

US EPA ARCHIVE DOCUMENT



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

SUBJECT: Evaluation of Owens Corning's status under the RCRAInfo Corrective Action Environmental Indicator Event Codes (CA725 and CA750)
EPA I.D. Number SCD 003 349 982

FROM: James H. Smith
Corrective Action Specialist
Corrective Action Section

THRU: D. Karen Knight, CHMM
Chief, Corrective Action Section

TO: Jeffrey T. Pallas, Chief
Restoration and Underground Storage Tank Branch

PURPOSE OF MEMO

This memo is written to formalize an evaluation of Owens Corning's status in relation to the following corrective action event codes defined in the Resource Conservation and Recovery Information System (RCRAInfo):

- 1) Current Human Exposures Under Control (CA725),
- 2) Migration of Contaminated Groundwater Under Control (CA750).

Concurrence by the Restoration and Underground Storage Tank Branch Chief is required prior to entering these event codes into RCRAInfo. Your concurrence with the interpretations provided in the following paragraphs and the subsequent recommendations is satisfied by dating and signing this memorandum

QUICK REFERENCE FOR STATUS OF ENVIRONMENTAL INDICATORS					
Name and EPA I.D. Number	Location (City or Town)	Current CA725 Decision	Current CA750 Decision	If Current Decision is a No, Projected Date for Positive EI	
				CA725	CA750
Owens Corning SCD 003 349 982	Anderson, South Carolina	YE	NO	TBA	TBA

I. HISTORY OF ENVIRONMENTAL INDICATOR EVALUATIONS AT THE FACILITY AND REFERENCE DOCUMENTS

This Environmental Indicator (EI) evaluation for CA750 is the third evaluation of environmental indicators for Owens Corning. The first EI evaluation, CA725NO and CA750NO was completed by South Carolina on September 29, 1998. The second EI evaluation, CA725YE was completed on August 14, 2002 and CA750YE was completed by EPA on August 25, 2003. The third and current EI determination is currently a CA725YE and CA750NO. The discussions, interpretations, and conclusions on contamination and exposures at the facility are based on the documents referenced.

II. FACILITY SUMMARY

General.

Owens Corning operates a glass fiber production facility on 160 acres of land near the town of Anderson, Anderson County, South Carolina. Since the plant began operation in 1951, operations have expanded to include production from four factories, the chemical and resins plant, and the corporate alloy facility. The resins manufacturing plant closed in 2002. The raw materials used to make glass include silica, limestone, borates, fluorospar, clay, trace amounts of other compounds including iron oxide and salt cake. The materials are combined in a furnace, melted, and mixed, and pulled into filaments. The facility also produces glass marbles. In the past, the facility has produced resins and coatings, which include epoxy resins, polyester resins, gel coats, and alkyd resins for paints.

Regulatory and Corrective Action History

Owens Corning (OC) entered into a Consent Order (89-34-R) with the U.S. Environmental Protection Agency (EPA) under Section 3008(h) of RCRA dated October 11, 1989. The consent order requires OC to perform a RCRA Facility Investigation (RFI) for nine (9) solid waste management units (SWMUs) at the Anderson Plant. Two SWMUs, SWMU 1 - The Abandoned Sludge Lagoon and SWMU 5 - The Parts Stripping Drum Storage Pad have completed closure under a Site Stabilization Plan.

Owens Corning conducted a RCRA Facility Investigation (RFI) Phase I investigation completed per the RFI Work Plan (1990) and a Draft RFI Report was submitted in April 1991. Two addendums to the work plan were prepared (November 1991 and July 1993) and these additional RFI investigations were completed between July 1992 and July 1993.

The U.S. EPA approved the draft RFI in September 1995. Nine (9) solid waste management units (SWMUs) were investigated during the RFI to determine if releases of hazardous constituents had occurred, to define the nature and extent of any releases, and to determine if a threat to human health or the environment exists from any

releases. The RFI, approved by the U.S. EPA in September 1995, determined that no further action was required at the following six (6) SWMUs:

- SWMU #2 - Old Tire Cord Wastewater Basin
- SWMU 3 - Backwash Storage Pond
- SWMU 4 - Sludge Drying Beds
- SWMU 6 - Chemical Wastewater Piping System
- SWMU 7 - Industrial Wastewater Piping System
- SWMU 8 - Alloy Building Clarifying and Settling Tank

The RFI determined that the following SWMUs required further action: SWMU #1, the Abandoned Sludge Lagoon (containing ethylbenzene, toluene, xylenes, chlorobenzene, phthalate esters, arsenic, chromium, and mercury); SWMU #5, Parts Stripping Room Drum Storage Area (containing polynuclear aromatic hydrocarbons, arsenic, and chromium); and SWMU #9, Hydrofluoric Acid Neutralization Pit (containing 1,1-DCE, 1,1,1-TCA, beryllium, and fluoride).

