

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

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

Current Human Exposure Under Control

Facility Name: Crompton Corporation
Facility Address: Route 268, Petrolia, PA 16050
Facility EPA ID #: PAD004388500

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

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

If no – re-evaluate existing data, or

If data are not available skip to #6 and enter “IN” (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

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

Definition of “Current Human Exposures Under Control” EI

A positive “Current Human Exposure 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 Determination

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

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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>			See Rationale and References below
Air (indoors)		<u>X</u>		
Surface Soil (e.g., <2 ft)		<u>X</u>		
Surface Water			<u>X</u>	
Sediment			<u>X</u>	
Subsurf. Soil (e.g., >2 ft)			<u>X</u>	
Air (outdoors)			<u>X</u>	

_____ 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):

Introduction

The primary sources of data and information regarding contaminant levels at the facility as identified in this EI CA725 are a Preliminary Conceptual Site Model (CSM) and Proposed Groundwater Investigation Workplan Report (Environmental Strategies Corp. June 13, 2001), January 2002 Groundwater Sampling Results as submitted under letterhead dated May 21, 2002, and a draft EI CA725 prepared by Crompton dated 9/24/03. The CSM was developed to help satisfy requirements of Pennsylvania’s Land Recycling and Environmental Remediation Standards Act (Act 2) and the Resource Conservation and Recovery Act (RCRA). The CSM compared facility contaminant levels to Act 2 Statewide Health Standard (SHS) and Act 2 medium-specific concentrations (MSCs), which are considered risk-based levels. The CSM summarizes site conditions based on data collected to date. While preliminary in nature because investigation activities have yet to be completed, in the case of certain pathways, data in the CSM, the January 2002 Groundwater Sampling Results or other documents to be referenced are sufficient to evaluate whether contaminant levels exceed risk-based levels.

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).

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Groundwater

The CSM identifies 22 areas of concern (AOCs) which are grouped into 9 management areas (MAs) based on location, local hydrogeology and the regulated substances present within each area. In 2001, 30 new monitoring wells were installed to supplement the 33 existing monitoring wells, and two sitewide groundwater sampling and characterization events were undertaken in January 2002 and, reportedly, April 2003. Sampling has confirmed that benzene is present in certain monitoring wells at the facility at concentrations of greater than 1000 ug/l, exceeding applicable non-residential MSCs for used aquifers. Benzene has been detected at concentrations greater than 90 ug/l in wells OW-6, MW-12, MW-27, 903, and 904. Sampling in January 2002 also found groundwater MSC exceedences for certain metals, including beryllium, chromium lead and arsenic. According to Crompton, these metals concentrations may be at least partly attributable to natural conditions or sources other than the facility. However, based on available information, this cannot be confirmed at this time.

Sampling of influent water to the facility's water treatment facility by PADEP (see results for sample collected June 19, 2002) detected two compounds which have been detected in groundwater at numerous locations throughout the South Branch Bear Creek drainage area - m-benzene disulfonic acid (74 ug/l) and benzene sulfonic acid (380 ug/l). Based on this information, sampling should be performed to determine if the facility has released these compounds to groundwater. To date, no sample results for these compounds in facility groundwater are available to EPA.

Indoor Air

The PADEP has issued Final Draft Guidance on Vapor Intrusion into Buildings from Groundwater and Soil under the Act 2 Statewide Health Standard (dated July 29, 2003) and EPA has issued Draft Guidance for Evaluating Vapor Intrusion (dated November 2002) for assessing this pathway. These guidances identify screening processes for this pathway which consider land use and/or known groundwater/soil concentrations of volatile contaminants. Based on available soil data and these guidances, there is no soil contamination which would suggest a potential risk to indoor air. With regard to groundwater, benzene is the contaminant of concern for the subject pathway. Benzene has been detected in wells OW-6, MW-12, MW-27, 903 and 904 at levels exceeding the most conservative PADEP/EPA groundwater-to-indoor air screening level of 14 ug/l (an EPA screening level which corresponds to a carcinogenic risk of 10⁻⁵). The groundwater data in the CSM and January 2002 groundwater data suggests that plumes of benzene-contaminated groundwater monitored by these wells do not extend beyond the facility property. In this case, vapor intrusion is a pathway of interest only for facility property. Both guidances indicate that screening for facility workers subject to OSHA should consider OSHA indoor air standards. The PADEP guidance indicates benzene vapor should not be of concern in a facility worker setting indoors unless a separate phase liquid (SPL) is present in groundwater. There is no evidence of SPL benzene at the facility. Per the subject EPA guidance, assuming a target carcinogenic risk of 10⁻⁵, a soil gas to indoor air attenuation factor = 0.001 and partitioning across the water table per Henry's Law, benzene in groundwater would need to exceed 14 mg/l to result in an indoor air concentration in exceedance of the OSHA standard for benzene of 3.19 mg/cubic meter (time-weighted average). Since the highest reported detection of benzene has not exceeded 3 mg/l, EPA guidance also projects no threat to facility workers subject to OSHA due to vapor intrusion.

