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:	**Western Berks Refuse Authority**
Facility Address:	**Poplar Neck Road, off Rt. 724 West, Birdsboro, PA 19508**
Facility EPA ID #:	**PAD 00 044 3705**

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 #6 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).

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?

X 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):

The facility is an operating municipal waste landfill. Closed waste cells include municipal waste, commercial waste and a small hazardous waste disposal area. Two landfill areas exist: Area A with closed waste cells; and, Area B with closed cells and one operating cell. An extensive monitoring well system is in place around the fill areas, and the wells are sampled quarterly as a permit requirement. A hydraulic barrier and leachate collection system operate to control the release of contaminants.

Groundwater - The following groundwater contaminants have exceeded human-health risk-based screening levels since 1/02. The screening standards used are the EPA Drinking Water Standards Maximum Contaminant Level (MCL), Region III Risk-Based Concentration for tap water for chemicals without established MCLs, and EPA Drinking Water Health Advisory for chemicals without established MCLs or Risk-Based Concentrations.

- **Arsenic concentrations of 15 to 30 ppb in several wells in Areas A and B exceed the EPA drinking water MCL of 10 ppb.**
- **Cadmium concentrations of 10 to 30 ppb in one Area B well (MW-27) exceed the EPA drinking water MCL of 5 ppb.**
- **Nitrate-Nitrogen concentrations of 400 ppm in one Area B well (MW-27) exceed the EPA drinking water MCL of 10 ppm.**
- **Manganese concentrations of 2,000 to 8,000 ppb at several wells in Areas A and B exceed the EPA Region III Risk-Based Concentration of 730 ppb (no EPA MCL is established). A significantly higher concentration (23,000 ppb) was detected at one well (MW-19) in Area A.**
- **Boron concentrations of 14,000 to 24,000 ppb in one well (MW-27) in Area B exceed the EPA Region III Risk-Based Concentration of 3,300 ppb (no EPA MCL is established).**
- **Sodium concentrations of 25 to 400 ppm in several wells in Areas A and B exceed the EPA drinking water draft advisory (for individuals on a restricted sodium diet) of 20 ppm (no EPA MCL or Risk-Based concentrations are established). A significantly higher concentration (2,000 ppm) was detected at one well (MW-27) in Area B.**
- **Sulfate concentrations of 600 to 800 ppm in one well (MW-27) in Area B exceed the EPA drinking water draft advisory of 500 ppm (no EPA MCL or Risk-Based concentrations are established).**

Low levels of volatile organic chemicals are found in the groundwater. Concentrations are currently below risk-based screening levels, with a downward trend.

References:

Western Berks Refuse Authority Groundwater monitoring data from 1995 to 2002 for on-site and off-site wells, electronic files (3 diskettes) submitted by Kurt Fritz, PADEP Hydrogeologist, in July 2002.

Western Berks Refuse Authority Landfill Review of Groundwater Data, memo dated 7/23/20, Maureen Essenthier, USEPA Region III.

Western Berks Refuse Authority Information Submittal for EPA, report dated 1/29/03, Charlene Sauls, PADEP Hydrogeologist.

Environmental Indicators Inspection Report, March 2002, prepared by Foster Wheeler for EPA and PADEP.

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).

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):

An extensive monitoring well system is in place around the fill areas and the wells are sampled quarterly as a permit requirement. Groundwater concentrations from the last ten (10) years have been plotted for each contaminant. The plots show that the concentrations of the contaminants of concern have declined or remained stable during that period.

Reference:

Monitoring well trend plots contained in the Western Berks Refuse Authority Information Submittal for EPA, report dated 1/29/03, Charlene Sauls, PADEP Hydrogeologist.

[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.

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):

The landfill is bound by the Schuylkill River to the south, east and west. Groundwater from the facility discharges to the River.

References:

Western Berks Refuse Authority Groundwater, Surface Water, Leachate and Witness Tank Monitoring Plan, Motley Engineering Co., February 1996.

