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: **BORICUA WOOD PROCESSING**
Facility Address: Km. 5.5, State Road 865, Toa Baja, PR
Facility EPA ID #: **PRD090564477**

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).

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.

__X__ 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:

1. Corrective measures have been completed so that the sourcing of on-going arsenic and chromium releases from the treatment operations has been stopped; the most serious areas of soil contamination from past releases (i.e., hot spots within the area where the drip pad has been installed) have been excavated; and any migration of contaminants from the remaining residual soil contamination has largely been eliminated by preventing future storm water infiltration through installation of the drip pad and associated run-on/run-off controls (including roofing covering the entire drip pad). The corrective measures included (Reference #1 and #2):

a) excavation of approximately 145 cubic yards of the most highly contaminated arsenic and chromium containing soils underlying the area where a drip pad meeting all requirements of 40 CFR § 264 Subpart W requirements has been installed,

b) removal of approximately 2.25 tons of contaminated storm sewer and catch basin sediments from the area where the Subpart W drip pad has been installed,

c) sealing of all storm sewer catch basins (which formerly, by design received process drippage and spillage) inside the area where the Subpart W drip pad has been installed, and

d) installation of a drip pad and associated run-on/run-off controls (including roofing covering the entire drip pad) meeting all requirements of 40 CFR § 264 Subpart W requirements,

2. Three deep soil borings (to depths of 16.5 - 20 feet) were installed either directly within the area now covered by the Subpart W drip pad, or immediately adjacent to it. A series of soil samples were obtained in each of the three borings and analyzed for arsenic

and chromium. The results showed that (Reference #7, #8, & #9):

a) arsenic and chromium concentrations exceeding the site-specific [on-site] clean-up criteria for those two constituents (80 mg/kg arsenic, and 400 mg/kg chromium) were only present in soils to depths of 4 feet below ground surface or shallower,

b) the arsenic and chromium concentrations attenuated rapidly with depth below 4 feet below ground surface, and

c) the groundwater aquifer was not encountered at 20 feet below ground surface. [The aquifer is believed to be approximately 93 feet below ground surface, based on the water table in the on-site process water production well. See Note below].

3. The concentration of arsenic and chromium in the bottom most samples from the two deep soil borings installed where the Subpart W drip pad was subsequently constructed, ranged from 51 mg/kg arsenic and 213 mg/kg chromium (at 16 - 16.5 feet below surface) in boring DP-20, to 8.8 mg/kg arsenic and 92 mg/kg chromium (at 19.5 - 20.0 feet below surface) in boring DP-37 (Reference #7, #8, & #9). Boricua interpreted that the relatively elevated arsenic and chromium contamination measured in the 16 - 16.5 foot sample in boring DP-20 "may have been cross-contaminated from surface soils, [since] the results from boring DP-37 (about 15 feet away) do not confirm this arsenic level. (Reference #9). To clarify that uncertainty, EPA requested that a third deep soil boring (NW-17) be installed. Since the drip pad had already been constructed, boring NW-17 was located approximately twenty feet west of the drip pad. The concentrations of arsenic and chromium in the bottom most sample (19.5 - 20.0 feet below surface) from NW-17 were 3.7 mg/kg and 131 mg/kg respectively. (Reference #9)

Therefore, the results from both borings DP-37 and NW-17 found arsenic below its generic Soil Screening Level (SSL) for migration to groundwater, i.e., 29 mg/kg, based on a dilution attenuation factor (DAF) of 20. (Reference #10). Although the concentration of total chromium (what was analyzed for in all sampling at Boricua) from both borings DP-37 and NW-17 exceeded the generic SSL of 38 mg/kg (based on a DAF of 20) for both total and hexavalent chromium, EPA believes that the usage of the generic SSL in this case, rather than a site-specific SSL, may be overly conservative considering: a) the demonstrated site specific chromium attenuation with depth; b) the relatively deep groundwater, i.e. 93 feet below surface; and c) naturally occurring chromium concentrations are present in most sedimentary and volcanic soils and rocks in Puerto Rico due to the core of the island consisting of volcanic rocks, which contain naturally occurring chromium. In addition, as discussed in 4) below, groundwater was sampled in 1985, and both arsenic and chromium concentrations were found to be below their respective maximum contaminant levels (MCLs).

