were detected at concentrations exceeding PADEP's Non-Residential Used Aquifer Medium Specific Concentrations (MSCs) in at least one sample location. The most prevalent contaminants include TCE (max. conc. - 11.44 mg/l at MW-5, vinyl chloride (max. conc. - 0.42 mg/l at MW-8), cis-1,2-DCE (max. conc. - 2.8 mg/l at MW-8), 1,2-DCA (max. conc. - 19 mg/l at MW-8) and 1,1-DCE (max. conc. - 0.064mg/l at MW-14). Monitoring well MW-2 was the only location containing semivolatile organic compounds at concentrations greater than the corresponding Act II Non-Residential Used Aquifer MSCs. A sample collected from MW-2 in November 1994 was found to contain pyrene (57 ug/l), benzo(a)anthracene (39 ug/l), chrysene (44 ug/l), benzo(b)fluoranthene (30 ug/l), benzo(k)fluoranthene (26 ug/l) and benzo(a)pyrene (23 ug/l). Lead in a sample collected from MW-15S in May 2001 (12 ug/l) was the only metal detected above the PADEP non-residential used aquifer MSC of 5 ug/l in any of the shallow groundwater samples. Lead was not detected in MW-15S when it was resampled one month later in June 2001. Although a few groundwater hotspots occur in the Northeast Area, there is no well defined plume of contaminants in the shallow aquifer.

The only VOC detected at a concentration above the non-residential MSC in the bedrock aquifer in the Northeast Area was 1,2-dichloroethane (1,2-DCA) in a sample collected from MW-13D. Lead in one bedrock well (MW-17D (7 ug/l in May 2001)) was the only metal detected above the MSC; however, lead was not detected in a sample collected from that location in June 2001.

Southwest Area

Groundwater sampling has been conducted in the Southwest Area since 1991. There are 31 monitoring well locations within the Southwest Area boundaries, including shallow wells and deeper wells that monitor the upper bedrock aquifer. Eleven well clusters containing a total of 32 wells are also located offsite and downgradient of Stackpole Center.

The historical sampling results indicate that the shallow groundwater in the vicinity of the Southwest Area's Main Plant Area contains concentrations of the following contaminants in excess of the non-residential MSCs for groundwater in a used aquifer: 1,1-dichloroethene (1,1-DCE), 1,2-DCA, 1,2-dichloroethene (1,2-DCE), cis-1,2-dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE), methylene chloride, PCE, TCE, vinyl chloride, naphthalene,

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cadmium and nickel. The shallow groundwater in the vicinity of the Special Purpose Resistors Area has been found to contain 1,1-DCE, 1,2-DCE, PCE, TCE and vinyl chloride at concentrations greater than the non-residential MSCs for groundwater in a used aquifer. The shallow groundwater in the vicinity of the Coal Tar Area contains 1,2-DCE, cis-1,2-DCE, TCE and vinyl chloride at concentrations greater than the non-residential MSCs for groundwater in a used aquifer.

TCE and 1,2-DCE have been detected in shallow groundwater samples collected from Offsite Areas at concentrations greater than the residential MSCs for groundwater in a used aquifer. The source of this contamination is likely the former SPR Building Area and a chlorinated organic contaminant plume has been delineated flowing northwesterly from the SPR Building Area towards Elk Creek. Portions of the plume are believed to flow beneath the commercial buildings located on the south side of Stackpole Street across from the Main Plant Area. The shallow aquifer plume is not believed to flow beneath any residential areas prior to discharging into Elk Creek.

Several volatile organic compounds including 1,2-DCA, 1,2-DCE, PCE, TCE and vinyl chloride have been detected at concentrations greater than the non-residential direct contact MSCs for groundwater in a used aquifer in samples collected from the intermediate and bedrock aquifers in onsite areas. The same contaminants with the exception of vinyl chloride were detected in intermediate and bedrock groundwater samples collected from off-site locations at concentrations exceeding the residential direct contact MSCs for groundwater in a used aquifer. Chlorinated organic plumes have been delineated flowing westerly from the SPR Building Area off-site to beneath commercial and residential areas between Brussels and Depot Streets on both sides of Elk Creek.

Surface and Subsurface Soil:

Northeast Area

Soil samples were collected from 33 locations in the Northeast Area in 1994/1995 and were submitted for chemical analysis.

