

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

RCRA Corrective Action Environmental Indicator (EI) RCRIS code (CA750) Migration of Contaminated Groundwater Under Control

Facility Name: Former Pfizer Consumer Healthcare
Facility Address: 2248 Darbytown Road, Richmond, Virginia VA
Facility EPA ID #: VAD000820548 & VAD188141626 & VAD982709669

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

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):

Footnotes:

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

Groundwater has been monitored since 2000, with a long-term monitoring program established in 2007 in which site-wide groundwater is monitored semi-annually. The monitoring network includes 39 monitoring wells. Multiple Direct Push Technology (DPT) temporary wells have also been sampled as needed. Chloroform is identified as the primary constituent of concern (COC), and secondary COCs include tetrachloroethene (PCE), trichloroethene (TCE), 1,4-dioxane, and 1,1,2,2-tetrachloroethane (TCA).

Primary and secondary COCs have historically exceeded EPA Region 3 Regional Screening Levels (RSLs) Observed concentrations have reduced over time, and 2014 monitoring well groundwater data indicated exceedances of chloroform, 1,4-dioxane, and 1,1,2,2-TCA.

Chloroform historically exceeded its MCL of 80 ug/L, but has been below the MCL since 2012. One well contained an elevated concentration of chloroform above the MCL in May 2014; a confirmation sample was collected in June 2014, and the concentration was below the MCL.

1,4-Dioxane was first analyzed at the site in 2011. It has been detected at a maximum concentration of 1.9 ug/L [at MW-12 in Spring 2014 (corrected level)]; a level within the 10⁻⁴ to 10⁻⁶ risk range risk range for cancer where the EPA 10⁻⁶ risk screening level for cancer in November 2015 was 0.46 ug/l.

1,1, 2, 2-TCA has been detected at a maximum concentration of 1.7 ug/L (at MW-5 in 2009); however, most detected concentrations are less than 0.5 ug/L, a level within the 10⁻⁴ to 10⁻⁶ risk range risk range for cancer where the EPA 10⁻⁶ risk screening level for cancer in November 2015 was 0.062 ug/l.

Chlorinated solvents have historically been detected primarily near the Building 2300 loading dock, with decreasing concentrations observed in the downgradient direction of groundwater flow. These constituents have remained below MCLs since 2010.

PAHs sporadically have been detected. A total of six PAHs infrequently have exceeded their respective screening levels in two wells located in or beside the Building 2300 parking lot. In April 2014, 0.22 ug/l benzo(a)pyrene was detected in MW-16 - a level which exceeds the MCL by 0.02 ug/l (where the MCL is 0.20 ug/l) yet is within the 10⁻⁴ to 10⁻⁶ risk range risk range for cancer where the EPA 10⁻⁶ risk screening level for cancer in November 2015 was 0.0034 ug/l. The maximum

detected PAH concentration is benzo(b)fluoranthene at 0.35 ug/L in April 2014, a level within the 10^{-4} to 10^{-6} risk range risk range for cancer where the EPA 10^{-6} risk screening level for cancer in November 2015 was 0.034 ug/l.

Site history indicates that chloroform was introduced to the aquifer in the vicinity of the Former Plant A Waste Water Treatment Plant (AOC-3) where the highest chloroform concentrations (up to 470 ug/l) previously were detected. The pattern of chloroform concentrations in the groundwater indicate that it is migrating in a south/southeastern direction consistent with the predominant groundwater gradient.

Due to the relatively greater mobility of chloroform (as compared to the other compounds detected at the site), the limits of chloroform in site groundwater is representative of the maximum area of constituents of concern in the groundwater at the site associated with the release by the vicinity of the Former Plant A Waste Water Treatment Plant.

Site history additionally includes a history of breaks and repairs to sewers throughout the property, including sewers below Plant B and compromise to sewers located in the southwest corner of Plant B. Sporadic detections of contaminants at low levels have been detected in groundwater south of Plant B. Bis(2 ethyl)hexyl phthalate was detected at its MCL (6 ug/l) at a location proximate to the southwest corner of Plant B in February 2013, a level within the 10^{-4} to 10^{-6} risk range risk range for cancer where the EPA 10^{-6} risk screening level for cancer in November 2015 was 5.6 ug/l. An estimated 0.0107 ug/l Aldrin was detected in groundwater in the same area in April 2014, a level within the 10^{-4} to 10^{-6} risk range risk range for cancer where the EPA 10^{-6} risk screening level for cancer in November 2015 was 0.00092 ug/l.

Footnotes:

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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):

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):

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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 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 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):

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 implemented.)?

- 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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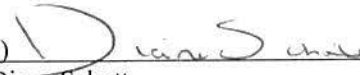
7. Will groundwater **monitoring** / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the “existing area of contaminated groundwater?”
- 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.

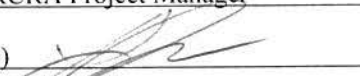
Rationale and Reference(s):

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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 Crompton Corporation Petrolia facility, EPA ID # PAD004388500, located at Route 269, Petrolia, Pennsylvania 16050. 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 4/20/2016
(print) Diane Schott
(title) RCRA Project Manager

Supervisor (signature)  Date 4/25/2016
(print) Luis Pizarro
(title) Associate Director, Office of Remediation
(EPA Region or State) EPA Region III

Locations where References may be found:

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