Plans were submitted in 1994 recommending site stabilization measures for SWMUs #1 and #5. In 1995, SWMU #1 was excavated and 64,000 cubic yards of sludge and soil were properly disposed as non-hazardous material in a clay-lined trench in the off-site Owens Corning Landfill. SWMU #5 was excavated and 100 cubic yards of soil was properly disposed of as non-hazardous material in a permitted treatment, storage or disposal facility. SWMU #1 was backfilled in December 1995 after U.S. EPA acceptance of confirmation sampling data. SWMU #5 was backfilled in March 1996 after U.S. EPA acceptance of confirmation sampling data in 1996.

SWMU #9 was over excavated in 1980 to support metals recovery. The area was then backfilled and paved with asphalt to support a truck loading/unloading area. The RFI determined that surface and subsurface soils at SWMU #9 were below cleanup criteria (likely as a result of the prior recovery action). SWMU #9 was identified as a source of chlorinated VOCs and fluoride in groundwater.

A draft Corrective Measures Study (CMS) was submitted to the U.S. EPA in 1996. This CMS documented successful stabilization measures at SWMUs #1 and #5. A final CMS, prepared in 1998 to evaluate technologies for addressing groundwater impacts from SWMU #9, was submitted to U.S. EPA in 1998. Air sparging and soil vapor extraction were recommended in the Final CMS as the remedy for shallow groundwater at SWMU #9.

Owens Corning implemented an Interim Measures for SWMU #9 by injecting molasses to enhance bioremediation of the VOCs in 2004. The presence of hydrofluoric acid in the soil prevented successful bioremediation of VOCs. Groundwater investigations in the saprolite down gradient of SWMU #9 indicate the VOC plume extends under Factory A 750 feet from the source. Additional delineation is warranted in the saprolite aquifer and under Factory A.

All known waste sources that may have affected groundwater have been removed from SWMU #9. The groundwater beneath the waste management areas are now the source areas for the VOC plume in the saprolite aquifer and fractured bedrock aquifer.

Previous pumping tests indicate that hydraulic containment is achievable for the fractured bedrock aquifer. EPA imposed interim measures through the Consent Order on Owens Corning in December 2006 to control the offsite migration of contaminated groundwater through hydraulic containment. However, to date, the facility has not implemented hydraulic containment as an interim measures. The facility is currently conducting additional offsite characterization.

In 2005 and 2006, the facility investigated the groundwater in northeast area of the plant along Betsy Creek and at the site of the former residential Gladden Well. Owens Corning determined that 1,1-DCE exceeded the MCL at the facility boundary to a depth of 250 feet in the bedrock aquifer. Groundwater data from 2006 to 2007 indicates that the 1,1-DCE concentrations are increasing and are migrating offsite.

In 2005, a private well survey was completed with groundwater sampling at residences established on the upland areas to the northeast and southwest of the Betsy Creek stream valley. Of the 139 residences investigated most were on supplied water. Of the seventeen drinking water wells identified nine wells were operational and sampled. None of the private wells on either side of the Betsy Creek stream valley was impacted by Owens Corning's groundwater contaminant plume. Owens Corning's groundwater plume is migrating offsite, under Betsy Creek, and between the residential areas along a 2,000-foot wide corridor.

Wastes Generated. Typical wastes historically generated and managed at the facility included the following: Waste solvents, waste oils, paint waste, resin waste, and esterification distillate.

References:

- November 19, 1980, original Part A application submitted to EPA.
- Part B permit application was submitted to EPA;
- RCRA 3008(h) Administrative Order on Consent (October 11, 1989);
- Description of Current Condition Report (July 1990);
- Draft Corrective Measures Study (February 1996);
- Final RFI Report (December 1995);
- EI Memo (RCRAInfo CA725NO and CA750NO) submitted to EPA (DHEC, September 29, 1998);
- Corrective Measure Study (June 1998);
- 2001 Annual Groundwater Monitoring (February 2002);
- 2002 Annual Groundwater Monitoring (January 2002);
- Site Conceptual Model and Site Monitoring Plan (March 2002);
- EPA EI Memo (RCRAInfo CA 725YE) (August 14, 2002);

Memorandum on Amended Guidance on Ecological Risk Assessment at Military Bases, Simon, Ted W., Office of Technical Services (U.S. EPA Region IV, June 2000);

Interim Measures Imposed SWMU #9 (EPA, April 23, 2003)

Interim Action Work Plan: Insitu Reactive Zone Enhanced Bioremediation Treatment (November 2003);

EPA EI Memo (RCRAInfo CA 750YE) (August 25, 2003);

Owens Corning Response to US EPA Comments March 22, 2005, Comments on the 2004 Annual Groundwater and Surface Water Report (April 28, 2005);

NE Corner Supplemental Investigation Work Plan (September 21, 2005);