Twelve (12) surficial soil samples were collected and analyzed for VOCs. The only contaminants detected above the PADEP 100 x GW MSC Soil to Groundwater MSC were methylene chloride, PCE and TCE. Most of this contamination was detected in samples D-2, D-3, D-4 and D-5 located in the southeast portion of the Northeast Area within 50 feet of the railroad tracks. None of these contaminants were detected at concentrations above the PADEP non-residential direct contact soil MSC. The only soil to groundwater MSC exceedence away from this area was the TCE (1.14 mg/kg) found in sample TS-1, which was actually collected below the floor of Bldg. 169 near the confluence of Elk Creek and North Elk Creek. That concentration, however, is also below the non-residential direct contact soil MSC for TCE (970 mg/kg). No exceedences of any of the applicable MSCs were observed in any of the seven surficial soil samples analyzed for polynuclear aromatic hydrocarbons (PAHs). Ten surficial soil samples were analyzed for metals and cyanide. Lead was found in three of the samples at concentrations slightly exceeding the PADEP generic value soil to groundwater MSC of 450 mg/kg. In addition to the lead exceedence, sample DS-3, collected near the railroad tracks along the northeastern property boundary, was found to also contain antimony and thallium at concentrations slightly above their respective soil to groundwater MSCs but below the non-residential direct contact MSC. While arsenic was found in each of the 10 surficial soil samples at concentrations exceeding EPA Region III's industrial direct contact risk based concentration (RBC) of 1.9 mg/kg, none of the samples contained arsenic above the Non-residential direct contact MSC of 53 mg/kg. Six surface soil samples were analyzed for total

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polychlorinated biphenyls (PCBs). One sample (D-5) was found to contain total PCBs at a concentration of 2.87 mg/kg, which is greater than the lowest applicable soil to groundwater MSC for aroclor-1232 (2.1 mg/kg), although it is unknown which aroclor species was present in the sample. The lowest applicable non-residential direct contact MSC is 44 mg/kg.

Eighteen (18) subsurface soil samples (>2' depth) were collected and analyzed for VOCs. TCE was detected at concentrations in excess of the applicable PADEP soil to groundwater MSC in five of the samples. Benzene was found to exceed the soil to groundwater MSC in two of the soil samples, vinyl chloride was found in two samples at concentrations above the soil to groundwater MSC and 1,2-DCA was detected in a single sample (MW-8, 11'-13') at a level above the soil to groundwater MSC. No exceedences of the applicable MSCs were observed in any of the seven subsurface soil samples analyzed for PAHs. Nine subsurface soil samples were analyzed for metals and cyanide. Antimony (10 mg/kg) in sample B-5, cadmium (4.5 mg/kg) in sample B-3 and lead (55 mg/kg) in sample B-7 were the only contaminants detected above the applicable soil to groundwater MSCs. None of the eight subsurface soil samples analyzed for total PCBs contained that contaminant in excess of the lowest applicable soil to groundwater MSC for a PCB (aroclor-1232, 2.2 mg/kg). None of the above contaminants found in subsurface soils were detected at concentrations greater than the non-residential direct contact MSCs for subsurface or surface soil.

In summary, no contaminants were detected in any of the surface soil or subsurface soil samples collected in the Northeast Area at concentrations above the corresponding PADEP non-residential direct contact MSCs. Although there were several exceedences of the soil to groundwater MSCs, groundwater is not used for any known purpose in the vicinity of the site, eliminating the potential for human exposure except for possible contact by construction workers during excavation activities. This possible route of exposure is addressed in the groundwater sections of this EI determination.

Southwest Area

The southwest area surface and subsurface soils were sampled in March 1991 through August 2004. The southwest area is further broken down into four separate areas, namely the Main Plant Area, Open Area, Special Purpose Resistors (SPR) Area and the Coal Tar Area. The Main Plant Area contains several currently operational buildings and can be further divided into western and eastern portions by Elk Creek. The Open Area contains no buildings and is located adjacent to and southeast of the eastern portion of the Main Plant Area. The Tannery Landfill is contiguous to the Open Area but is not considered part of that area. Within the boundaries of the Open Area, however, are the two remaining portions of the Southwest Area, the SPR and Coal Tar Areas.