While there are four residences on facility property, these residences are not located within 100 feet of the five wells with benzene levels of concern and, based on available information, are not within 100 feet of any potential benzene plume (see draft CA 725 by Crompton dated 9/24/03 regarding location of residential use on facility property). In this case, based on both PADEP and EPA guidance, benzene levels in the indoor air of these residences should not exceed risk-based levels.

Similarly, based on the location of non-residential uses at the facility such as of administrative buildings (see Figure 1, Locations of Administrative Buildings dated 9/25/03 prepared by Crompton) and the referenced groundwater data, these uses also do not appear to be within 100 feet of any benzene plume and there should be no exceedance of risk-based levels in the indoor air of the subject administrative buildings.

Subsurface Soil

Based on the CSM, no subsurface soils exceed PADEP MSCs for direct contact in an industrial settings. However, the CSM does not compare available subsurface soil results to EPA Region III Risk Based Concentrations (RBCs) for direct contact. A comparison to these RBCs should be considered.

As in the case of surface soils, while the CSM found that subsurface soils at many locations exceeded MSCs protective of groundwater quality, subsequent SPLP results did not exceed Act 2 criteria of interest. The only exception was the case of lead in sample in AOC 15, where if a buffer zone of 10 feet is applied per Act 2 guidance, the Statewide Health Standard (SHS) is not exceeded. However, based on a review of subsurface soil investigations described in the CSM, further subsurface soil investigation may potentially be necessary to confirm whether subsurface soils present a threat to groundwater quality.

Given that further investigation of subsurface soils and a comparison to EPA RBCs may be needed, for purposes of this EI, it is unknown whether subsurface soils are contaminated above risk-based levels.

Surface Soil

Based on the location of known AOCs, potential surface soil contamination attributable to the facility is likely to be limited to industrial settings on facility property. Therefore, surface soil sample results in the CSM have been reviewed to identify where detected substances may be in exceedance PA MSCs protective of industrial direct contact. Two cases of potential concern in this case have been identified. Lead was detected in sample A15-SB-6 at 2,700 mg/kg, which is above the Act 2 MSCs for industrial use. However, followup sampling at four locations around A15-SB-6 detected lead concentrations ranging from 25mg/kg to 69 mg/kg. These levels are well below MSC protective of industrial direct contact and indicate soils in the vicinity of A15-SB-6 should not present a direct contact threat. In the second case, arsenic was detected in a surface soil sample from at location A16-SB-2 at 110 mg/kg, which is above the PADEP MSC for direct contact in industrial setting. However, analysis of four additional samples collected 10 feet from A16-SB-2 detected arsenic at levels ranging from 9.1 to 13.4 mg/kg (see draft EI725 by Crompton dated 9/24/03 and Analytical Report prepared by ESC for Crompton dated May, 7, 2003), well below the subject MSC of 53 mg/kg. There are no other cases where surface soil sample results suggested a potential direct contact threat in an industrial setting. Per the CSM, constituent levels above PA Act 2 MSCs protective of groundwater quality have been detected soils at certain locations. However, per the CSM, followup SPLP sampling at these locations per Act 2 guidance suggests that the soils at these locations may not present a threat to groundwater quality. Based on the above, there are no surface soils that are known or reasonably suspected to be contaminated above risk based levels for the current industrial use of the property.

Surface Water

Known sampling of surface water to help characterize any impacts of the facility on surface water quality has been limited to the collection of three samples from the South Branch of Bear Creek in November 2000 for analysis of BTEX compounds (see CSM). The detection limit for the compounds was 5 ug/l and no constituent was detected. Despite the detection of elevated levels of metals at the facility (see Groundwater), surface water has not been sampled for metals.

PA Act 2 and EPA RCRA corrective action guidance both require that the effects on surface water from groundwater flow under low flow conditions be evaluated. It is EPA's understanding that an evaluation is in progress (see draft EI 725 by Crompton dated 9/24/03). However, documentation regarding this evaluation is not available to EPA at this time.

Based on the limited data regarding surface water quality, it is unknown whether surface water exceeds risk-based levels protective of human use.

Sediment

No sediment samples have been collected to date. In this case, it is unknown if sediment exceeds protective risk-based levels.

