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:	Ferro Glass & Color Corporation (formerly Degussa Metals Corporation)
Facility Address:	251 West Wylie Avenue, PO Box 519, Washington, PA 15301-0519
Facility EPA ID #:	PAD 041 731 670

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 "Current Human Exposures Under Controls" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "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 groundwater 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 risk-based "levels" (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 (for any media) – skip to #8 and enter "IN" status code. (In order to present a more complete picture of site conditions, the reviewer has chosen not to skip to #6.)

Rationale and Reference(s):

Total lead and cadmium exceed MSCs in groundwater beneath the facility, as indicated below.

Initial groundwater samples were collected April 22 and May 4, 1982 and analyzed for indicator parameters that established groundwater quality and heavy metals that were screened using USEPA's Interim Primary Drinking Water Standards (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver) at the time of the sampling. Lead and chromium were the only metals that exceeded interim drinking water standards in some of the well samples, as noted in the table below:

Parameter	**Well W01S**	**Well W01D**	**Well W02S**	**Well W02D**	**Well W03S**	**Well W03D**	**Interim Drinking Water Standard***
Chromium (Total)	**0.17**	ND	ND	ND	**0.12**	ND	0.05
Chromium (Hex)	**0.17**	ND	ND	ND	**0.10**	ND	0.05
Lead	**0.31**	ND	**0.35**	**0.21**	**0.22**	**0.24**	0.05

Notes:
All results in ppm.
*Interim Drinking Water Standard at the time of the sampling
Bold results exceed Interim Drinking Water Standard

Additional samples collected in June and July 1982 were analyzed for heavy metals that were present in the initial round of samples (chromium and lead, with the addition of cadmium). Sample results indicated low levels of lead in wells W02S and W03D in the June 17 and July 14, 1982 round of sampling, as follows (lower concentrations than initial sampling round):

[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).

Parameter	Well W01S	Well W01D	Well W02S	Well W02D	Well W03S	Well W03D	Interim Drinking Water Standard*
6/4/82							
Lead (unfiltered)	ND	ND	ND	ND	ND	ND	0.05
Lead (filtered)	ND	ND	ND	ND	ND	ND	0.05
Chromium (unfiltered)	ND	ND	ND	ND	ND	ND	0.05
Chromium (filtered)	ND	ND	ND	ND	ND	ND	0.05
6/17/82							
Lead (unfiltered)	ND	ND	**0.07**	ND	ND	**0.16**	0.05
Lead (filtered)	ND	ND	ND	ND	ND	**0.06**	0.05
Chromium (unfiltered)	ND	ND	ND	ND	ND	ND	0.05
Chromium (filtered)	ND	ND	ND	ND	ND	ND	0.05
7/14/82							
Lead (unfiltered)	ND	ND	**0.18**	ND	ND	**0.20**	0.05
Lead (filtered)	--	--	--	--	--	--	0.05
Chromium (unfiltered)	ND	ND	ND	ND	ND	ND	0.05
Chromium (filtered)	--	--	--	--	--	--	0.05
Cadmium (unfiltered)	ND	ND	ND	ND	ND	ND	0.01
Cadmium (filtered)	--	--	--	--	--	--	0.01

Notes:
All results in ppm.
*Interim Drinking Water Standard at the time of the sampling
Bold results exceed Interim Drinking Water Standard

Sources of lead contamination in W02S were determined to possibly include the former lagoons located upgradient of the well, a flow-through manhole pit (now closed) located upgradient of the well near the lab entrance at Building N-1, or potential leaching from parking lot slag or related contaminants. The source of lead contamination in W03D was unable to be determined. DLA (the facility's contractor) reported that any historical contamination from early Drakenfeld operations in the 1940s, (such as reported draining of floor and machine wash water to the ground beneath Bays 1 through 6) should also have appeared in shallow well samples. It was concluded that the contamination was not due to the current Drakenfeld operation, although the exact source was not known.

It was concluded that the low levels of lead detected in the samples did not appear to warrant further investigation. (*Report on Groundwater Monitoring Program for Drakenfeld Colors, Inc., August 24, 1982)*

Additional groundwater sampling was performed quarterly from August 1983 through May 1984 (shallow wells only). Drakenfeld authorized the sampling, based on a directive from PADEP, to determine the potential for migration of

hazardous metal contaminants from a closed, former settling pond area. PADEP also required semi-annual sampling of the shallow wells after the first year. DLA concluded that, in most cases, metals in the wells were either below detection limits or slightly exceeded detection limits. DLA indicated that essentially none of the waste materials in the former pond area solubilized and entered the shallow perched groundwater system and are thus relatively immobile in groundwater. DLA reported that natural soil filtration may have also prevented migration of the metals from the former ponds.