12-Month Progress report SWMU #9 Interim Measures (January 2006);

Private Well Survey, Northeast Area added Supplemental Investigation (August 30, 2006);

Northeast Area Investigation Preliminary Data (August 30, 2006);

EPA letter Additional Plume Delineation Recommendation at the Former Acid Neutralization Pit (SWMU #9) (December 11, 2006);

EPA letter Northeast Area Investigation Preliminary Data & Private Well Survey , Northeast Area Added Supplemental Investigation Report Groundwater Interim Measures Imposed (December 11, 2006);

Owens Corning-Anderson Plant, Residential Well Survey Results (January 23, 2007);

2006 Annual Groundwater and Surface Water Monitoring Report (February 8, 2007);

Owens Corning: Response to EPA Comments Letter (February 16, 2007);

2007 Annual Groundwater and Surface Water Monitoring Report (January, 2008);

Response to EPA Comment Letters (February 16, 2007);

Additional Investigation Work Plan (May 2, 2008); and

Response to EPA and DHEC Comments (May 20, 2008)

CONCLUSION FOR CA725

It is recommended that the current status of CA750YE status for Owens Corning, remain a "YE" (*Current Human Exposures Under Control*) until further evaluation.

CONCLUSION FOR CA750

The overall EI determination for CA 750 (*Migration of Contaminated Groundwater Under Control*) is reported as NO – "Unacceptable migration of contaminated groundwater is observed or expected". Contaminated groundwater (1,1-DCE and carbon tetrachloride) exceeding the drinking water standards is expected to continue migrate offsite through the bedrock aquifer.

LEVEL OF CONFIDENCE IN REACHING A POSITIVE EI EVALUATION AND MAJOR ISSUES

CA725

A "yes" (YES) determination for human exposures under control determined in EPA EI Memo (RCRAInfo CA725YE) (August 14, 2002) reflects current conditions.

