

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: General Electric South Plant
Facility Address: Morgantown Industrial Park, Morgantown, West Virginia
Facility EPA ID #: WVD061776977

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 #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).

Organic Chemicals in South Plant Groundwater

Area 212: Groundwater analyses from historic and recent analyses indicate a release of organics in the area of Perimeter Monitoring Well SP-212. The following data were reported for groundwater samples collected in the area in 2003 during GE’s Phase II RFI and in 2005 during GE’s Bedrock and Overburden Investigation:

cis-1,2 Dichloroethene:

GE Surface Water Specific Criteria: 620 ug/l
State RBC*: 70 ug/l
Federal MCL**: 70 ug/l
Well 212-TW02 (2003): 680 ug/l J
Well 212-TW04 (2003): 290 ug/l
Well 212-TW02 (2005): 340 ug/l
Well SP-GW03 (2005): 410 ug/l
Well 212-MW02 (2005): 400 ug/l

* West Virginia Deminimis Concentration for Groundwater

** EPA Maximum Contaminant Level in Drinking Water

Tetrachloroethene:

GE Surface Water Specific Criteria: 98 ug/l
State RBC: 5 ug/l
Federal MCL: 5 ug/l
Well SP-212 (2003): 8.1 ug/l
Well SP-212 (2005): 8.5 ug/l
Well 212-TW02 (2003): 68,000 ug/l
Well 212-TW02 (2005): 3,600 ug/l
Well 212-MW02 (2005): 320 ug/l
Well SP-GW03 (2005): 180 ug/l

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Well 212-TW04 (2003): 33 ug/l

Trichloroethene:

GE Surface Water Specific Criteria: 260 ug/l
State RBC: 5 ug/l
Federal MCL: 5 ug/l
Well 212-TW02 (2003): 1100 ug/l J
Well 212-TW02 (2005): 130 ug/l
Well SP-GW03 (2005): 150 ug/l
Well 212-MW02 (2005): 170 ug/l
Well 212-TW04 (2003): 37 ug/l

Vinyl chloride:

GE Surface Water Specific Criteria: 930 ug/l
State RBC: 2 ug/l
Federal MCL: 2 ug/l
Well 212-TW04 (2003): 47 ug/l
Well SP-GW03 (2005): 11 ug/l
Well 212-MW02(2005) : 17 ug/l

Chloroform:

GE Surface Water Specific Criteria: 1240 ug/l
State RBC: 0.16 ug/l
Well 212-TW04 (2003): 1.6 ug/l
Well 212-BW01(2005): 1.4 ug/l
Well 212-BW02 (2005): 1.4 ug/l

Area of Concern A: Groundwater analyses results from sampling in 2003 that took place for the Phase II RFI reported that groundwater by Area of Concern A contained 1,2 Dichloroethane (“DCA”) at concentrations exceeding the Federal MCL and the State RBC for groundwater, and bromodichloromethane and chloroform in concentrations exceeding the State RBCs for groundwater. During the 2005 Bedrock and Overburden Investigation, DCA was found in bedrock groundwater well MW-SP-B01 at a concentration less than the screening level.

1,2 Dichloroethane (“1,2 DCA”):

GE Surface Water Specific Criteria: 14 ug/l
Federal MCL: 5 ug/l
State RBC: 5 ug/l
Well AOC-A- TW01 (2003): 15 ug/l
Deep Well MW-SP-B01 (2005): 2.4 ug/l

Bromodichloromethane:

State RBC: 0.18 ug/l
Well AOC-A-TW01: 0.35 ug/l (estimated)

Chloroform:

GE Surface Water Specific Criteria: 1240 ug/l
State RBC: 0.16 ug/l

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Well AOC-A-TW01: total: 1890 ug/l dissolved: 2070 ug/l
Seep SP-002-SE: total: 5780 ug/l, dissolved: 5700 ug/l

7. Thallium GE Surface Water Specific Criteria: 6 ug/l;
Federal MCL: 2 ug/l;
State RBC: 2.4 ug/l;
Well SP-204 total: 12.9 ug/l
Well SP-202 total: 11.6 ug/l
Seep SP-002 SE total: not reported
dissolved: 13.4 ug/l (biased low, expect actual value to be higher)

Laboratory

For the Phase II RFI, three wells were installed at the Laboratory. LAB TW01 is on the upgradient south west perimeter of the property. LAB TW02 is located on the downgradient northeast perimeter and LAB TW03 is located on the downgradient eastern perimeter of the property. The groundwater contaminants that were found above screening levels are described below.

