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: USS Taylor Facility
Facility Address: 555 Delwar Road, West Mifflin, PA 15122
Facility EPA ID #: PAD 000 739 672

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.

Background:

The 490-acre property is divided into 2 areas, based on past waste disposal activities: South Taylor and Mid/North Taylor. (Figure 1)

Mining influences

- The geologic units beneath the site include the Pittsburgh Coal seam, which was mined extensively under and around the site.
- Groundwater beneath the site flows through mine-induced fractures (caused by mine subsidence) into the underlying mine workings (mine pool).
- The mine workings are above the elevation of the local streams (above drainage mine).
- Groundwater eventually discharges as acid-mine drainage seeps.
- PADEP has listed the surface water within and adjacent to the site (South Taylor tributary, North Taylor tributary, and Streets Run) as impaired waters due to metals from abandoned coal mine drainage.
- PADEP removed the potable water supply designation from all surface water in the Streets Run watershed.

South Taylor (Figure 2)

Waste disposal on the 240-acre area includes three adjacent landfill areas that are monitored under PADEP permitting authority: Hazardous Waste Landfill (closed) – 10.7 acres,
Residual Waste Landfill (inactive/interim closed) – 26.4 acres, and
Old Residual Waste Landfill (ORWL) (closed) – 11 acres

Seepage and leachate are collected from the following areas:

- Residual waste areas – underdrain collection system, surface seepage, and leachate collection system;
- Hazardous waste area – leachate collection system and groundwater recovery wells (A-5R, M-5, and M-12); and
- Acid mine drainage seeps.

Hazardous waste leachate and recovered groundwater are treated at the on-site (NPDES-permitted) treatment plant. Residual waste drainage/leachate and acid mine drainage are combined with the effluent from the hazardous waste treatment plant, then pumped to the USS Irvin Works for treatment and discharge (NPDES permitted).

Mid/North Taylor Area

This 250-acre area was used for waste disposal until the early 1980's, primarily in the 1970's through the early 1980's. Waste disposal areas include:

Closed Landfill, ~ 2 acres

- Operated from February 1981 until January 1982.
- Waste included: Class III demolition waste from steel plants, railroad ties, and drummed waste (oil, grease, and paint sludge).
- The landfill was closed in 1983 in accordance with a PA Consent Agreement. Closure actions included: drum removal, clay cap, vegetated cover, and groundwater monitoring.

Debris/Trash Area – A small quantity of general refuse, possibly including petroleum products (motor oil filters), appears to be dumped on the ground surface.

Steel (Blast Furnace) Slag Disposal Area, ~ 70 acres
- Operated from 1940's until 1977.

Waste Tar Disposal Area, ~ 5 acres
- Operated from 1969 until 1977.
- Waste Tar was mixed with slag and covered with slag and soil.
- Several small areas of hardened tar are visible at the ground surface.

Railroad Tie Disposal Areas, ~ 0.5 acres
- Operated during the 1970's to 1980's
- Waste included: old railroad ties, slag, and general debris

The remaining Mid/North Taylor area is wooded land.

Seep water is collected from the area above the headwaters of the primary drainage feature, the North Taylor tributary to Streets Run, and treated prior to discharge to the North Taylor tributary (NPDES permitted). The treatment system includes neutralization of acid mine drainage with slag, then treatment of the slag discharge through a constructed wetland area.

Rationale:

South Taylor Groundwater - Groundwater is monitored on a quarterly basis in 4 hydrogeologic zones (upper to lower):
Overburden – Series A wells: 4 wells (3 sampled, 1 dry)
Monongahela Formation – Series B wells: 10 wells (5 sampled, 5 dry)
Pittsburgh Coal (mined) – Series M wells: 8 wells (6 sampled, 2 dry)
Conemaugh Formation – Series C wells: 13 wells (8 sampled, 5 dry)

Monitoring data for the 4 quarters in 2016 shows the following exceedances of EPA screening levels:
MCLs: EPA National Primary Drinking Water Maximum Contaminant Level, or
RSL: EPA Regional Screening Level (for contaminants without MCLs).