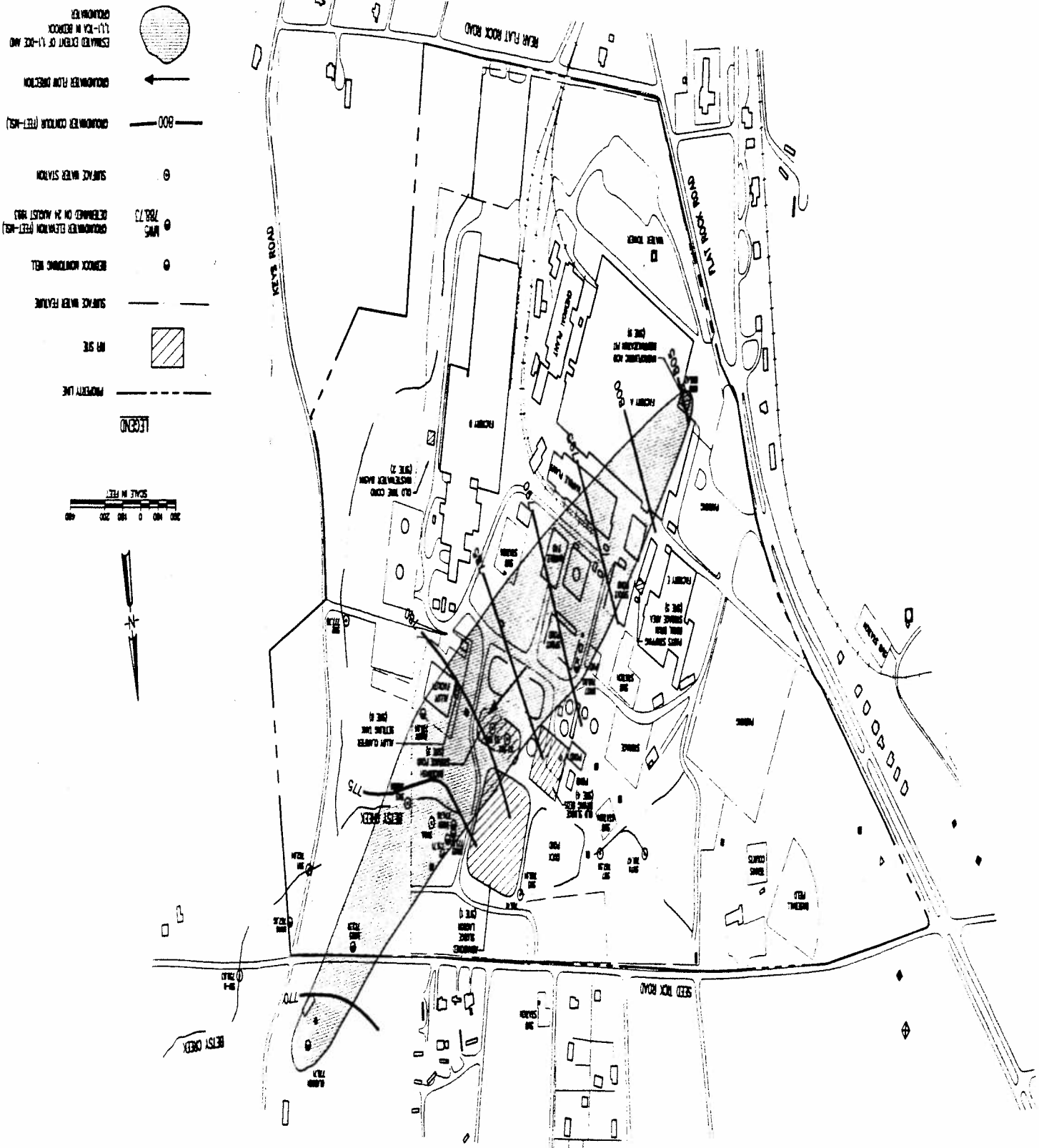
CA750

A "no" (NO) determination for "contaminated groundwater migration controlled" has been determined. Interim Measures was imposed on the facility in December 11, 2006, to control the migration of the VOC plume at the facility boundary. Hydraulic containment to control the migration of VOCs and meet CA750 is recommended. The facility has stated that hydraulic containment is an option for Interim Measures. Hydraulic containment has not been implemented and the plume is uncontrolled. Once the interim measures are implemented in early FY09, the migration of the VOC plume will be under control.

Attachment: 1. CA750: Migration of Contaminated Groundwater Under Control

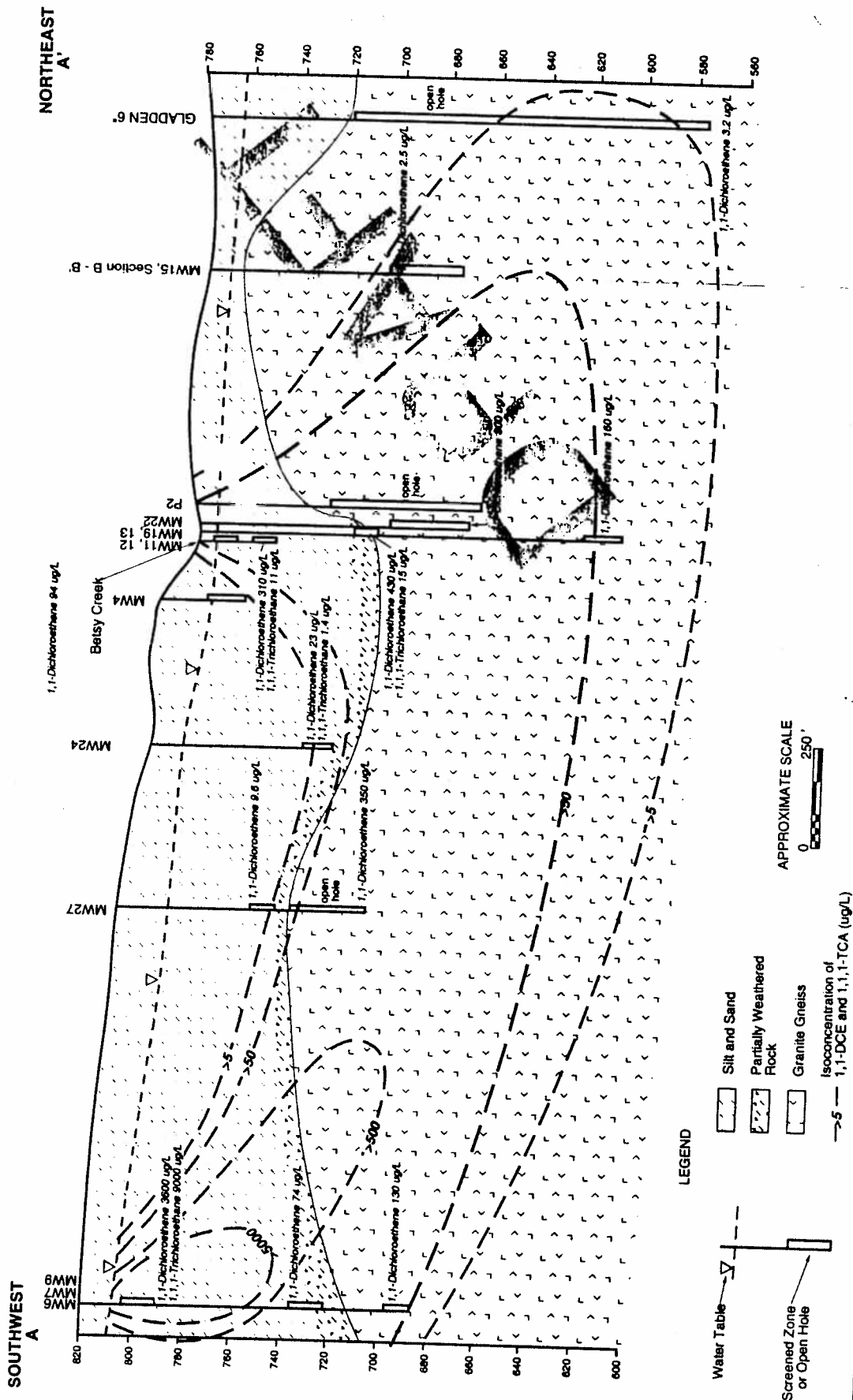
Estimated Extent of 1,1-Dichloroethene and 1,1,1-Trichloroethane in Bedrock Groundwater
 Owens Corning - Anderson, South Carolina

