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

Facility Name:	Emporia Foundry Incorporated
Facility Address:	620 Reese Street, Emporia, VA 23847
Facility EPA ID #:	VAD023720105

- 1. Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?
  - X If yes check here and continue with #2 below.
  - \_\_\_\_\_ If no re-evaluate existing data, or
  - If data are not available skip to #6 and enter "IN" (more information needed) status code.

# BACKGROUND

## Definition of Environmental Indicators (for the RCRA Corrective Action)

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

## **Definition of "Migration of Contaminated Groundwater Under Control" EI**

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

## **Relationship of EI to Final Remedies**

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

### **Duration / Applicability of EI Determinations**

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

- 2. Is **groundwater** known or reasonably suspected to be "**contaminated**" <sup>1</sup> above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?
  - X If yes continue after identifying key contaminants, citing appropriate "levels", and referencing supporting documentation.
  - If no skip to #8 and enter "YE" status code, after citing appropriate "levels", and referencing supporting documentation to demonstrate that groundwater is not "contaminated."
    - If unknown skip to #8 and enter "IN" status code.

#### **<u>RATIONALE</u>**:

#### **Site Description**

Emporia Foundry Inc. (Emporia Foundry) is located in an industrial area in Emporia, Virginia. The facility consists of 20.16 acres and lies between multi-family residential areas to the North, and commercial/industrial areas to the South and East. The facility manufactures gray-iron, municipal castings by mold-casting methods for use by municipal governments and the construction industry. Manufactured castings include manhole covers, manhole cover receptacles, and drain grates.

The foundry site contains a closed hazardous waste landfill, approximately 3.13 acres; the landfill contains characteristic wastes under the RCRA. The landfill, a regulated unit, is bounded on the north and east by Little Metcalf Branch, on the south by CSX Railroad tracks, and on the west by a drainage ditch.

Between 1965 and 1975, foundry wastes consisting of cupola slag, spent casting sand, and spent steel shot were spread at the landfill. Between January 1975, and December 1981, cupola baghouse dust (a characteristic hazardous waste due to toxicity from lead and cadmium concentrations) was included with other wastes. Between January 1982, and the fall of 1982, foundry waste without cupola baghouse dust was disposed in the landfill. The facility stopped disposal of industrial wastes in the on-site landfill by December 1982.

### **Current Data**

#### NOTE ABOUT "APPROPRIATE LEVELS":

Groundwater at the closed hazardous waste landfill unit boundary is screened against facility specific Groundwater Protection Standards (GPS) as set forth in the Facility's Permit that are derived from:

- 1. EPA Maximum Contaminant Levels (MCLs) for drinking water, or when MCLs are not promulgated,
- 2. Virginia Alternate Concentration Limits (ACLs) for drinking water

Groundwater evaluated in site-wide investigations is screened against:

- 1. EPA Maximum Contaminant Levels (MCLs) for drinking water, or when MCLs are not promulgated,
- 2. EPA Region III Risk Based Concentrations (RBCs) for tap water

The use of drinking water standards is a conservative measure since groundwater at the facility is not a drinking water source. However, these "levels" are appropriate for the protection of the groundwater resource and its most beneficial use.

#### Hazardous Waste Landfill

Emporia Foundry was issued a Post-Closure Care Permit in 1994 for their closed hazardous waste landfill. The Permit included requirements for initiation of a Groundwater Compliance Monitoring

Program because it was determined during detection monitoring (begun in 1985) that there had been a release of constituents from the landfill above background concentrations. However, the concentrations of detected constituents in groundwater at the unit boundary of the closed landfill do not exceed the GPS specified in the Permit (based on either MCLs or ACLs). (See Table 1).

