DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

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

Facility Name: United States Steel Corporation – Clairton Works
Facility Address: 400 State St. Clairton, PA 15025
Facility EPA ID #: PAD004498010

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).

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

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.

As documented in the 2013 Consent Order and Agreement (COA), United States Steel Corporation (USS) investigated, determined, and admitted responsibility for areas in the Clairton Plant in which groundwater is contaminated with Benzene, phenols, and other organic compounds and that this contaminated groundwater may be entering Peters Creek and the Monongahela River. An initial February 12, 1987 COA established obligations for USS to remediate and abate these conditions. Since 1990, USS has taken measures to fulfill its obligations via the installation and sampling of numerous monitoring wells, installation and operation of contaminated groundwater recovery systems, installation and operation of an Early Warning System, and installation of a cap and barrier around the Peters Creek Lagoon. The 2013 COA aim is to evaluate and update the groundwater recovery systems. Results and information presented in reports required by the 2013 COA including a Groundwater Site Characterization Report (SCR) and Groundwater Monitoring and Control Work Plan (GWMCWP) along with the most recent First and Second Quarters 2021 Semiannual Compliance Progress Report support the evaluation of this EI.

A description of the current specific areas containing contaminated groundwater and associated recovery systems include:

Keystone Area: The Keystone Area encompasses the largest area of the site including the No.1, No.2, and No.5 Control Rooms; Wastewater Treatment (Bug Plant); Aeration Basins; Keystone Cooling Tower; Tar Storage; Compressor Building; numerous batteries; tar decanters; sulfur plant; and first and second unit coolers. Monitoring Well RW-98 was installed near wells TW-76 and W-77 in the Keystone Area. RW-98 is not currently piped for recovery but used for monitoring purposes only and is continued to be evaluated for the possibility of upgrading to include recovery in the future. Manual passive recovery of LNAPL occurs at well MW-74 via absorbent socks and/or manual hand bailing.

BTX Plant Area: The BTX Plant Area contains the former BTX Plant where Benzene, Toluene, and Xylenes were extracted from the by-product coal tar and stored in aboveground storage tanks. Current recovery operations include a BTX Trench consisting of 1,200 feet of interceptor trench to cut-off and prevent contaminated groundwater from flowing into the Monongahela River. Additionally, to enhance remediation of the BTX Plume, in 2019 USS installed a 6-inch stainless steel recovery well MW-39R. Recovered contaminated groundwater is sent to the Bug Plant for treatment.

Tar Plant Area: The Tar Plant Area represents the location of the former USS Tarben Plant. Operations involved the conversion of crude coal tars into liquid pitch and other liquid products such as creosote and chemical oils. Current recovery operations include three active single well Recovery Wells RW-26, RW-27, and RW-38. Recovered contaminated groundwater is sent to the Bug Plant for treatment.

The Tar Plant Area also includes a recovery sump in the Mendelssohn Street Storm Sewer, a 42-inch storm sewer that discharged flow under the Tar Plant into Peters Creek. Contaminated groundwater infiltration was a major source of phenol contribution. The sewer was plugged to prevent discharge and a sump collects infiltrating contaminated groundwater which is sent to the Bug Plant for treatment.

Oil Seep Investigation Area: The Phenol and Cyanide Study conducted in 1981 identified several seeps to the Monongahela River. Current recovery operations include quarterly Enhanced Fluid Recovery (EFR) occurs at wells RW-94-1 and RW-94-4. EFR is implemented through quarterly manual recovery using vacuum trucks to maximize light non-aqueous phase liquid (LNAPL) removal. The most recent reported recovery totals form Q1 and Q2 are 1075 gallons of water and 225

gallons of LNAPL. Recovered contaminated oil and groundwater are processed on-site via oil/water separation and treatment at the Bug Plant.

Peters Creek Coke Yard Area: The Coke Yard Area consists of approximately 108 acres and contains Peters Creek Lagoon, a man-made, unlined lagoon that historically received a number of coke by-product and lime sludge wastes. It is believed that the lagoon was formed as a diked area on the original flood plain of Peters Creek and possibly as part of the old creek bed. Active usage of the Peters Creek Lagoon ceased in the early 1970s. Closure activities of the Peters Creek Lagoon began in 1998 and were completed in 2003. This includes the installation of a slurry wall, in-situ and ex-situ solidification of the lagoon contents, and the construction and installation of an impervious cap. To prevent contaminated groundwater seeps near the lagoon from entering Peters Creek, a French drain-like collection system was installed in 1999. In April 2011, USS began operating a permanent water treatment plant to collect and treat contaminated groundwater from the drain.

In addition to these active remedial system operations, quarterly passive manual recovery of LNAPL occurs at select identified wells via absorbent socks and/or manual hand bailing coinciding with quarterly sampling events.

Rationale and Reference(s):
2013 Consent Order and Agreement – March 15, 2013
Groundwater Site Characterization Report – September 2018
Final Revised Groundwater Monitoring and Control Work Plan – December 2020/Revised September 2021
Semiannual Compliance Progress Report (First and Second Quarters 2021) – July 23, 2021
Response to Comments - Revised Groundwater Monitoring and Control Work Plan – September 2021

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).

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

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):

The GWMCWP identifies a number of existing actions conducted at the site on a regular basis to ensure that shallow and deep groundwater impacts are monitored and controlled. In addition to the activities described previously, USS also conducts the following:

- Quarterly monitoring and sampling of 76 current COA monitoring wells
- Quarterly monitoring and sampling of surface water from three staff gauge locations along Peters Creek
- Quarterly monitoring and sampling of 14 seep locations along Peters Creek
- Monitoring/operating an in-place Early Warning System at outfalls and sewers

The SCR provided trend analyses and plume delineation discussions regarding the existing ares of contaminated groundwater. Trend analyses are useful calculations in determining the upward or downward trend in concentrations over time. In this case, trends were assessed using Mann-Kendall Statistics Test as recommended and described in PADEP and EPA guidance.