Figure 2.20

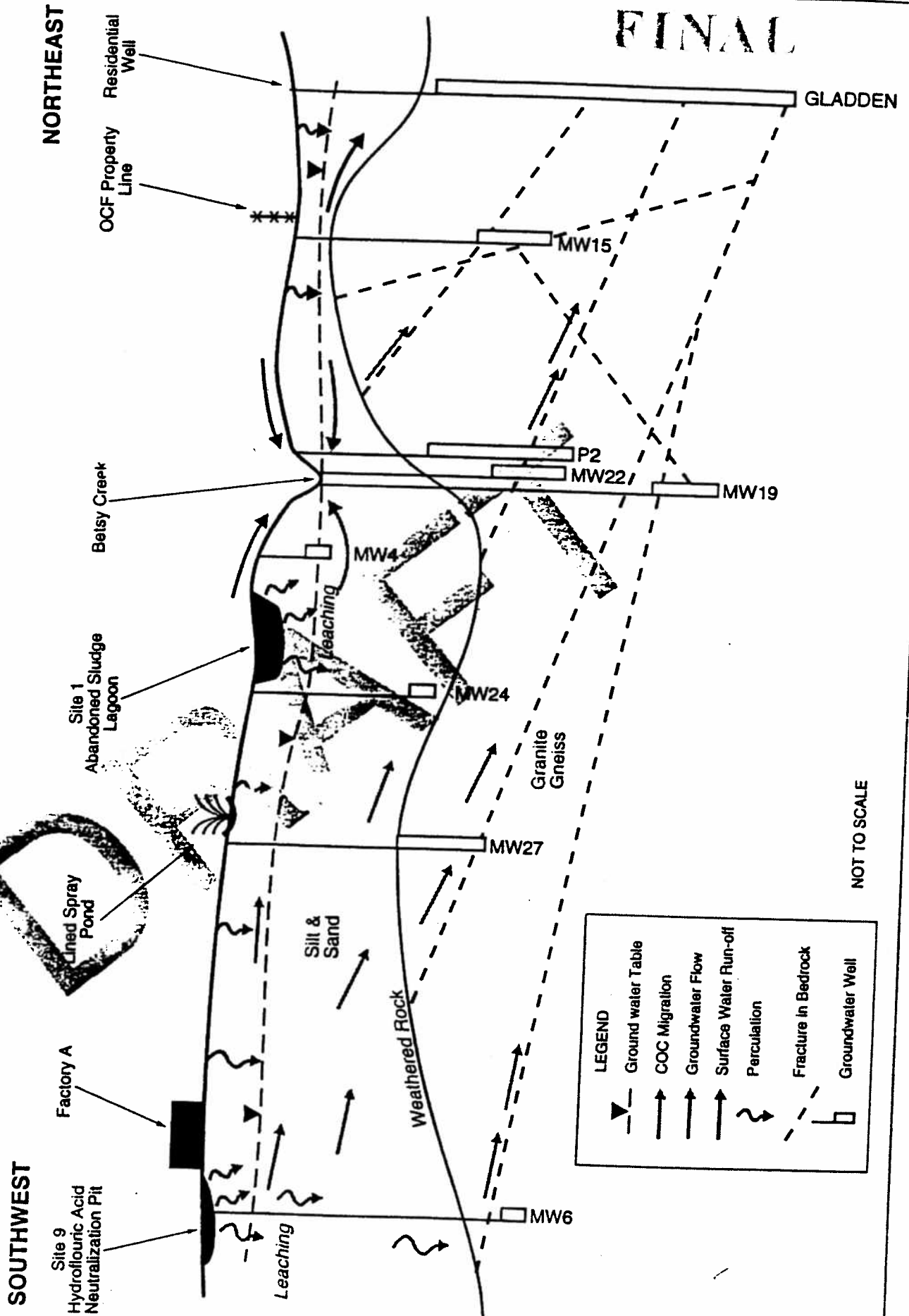


Isoconcentration Map of 1,1-Dichloroethene and 1,1,1-Trichloroethene
Along Hydrogeologic Cross-Section A - A'
Owens Corning - Anderson, South Carolina

Figure 2.21



Generalized Hydrogeologic and Conceptual Site Model Owens Corning Anderson, South Carolina



DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

RCRA Corrective Action Environmental Indicator (EI) RCRIS code (CA 750)

Migration of Contaminated Groundwater Under Control

Facility Name: Owens Corning
Facility Address: Highway 81, South, Anderson, South Carolina
Facility EPA ID#: SCD 003 349 982

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).