In March 1990, PADEP relieved the facility from its semi-annual groundwater monitoring program that was associated with the on-site, closed, former ponds. Sample results showed no significant contamination. The facility contacted PADEP in March 1991 with plans of an office expansion project. Test borings and soil sample analyses, which indicated significant heavy metal soil contamination, were submitted with the plan. The facility later decided to delay the project until 1994. PADEP agreed to delay contaminated soil removal until then so long as semi-annual groundwater monitoring was re-initiated. (*Program Investigation Memo – Michael Watson regarding Drakenfeld Semi-Annual Groundwater Monitoring, March 4, 1993)*

Semi-annual groundwater monitoring commenced again in 1993 at the request of the PADEP. Monitoring of cadmium and lead were required based on PADEP's review of sample analyses of plant expansion soil borings. Since the deep monitoring wells had not been sampled since 1982, they were included with initial sampling. Lead and cadmium were not detected in these wells during the first round of sampling in 1993, so continued monitoring of deep wells was suspended. Environmental Management Associates, LLC (EMA) installed replacement wells for WO-1S/WO-1D (upgradient wells) in October 1999. The former upgradient wells occupied the area of a previous plant expansion in late 1999/early 2000. The new wells (WO-1SA and WO-1DA) were located approximately 140 feet north of the previous ones and were first sampled in June 2000. It is also important to note that the new wells are located on previous residential property acquired by Cerdec about 1996. (*Letter Report (January 29, 2001) from Environmental Management Associates (EMA) to DMC2-Cerdec regarding Groundwater Monitoring Well Sampling and Analyses (12/29/00))*

GES (the facility's present contractor) conducted recent semi-annual sampling events, the results of which are summarized below. Well WO-3S was replaced with well WO-3SA in 2006 due to the presence of silt buildup in the old well. All results are in mg/L and bold face results indicate an exceedance of the MSCs. GES concluded that total lead concentrations were due to fine particulate suspended in the wells that was not mobile in groundwater. Therefore, GES believed that the groundwater underlying the facility was not adversely impacted by cadmium or lead in any form.

Second semi-annual event – 2008

Constituent	MSC	WO-1SA	WO-2S	WO-3SA
Cadmium, Total	0.005	0.002	**0.076**	**0.073**
Cadmium, Dissolved	0.005	<0.001	<0.001	<0.001
Lead, Total	0.005	**0.052**	**0.040**	**1.7**
Lead, Dissolved	0.005	<0.002	<0.002	<0.002

First semi-annual event – 2009

Constituent	MSC	WO-1SA	WO-2S	WO-3SA
Cadmium, Total	0.005	<0.001	**0.081**	**0.1**
Cadmium, Dissolved	0.005	<0.001	<0.001	0.002
Lead, Total	0.005	**0.033**	**0.062**	**2.6**
Lead, Dissolved	0.005	<0.002	<0.002	<0.002

References:

Environmental Management Associates, LLC
Ferro Corporation (formerly DMC2-Cerdec, Groundwater Monitoring Well Sampling & Analyses, First Semi-Annual Event 2003-June 30, 2003,
EMA Project No. 2C011, dated July 21, 2003

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):

Based on the data provided in the response to the previous question, it appears that groundwater contamination (first identified in the 1980s) has stabilized as sampling results for total cadmium and lead remain above PADEP MSCs and dissolved cadmium and lead remain below MSCs.

[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.
X	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):

Shallow groundwater underneath the facility likely discharges to Chartiers Creek due to proximity of the facility to the creek, depth to groundwater of 5-6 feet and groundwater flow direction, and topography of the area. However, it is not expected that any historical contamination from the facility is being transported to the creek by groundwater since essentially none of the contamination exists in the dissolved phase; contamination is being effectively filtered and immobilized by subsurface soils.

Reference: *EI Inspection Report, November 2004*

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 <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 judgment/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 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 "level(s)," and if 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 a "NO" status, 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 continues to be monitored semiannually for dissolved and total lead and cadmium at WO-1SA, WO-2S, and WO-3SA.

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

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 Ferro Glass & Color Corporation (formerly Degussa Corporation) facility, EPA ID PAD 041 731 670, located at 251 West Wylie Avenue, PO Box 519, Washington, PA 15301-0519. 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) /Griff E. Miller/ Date 10/15/09

(print) Griff Miller

(title) Remedial Project Manager

Supervisor: (signature) /Paul J. Gotthold/ Date 11/10/09

(print) Paul Gotthold

(title) Associate Director

(EPA Region or State) EPA Region III

Locations where References may be found:

References have been appended to the Environmental Indicator Report and can also be found at PADEP's Pittsburgh office and USEPA's Region III office.

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