Nine surface and 51 subsurface soil samples were collected from the main plant area. Eight surface and 8 subsurface soil samples were collected from the Open Area. Soil samples were collected at 16 surface and 99 subsurface locations in the SPR Area. Six subsurface soil samples were collected from the Coal Tar Area.

No contaminants were detected at concentrations greater than the non-residential direct contact MSCs in any of the surface/subsurface soil samples collected in the Open Area.

Lead was the only constituent detected at a maximum concentration exceeding the non-residential direct contact MSC for surface soil in the Main Plant Area, although there were a few exceedences of EPA's Industrial Soil Direct Contact RBCs for PAHs including benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene. For subsurface soils in the Main Plant Area, the PAHs found above the EPA RBCs above, as well as dibenz(a,h)anthracene were found at concentrations in excess of the non-residential direct contact MSCs for subsurface soils.

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The surface soil samples collected in the SPR Area did not contain any constituents at concentrations above the non-residential direct contact MSCs, although PCE, TCE, vinyl chloride and a few PAHs were detected at concentrations exceeding the industrial direct contact RBCs in at least one of the samples. The SPR Area subsurface samples did contain a few exceedences of the non-residential direct contact MSCs for TCE and vinyl chloride. In addition to TCE and vinyl chloride, PCE was also found in the subsurface soils of the SPR Area at concentrations in excess of EPA's industrial direct contact RBC.

Benzo(a)pyrene was the only constituent detected in the subsurface soils of the Coal Tar Area at concentrations exceeding the non-residential direct contact MSC for subsurface soil. Other PAHs, including benzo(a)anthracene, benzo(b)fluoranthene, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene were found at concentrations in excess of their industrial soil direct contact RBCs as well.

Surface Water:

The site is bisected into the Northeast and Southwest Areas by Elk Creek, which enters the site property from the east. North (Lower) Elk Creek, which enters Stackpole Center from the north, flows along the western boundary of the Northeast Area until its confluence with (Upper) Elk Creek in the vicinity of Building No. 169. The combined flow of North Elk Creek and Elk Creek flows off the facility property as (Lower) Elk Creek to the west.

In July and August 1997, surface water samples were collected at 21 locations along Elk Creek, North Elk Creek and Simon's Run (a small tributary that discharges into North Elk Creek near the Stackpole Center northern boundary). All of the samples were analyzed for VOCs and samples from 11 locations were additionally analyzed for PAHs and metals.

TCE and 1,2-DCE were the only VOCs detected in samples collected from locations adjacent to the Northeast Area during the above sampling event. TCE was found at a concentration of 1.0 µg/l in two samples collected on opposite stream banks at STR-3, located within North Elk Creek approximately 100 ft. upstream of the confluence of Elk and North Elk Creeks. 1,2-DCE was found at several of the downstream samples in both Elk Creek and North Elk Creek at concentrations ranging from 1.0 µg/l to 5.0 µg/l. All of the detected concentrations of VOCs were below the PA Chapter 16 Aquatic Life Continuous and Human Health Water Quality Criteria. Although some PAH contaminants were detected in sample STR-20 at concentrations above one or more Chapter 16 criteria, the same contaminants were detected at higher concentrations in off-site, upstream sample STR-6, indicating the contamination seen at STR-20 was from an off-site source.

Along the portions of Upper Elk Creek and Lower Elk Creek adjacent to or downstream of the Southwest Area, TCE in the Lower Elk Creek was the only VOC detected above the applicable PADEP water quality criteria. Benz(a)anthracene and benzo(b)fluoranthene were the only contaminants detected above the State screening criteria in surface water samples collected from the Upper Elk Creek.

Sediment:

Sediment samples were collected at six locations along Upper Elk Creek and North Elk Creek adjacent to the Northeast Area as part of the 1997 stream sampling program. Although a few VOCs were detected in sample SED-21 in Upper Elk Creek and styrene was detected in the duplicate sample collected in North Elk Creek at SED-24, the concentrations of these contaminants were all below the PADEP residential direct-contact MSCs for soil. Approximately ten PAH compounds were detected in sediment samples collected from upper Elk Creek but the same contaminants at similar concentrations were also detected in the background sediment samples collected in that water body. In North Elk Creek, PAH compounds were only detected in the background sediment samples.

