

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: Former Emerson Electric Corporation (Former Alco Controls Division)
Facility Address: 555 Peppers Ferry Road, Wytheville, VA 24382
Facility EPA ID #: VAD065415457

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?

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

If no - re-evaluate existing data, or

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

BACKGROUND

The former Emerson Electric Corporation, Alco Controls Division (Emerson) facility is located at 555 Peppers Ferry Road, Wytheville, Virginia 24382. The former Emerson facility is located in a commercial and light industrial area on the north side of Wytheville. The facility is currently bordered by two hotels and Wytheville Community College to the north and east, the Wytheville Redevelopment and Housing Authority to the south, and Peppers Ferry Road to the north and west. Interstate 81 is located farther to the north (approximately 0.5 mile) of the site. Farm Credit and Country Mortgages, Oakwood Cemetery, King and King Enterprises, and several residences are located across Peppers Ferry Road to the west.

The facility initially operated as a textile mill and a knitting mill (Wyomissing Corporation) from 1935 until 1974. Emerson Electric Corporation purchased the Alco Control Company in 1967. Alco manufactured refrigeration valves and expansion valves. Tuttle Electric, which was purchased and owned by Emerson Electric, began production of open coil electric heating elements for commercial dryers and refrigerators at this site in 1974. In 1981, the Alco Controls Division of Emerson Electric, purchased the property and took over production operations at the site. Alco Controls, under the ownership of Emerson, manufactured refrigeration control valves on the property from the late 1970s until 2001, when the facility was closed. On January 27, 2008, Emerson Electric changed the name of the Alco Controls Division Products, to Emerson Climate Technologies Flow Controls. This name change occurred after Emerson terminated the operations at the Alco Controls Division Products at the Wytheville facility.

Before operations ceased at the facility in 2001, a staff of 32 people worked in the production areas and office. Primary operations at the site included turning, welding, honing, grinding, spray painting, assembling, testing, warehousing, and packaging.

The Emerson manufacturing facility consisted of four buildings that covered approximately 139,000 square feet of the 20.7-acre parcel. Outdoor features include a chip storage area and two paved parking lots. The entire Emerson facility contains three parcels (lots). Lot 1 is 1.5 acres in size and is located at the north end of the property, next to Peppers Ferry Road. The area was formerly used as an employee parking lot, and there are no buildings on the lot. Lot 2 is located to the southeast of the facility, and consists of 7.2 acres of undeveloped open land. Lot 3 consists of approximately 12 acres and contains the former Emerson plant and surrounding land. All manufacturing operations took place on Lot 3, where the original facility buildings were constructed. Lots 1 and 3 were never legally subdivided, but the distinction between the two lots was used during investigation and remediation of the property under the VDEQ's Voluntary Remediation Program (VRP).

The original facility buildings (Buildings 1, 2, and 3 on Lot 3) were constructed in 1935 on farmland. An addition was added to the southern portion of the facility in the early 1950s.

Chromolox, a division of Emerson Electric, leased the southern portion of the building from approximately 1974 to 1977. The first courtyard, the location of the Emerson's Former bright dip operations, was enclosed in 1974. A second courtyard area was enclosed in approximately 1975.

Raw materials used at the site prior to 2001 included copper, brass, steel, nitric acid, sulfuric acid, hydrochloric acid, chromic acid, alkaline solution, freon, and 1,1,1-trichloroethane (1,1,1-TCA). Small quantities of nitric acid and sulfuric acid were used in the metal processing, electroplating, and manufacturing operations. Fuels used at the facility included gasoline, natural gas, No. 2 fuel oil, and propane. Oil, 1,1,1-TCA, gasoline, ammonia, argon, nitrogen, propane, and an alkaline solution were stored in tanks outside the facility. The major manufacturing activities at the facility included machining, brazing, welding, assembly, testing spray painting, parts washing, electroplating, packaging, shipping, and receiving.

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).

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

- If yes - continue after identifying key contaminants, citing appropriate “levels,” and referencing supporting documentation.
- If no - skip to #8 and enter “YE” status code, after citing appropriate “levels,” and referencing supporting documentation to demonstrate that groundwater is not “contaminated.”
- If unknown - skip to #8 and enter “IN” status code.