Tetrachloroethene: GE Surface Water Specific Criteria: 98 ug/l;
Federal MCL: 5 ug/l
State RBC: 5 ug/l
Well TW02: 6.2 ug/l;

Carbazole: State RBC: 3.3 ug/l
Well LAB-TW01: 27 ug/l;

Dibenzofuran: State RBC: 24 ug/l;
Well LAB-TW01: 33 ug/l

Naphthalene: State RBC: 6.2 ug/l;
Well LAB-TW01: 140/160 ug/l

Benzo(a)anthracene: GE Surface Water Specific Criteria: 0.03 ug/l;
State RBC: 0.09 ug/l;
Well LAB-TW01: 0.1 ug/l (J)

Manganese: GE Surface Water Specific Criteria: 1788.1 ug/l;
State RBC: 880 ug/l;
Well Lab TW01 total: 5060 ug/l, dissolved: 5100 ug/l;
Well Lab TW02 total: 857 ug/l, dissolved: 895 ug/l;
Well Lab TW03 total: 2740/2700 ug/l, dissolved: 2730/2760 ug/l
Morgantown Utility Board Morgantown River source water analyses: 6450 ug/l

Thallium: GE Surface Water Specific Criteria: 6 ug/l;
EPA MCL: 2 ug/l;
State RBC: 2.4 ug/l;
Well LAB TW03: total: not reported dissolved: 4/5.7 ug/l

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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)?

 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”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.

Stabilization of Contamination:

The sources of groundwater contamination at this facility are believed to have been present for sufficient time such that the migration of contamination has stabilized. Releases are likely occurring at a steady rate (such as any potential releases from the ponds/surface impoundments) or diminishing through time (all others). Groundwater in the South Plant exists both in the unconsolidated overburden aquifer and in the bedrock aquifer and, in general, travels east towards the Monongahela River. The lateral extent of the overburden aquifer is limited to the east by a steep hillside. Contaminants in overburden groundwater are either discharged to the bedrock or to the surface. The direction of overburden groundwater may be influenced by surface impoundments on the property that are dredged approximately every seven years and by a stream which runs south outside the south western perimeter of the property (the South Tributary). The surface of the Monongahela River is located 100 feet below the upper land surface of the former GE facility, with a railroad track and a different business operating on a thin strip of land between the river and the steep hillside bearing the former GE facility.

Organic Chemicals in Groundwater at the South Plant:

Area 212: The extent of ground water contamination in the SP-212 area is adequately defined for the purpose of evaluating the Groundwater Environmental Indicator. Bedrock wells are non-detect for PCE and breakdown products. Surface water sample 2.9 -SW01, located about 250 feet downgradient of the highest recent concentration

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in overburden groundwater (212-TW02 at 3,600 ug/l PCE), detected PCE and breakdown products, but at estimated concentrations below evaluation criteria. A boundary location for evaluating contamination from this area is Surface Water Sampling Location 2.9-SW01.

Area of Concern A: The extent of groundwater contamination by Area of Concern A is adequately defined for the purpose of evaluating the Groundwater Environmental Indicator. Other than being present above the Federal MCL (5 ug/l) at Area of Concern A and below the Federal MCL in possible downgradient wells 2.2 GW02, SP-208, SP-215, and one bedrock well (MW-SP-B01), 1,2 DCA is not observed in any other groundwater at the South Plant. Chloroform is observed only in a groundwater sample from Area A and in estimated concentrations at the 212 area and the 2.2 area: SP-212 (0.64 ug/l) , 212-GW01 (0.13 ug/l), 212-GW02 (0.1 ug/l), 212-GW04(1.6 ug/l) , 0.18 ug/l at 2.2-GW02. Bromodichloromethane was detected in groundwater only at Area A in the South Plant and only in an estimated concentration. GE reported that higher concentrations of chloroform and bromodichloromethane were found in rinse and field blanks and may be the result of laboratory contaminants. The recent NPDES permit included chloroform as a monitoring parameter due to chlorine treatment of feed water from the Morgantown Utility Board. The chemicals 1,2 DCA, chloroform, and bromodichloromethane were evaluated and not detected in analyses of the South Tributary during Crompton's 2003 evaluation. Boundary locations for evaluating contamination in this area include the South Tributary, NPDES Outfall 002 which monitors discharges from Surface Impoundment Ponds B and C, SP-208, 2.2 GW02, the 212 area wells, and MW-SP-B01.