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 groundwater onsite is contaminated with volatile organic compounds (VOCs). Both aquifers, the shallow aquifer in the unconsolidated saprolite, and the bedrock aquifer in fractured gneiss are impacted with VOCs. The primary contaminant of concern is 1,1-DCE although, 1,1,1-trichloroethane (1,1,1-TCA), tetrachloroethene (PCE), carbon tetrachloride and vinyl chloride are present in both aquifers exceeding the maximum contaminant levels (MCLs) for groundwater. The monitoring system consists of 42 permanent monitoring wells and two piezometers. The monitoring wells have been installed as shallow overburden wells screened in the saprolite, overburden-monitoring wells screened at the top of the bedrock, and bedrock monitoring wells.

Occurrence of VOCs in Groundwater Onsite

Shallow Aquifer

The 2007 groundwater quality data for the 38 monitoring wells provided comprehensive groundwater monitor for the facility. The primary source area for contaminated groundwater at the Owens Corning Facility is at SWMU #9, Former Hydrofluoric Acid Pit. The following VOCs were detected in the shallow saprolite aquifer in MW-28 at SWMU #9 above their respective MCLs.

<u>MW-28</u>	1,1,1-TCA	100,000 ug/L (MCL 200 ug/L)
	1,1-DCE	130,000 ug/L (MCL 7 ug/L)
	1,2-DCA	270 ug/L (MCL 5 ug/L)
	PCE	63 ug/L (MCL 5 ug/L)
	TCE	140 ug/L (MCL 5 ug/L)
	Vinyl chloride	6.3 ug/L (MCL 2 ug/L)

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

On the other side of Factory A and 400 feet and 700 feet down gradient of MW-28 at SWMU #9 are MW-30 and MW-31. VOCs exceeding the MCL have been detected in both wells screened in the shallow saprolite aquifer.

<u>MW-30</u>	1,1-DCE	3,900 ug/L (MCL 7 ug/L)
	1,2-DCA	26 ug/L (MCL 5 ug/L)
	TCE	5.7 ug/L (MCL 5 ug/L)
	Vinyl chloride	6.3 ug/L (MCL 2 ug/L)

MW-30 was installed at the location of Geoprobe (GP-12). MW-30 was screened in a deeper portion of the saprolite aquifer at 112 feet. 1,1-DCE detected at GP-12 which was 19,000 ug/L at 77 feet.

<u>MW-31</u>	1,1-DCE	4,000 ug/L (MCL 7 ug/L)
	1,2-DCA	24 ug/L (MCL 5 ug/L)
	PCE	5.2 ug/L (MCL 5 ug/L)
	TCE	5.5 ug/L (MCL 5 ug/L)
	Carbon tetrachloride	67 ug/L (MCL 5 ug/L)

The farthest down gradient saprolite well (MW-11) is 1,800 feet from MW-28. It is possible that another source for 1,1-DCE maybe SWMU #1, Abandoned Sludge Lagoon.

<u>MW-11</u>	1,1-DCE	410 ug/L (MCL 7 ug/L)
	Vinyl chloride	30 ug/L (MCL 2 ug/L)

Bedrock Groundwater Contamination Plume

The bedrock monitoring wells are located down gradient of SWMU #9, Former Hydrofluoric Acid Neutralization Pit. The down gradient most wells are located at the facility boundary near Betsy Creek. Historic data from the former offsite and down gradient residential Gladden Well, 200-foot deep bedrock well, detected VOCs (1,1-DCE at 80.4 ug/L in March, 1992), (1,1-DCE at 29 ug/L in August 1992) above the MCL (7 ug/L) and 1,1-DCE at 3.2 ug/L in September 1993, below the MCL. Owens Corning purchased the Gladden Property after VOCs were detected in the drink water well. In 1996, Owens Corning conducted a pumping test at MW-22 at 70 gallons per minute and had significant hydraulic interaction with MW-15 resulting in 15.34 feet of drawdown and 7.7 feet of drawdown at the Gladden Well. MW-15 and the Gladden Well are located 580 feet and 900 feet from MW-22. The interaction between wells over a long distance makes hydraulic containment feasible for controlling offsite movement of VOCs. VOCs were detected in bedrock wells MW-22 and MW-15 during the November 2006 groundwater-sampling event.