	Maximum Concentration Detected in 2005	Maximum Concentration Detected in 2006	Maximum Concentration Detected in 2007	USEPA MCL	Virginia ACL			
Constituent	(μg/l)	(μg/l)	(μg/l)	(µg/l)	(µg/l)			
Arsenic	4.2 J	ND	ND	10				
Barium	242	239	223	2000				
Cadmium	0.66 J	ND	ND	5				
Chromium	7.1	ND	ND	100				
Cobalt	63.7	57.4	53.7		313			
Copper	5.6 J	ND	ND	1300*				
Lead	4.0	ND	ND	15*				
Mercury	0.34	0.12 J	ND	2				
Nickel	6.0 J,B	4.9 J	4.3 J		313			
Thallium	0.32 J	0.095 J	0.11 J	2				
Vanadium	5.3 J	ND	ND		15.7			
Zinc	76.4	53.5	38.4		4695			
Cyanide	0.0044 J (mg/l)	0.15 (mg/l)	ND	0.2 (mg/l)				

**Table 1.** Maximum concentrations for each constituent detected at the closed landfill unit boundary each year from 2005 to 2007.

J = Estimated result. Result less than reporting limit. ND = Constituent not detected.

B = Reportable level in associated Method Blank. \* MCL based on a Treatment Technique action level.

### Site-Wide Groundwater Investigations

A Phase I RFI was conducted at Emporia Foundry in March 2008 to assess potential site-wide groundwater, surface and subsurface soil, sediment, and surface water impacts from identified existing or former SWMUs. During the investigation, groundwater samples were collected at 8 Geoprobe boring or monitoring well locations. The RFI Report was submitted to the Department on July 31, 2008. Although the Department has not completed its review of the report or granted the Facility RFI approval, the results of the initial report review indicate there are some areas of groundwater contamination with inorganic constituents, primarily in the vicinity of the former (SWMU 1) and existing (SWMU 8) waste oil tanks. The concentrations of detected constituents in groundwater downgradient of each SWMU which exceeded MCLs during the RFI are included in Table 2 on the following page. The attached site location map (Figure 1) provides the environmental setting for the facility and Figure 2 provides a detailed site plan for the facility.

Table 2. Concentrations of each constituent detected above background and the MCL in groundwater during the site-wide RFI.

							SWMU 5		
							(Cupola		
					SWMU 4		Dust	SWMU 6	
	SWMU 1 (Former Waste Oil Tank) and			SWMU 2	(Waste	SWMU 7	Treatment	(Baghouses/	
Constituents	SWMU 8 (Existing Waste Oil Tanks)		(Baghouses)	Sand Pile)	(Baghouses)	Unit)	Roll-Off)		
Exceeding	Monitoring	Monitoring	Monitoring	Geoprobe	Geoprobe	Geoprobe	Geoprobe	Geoprobe	
Background	Well	Well	Well	Boring	Boring	Boring	Boring	Boring	USEPA
and the	SWMU 1-2	SWMU 1-4	SWMU 8-3	SWMU 2-5	SWMU 4-5	SWMU 7-3	SWMU 5	SWMU 6	MCL
MCL	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)
Lead									
(Total)	157	216	21.7					15.5	15*
Arsenic									
(Total)	29.9	32.6							10
Chromium									
(Total)	429	677	111						100

\*MCL for Lead is based on a Treatment Technique that requires systems to control the corrosiveness of their water. If more than 10% of tap water samples exceed the action level, water systems must take additional steps.

"--" - Constituent was either not detected or was detected below background and/or the MCL or Tap Water RBC.

## **<u>REFERENCES</u>**:

- Emporia Foundry, Inc.: Phase I RFI Work Plan (Revised July 17, 2007, Draper Aden Associates)
- Emporia Foundry, Inc.: Phase I RFI Report (July 31, 2008, Draper Aden Associates)
- Emporia Foundry, Inc.: 2005 Annual Groundwater Monitoring Report (February 28, 2006, Draper Aden Associates)
- Emporia Foundry, Inc.: 2006 Annual Groundwater Monitoring Report (March 1, 2007, Draper Aden Associates)
- Emporia Foundry, Inc.: April 2007 Semi-Annual Groundwater Monitoring Report (June 26, 2007, Draper Aden Associates)
- Emporia Foundry, Inc.: 2007 Semi-Annual Groundwater Monitoring Report, October and December 2007 Sampling Events (February 14, 2008, Draper Aden Associates)
- Emporia Foundry, Inc.: January 2008 RCRA Corrective Action Fact Sheet

### Footnotes:

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

- 3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"<sup>2</sup> as defined by the monitoring locations designated at the time of this determination)?
  - X If yes continue after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"<sup>2</sup>).
  - If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"<sup>2</sup>) skip to #8 and enter "NO" status code, after providing an explanation.
  - If unknown skip to #8 and enter "IN" status code.

