

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: _____Mittal Steel USA - Weirton Plant_____

Facility Address: _____400 Three Springs Drive, Weirton, WV 26062-4989 _____

Facility EPA ID #: _____WVD000068908_____

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):

Groundwater at the facility is known to be contaminated above appropriately protective levels including Maximum Contaminant Levels (“MCLs”), USEPA Region III Risk-Based Concentrations (“RBCs”) for tapwater, and surface water quality criteria for aquatic and human receptors. Groundwater sampling has been conducted at the site since 1998 when the RCRA Corrective Action project began, and focused investigation work has been completed in two specific areas where releases from Solid Waste Management Units (“SWMUs”) occurred (Corrective Action Area I - C & E Outfall Area and Corrective Action Area II - Mainland Coke Plant). Additional groundwater sampling has been completed in specific portions of the site pursuant to the requirements of the WVDEP Underground Storage Tank program, and in conjunction with the closure of RCRA hazardous waste management units. Facility-wide groundwater sampling was completed in 2003-2004 as part of the Environmental Indicator (“EI”) program developed in cooperation between the facility and EPA Region III in 2003.

The key contaminants found to be present in groundwater at the facility above MCLs, USEPA Region III RBCs, and surface water quality criteria for aquatic and human receptors include cyanide, benzene, tetrachloroethene, arsenic, cadmium and zinc. A complete list of contaminants found to be present above appropriately protective levels is provided on Table 2 of the Groundwater Environmental Indicator Document dated July 2004, and in the RCRA Facility Investigation (“RFI”) Reports for CAA I and II dated March 2, 2000 and February 2, 2001, respectively. These key contaminants include cyanide, benzene, tetrachloroethene, arsenic, cadmium and zinc.

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).

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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):

Based on the groundwater sampling conducted at the facility, it appears that the migration of contaminated groundwater has stabilized. The facility-wide groundwater sampling completed for the EI program involved the use of 39 monitoring points that were situated adjacent to and/or downgradient from potential significant contaminant source areas identified for the RFI project. These monitoring points were also situated along the perimeter of the facility immediately adjacent to surface water bodies that receive groundwater discharge from the upper most water bearing zone beneath the facility. The network was designed to provide representative data to define the horizontal or vertical dimensions of the existing area of groundwater contamination.

The facility installed 13 additional monitoring wells to supplement the existing perimeter network in 2003. Ten wells were installed at five nested locations (2 at the Strip Mill, 1 at the Sheet Mill, and 2 at the Tin Mill). The other three shallow water table wells were installed in the alluvial aquifer on Browns Island and at the C & E Outfall Area (see Figure 1, GW EI Document). Two comprehensive rounds of groundwater monitoring were completed at these points to define the extent of groundwater impacts, or the existing area of groundwater contamination. Additional sampling was completed at groundwater seeps in the Avenue F portion of the facility to evaluate the migration of contaminants and potential for exposure.

Based on the data generated by the EI program, it appears that there are localized areas of groundwater contamination present in specific portions of the facility above appropriately protective levels. However, no significant groundwater contaminant plumes were identified, and no contaminant plumes were found to be migrating from the site. We expect these conditions to remain stabilized, and additional sampling and monitoring work will be completed at the facility to ensure that significant impacts are identified, and that appropriate measures are taken to ensure that the migration of contaminated groundwater remains under control.

References -GW EI Document dated July 2004

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):

Groundwater flow patterns for the uppermost water-bearing zone beneath the facility (that has shown localized areas of contamination) are influenced by a groundwater divide (high water table) that exists beneath the mainland portion of the Facility. The results of water level measurements collected at the site indicate that groundwater flow appears to be to the north and northwest in the northern portion of the site with discharge to the Ohio River near the Tin Mill and Mainland Coke Plant areas of the facility. Groundwater flow in the southern portion of the site appears to be to the south and southwest, with discharge to Harmon Creek or the Ohio River at the southern limit of the facility (See Figure 1, GW EI Report dated July 2004).