Contaminant	Screening level	Well	# quarters exceeded	Annual Average Concentration: mg/l	
Manganese	0.43 mg/l RSL for Tap Water	B-13	3	0.55	Below ORWL waste fill
		M-5	4	0.95	Recovery well / Coal mine pillar
		M-6	4	1.05	Down gradient Coal mine pillar
		M-12	4	1.02	Recovery well / Coal mine pillar
Cyanide	0.2 mg/l MCL	A-5R	3	0.72	Recovery well / below ORWL
		HWMH#1	4	1.03	Leachate and seep collection manhole
		M-3R	4	1.43	Down Gradient / Coal mine pillar
		M-12	4	1.44	Recovery well / Coal mine pillar
Chromium	0.1 mg/l, MCL	A-5R	3	0.20	Recovery well / below ORWL
Iron	14 mg/l RSL for Tap Water	M-5	3	25	Recovery well / Coal mine pillar
		M-6	4	18	Down gradient / Coal mine pillar

Several of the groundwater monitoring wells are currently not producing enough water to sample. Under the direction of PADEP, US Steel has recently evaluated the monitoring system. The monitoring system will be upgraded, by well redevelop and/or installation of new wells, to comply with the requirement for 1 upgradient and 3 downgradient wells for each hydrogeologic zone. Should the remediated monitoring system show a change in the nature or area of contamination, this evaluation will be revised accordingly.

Mid/North Taylor Groundwater - Ongoing groundwater contamination is not likely due to the nature of the waste, the length of time that has passed since the disposal activities ceased, and treatment of slag area seeps.

- SVOC and PAH compounds – Low solubility and high soil adsorption gives low potential for contaminants to migrate to groundwater.
- VOCs – Biodegradation over 35 years makes continued migration to the groundwater unlikely.
- Metals – Water from the slag disposal area seeps is collected and treated prior to discharge through an NPDES outfall.

Reference(s):

Results of Investigation, Monitoring Well Evaluation Program Phase I, Hazardous Waste Landfill, South Taylor Environmental Park, Michael Baker International for United States Steel Corporation, January 2017

Results of Investigation, Monitoring Well Evaluation Program Phase I, Residual Waste Landfill, South Taylor Environmental Park, Michael Baker International for United States Steel Corporation, January 2017

South Taylor Environmental Park Technical Information Summary, Michael Baker International for United States Steel Corporation, July 2015

Streets Run Watershed TMDL, Allegheny County, For Abandoned Mine Drainage Affected Segments, PADEP, February 19, 2009

EPA summary of 2016 Quarterly monitoring data, February 2016

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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:

- An evaluation of 7 years of quarterly monitoring data (2010 through 2016) shows that contaminant concentrations are stable or slowly declining.
- Contamination above EPA screening levels remains in only six of the monitoring well locations, and in the leachate/seep collection stream (HWMH#1).
- Contaminated groundwater is confined to the area beneath the waste disposal areas (Wells A-5R, and B-13), or in the mine pool zone beneath the landfills (M-3R, M-5, M-6, and M-12).
- Three of the six wells (A-5R, M-5 andM-12) that continue to show contamination are part of the groundwater recovery system. The recovered groundwater is treated on-site.

Reference(s):

South Taylor Environmental Park Technical Information Summary, Michael Baker International for United States Steel Corporation, July 2015
- Includes time-trend analysis for each analyte by sampling location, for both groundwater and surface water.

EPA summary of 2016 Quarterly monitoring data, February 2016

[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

Contaminated groundwater discharges to the South Taylor tributary of Streets Run. The tributary flow northwest into Streets Run. Streets Run flows north along the western edge of the property into the Monongahela River.

Reference(s):

South Taylor Environmental Park Technical Information Summary, Michael Baker International for United States Steel Corporation, July 2015

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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

Groundwater: In 2016, 4 contaminants were detected above EPA screening levels. Maximum groundwater concentrations are less than 10 times the EPA screening levels at each well location.