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

Down gradient open holed wells, MW-29R, MW-33, and MW-34, were sampled at intervals between packers during sampling events in 2006¹ and 2007² to determine if the concentration of 1,1-DCE is increasing or decreasing in concentration. MW-33 and MW-34 are located at the down gradient edge of Owens Corning property. MW-29R replaced the Gladden Well for monitoring purposes. Bedrock wells MW-29R is 200 feet deep, MW-33 is 255 feet deep and MW-34 is 252 feet deep. The VOCs were detected in the following wells in 2006^{2,4} and 2007^{3,5}.

MW-22 ⁴	1,1-DCE	480 ug/L (MCL 7 ug/L)
MW-22 ⁵	1,1-DCE	510 ug/L (MCL 7 ug/L)
MW-15 ⁴	1,1-DCE	330 ug/L (MCL 7 ug/L)
MW-15 ⁵	1,1-DCE	530 ug/L (MCL 7 ug/L)
MW-29R ²	1,1-DCE	340D ug/L (MCL 7 ug/L) (163-169 feet in depth)
	Carbon tetrachloride	17 ug/L (MCL 5 ug/L)
MW-29R ³	1,1-DCE	390 ug/L (MCL 7 ug/L) (178-180 feet in depth)

Four hundred feet down gradient from MW-29R is MW-33.

MW-33 ²	1,1-DCE	290D ug/L (MCL 7 ug/L) (108 to 114 feet in depth)
MW-33 ³	1,1-DCE	500 ug/L (MCL 7 ug/L) (106 to 110 feet in depth)
MW-33 ²	1,1-DCE	320D ug/L (MCL 7 ug/L) (239 to 244 feet in depth)
MW-33 ³	1,1-DCE	440 ug/L (MCL 7 ug/L) (237 to 240 feet in depth)
	Toluene	88 ug/L
	Chloroform	18 ug/L
	Carbon Tetrachloride	15 ug/L (MCL 5 ug/L) (237 to 240 feet in depth)

Side gradient to MW-33 is MW-34 located next to Betsy Creek.

MW-34 ²	1,1-DCE	270D ug/L (MCL 7 ug/L) (168 to 170 feet in depth)
MW-34 ³	1,1-DCE	420 ug/L (MCL 7 ug/L) (168 to 170 feet in depth)
MW-34 ²	1,1-DCE	280D ug/L (MCL 7 ug/L) (247 to 252 feet in depth)
MW-34 ³	1,1-DCE	490 ug/L (MCL 7 ug/L) (247 to 252 feet in depth)

Current and historic groundwater quality data indicates that 1,1-DCE are increasing in concentration over time in the downgradient wells between the 2006 and 2007 sampling events. The data indicates that 1,1-DCE is leaving the Owens Corning property as indicated by groundwater data from MW-33 and MW-34 located at the property boundary. 1,1-DCE is present in the deep bedrock aquifer below Betsy Creek. In addition, packer testing and flow tests³ conducted in MW-33 indicated that there is an upward flow from below the 252 foot

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

depth indicating that there may also be deeper contamination. Unless there are fractures to allow groundwater to migrate vertically upward the groundwater plume will continue to follow the sub-planar foliation fractures horizontally. While there are currently no offsite groundwater wells, the concentrations of 1,1-DCE at depth indicates that groundwater underflows Betsy Creek. The offsite groundwater is classified as a drinking water aquifer by the state of South Carolina. Owens Corning collected drinking water samples from private wells downgradient but outside the plume swath and detected no VOCs in water samples.

References:

RFI Report, Appendix B, Aquifer Pumping Test Methodology, Results, and Interpretations, (April 1994).

Final RFI Report Volume 1 (December 2005)

Owens Corning Response to US EPA Comments March 22, 2005, Comments on the 2004 Annual Groundwater and Surface Water Report (April 28, 2005);

NE Corner Supplemental Investigation Work Plan (September 21, 2005);

Private Well Survey, Northeast Area Added Supplemental Investigation (August 30, 2006);

²Northeast Area Investigation Preliminary Data (August 30, 2006);

EPA letter: Additional Plume Delineation Recommendation at the Former Acid Neutralization Pit (SWMU #9) (December 11, 2006);

EPA letter: Northeast Area Investigation Preliminary Data & Private Well Survey , Northeast Area Added Supplemental Investigation Report Groundwater Interim Measures Imposed (December 11, 2006);

⁴2006 Annual Groundwater and Surface Water Monitoring Report (February 8, 2007);

³Owens Corning: Response to EPA Comments Letter (February 16, 2007);

⁵2007 Annual Groundwater and Surface Water Monitoring Report (February 5, 2008);

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).

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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.

X _____ 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 historic and current data indicate that the down gradient monitoring wells have been affected by the migration of VOCs from source areas at SWMU #9 and potentially from SWMU #1.