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For the Southwest Area, samples were collected from three locations in Lower Elk Creek in the area intersecting the Main Plant Area and a total of four samples were collected from locations in Upper Elk Creek adjacent to the Main Plant Area and near the Coal Tar Area. Some of the sediment sampling occurred as part of the 1997 stream sampling program with the remainder of the sampling completed in March 2005. The analytical data indicate that benzo(a)pyrene and lead were present in sediment samples collected from Lower Elk Creek at concentrations greater than the PADEP residential direct contact MSCs for soil. Benzo(a)pyrene was the only contaminant detected above its respective MSC in sediment samples collected from Upper Elk Creek.

Air (indoor)

The following VOCs have been detected in the soils of the Northeast Area: 1,1,2-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethene, 1,2-dichloroethane, 1,2-dichloroethene (total), 4-methyl-2-pentanone, benzene, carbon tetrachloride, chloroform, ethylbenzene, methylene chloride, PCE, toluene, TCE, vinyl chloride and xylene (total). Of all of these contaminants, only vinyl chloride has been detected at a concentration above PADEP's default volatilization to indoor air screening level. However, since the default screening levels cannot be used in instances where the depth to contamination is less than five feet, the default screening levels cannot be used and further evaluation is warranted.

Similarly for groundwater in the Northeast Area, since depth to groundwater is less than five feet in many locations, none of the groundwater contaminants can be screened out of the groundwater volatilization to indoor air pathway even though 1,2-dichloroethane was the only contaminant detected at a concentration above the PADEP default screening level. A similar list of the chlorinated organics and other VOCs in soils also exists for groundwater samples collected from the shallow aquifer beneath the Northeast Area.

Using the same methodology for groundwater in the Southwest Area, only vinyl chloride in the SPR Area was detected at a concentration above the PADEP default screening level. Since depth to groundwater is less than five feet in some areas, all of the detected VOCs are initially suspected to have the potential to cause indoor air quality concerns.

Soil gas samples were collected in 2004 from beneath the concrete floors of Building Nos. 53 and 54 in the Southwest Area. These buildings are currently occupied and are located in an area with elevated concentrations of VOCs in the shallow groundwater. Several chlorinated organics including 1,2-dichloroethene (total), cis-1,2-dichloroethene, TCE and vinyl chloride were found in soil gas samples at concentrations exceeding the non-residential soil gas MSCs contained in PADEP's Vapor Intrusion Technical Guidance Manual. Other contaminants were also found at concentrations exceeding EPA's target soil gas concentrations.

Another area requiring further evaluation is the off-site commercial/residential area located downgradient of the former SPR Area. Contaminants in the shallow groundwater plume emanating from this area toward off-site commercial properties predominantly include, 1,2-dichloroethane, 1,2-dichloroethene, PCE, TCE and vinyl chloride.

Air (Outdoor)

Risk Assessment reports for both the Northeast and Southwest Areas evaluated the potential risk associated with exposure to particulates and volatiles in Ambient Air from both soil and groundwater sources. It was concluded that the potential for adverse ncarcinogenic effects for all chemicals and receptors was below the benchmark hazard index of 1.0 and the theoretical excess lifetime cancer risk associated with exposure to ambient air at the site was also well within acceptable levels as well.