Contaminant	Screening level	Well	# quarters exceeded	Annual Average Concentration: mg/l	
Manganese	0.43 mg/l RSL for Tap Water	B-13	3	0.55	Below ORWL waste fill
		M-5	4	0.95	Recovery well / Coal mine pillar
		M-6	4	1.05	Down gradient Coal mine pillar
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Cyanide	0.2 mg/l MCL	A-5R	3	0.72	Recovery well / below ORWL
		HWMH#1	4	1.03	Leachate and seep collection MH
		M-3R	4	1.43	Down Gradient / Coal mine pillar
		M-12	4	1.44	Recovery well / Coal mine pillar
Chromium	0.1 mg/l, MCL	A-5R	3	0.20	Recovery well / below ORWL
Iron	14 mg/l RSL for Tap Water	M-5	3	25	Recovery well / Coal mine pillar
		M-6	4	18	Down gradient / Coal mine pillar

Several of the groundwater monitoring wells are currently not producing enough water to sample. Under the direction of PADEP, US Steel has recently evaluated the monitoring system. The monitoring system will be upgraded, by well redevelop and/or installation of new wells, to comply with the requirement for 1 upgradient and 3 downgradient wells for each hydrogeologic zone. Should the remediated monitoring system show a change in the nature or area of contamination, this evaluation will be revised accordingly.

Surface Water: Surface water is monitoring at 5 stream locations. Acid-mine drainage seeps are monitored at 4 locations. Seep water is collected and treated.

In 2016, only manganese was detected above screening levels.

Surface Water	Screening level	Location	# quarters exceeded	Average Concentration: mg/l	
Manganese	0.43 mg/l RSL for Tap Water	STT@SR	3	0.48	South Taylor tributary to Streets Run
		SR-2	2	0.29	Streets Run downstream

The annual average concentration was above the screening level at only one location, South Taylor tributary immediately upstream of the confluence with Streets Run (SST@SR). The annual average concentration in Streets Run, immediately downstream of the confluence, was below the screening level.

The concentration at STT@SR was only marginally above the screening level. A time-trend analysis shows that manganese concentrations are consistently declining, from approximately 1.0 mg/l in 2010.

PADEP has listed South Taylor tributary, North Taylor tributary, and Streets Run as impaired waters due to metals from drainage from abandoned coal mines. Therefore, impacts to ecosystems at these concentrations are "insignificant."

Reference(s):

South Taylor Environmental Park Technical Information Summary, Michael Baker International for United States Steel Corporation, July 2015

- Includes time-trend analysis for each analyte by sampling location, for both groundwater and surface water.

EPA summary of 2016 Quarterly monitoring data, February 2016

Streets Run Watershed TMDL, Allegheny County, For Abandoned Mine Drainage Affected Segments, PADEP, February 19, 2009

[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[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.

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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):

Groundwater and surface water monitoring will continue on a quarterly schedule under the PADEP Solid Waste permitting authority:

- Hazardous Waste Landfill Permit PAD 000 739 672, and
- Residual Waste Landfill Permit 301193.

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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 USS Taylor Facility, PAD 000 739 672, located at 555 Delwar Road, West Mifflin, PA 15122. 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.