Air (outdoors)

No evaluation has been performed to date for this pathway. For example, it is unknown whether excavation of soils in certain areas may present an unacceptable risk to construction workers if no protective measures were undertaken.

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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

Contaminated Media	Potential Human Receptors (Under Current Conditions)									
	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food			
Groundwater	No	No	No	No	No	No	No			
Air (indoors)	X	X	X	No	No	No	No			
Soil (surfaces, e.g., <2 ft)	X	X	No	No	No	No	No			
Surface Water	No	No	No	No	No	No	No			
Sediment	No	No	No	No	No	No	No			
Soil (subsurface e.g., >2 ft)	No	No	No	No	No	No	No			
Air (outdoors)	No	No	No	No	No	No	No			

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors’ spaces for Media which are not “contaminated” as identified in #2 above.
2. enter “yes” or “no” for potential “completeness” under each “Contaminated” Media – Human Receptor combination (Pathway).

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

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

If yes (pathways are complete for any “Contaminated” Media – Human Receptor combination) – continue after providing supporting explanation.

If unknown (for any “Contaminated” Media – Human Receptor combination) – skip to #6 and enter “IN” status code.

Rationale and Reference(s):

Groundwater

Plans are currently in place to provide a permanent potable public water supply to all water users within an area which includes groundwater potentially impacted by the facility (see final Consent Order and Agreement between PA and the Beazer East Inc. dated May 5, 2003 and Water Supply Feasibility Study for the Bear Creek Area Chemical Sites completed by PADEP in September 2002). Water users within the subject area are currently being provided a temporary water supply in the form of bottled water until the permanent supply is in place. These actions have and/or will effectively eliminate the potential for human exposure to groundwater potentially impacted by the facility.

² Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

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While construction or utility workers may be exposed to impacted groundwater on facility property during subsurface excavation activities, safety precautions during construction activities should protect such workers. Areas where the highest benzene levels have been detected are considered unlikely locations for construction work. However, human exposure to benzene may could occur during soil disturbance work, including excavation, grading, and trenching associated with utility projects. The mitigation of any short-term exposure risks to utility worker resulting from potentially affected soils or groundwater will reportedly be accomplished by implementing a Health and Safety Plan (H&SP) for the receptor population (see draft EI form prepared by Crompton dated 9/24/03). The H&SP approval, monitoring, and reporting requirements associated with the H&SP are part of the Petrolia facility's routine safety procedures. Included in these procedures is approval via a permit process for all excavation activities by the facility safety personnel. These personnel will require that air samples be tested using portable measuring instruments for benzene and other constituents such as carbon dioxide, oxygen, and constituents that may be ignitable or flammable. In addition, based on the results of the monitoring program, site-specific and activity-specific personal protective equipment will be used, as well as adequate ventilation systems.

Surface Soil

According to Crompton, the facility maintains a chainlink security fence around current and former operational areas and maintains 24-hour security patrols, surveillance cameras and motion detectors. Based on these access restrictions and available surface soil data, access of trespassers to any surface soils which may exceed risk-based levels for such receptors is likely to be restricted. In addition, it is notable that Crompton has reported there is no day-care on facility property (see draft EI form by Crompton dated 9/24/03).

Surface Water and Sediment

Recreational access to the South Branch of Bear Creek on facility property is also restricted by a chain link fence. Immediately downstream of Crompton property, the creek flows about 1000 feet before flowing an additional, estimated 1000 feet through another industrial property. According to Mr. Dick Fleeger, a member of the local community and employee of Crompton who has been interviewed regarding his observations of the use of this creek, the creek flows through fairly rugged, inaccessible terrain downstream of this adjacent industrial facility (see draft EI CA725 by Crompton dated 9/24/03). According to Mr. Fleeger, there is no recreational use of the creek downstream of Crompton and the lack of use is associated with historic impacts of mining and industrial operations in the watershed, e.g., red staining attributable to acid mine impacts can be observed in portions of the creek. Based on this information, current use of the South Branch of Bear Creek downstream of the facility appears to be minimal and human exposure at this time to any surface water and sediment potentially impacted the facility is likely to be insignificant. Based on this information, for purposes of this EI 725, the pathway from surface water and sediment to human use is considered to be incomplete.

Subsurface Soil and Outdoor Air

While construction or utility workers could potentially exposed to impacted soils or outdoor air impacted by soil excavation, these pathways will effectively eliminated by the implementation of a Health and Safety Plan (H&SP) for the receptor population (see Groundwater above).

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

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

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

_____ If unknown (for any complete pathways) – skip to #6 and enter “IN” status code

Rationale and Reference(s):

³ 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.

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5. Can the “significant” **exposure** (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”) – continued 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

Rational and Reference(s):