Within the main plant area, which includes impacted groundwater and recovery efforts at the Keystone, BTX Plant, Tar Plant, and Oil Seep Investigation Areas, trend analyses for two wells showed increasing trends. These two wells are located within the interior portion of the identified groundwater impacted area and may represent fluctuations due to infiltration and LNAPL influence. However, the trend analyses for the boundary wells indicate either stable or decreasing trends which confirms that migration has stabilized. The stabilization is primarily a direct result of the recovery efforts being employed within these areas of known groundwater impacts and contamination.

Within the Peters Creek Coke Yard Area, trend analyses for three wells showed increasing trends. Two of these wells are located just outside of the slurry wall (one on North side and one on South side) and the other is located approximately 400 feet sidegradient of the well on the southern side. EPA identified errors in the trend analysis conducted for the well on the northern side of the slurry wall and recalculated the data using its own groundwater statistics tool. The results showed no trend in the well signifying stabilization. For the wells on the southern side of the slurry wall, per PADEP request, USS has implemented a passive soil gas survey to investigate potential sources with the understanding that, based on the results, more invasive/investigation activities may be necessary. Review of the Q1/Q2 Progress Report data indicates that well OW-1 (just outside slurry wall) concentrations are below/within their historic levels and the sidegradient well (P-24S) concentrations are non-detect. All other well trend analyses indicated either stable or decreasing trends. Considering this along with the intent of the COA, the in-place slurry wall and drain, and that the EI determination provides for reasonable allowances in the proximity of the monitoring locations (footnote 2), EPA considers the migration in this area to be stabilized.

In support of the trend analyses to determine migration stabilization, monitoring data from existing and newly installed groundwater monitoring wells show that the areas that have identified plumes have been delineated.

Therefore, EPA concludes that the migration of contaminated groundwater stabilized such that contaminated groundwater is expected to remain within existing area of contaminated groundwater as defined by the monitoring locations designated

at the time of this determination. Data continues to be collected and evaluated under the 2013 COA and if additional information yields a re-evaluation of this EI, EPA will review and issue a new determination.

Trend analyses

[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.

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

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):

Concentration data from newly installed wells along the Monongahela River side of the BTX Trench (MW-110S/D, MW-114S/D), seep data from between the slurry wall and Peters Creek, and current fate and transport evaluations have been considered and are the focus of the information used to respond to this EI question. The BTX Plant Area and the Peters Creek Coke Yard Area were the only locations at the facility that were identified as having the potential for discharge to surface water.

Within the BTX Plant Area, monitoring wells (MW-110S/D, MW-114S/D) installed between the BTX Trench and the Monongahela River exhibit concentrations of Benzene exceeding current drinking water and surface water quality standards. Within the Peters Creek Coke Yard Area, seep data similarly exceeds current drinking water and surface water quality standards.

As an initial step, PADEP's SWLOAD model was used to estimate mass loading to the surface water body. The SWLOAD model is meant to be conservative tool based on model assumptions and if the mass loading is within 30 to 50 percent of a standard, more rigorous sampling, monitoring, or modeling are recommended. For both the BTX Plant Area and Peters Creek Coke Yard Area, SWLOAD results indicated that Benzene concentrations in surface water could exceed

Therefore, it is reasonable to suspect contaminated groundwater does discharge to the surface water bodies the Monongahela River and Peters Creek.

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

5. Is the **discharge** of "contaminated" groundwater into surface water likely to be **"insignificant"** (i.e., the maximum concentration[3] 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 concentration[3] 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 concentration[3] 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 concentrations[3] 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):

Continuing the fate and transport evaluation from the above SWLOAD results, USS next used PADEP's PENTOXSD model which is a mass-balance water quality analysis model used to calculate waste load allocations (WLAs) to the surface water body which can be compared to published water quality-based effluent limits (WQBELs). The appropriate WQBEL would then be the most stringent WLA toxicity limits for fish and humans. For the BTX Trench Area, PENTOXSD results indicate that the average calculated discharge from this area is less than the most protective WQBEL. For the Peters Creek Coke Yard Area, PENTOXSD results indicate that the average calculated discharge from this area exceeds the most protective WQBEL. While these modeling results predict that discharges from the seeps will exceed the appropriate WQBEL, all of the actual analytical results from surface water samples SG-1 through SG-3 were below laboratory detection limits and water quality standards. Therefore, the combined modeling and sampling results indicate that any actual or potential discharge of contaminated groundwater into surface water is likely to be insignificant.

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

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

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[4])?

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

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

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):

Paragraph 12 of the 2013 COA requires USS to continue to submit quarterly Progress Reports that include sampling and analytical data from groundwater monitoring activities.

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

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 United States Steel Corporation – Clairton Works facility, EPA ID # PAD004498010, located at 400 State Street, Clairton, PA 15025. 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 __9/29/2021__
(print) Kevin Bilash
(title) RPM

Supervisor (signature) _____ Date _9/29/2021___
(print)
(title)
(EPA Region or State)

Locations where References may be found:

US EPA Region III
Land, Chemicals & Redevelopment Division
1650 Arch Street
Philadelphia, PA 19103

Contact telephone and e-mail numbers
(name) Kevin Bilash
(phone #) 215-814-2796
(e-mail) bilash.kevin@epa.gov