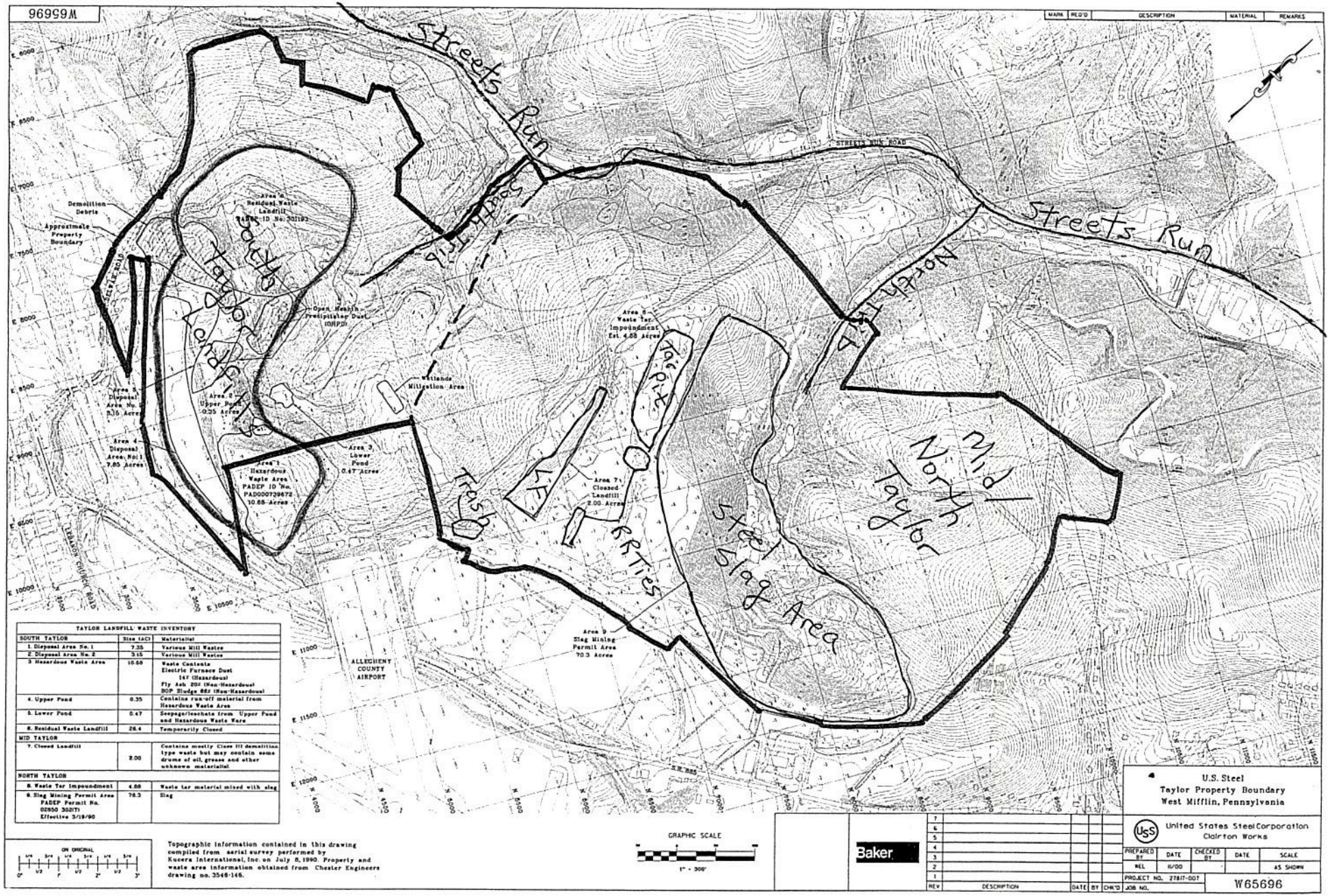
Completed by _____ Date 3-6-2017
(print) Maureen Essenthier
(title) EPA RCRA Project Manager

Supervisor _____ Date 3-13-2017
(print) Paul Gotthold
(title) Assoc. Dir., Office of PA Remediation
(EPA Region or State) EPA Region 3

Locations where References may be found:

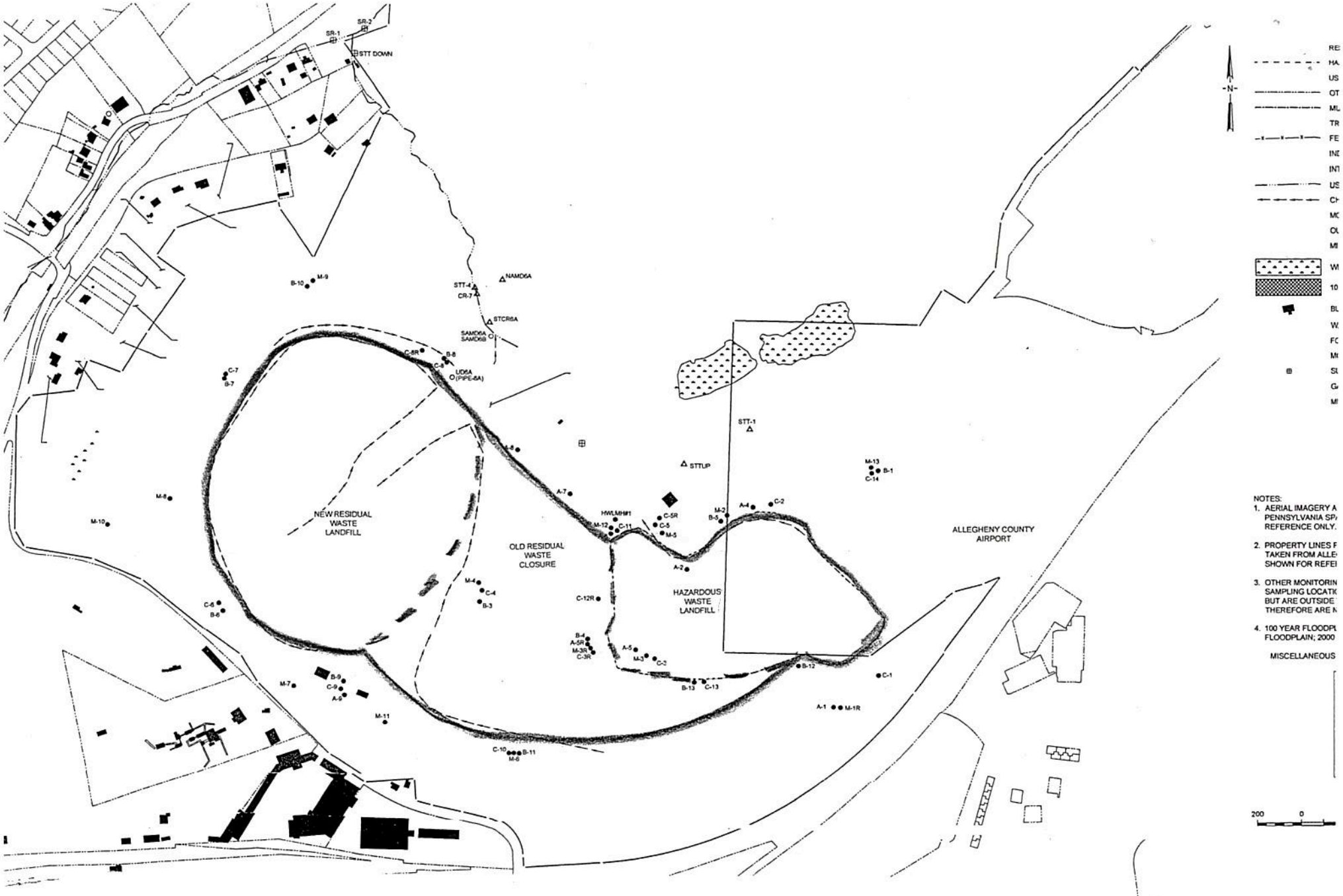
US EPA Region III
Land and Chemicals Division
1650 Arch Street
Philadelphia, PA 19103

Contact telephone and e-mail numbers
(name) Maureen Essenthier
(phone #) 215-814-3416
(e-mail) essenthier.maureen@epa.gov



US STEEL TAYLOR FACILITY
Environmental Indicator (EI) RCRIS code (CA750)
Migration of Contaminated Groundwater Under Control

FIGURE 1



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Migration of Contaminated Groundwater Under Control
South Taylor Landfills

2016 Samples Exceed Screening Levels

FIGURE 2

RR 11/2