4. The 1985 Superfund Scoring work (Reference #4) included sampling of the facility's on-site process water well (apparently from a surface tap, not by bailer, or their own

pump). Arsenic was non-detect, and chromium was detected at 12 ug/liter, which is below its MCL of 50 ug/liter. [It is unclear where the water came from, i.e., 8 ft below ground, or, as seems more likely based on the below Note, from below 93 ft.] Also as part of its 1985 work, Superfund sampled 3 public water supply [i.e., PRASA] wells approximately 2-3 Km north and northwest (down-gradient) of Boricua. No hazardous constituents were detected in those public water supply wells. (Reference #4).

NOTE: The 1990 RFA prepared by the Puerto Rico EQB and the 1985 Superfund Scoring report (References #3 and 4) had indicated that groundwater was eight feet below ground surface. Both appear to be incorrect (the RFA depth was derived from the 1985 Superfund report). Boricua, in the Description of Current Conditions in the December 1992 RFI Workplan (Reference #5) and September 1993 RFI report (Reference #6), refutes the 8 foot figure, and states that the water table is at 93 feet below surface [+ 25 feet mean sea-level] in their on- site production well. The RFA's 8 foot groundwater depth is apparently based on the 1985 Superfund report, which seems to be in error, as to both the on-site well's total depth [160 ft according to Boricua, not 60 ft as stated in the Superfund report], and water table depth.

The results of subsequent 3 RFI deep (16-20 ft) borings, and 4 additional geo-technical borings (to 25 feet) installed in June 1993[refer to Reference #6, Appendix B], refute the 8 foot depth groundwater figure. Five of those 7 borings were dry at total depth, while small zones of tight water bearing clays were encountered in 2, where some water was reported between 20 - 25 feet in geo-technical borings DP-19 and DP-24. However, the water encountered in DP-19 and -24 was never pumped or bailed to measure recharge, etc. Boricua has interpreted the water observed in DP-19 and 24 to be perched water as it was not seen in the 5 other nearby borings (Reference #6).

REFERENCES

1. "Drip Pad Soil Excavation and Removal Interim Measures Report", May 1996.

2. "Drip Pad Assessment Report and Certification", October 30, 1996.

3. "RCRA Facility Assessment (RFA), May 30, 1990.

4. "Superfund Hazardous Ranking Report (prepared by NUS), November 1985.

5. "RFI Work Plan Proposed Drip Pad Area", December 1992.

6. "Draft RFI Report", September 1993.

7. "Draft Phase 1A RFI Report" (3 volumes), June 1994.

8. " Draft Phase 1A RFI Report (revised), February 1995.

9. "Phase 2C RFI Report", December 1998.

10. "Soil Screening Guidance: Technical Background Document" (EPA/540/R-95/128), May 1996.

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)?

_____ 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):_____

[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?

_____ 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):_____

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):_____

[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?"

_____ 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):_____

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 **BORICUA WOOD PROCESSING** facility , EPA ID # **PRD090564477** , located at Toa Baja, PR. Specifically, this determination indicates that **there is no indication of contaminated groundwater at this facility**. 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 ____original signed by_____ Date___09/17/99__
Timothy R. Gordon, Project Manager
RCRA Programs Branch
EPA Region 2

Supervisor ____original signed by_____ Date ___09/30/99__
Nicoletta DiForte, Section Chief
Caribbean Section
RCRA Programs Branch
EPA Region 2

Approved by ____original signed by_____ **Date:**___09/30/99__
Raymond Basso, Chief
RCRA Programs Branch
EPA Region 2

Locations where References may be found:

U.S. Environmental Protection Agency - Region 2
RCRA File Room
290 Broadway - 15 th Floor
New York, NY 10007

Contact telephone and e-mail numbers:

Timothy R. Gordon, Project Manager
U. S. Environmental Protection Agency
Region 2
RCRA Programs Branch
Telephone: (212) 637-4167
E-mail: Gordon.Timothy@EPAMAIL.EPA.Gov