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Ref.: Plan for Abatement of Groundwater Discharge to Elk Creek Building 54 Area, Stackpole Center, St. Marys, PA, prepared by Civil & Environmental Consultants, Inc., April 2001; Remedial Investigation Report, Stackpole Center Industrial Subdivision (SCIS), Northeast Area, St. Marys, PA, prepared by Hydrosystems Management, Inc. (HMI), November 2001; Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils, USEPA, November 2002; Land Recycling Program Technical Guidance Manual - Section IV.A.4. Vapor Intrusion into Buildings from Groundwater and Soil under the Act 2 Statewide Health Standard, January 24, 2004; Analysis of Potential Vapor Intrusion and Related Health Risk Assessment for Downgradient Areas, SCIS, Southwest Area, St. Marys, PA, prepared by Risk Based Remedies (RBR) Consulting, Inc., March 2004; Human Health and Ecological Risk Assessment, SCIS, Northeast Area, St. Marys, PA, prepared by RBR Consulting, Inc., May 2004; Soil Sampling Report, Former Special Purpose Resistors Area, SCIS, St. Marys, PA, prepared by HMI, June 2004; Results of PENTOXSD Modeling for Elk Creek, SCIS – Southwest Area, St. Marys, PA, prepared by HMI, June 2004; Act 2 Final Report, SCIS, Northeast Area, St. Marys, PA, prepared by HMI, February 2005; Assessment of Plum Stability and Monitored Natural Attenuation, Stackpole Center, Southwest Area and Former SPR Area, St. Marys, PA, prepared by GeoSyntec Consultants, April 2005; Draft Human Health and Ecological Risk Assessment, SCIS, St. Marys, PA, prepared by RBR Consulting, Inc., June 2005; Supplemental Evaluation of Surface Soil Data from the SPR Area, SCIS, Southwest Area, St. Marys, PA, Memorandum prepared by RBR Consulting, Inc., September 2005; Supplemental Evaluation of Soil Gas Data from Buildings 53 and 54, SCIS, Southwest Area, St. Marys, PA, Memorandum prepared by RBR Consulting, Inc., September 2005.

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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)

<u>“Contaminated” Media</u>	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food ³
Groundwater	<u>No</u>	<u>No</u>	<u>No</u>	<u>Yes</u>			<u>No</u>
Air (indoors)	<u>Yes</u>	<u>Yes</u>	<u>No</u>				
Soil (surface, e.g., <2 ft)	<u>No</u>	<u>No</u>	<u>No</u>	<u>Yes</u>	<u>Yes</u>	<u>No</u>	<u>No</u>
Surface Water	<u>No</u>	<u>No</u>			<u>Yes</u>	<u>Yes</u>	<u>No</u>
Sediment	<u>No</u>	<u>No</u>			<u>Yes</u>	<u>Yes</u>	<u>No</u>
Soil (subsurface e.g., >2 ft)				<u>Yes</u>			<u>No</u>
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):

See Following Pages

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

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Groundwater

As described in the rationale for Question No. 2 above, several VOCs and a few metals have been detected in the groundwater beneath the site, with some VOC contamination occurring in the shallow, intermediate and bedrock aquifers downgradient of the site. The most common contaminants observed in groundwater include chlorinated solvents such as 1,2-DCA, 1,2-DCE, TCE, PCE and vinyl chloride. While a well-defined contaminant plume was never observed in the Northeast Area, a well delineated chlorinated organic plume is seen emanating from the SPR Area to off-site locations.

Groundwater in the vicinity of the site is not used as a source of drinking water. There is an ordinance in place that prohibits groundwater use at the site and the surrounding area is serviced by the City of St. Marys public water supply system. Any commercial or residential buildings constructed, altered or newly occupied after July 8, 2004 must use the public water supply system. Also, a 1995 Buyer/Seller Consent Order and Agreement prohibits the consumptive use of groundwater beneath the site, unless approved by PADEP. There are no known residential wells downgradient of the site used for either potable or non-potable purposes.

Although groundwater is not used as a source of drinking water, direct exposure to groundwater in the shallow aquifer is possible during construction/excavation activities. While it is likely that an on-site construction worker would be aware of the potential exposure to hazardous constituents in groundwater and would as a result wear the proper protective equipment (PPE) to minimize or eliminate the exposure, this cannot be guaranteed, and therefore must be further evaluated.

Soil and Subsurface Soil

While the vast majority of surface and subsurface soil samples did not contain any contaminants at concentrations above the PADEP non-residential direct contact MSCs, lead was detected in surface soil samples in the Main Plant Area within the Southwest Area above its respective MSC. Lead and a few PAHs were detected in subsurface soil samples collected in the Main Plant Area at concentrations above the non-residential direct contact MSCs for subsurface soils. Benzo(a)pyrene was the only contaminant detected in a subsurface soil sample in the Coal Tar Area at a concentration greater than its respective non-residential direct contact MSC. In the SPR Area, although no surficial soil samples were found to contain contaminants in excess of the non-residential MSCs, several of the samples did contain PCE, TCE, vinyl chloride and a few PAHs at concentrations in excess of the EPA Region III RBCs for industrial soils. The subsurface soils in the SPR Area were found to contain TCE and vinyl chloride at concentrations in excess of the non-residential direct contact MSCs for subsurface soils.

