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:	**G.R.O.W.S. Landfill**
Facility Address:	**1000 New Mill Ford Road, Morrisville, PA 19067**
Facility EPA ID #:	**PAD 00 042 9589**

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): Most of the RCRA wells at the G.R.O.W.S. Landfill do not yield groundwater that is contaminated by volatile organic compounds (VOCs), pesticides, semivolatile organic compounds (SVOCs) or other organic parameters. However, certain RCRA wells (GD51, GD52, GD53 and GD53D) do yield groundwater that has high concentrations of ca, mg, K, Na, Cl, SO4, As, Se, Total Organic Halogens (TOX), total organic carbon (TOC), NH3-N, Total dissolved solids(TDS, Pb, Fe, Mn, specific conductance, chemical oxygen demand (COD) and trace metals (be, Co, Ni, Tl.) These parameters, along with benzene and naphthalene (wells GD52, GD53 only) are more related to the old Hughes Landfill, especially where wells GD51, GD52, GD53, and GD53D are concerned. All of these wells were completed through trash from the Hughes Landfill, and thus, the quality of groundwater is compromised. A few of the aforementioned contaminants have maximum contaminant levels (MCLs), but most of them do not. MCLs are health-based drinking water criteria, which EPA uses as a screening tool to evaluate groundwater quality. Benzene, naphthalene, Se, TDS, Tl, Ni, Be, and Pb exceed MCLs. Cl, Fe, Mn, As, and SO4 do not exceed MCLs or naturally occurring background levels.

Special Note: Slag buried at the G.R.O.W.S. Landfill years ago (via U.S. Steel) is a likely source for elevated concentrations of some metallic and nonmetallic compounds in groundwater samples form some RCRA wells at G.R.O.W.S.

Reference: G.R.O.W.S. Landfill Annual Groundwater Assessment Report (1998)

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): The main reason for "stabilized" groundwater contamination at the G.R.O.W.S. Landfill is well location. As stated in Question #2, the main source of groundwater contamination is the old Hughes Landfill. Because some wells (GD51, GD52. GD53, and GD53D) have been built through trash from Hughes Landfill, these wells' collective groundwater quality is compromised, especially in terms of specific conductance and total dissolved solids (increased concentrations of these two parameters in groundwater can lead to similar increases in metallic and nonmetallic inorganic parameters in groundwater.) The other RCRA wells, (GW4R, GD11, GD22, GU39, GD25A, and GD44D) at the G.R.O.W.S. Landfill do not yield groundwater that has extremely elevated specific conductance or total dissolved solids; these other wells do, however, yield groundwater that has elevated concentrations of Na, K, Ca, Mg, SO4, Cl, Fe, Mn, NH3-N, and COD. These may be related to buried U.S. Steel slag. However, it should be noted that none of the non-RCRA (municipal) wells at G.R.O.W.S. Landfill yield groundwater that has been as affected as the groundwater from the RCRA wells have been. Hence, the contamination is localized.

References: G.R.O.W.S. Landfill Groundwater Monitoring Reports (1987-2000)
G.R.O.W.S. Landfill Annual Groundwater Assessment Report (1998)

[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 G.R.O.W.S. Landfill is surrounded by Manor Lake (west), Penn Manor Cove (south), Motor Boat Cove (north), and the Delaware River (southeast). Groundwater flow is generally south-by-southeast and south-by-southwest (towards Manor Lake and the Delaware River.) Another surface water body , Scotts Creek(a Delaware River tributary) also receives groundwater discharges from the G.R.O.W.S. Landfill. The Penn Manor Cove also receives groundwater discharges directly from the G.R.O.W.S. Landfill. Groundwater from the old Hughes Landfill discharges into the Penn Manor Cove, while Scotts Creek and Manor Lake lie in the groundwater flow path/discharge path of the old G.R.O.W.S. (RCRA and the current G.R.O.W.S. (municipal) Landfills.

Reference: G.R.O.W.S. Landfill Annual Groundwater Assessment Report (1998)

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 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): Outside of specific conductance and total dissolved solids, the main contaminants from both the old G.R.O.W.S. (RCRA) and Hughes Landfills are metals and non-metals identified in Question #2 and a few organic constituents (benzene and naphthalene). All of the aforementioned parameters are analyzed from three surface water points at the G.R.O.W.S. Landfill. These points are connected to Scotts Creek, Manor Lake, and Penn Manor Cove. After over a decade's worth of sampling, none of the aforementioned parameters (save Fe, Mn, COD) have ever been elevated above their groundwater screening levels. In fact, most of these parameters have been analyzed at virtually nothing (near detection limits). The surface water points still support fish, crustaceans, insects, reptiles, amphibians, water birds, mammals, and plants. This shows that the"contaminated" groundwater discharge from G.R.O.W.S. is not impacting the surface water bodies.

References: G.R.O.W.S. Landfill Annual Groundwater Assessment Report (1998)
On-site observation by Daniel Snowden, Geologist, PADEP, SERO

[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): G.R.O.W.S. Landfill's surface water points (GUS 101, GDS102, and GDS103) are sampled quarterly along with the site's monitoring wells. All wells (municipal and RCRA) will continue to be sampled on a quarterly basis at G.R.O.W.S. Landfill and groundwater/surface water interaction will continue to be assessed. So far, the assessment has shown that no contaminants of concern from groundwater are present in elevated concentrations in surface water.

References: G.R.O.W.S. Landfill Groundwater Monitoring Reports (1987-2000)
G.R.O.W.S. Landfill Annual Groundwater Assessment Report (1998)

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).

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 **G.R.O.W.S. Landfill** facility, EPA ID # **PAD 00 042 9589**, located at **1000 New Ford Mill Road, Morrisville, PA 19067.** 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 11/20/00

(print) Linda A. Matyskiela

(title) Remedial Project Manager (Senior)

Updated 09/24/02

Supervisor (signature) _____ Date 01/08/01

(print) Paul Gotthold

(title) PA Operations Branch Chief

(EPA Region or State) EPA, Region 3

Locations where References may be found:

References may be found in the RCRA Record Room and
PADEP Southeast Regional Office
Lee Park, Suite 6010; 555 North Lane
Conshohocken, PA 19428

G.R.O.W.S. Landfill Groundwater Assessment Report (1998);G.R.O.W.S. Landfill Groundwater Monitoring Reports (1987-2000); and On-site observation by Daniel Snowden, Geologist, PADEP, SERO

Contact telephone and e-mail numbers:

(name) Linda Matyskiela
(phone #) 215-814-3420
(e-mail) matyskiela.linda@epa.gov

(name) James Wentzel (PADEP)
(phone #) 610-832-6212
(e-mail) jwentzel@state.pa.us