#### **RATIONALE:**

Groundwater at the closed landfill unit boundary is not "contaminated" (see the response to question #2) and therefore contaminated groundwater is not migrating in this area of the facility property. The concentrations of detected constituents in groundwater at the closed landfill unit boundary do not exceed the GPS specified in the Permit (based on either MCLs or ACLs).

The horizontal and vertical extent of contaminated groundwater has not yet been delineated in the vicinity of SWMU 1 and SWMU 8. There are no groundwater monitoring locations downgradient of SWMU 1 and SWMU 8. However, based on current data, groundwater is expected to remain within the horizontal and vertical dimensions of the existing area of groundwater contamination. Vertical migration is likely limited due to the presence of a confining clay layer at the base of the shallow aquifer located approximately 30-40 ft below ground surface. In areas of the site that have undergone more extensive investigation in the past (i.e. in the vicinity of the landfill), groundwater flow in the uppermost aquifer was found to be influenced by the topography. Therefore, at SWMU 1 and SWMU 8 shallow groundwater likely flows directly towards and discharges into Little Metcalf Branch (LMB), located approximately 100 feet north and down a steep slope from SWMU 1 and SWMU 8. In addition, the inorganic constituents of concern at SWMU 1 and SWMU 8 are not likely to be highly mobile because they were detected as total metals only; dissolved lead, dissolved arsenic, and dissolved chromium were not detected. Therefore, it is believed that migration of contaminated groundwater beneath SWMU 1 and SWMU 8 has stabilized. The horizontal and vertical extent of groundwater contamination in the vicinity of SWMU 8 will be further evaluated during a Phase II RFI for the facility.

#### **<u>REFERENCES</u>**:

- Emporia Foundry, Inc.: Phase I RFI Work Plan (Revised July 17, 2007, Draper Aden Associates)
- Emporia Foundry, Inc.: Phase I RFI Report (July 31, 2008, Draper Aden Associates)

### Footnotes:

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

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

<u>**X**</u> If yes – continue after identifying potentially affected surface water bodies

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

### **RATIONALE:**

Groundwater flow in the uppermost aquifer at the site was found to be influenced by the topography. Therefore, at the two locations with contaminated groundwater, namely SWMU 1 and SWMU 8, groundwater flow is likely towards and discharging into Little Metcalf Branch (LMB), located approximately 100 feet north and down a steep slope from SWMU 1 and SWMU 8.

#### **REFERENCES:**

- Emporia Foundry, Inc.: Phase I RFI Work Plan (Revised July 17, 2007, Draper Aden Associates)
- Emporia Foundry, Inc.: Phase I RFI Report (July 31, 2008, Draper Aden Associates)

- 5. Is the **discharge** of "contaminated" groundwater into surface water likely to be "**insignificant**" (i.e., the maximum concentration<sup>3</sup> of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?
  - X If yes skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration<sup>3</sup> of <u>key</u> contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgement/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.
    - If no (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration<sup>3</sup> of <u>each</u> contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations<sup>3</sup> greater than 100 times their appropriate groundwater "levels," the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

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

#### **RATIONALE**:

As shown in Table 2, the maximum concentrations of total arsenic and chromium are less than 10 times their appropriate groundwater level (MCL). Although the two groundwater samples collected at SWMU 1 exceed the appropriate level (MCL) for lead by factors of 10.5 and 14.4, respectively, using these groundwater concentrations at SWMU 1 is conservative because there is likely dilution occurring between SWMU 1 and the stream, and because the dissolved concentrations for lead were below detection.