The presence of contaminants in surface and subsurface soils indicate the potential for a complete pathway between the contamination and human receptors and therefore, any receptors with potential to directly contact site soils must be assessed for incidental ingestion of constituents in soil and dermal contact with constituents in soil. Potential receptors at the site would include outside workers, construction/excavation workers and trespassers.

Surface Water

Historical surface water sampling has indicated the presence of TCE, benz(a)anthracene and benzo(b)fluoranthene at concentrations greater than the PA Chapter 16 Aquatic Life Continuous and Human Health Water Quality Criteria. Upper Elk Creek and Lower Elk Creek have no known recreational uses, are not known to be fished, and are not used as a source of drinking water (unrelated site activities such as acid mine drainage has rendered these streams unsuitable for potable use).

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A groundwater containment and recovery well was installed in Building No. 54 and has been operating since late 2001. The purpose of this well is to intercept VOC-contaminated groundwater before it discharges to Lower Elk Creek, thereby preventing any exceedences of the PADEP Chapter 16 criteria for VOCs in the stream. Recovered groundwater is treated on-site via an air stripper prior to discharging to the local sanitary sewer system. During a recent optimization test (Fall 2004), it was concluded that the same level of protection could be afforded to the stream at a pumping rate of two gallons per minute (the recovery well had previously been operating at a pumping rate of 4.5 gpm).

To assess the potential impact of the discharge of shallow groundwater into Upper Elk Creek and Lower Elk Creek, a site-specific analysis by application of the Pennsylvania Single Discharge Wasteload Allocation Program for Toxics (PENTOXSD) Model was employed in both the Northeast and Southwest Areas adjacent to the Upper and Lower Elk Creeks. The PENTOXSD analyses indicated compliance with the PADEP Chapter 16 surface water criteria for each of the contaminants detected in shallow ground water near the streams.

The only potential complete pathway associated with surface water is for a trespassing youth that could be exposed to contaminated surface water while wading in the creeks within the Southwest Area.

Sediment

Historical sediment sampling has indicated the presence of benzo(a)pyrene and lead at concentrations greater than the residential direct contact MSC for soil. A potential complete pathway exists for a trespassing youth that could be exposed to contaminated sediment while wading in the creeks within the Southwest Area.

Air (indoor)

Available analytical data indicate the presence of VOC contamination in the groundwater onsite and downgradient of the site, in the site surface and subsurface soils in both the Northeast and Southwest Areas, and in soil gas samples collected from beneath Building Nos. 53 and 54 in the Main Plant Area. EPA does not recommend using soils data to assess the indoor air pathway because of uncertainties associated with soil sampling and soil chemical analyses for VOCs. EPA has found that utilizing soil gas and groundwater data in models to predict indoor air concentrations is generally more accurate. There are numerous commercial buildings, both onsite and offsite, and several residences located directly above or proximate to groundwater contaminated with VOCs known to negatively impact indoor air quality. A potential complete pathway for the inhalation of VOCs exists for indoor workers and nearby residents, who may be exposed to VOCs in indoor air which have volatilized from groundwater/soils beneath the buildings.

Ref.: Remedial Investigation Report, Stackpole Center Industrial Subdivision (SCIS), Northeast Area, St. Marys, PA, prepared by Hydrosystems Management, Inc. (HMI), November 2001; Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils, USEPA, November 2002; Land Recycling Program Technical Guidance Manual - Section IV.A.4. Vapor Intrusion into Buildings from Groundwater and Soil under the Act 2 Statewide Health Standard, January 24, 2004; Analysis of Potential Vapor Intrusion and Related Health Risk Assessment for Downgradient Areas, SCIS, Southwest Area, St. Marys, PA, prepared by Risk Based Remedies (RBR) Consulting, Inc., March 2004; Human Health and Ecological Risk Assessment, SCIS, Northeast Area, St. Marys, PA, prepared by RBR Consulting, Inc., May 2004; Soil Sampling Report, Former Special Purpose Resistors Area, SCIS, St. Marys, PA, prepared by HMI, June 2004; Results of PENTOXSD Modeling for Elk Creek, SCIS – Southwest Area, St. Marys, PA, prepared by HMI, June 2004; Act 2 Final Report, SCIS, Northeast Area, St. Marys, PA, prepared by HMI, February 2005; Assessment of Plum Stability and Monitored Natural