Rationale and Reference(s):

The former Emerson Electric Corporation maintained a number of SWMUs. Releases and contamination were previously identified in several of these areas. Investigation of soil and groundwater on the Emerson property was completed under the VDEQ Voluntary Remediation Program (VRP) from 2003 to 2006. Affected soil was identified, excavated and shipped off-site for disposal. Results of the groundwater investigation on site indicated contamination above applicable MCLs and tap water RBCs. The facility implemented groundwater remediation via in-situ treatment by injecting zero valent iron (ZVI) into groundwater at the source area and imposed a groundwater use restriction on the property. Subsequently, the VDEQ VRP issued a Certificate of Satisfactory Completion of Remediation on July 9, 2007. Post certification groundwater monitoring was conducted in 2007 and 2008 to verify groundwater concentrations. Since then, there has been no indication of new releases. Currently, surface soil and subsurface soil is not known or reasonably suspected to be contaminated above appropriately protective risk-based levels at the Emerson site. However, subsequent groundwater investigations have been conducted under RCRA CA to further define site geology, stratigraphy, maximum concentrations of hazardous constituents in groundwater, and source of the groundwater contamination.

The investigations to date have identified releases from two locations; the former aboveground solvent storage tank and a former gasoline underground storage tank. TCA and 1,1-dichloroethene (DCE) concentrations greater than the MCLs were detected in samples collected from MW-4 and MW-2. Therefore, downgradient monitoring well MW-13B was installed on downgradient property owned by the town of Wytheville in March 2005. A groundwater sample collected from MW-13B in March 2005 contained a 1,1-DCE concentration greater than the MCL. Samples from downgradient bedrock monitoring wells have contained TCA, TCA breakdown products (chloroethane, 1,1-DCA, and 1,1-DCE), and 1,4-dioxane. The VOC concentrations in the off-site monitoring wells are less than the EPA MCLs, with the exception of 1,1-DCE at sampling location MW-13B. The VOC concentrations are also less than the EPA RBCs, with the exception of 1,1-DCA and 1,4-Dioxane at sample locations MW-13B, MW-17B, and MW-18B.

Geophysical investigations were conducted as part of the groundwater investigations to further understand the site’s subsurface geology and stratigraphy in part to further define the site’s hydrogeology and develop a conceptual site model. Bedding plane fractures were identified and mapped in the shallow bedrock. These bedding plane fractures are found to be hydrogeologically connected to surface water features downgradient and crossgradient of the site. Based on the findings of these investigations, the surface water features represent a topographic low at which the groundwater from the west (from the site) discharges. Additionally, groundwater from the east discharges to these surface water features as well. Therefore, the surface water features represent an interception/divide to the groundwater flowing from the site within the bedrock.

The facility implemented a semi-annual groundwater and surface water monitoring program in 2009 to further assess groundwater and surface water conditions and remedial effectiveness of the ZVI treatment performed in accordance with the VRP and to verify contaminant plume stability. The surface water monitoring program includes sample locations associated with groundwater discharge points within the surface water features. A review of the groundwater and surface water monitoring data verifies this conceptual site model.

References:

1. *Voluntary Remediation Report, Lot 3, Former Alco Controls*, March 1, 2007
2. *RCRA Supplemental Groundwater Characterization Report*, October 29, 2009
3. VDEQ project files

Footnotes:

i“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).

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

- If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the “existing area of groundwater contamination”²).
- If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the “existing area of groundwater contamination”²) – skip to #8 and enter “NO” status code, after providing an explanation.
- If unknown - skip to #8 and enter “IN” status code.

Rationale and Reference(s):

Historical groundwater monitoring data collected in accordance with the VRP and during the supplemental groundwater characterization investigations indicate groundwater/contaminant plume stability on-site and off-site. Additional monitoring data collected in accordance with the facility’s approved groundwater and surface water monitoring plan also indicates stability. Trend analysis of the groundwater data collected after the ZVI injections from monitoring wells located at the source area and downgradient of the source area indicates either downward trends or no trends in groundwater concentrations. Groundwater flow direction is from west to east across the site and generally discharges to the surface water bodies in the east. Based on historical groundwater elevation data, groundwater flow direction has not changed at the site and is consistent seasonally. These conditions are indicative of groundwater and contaminant plume stability.