SP-215/Benzene and Potential Fuel Release: The extent of groundwater contamination associated with these chemicals is adequately defined for the purpose of evaluating the Groundwater Environmental Indicator. These chemicals were identified only in groundwater at the Crompton SP-215 well location. Well location SP-208 and Crompton seep locations SP-SE-1 and SP-SE-5 are potentially downgradient. Upgradient locations that were evaluated (SP-202, SP-204, AOC A, Area 2.2, and Crompton surface water locations SP-SW-3, SP-SW-4, and SP-SW-5) are by the western perimeter of the facility. Therefore the extent of potential benzene contamination and any potential fuel release is located within the South Plant. Boundary locations for evaluating contamination from this area include the South Tributary, NPDES Discharge Outlet 002 which monitors discharges from Surface Impoundment Ponds B and C, SP-202, SP-204, SP-208, AOC A, Area 2.2, and Crompton Seep locations SP-SE-1 and SP-SE-5.

Inorganic Chemicals in Groundwater and Seeps at the South Plant:

The presence of inorganic chemicals in groundwater and surface water appears ubiquitous throughout the area. Increased concentrations are apparent on the western portion of the plant property. Their concentrations decline as groundwater travels east on the property. A discussion on impact to the South Tributary is presented in the response to Question 6, below. Boundary locations for evaluating metals include the stream outside the southwest perimeter, AOC-A-GW01 (east), 2.2-TWO2 (between SP-202 and SP-204) SP-206, SP-207, SP-208, SP-002SE, Crompton SP-216, Crompton SP-215, Crompton SP-SE-1, Crompton SP-SE-5, and NPDES discharge outlet 002 which monitors discharges from Surface Impoundment Ponds B and C.

Laboratory

The extent of groundwater contamination at the laboratory is adequately defined for the purpose of assessing the groundwater environmental indicator. Three (3) wells are used to define the property. Well TW01 is an upgradient well on the eastern boundary. Wells TWO2 and TWO3 are downgradient wells on respective northeastern and western boundaries of the Lab. With the exception of thallium, the concentration of contaminants is greater as it enters the property at TW01 and, with the exception of manganese, diminishes to below screening levels as it travels through the property. With respect to manganese, the level of manganese reduces to 45% of its initial concentration as it travels in groundwater through the lab property, and exceeds the screening level by a multiple of

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three once it leaves the property. With respect to thallium, it appears to be the only contaminant released to groundwater at the property and its level at the property is twice the screening level. Groundwater from this area travels towards the east hillside that drops down towards the river.

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

 X 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):

Well SP-04 by the southwestern perimeter of the property contains elevated metals and may discharge into the South Tributary. During a site visit on September 9, 2005, the US Corps of Engineers observed a seep of unknown quality discharging from the South Plant to the South Tributary. (See USACE figures from September 9, 2005).

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.

 X 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.

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_____ 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.

See concentrations listed in Question 2, above.

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)?

 X 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-assessment,⁵ 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

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unacceptable impacts to the surface waters, sediments or eco-systems.

The South Tributary was evaluated for many constituents in 2003 by Crompton during the Phase II Due Diligence Evaluation and evaluated for manganese in 2005 by the US Army Corps of Engineers (See USACE September 2005 Field Report including September 9, 2005 USACE Figures and September 22, 2005 letter report from REIC to the COE). The evaluations indicate that downstream concentrations of contaminants were nondetect or below applicable screening levels. As the South Tributary is not a drinking water source and does not contain any fish, surface water criteria for human ingestion of water and organisms are not applicable.

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):

A groundwater monitoring program is in place under the NPDES program. The program is described in NPDES Permit Number WV0022047 which was issued on July 16, 2004 and expires on June 30, 2009. The program includes quarterly groundwater monitoring of perimeter wells. Parameters that are evaluated include pH, manganese, aluminum, iron, trichloroethylene, and tetrachloroethylene.

The details of additional monitoring that is necessary to verify that contaminated groundwater has remained within the dimensions of the existing area of contaminated groundwater will be negotiated with GE and Crompton in coordination with WVDEP.

Additional monitoring shall include an evaluation of PAHs and metals in the three bedrock wells to confirm that the presence of these contaminants in respective overburden soil and groundwater is limited.

Additional monitoring shall ensure (a) there exists no pathway from all seeps from the property to any human or ecological receptor and (2) if a pathway exists or develops, that there exists no unacceptable impact resulting from releases from the South Plant. Seeps which shall be inspected include, but are not limited to, the seep on the western perimeter, and seeps identified by GE and/or Crompton along the eastern perimeter, including the “red” seep discharging from the former GE property just outside the southeastern property boundary. Monitoring frequency shall be increased during increased rainfall loading conditions.

The monitoring plan will be re-evaluated if groundwater use changes or if information is learned that significantly changes this decision.