For the RFI, surface water samples were collected from LMB at one point that may be slightly upstream or slightly downstream of where groundwater flowing beneath SWMU 1 and SWMU 8 likely discharges to the stream (LMB-1), and at one point approximately 800 feet downstream of where groundwater flowing beneath SWMU 1 and SWMU 8 likely discharges to the stream (LMB-2). In surface water sample LMB-1, the constituents contained in Table 2 of this document (lead, arsenic, and chromium) were not detected. In surface water sample LMB-2, arsenic and chromium were not detected and lead was detected at an estimated concentration below all 9 VAC 25-260 Virginia Water Quality Standards, as updated September 2007. Please proceed to question #7.

#### **<u>REFERENCES</u>**:

- Emporia Foundry, Inc.: Phase I RFI Work Plan (Revised July 17, 2007, Draper Aden Associates)
- Emporia Foundry, Inc.: Phase I RFI Report (July 31, 2008, Draper Aden Associates)

#### Footnotes:

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

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

\_\_\_\_If yes – continue after either:

- identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and ecosystems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR
- (2) providing or referencing an interim-assessment<sup>5</sup>, appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.
- If no (the discharge of "contaminated" groundwater into surface water is potentially significant) continue after documenting: 1) the maximum known or reasonably suspected concentration<sup>3</sup> of <u>each</u> contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations<sup>3</sup> greater than 100 times their appropriate groundwater "levels," the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

\_\_\_\_ If unknown – skip to #8 and enter "IN" status code.

### **RATIONALE & REFERENCES:**

#### Footnotes:

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

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

- 7. Will groundwater **monitoring** / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"
  - X If yes continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."
  - If no enter "NO" status code in #8. skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies

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

### **RATIONALE**:

Further investigation of the vertical and horizontal extent of contaminated groundwater beneath SWMU 1 and SWMU 8 will be conducted as part of an upcoming Phase II RFI for the facility. If necessary, this EI determination will be revised/updated based on data collected during the Phase II RFI.

Additionally, groundwater at the closed landfill unit boundary will continue to be monitored semiannually under the Post-closure Permit for the Facility.

#### **<u>REFERENCES</u>**:

- Emporia Foundry, Inc.: Phase I RFI Report (July 31, 2008, Draper Aden Associates)
- Emporia Foundry, Inc.: Phase I RFI Work Plan (Revised July 17, 2007, Draper Aden Associates)
- Emporia Foundry, Inc.: 2007 Semi-Annual Groundwater Monitoring Report, October and December 2007 Sampling Events (February 14, 2008, Draper Aden Associates)

- 8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).
  - X YE Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the Emporia Foundry, Incorporated facility, EPA ID# VAD023720105, located in Emporia, Virginia. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

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

IN – More information is needed to make a determination.

Completed by	(Print) Trisha Johnson (Title) Environmental Specialist II	Date
Supervisor	(Print) Leslie A. Romanchik (Title) Director, Office of Hazardous Waste	Date <u>9/9/08</u>
Locations when Depa Divi 629 Rich	re References may be found: artment of Environmental Quality sion of Waste, Office of Hazardous Waste East Main Street mond, VA 23219	_
Contact telepho	one and e-mail numbers:	

(Name) Trisha Johnson (Phone #) (804)-698-4131 (e-mail) tbjohnson@deq.virginia.gov

FINAL NOTE: THE MIGRATION OF CONTAMINATED GROUNDWATER UNDER CONTROL EI IS A QUALITATIVE SCREENING OF CURRENT GROUNDWATER CONDITIONS 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 GROUNDWATER QUALITY.







5

EXISTING WASTE OIL TANKS



SCO SCO SCO SCO SCO SCO SCO SCO	NH HORE HOUSE	VICINITY MAP - NO SCALE
DESIGNED BY: DRAWN BY: DCJ CHECKED BY: JWP SCALE: 1"= 100' DATE: JULY 30, 2008 PROJECT NUMBER: PRO2263-05J FIG. 2	SITE/SAMPLE LOCATION MAP EMPORIA FOUNDRY, INC. PHASE 1 RFI WORK PLAN, VAD023720105 EMPORIA, VIRGINIA	Draper Aden Associates         Engineering * Surveying * Environmental Services         Richmond, VA       Blacksburg, VA         8090 Villa Park Drive       Charlottesville, VA         Richmond, VA 23228       Charlottesville, VA         B04-264-2228 Fax: 804-264-8773       Hampton Roads, VA