Western Berks Refuse Authority Information Submittal for EPA, report dated 1/29/03, Charlene Sauls, PADEP Hydrogeologist.

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)?

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X 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 <u>key</u> 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 <u>each</u> 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.

<u>Rationale and Reference(s)</u>:

Groundwater discharge into the River is monitored by 12 wells located adjacent to the River bank. Three contaminants of concern are found at concentrations above the screening levels in the river-bank wells. The contaminants and the concentrations detected during the 2002 monitoring are described below.

<u>Arsenic</u> - Arsenic concentrations above the EPA Drinking Water Standards MCL of 10 ppb were detected in 4 of the 12 wells. Three of the wells had concentrations above the MCL only one time during the 2002 sampling. The average concentration for these wells during 2002 was about 10 ppm. The forth well, MW-11, contained about 33 ppb of Arsenic, about 3 times the MCL. All concentrations were below the PA Water Quality Standard for Arsenic in surface water of 50 ppb for human health and 150 ppb for chronic aquatic exposure.

<u>Manganese</u> - Manganese concentrations above the EPA Region III Risk-Based Concentration of 730 ppb were detected in 5 of the 12 wells. Four of the five wells had concentrations ranging from 1,000 ppb to 5,000 ppb, up to 7 times the screening level. The other well, MW-19, contained 23,000 ppb of Manganese, about 30 times the screening level. However, the average concentration of manganese in the 12 river-bank wells was about 3,500 ppb, about 5 times the health-based screening levels. The PA Water Quality Standard for Manganese in surface water is 1,000 ppb. Therefore, the average groundwater concentration adjacent to the River is 3.5 times the PA Water Quality Standard for Manganese.

Sodium - Sodium concentrations above the EPA drinking water draft advisory (for individuals on a restricted sodium diet) of 20 ppm were detected in 5 of the 12 wells. Four of the five wells have concentrations ranging from 25 ppm to 58 ppm, up to 3 times the screening standard. The forth well, MW-11, contained 400 ppm, 20 times the health-based screening level. However, the average concentration of sodium in the 12 river-bank wells is about 60 ppm, about 3 times the health-based screening levels. No PA Water Quality Standard for Sodium in surface water has been established.

Groundwater concentrations of Arsenic are declining over time. Groundwater concentrations of manganese and sodium appear to be stable over time. Given the localized occurrence of the contamination and the dilution by the Schuylkill River flow, contamination discharge into the River is not a concern.

References:

Western Berks Refuse Authority Groundwater monitoring data from 1995 to 2002 for on-site and off-site wells, electronic files (3 diskettes) submitted by Kurt Fritz, PADEP Hydrogeologist, in July 2002.

Western Berks Refuse Authority Landfill Review of Groundwater Data, memo dated 7/23/20, Maureen Essenthier, USEPA Region III.

Western Berks Refuse Authority Information Submittal for EPA, report dated 1/29/03, Charlene Sauls, PADEP Hydrogeologist.

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

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.

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):

Groundwater is routinely monitored by the facility under the direction of PADEP, as required by the facility's landfill permit. Groundwater samples from 16 wells around the perimeter of the fill areas and adjacent to the river bank and property boundary are analyzed to monitor the extent of contamination. Monitoring data is reported to PADEP. A Comprehensive Ground-water Monitoring Evaluation is conducted by PADEP every three years.

References:

Environmental Indicators Inspection Report, March 2002, prepared by Foster Wheeler for EPA and PADEP.

Comprehensive Ground-water Monitoring Evaluation, CME 99, Western Berks Refuse Authority, PAD 000 443 705.

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).

X 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 **Western Berks Refuse Authority** facility**,** EPA ID # **PAD 00 044 3705, located at Poplar Neck Road, off Rt. 724 West, Birdsboro, PA 19508**. 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 04/15/03

(print) Maureen Essenthier

(title) Remedial Project Manager

Supervisor (signature) _____ Date 04/16/03

(print) Paul Gotthold

(title) PA Operations Branch Chief

EPA Region 3

Locations where References may be found:

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