References: Final RFI Workplan dated June 1999
GW EI Document dated July 2004

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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.

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.

_____ If unknown - enter “IN” status code in #8.

Rationale and Reference(s):

Table 2 (Groundwater Analytical and Screening Results) included in the GW EI Document dated July 2004 provides the facility-wide groundwater sampling results from the network of wells used to identify releases of contaminated groundwater above appropriately protective levels from the site. This table also identifies the maximum concentration of those contaminants found to be present in groundwater at the facility above appropriately protective levels. Based on EPA’s review of this data, it appears that in general, the discharge of contaminated groundwater into surface water is likely to be insignificant, and there is no evidence to date indicating that concentrations are increasing. Cyanide was found to be present above appropriately protective levels (continuous chronic criterion for cyanide in surface waters, for the protection of aquatic organisms) in the groundwater results for the C & E Outfall Area, the Mainland Coke Plant, Browns Island, the Sheet Mill and Strip Mill, the Tin Mill, and IMS areas of the site. However, the cyanide levels in groundwater in these portions of the site were all less than an order of magnitude above the appropriately protective levels, and they occurred either in the interior of the facility, or near the relatively high volume Ohio River or Harmon Creek. Based on these factors, it was determined that these cyanide concentrations would not pose a risk to the adjacent surface waters.

The cyanide results for the Avenue F seeps are the only groundwater results for the facility that were considered potentially significant. The cyanide results for these seeps ranged from 74 to 2160 ug/L, as compared to the continuous chronic criterion of 5.2 ug/L for surface water.

References - GW EI Document dated July 2004

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)?

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):

The cyanide results for the Avenue F seeps are the only groundwater results for the facility that were considered potentially significant. The cyanide results for these seeps ranged from 74 to 2160 ug/L, as compared to the continuous chronic criterion of 5.2 ug/L for surface water.

Additional evaluation of the nature of a small tributary and pond near the seep locations in the Avenue F area was completed in May 2005. Based on this evaluation, it appears that although these water bodies provide some limited and isolated habitat functions, the overall value of these water resources is limited by several factors including low/intermittent flows, small drainage areas, impacts from previous industrial activities (slag disposal), and lack of connectivity to larger downstream water resources. The evaluation also concluded that all of the drainage and discharge from these water bodies is connected to the facility’s underground storm sewer system, and ultimately discharges through an NPDES permitted outfall where water quality parameters (including cyanide) are regularly monitored. Also, while the seep results showed elevated concentrations of cyanide, it is not known whether these elevations persist in the receiving surface waters. Additional sampling was completed in these water bodies and seeps in August 2005 to verify the cyanide levels detected previously. Further evaluation of the potential impacts to receiving surface water bodies (and the significance of this discharge of contaminated groundwater) will be completed as part of the RFI project.

References: GW EI Document dated July 2004

Aquatic Resources Evaluation Summary for the Avenue F Area dated June 17, 2005

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?”

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.

If unknown - enter “IN” status code in #8.

Rationale and Reference(s):

Additional groundwater monitoring will be completed in the future to verify that contaminated groundwater remains within the dimensions of the existing area of contaminated groundwater. Periodic groundwater monitoring on a facility-wide basis will be completed using the network of monitoring points established for the EI program (See Figure 1 and Avenue F documents, GW EI Document dated July 2004). The schedule, scope and frequency of this facility-wide monitoring program will be finalized in the near future after EPA and the facility have an opportunity to meet and review current site conditions. Additional sampling was completed for the seeps and surface water bodies that were found to contain cyanide above appropriately protective levels in the Avenue F portion of the facility. Further evaluation of the potential impacts to receiving surface water bodies (and the significance of this discharge of contaminated groundwater) will be completed as part of the RFI project. Additional sampling and monitoring activities will also be completed in a focused manner in conjunction with the completion of the RFI project for the facility. This additional monitoring work will be used to verify the expectation that groundwater contamination will remain within the existing area of contaminated groundwater.