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Attenuation, Stackpole Center, Southwest Area and Former SPR Area, St. Marys, PA, prepared by GeoSyntec Consultants, April 2005; Draft Human Health and Ecological Risk Assessment, SCIS, St. Marys, PA, prepared by RBR Consulting, Inc., June 2005; Supplemental Evaluation of Surface Soil Data from the SPR Area, SCIS, Southwest Area, St. Marys, PA, Memorandum prepared by RBR Consulting, Inc., September 2005; Supplemental Evaluation of Soil Gas Data from Buildings 53 and 54, SCIS, Southwest Area, St. Marys, PA, Memorandum prepared by RBR Consulting, Inc., September 2005.

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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):

See Following Pages

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.

Groundwater

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The risk assessments for the Northeast and Southwest Areas addressed the direct exposure to groundwater potential for on-site construction workers that could be exposed to contaminated groundwater through routine excavation activities. The risk assessments evaluated the potential exposure associated with incidental ingestion, dermal contact and inhalation of VOCs that have volatilized from exposed groundwater into ambient air. Both risk assessments documented that the potential for adverse human health effects associated with a construction worker's potential direct exposure to groundwater is within EPA and PADEP acceptable levels of potential risk.

Surface and Subsurface Soil

Since there were no exceedences of the non-residential direct contact MSCs in the Northeast Area, there were no complete pathways to human receptors in that area. The draft risk assessment for the Southwest Area evaluated both the noncarcinogenic and potential carcinogenic effects of exposures to contaminated soils by construction workers in the areas where exceedences of the direct contact MSCs were observed. In addition, per EPA's request, a supplemental evaluation of the SPR Area surface soil data was performed to assess the potential exposure to surface soil by a trespassing child. The SPR Area is located in a relatively accessible portion of the property that may pose a more attractive area for a trespassing child. The risk evaluations conducted for the above areas confirm that using conservative receptor-specific exposure assumptions, exposure to constituents in soils in the Southwest Area are within the acceptable benchmarks established by EPA and PADEP.

Surface Water

The risk assessments for the Northeast and Southwest Areas addressed the potential dermal and incidental ingestion exposure pathways for a trespassing youth wading through Upper and Lower Elk Creek within the site. Both risk assessments documented that the potential for adverse human health effects associated with a trespassing youth's exposure to surface water is within acceptable levels of potential risk.

Sediment

The risk assessments for the Northeast and Southwest Areas addressed the potential dermal and incidental ingestion exposure pathways for a trespassing youth wading through Upper and Lower Elk Creek within the site. Both risk assessments documented that the potential for adverse human health effects associated with a trespassing youth's exposure to sediment is within acceptable levels of potential risk.

Air (Indoor)

The potential for indoor vapor intrusion into the buildings of the Northeast Area was evaluated in a risk assessment completed in May 2004. This risk assessment investigated the potential for the health of indoor workers to be negatively impacted by the volatilization of contaminants into indoor air from both contaminated soil and groundwater beneath the Northeast Area buildings. The risk assessment concluded that the potential work exposure associated with VOC contamination in indoor air attributable to contaminated groundwater and soils beneath the buildings of the Northeast Area is within EPA and PADEP acceptable limits.

The potential for indoor vapor intrusion in the commercial and residential areas located downgradient of the SPR Area was evaluated by a separate risk assessment completed in March 2004. This risk assessment utilized actual shallow groundwater data from on-site and off-site monitoring wells to estimate indoor air concentration with the use of a vapor intrusion fate and transport model. The data indicate that the predominant VOCs detected in the shallow groundwater are TCE, PCE, vinyl chloride, 1,2-DCE and 1,2-

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DCA. The risk assessment focused on the residential area located around Fourth and Depot Streets, southwest of Stackpole Center, and on the commercial area located immediately downgradient of the SPR Area. The risk assessment documented that the potential residential and worker exposures associated with VOC contamination in indoor air in downgradient residences and commercial buildings attributable to contaminated shallow groundwater are all within EPA and PADEP acceptable limits.