References:

1. *RCRA Supplemental Groundwater Characterization Report*, October 29, 2009
2. *Project Status Report: Former Alco Controls Facility*, July 21, 2010

Footnotes:

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

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

- 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 and Reference(s):

Results of the surface water monitoring program indicated low level concentrations (below the tap water RBC) of 1,4-dioxane detected at one sampling location (SW-3) associated with groundwater discharge into the surface water feature (upper pond) downgradient of the site during the first round of sampling. Second round sampling results indicated that 1,4-dioxane was not present; however, low level concentrations (below MCL and tap water RBC) of 1,1,1-TCA at the same sample location were observed. The presence of these constituents in surface water in the upper pond verifies the conceptual site model; that groundwater is transmitted to surface water downgradient of the site via the identified bedding plane fractures. Surface water monitoring will continue in efforts to further evaluate and monitor these conditions.

References:

1. *RCRA Supplemental Groundwater Characterization Report*, October 29, 2009
2. *Project Status Report: Former Alco Controls Facility*, July 21, 2010

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5. Is the **discharge** of “contaminated” groundwater into surface water likely to be “**insignificant**” (i.e., the maximum concentration³ 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)?

- If yes - skip to #7 (and enter “YE” status code in #8 if #7 = yes), after documenting:
1) the maximum known or reasonably suspected concentration³ of key contaminants discharged above their groundwater “level,” the value of the appropriate “level(s),” and if there is evidence that the concentrations are increasing; and
2) provide a statement of professional judgment/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 concentration³ of each contaminant discharged above its groundwater “level,” the value of the appropriate “level(s),” and if there is evidence that the concentrations are increasing; and
2) for any contaminants discharging into surface water in concentrations³ greater than 100 times their appropriate groundwater “levels,” the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.
- If unknown - enter “IN” status code in #8.

Rationale and Reference(s):

Results of the surface water monitoring program indicated low level concentrations (below the tap water RBC) of 1,4-dioxane detected at one sampling location (SW-3) associated with groundwater discharge into the surface water feature (upper pond) downgradient of the site during the first round of sampling. Second round sampling results indicated that 1,4-dioxane was not present; however, low level concentrations (below MCL and tap water RBC) of 1,1,1-TCA at the same sample location were observed. The presence of these constituents in surface water in the upper pond verifies the conceptual site model; that groundwater is transmitted to surface water downgradient of the site via the identified bedding plane fractures. Surface water monitoring will continue in efforts to further evaluate and monitor these conditions.

References:

1. *RCRA Supplemental Groundwater Characterization Report*, October 29, 2009
2. *Project Status Report: Former Alco Controls Facility*, July 21, 2010

Footnotes:

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

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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 implemented₄)?

- If yes - continue after either:
- 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site’s surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater;
 - OR
 - 2) providing or referencing an interim-assessment₅, 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 can not be shown to be “**currently acceptable**”) - skip to #8 and enter “NO” status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.
- If unknown - skip to 8 and enter “IN” status code.

Rationale and Reference(s):

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

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

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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?”
- If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations, which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the “existing area of groundwater contamination.”
 - If no - enter “NO” status code in #8.
 - If unknown - enter “IN” status code in #8.

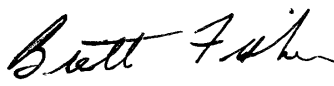
Rationale and Reference(s):

The Virginia Department of Environmental Quality has approved a monitoring program that requires semi-annual monitoring of groundwater and surface water for a minimum of 5 years. The purpose of this monitoring plan is to verify groundwater and contaminant plume stability and to evaluate the effectiveness of the ZVI injections. Based on the results of the ongoing monitoring, the surface water monitoring program may be modified as necessary.

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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).

- 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 Former Emerson Electric Corporation (Former Alco Controls Division) EPA ID# VAD065415457, located at 555 Peppers Ferry Road, Wytheville, VA 24382. 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 (signature)  Date September 17, 2010
(print) Brett Fisher, P.G.
(title) Environmental Specialist II

Supervisor (signature) _____ Date _____
(print) Jutta Schneider
(title) RCRA CA/GW Program Manager, ORP
Virginia DEQ

Locations where References may be found:

Virginia Department of Environmental Quality
629 East Main Street
Richmond, VA 23219

Contact telephone and e-mail numbers

(name) Brett Fisher
(phone #) 804-698-4219
(e-mail) brett.fisher@deq.virginia.gov