EMSOURCE is currently in the process of finalizing its risk assessment for the Southwest Area of the Stackpole Center Industrial Subdivision and has decided to share its preliminary results with EPA via a draft document. In that document, the potential for the health of indoor workers in the Southwest Area to be impacted by the volatilization of contaminants into indoor air from both contaminated soil gas and groundwater was investigated. Soil gas samples were collected from beneath Building Nos. 53 and 54 because both buildings are currently occupied and are located in an area with elevated concentrations of VOCs in the groundwater. For the soil gas to indoor air pathway, initially only the VOCs detected in soil gas samples at levels greater than the PADEP non-residential soil gas MSCs published in the Technical Guidance Manual were evaluated (i.e., only 1,2-DCE (total), cis-1,2-DCE, TCE and vinyl chloride were included as contaminants of interest). Per EPA's request, a supplemental risk assessment was performed which included all of the VOCs found in soil gas at concentrations greater than EPA's soil gas screening criteria contained in the 2002 draft EPA Indoor Air Vapor Intrusion Guidance. The results of both the draft and supplemental risk assessments indicate that worker exposure to VOCs in indoor air that has volatilized from soil gas into buildings in the Southwest Area is within the acceptable benchmarks established by USEPA and PADEP. The draft risk assessment for the Southwest Area also concluded that worker exposure to constituents that volatilize from groundwater into the Southwest Area buildings is within EPA and PADEP acceptable limits under the current land-use scenario. A future building on the site of the Former SPR Building Area may require an engineered control to ensure that concentrations of VOCs that volatilize into the building would not pose an unacceptable potential risk; however this EI determination focuses only on current human exposures at the site.

Ref.: Plan for Abatement of Groundwater Discharge to Elk Creek Building 54 Area, Stackpole Center, St. Marys, PA, prepared by Civil & Environmental Consultants, Inc., April 2001; Remedial Investigation Report, Stackpole Center Industrial Subdivision (SCIS), Northeast Area, St. Marys, PA, prepared by Hydrosystems Management, Inc. (HMI), November 2001; Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils, USEPA, November 2002; Land Recycling Program Technical Guidance Manual - Section IV.A.4. Vapor Intrusion into Buildings from Groundwater and Soil under the Act 2 Statewide Health Standard, January 24, 2004; Analysis of Potential Vapor Intrusion and Related Health Risk Assessment for Downgradient Areas, SCIS, Southwest Area, St. Marys, PA, prepared by Risk Based Remedies (RBR) Consulting, Inc., March 2004; Human Health and Ecological Risk Assessment, SCIS, Northeast Area, St. Marys, PA, prepared by RBR Consulting, Inc., May 2004; Soil Sampling Report, Former Special Purpose Resistors Area, SCIS, St. Marys, PA, prepared by HMI, June 2004; Results of PENTOXSD Modeling for Elk Creek, SCIS – Southwest Area, St. Marys, PA, prepared by HMI, June 2004; Act 2 Final Report, SCIS, Northeast Area, St. Marys, PA, prepared by HMI, February 2005; Assessment of Plum Stability and Monitored Natural Attenuation, Stackpole Center, Southwest Area and Former SPR Area, St. Marys, PA, prepared by GeoSyntec Consultants, April 2005; Draft Human Health and Ecological Risk Assessment, SCIS, St. Marys, PA, prepared by RBR Consulting, Inc., June 2005; Supplemental Evaluation of Surface Soil Data from the SPR Area, SCIS, Southwest Area, St. Marys, PA, Memorandum prepared by RBR Consulting, Inc., September 2005; Supplemental Evaluation of Soil Gas Data from Buildings 53 and 54, SCIS, Southwest Area, St. Marys, PA, Memorandum prepared by RBR Consulting, Inc., September 2005.

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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):

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

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 Stackpole Corporation facility, EPA ID #PAD063652820, located at 201 Stackpole Street, St. Marys, PA under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

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

IN - More information is needed to make a determination.

Completed by _____/s/_____ Date 9/29/05
Andrew Clibanoff
RCRA Project Manager

Supervisor _____/s/_____ Date 9/29/05
Paul Gotthold
PA Operations Branch Chief
EPA, Region 3

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