- VOCs are present in overburden material at SWMU #9, Former Hydrofluoric Acid Pit, under Factory A and down gradient of Factory A. The VOCs at SWMU #9 are the likely source area for VOCs detected in down gradient overburden and bedrock wells. Until the source of VOCs in the saprolite overburden is removed, they will be an ongoing source for the VOCs in the bedrock and offsite migration.
- VOCs are also located in the shallow overburden material down gradient of former SWMU #1, immediately north of Betsy Creek (though at lower concentrations than at SWMU 9). SWMU #1 was taken out of service and over-excavated to the water table in 1995, effectively removing the source of VOCs to the groundwater in this area. However, VOCs remain in the saprolite aquifer downgradient of SWMU #1 and are discharging to Betsy Creek.
- VOCs have been detected in the deep bedrock aquifer at the down gradient property boundary. The VOCs have shown an increase in concentration from 2006 to 2007 in MW-29R, MW-33, MW-34 throughout the vertical extent of the aquifer to a depth of 250 feet. The increase in concentration or fluctuations in contaminant concentrations indicate plume movement at the facility boundary. Pumping tests indicates that the aquifer is highly transmissive. Geophysical logging has determined that groundwater moves along fractures that are sub-planar and controlled by the strike a dip of the foliation planes. The VOC plume is increasing in concentration, migrating offsite and therefore not controlled.

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References:

- Owens Corning Response to US EPA Comments March 22, 2005, Comments on the 2004 Annual Groundwater and Surface Water Report (April 28, 2005);
- NE Corner Supplemental Investigation Work Plan (September 21, 2005);
- Private Well Survey, Northeast Area Added Supplemental Investigation (August 30, 2006);
- Northeast Area Investigation Preliminary Data (August 30, 2006);
- EPA letter: Additional Plume Delineation Recommendation at the Former Acid Neutralization Pit (SWMU #9) (December 11, 2006);
- EPA letter: Northeast Area Investigation preliminary Data & Private Well Survey; Northeast Area Added Supplemental Investigation Report Groundwater Interim Measures Imposed (December 11, 2006);
- 2006 Annual Groundwater and Surface Water Monitoring Report (February 8, 2007);
- Owens Corning: Response to EPA Comments Letter (February 16, 2007);

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.

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

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):

Groundwater discharges to Betsy Creek in the northeastern portion of the site. This interpretation is based on surface water data that indicates that VOCs are entering the creek from the saprolite aquifer through diffuse flow. Shallow springs occur along Betsy Creek and represent the shallow water table in contact with the streambed. The 2006 Annual Groundwater and Surface Water Monitoring Report dated February 8, 2007, indicated that 1,1-DCE was detected from SW-3 to SW-15. The highest concentration of 1,1-DCE detected was at SW-11 at 20 ug/L. Carbon tetrachloride was also detected at a concentration of 5.7 ug/L. SW-11 is located 600 feet from SWMU #1. The surface water concentrations for 1,1-DCE and carbon tetrachloride are below the ecological surface water chronic screening values of 303 ug/L and 352 ug/L respectively.

Surface water sampling in 2007 detected 1,1-DCE from SW-1 to SW-15 with the highest concentration of VOCs in surface water sample, SW-3A at 390 ug/L and tetrachloroethane (PCE) at 6.4 ug/L in November 2007 as compared to non-detect in 2006. The MCL for both constituents have been exceeded. A risk assessment has not been performed to determine if exposure to surface water is a risk to human health. The surface water concentrations for 1,1-DCE and carbon tetrachloride are above the ecological surface water chronic screening values of 303 ug/L for 1,1-DCE.

Reference:

- 2006 Annual Groundwater and Surface Water Monitoring Report (February 8, 2007)
- ²2007 Annual Groundwater and Surface Water Monitoring Report (February 5, 2008)

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5. Is the **discharge** of "contaminated" groundwater into surface water likely to be "**insignificant**" (i.e., the maximum concentration³ 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 concentration³ 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 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.

X_____ If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration³ 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 concentrations³ 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):

To provide a conservative evaluation of whether the discharge of VOCs in groundwater to Betsy Creek is likely to be insignificant, the maximum concentration of each constituent in monitoring wells located adjacent to Betsy Creek from the 2006 monitoring programs were evaluated to determine if these VOCs are present at concentrations 10 times the MCL. Groundwater monitoring of the VOC plume migrating towards Betsy Creek can be represented by groundwater quality data from shallow overburden wells MW-11 and MW-12 and top of rock well, MW-13, which are located proximal to and upgradient of Betsy Creek. These data provide a conservative evaluation of the potential significance of the VOC plume discharging to surface water because these data represent groundwater quality prior to further attenuation associated with migration to the discharge point and entry into the groundwater-surface water/sediment interaction zone.

The 2006 and 2007 groundwater and surface water quality data indicate that the VOCs, carbon tetrachloride, 1,1-DCE, and vinyl chloride are present in site groundwater and is potentially discharging to surface water as a diffuse plume or intermittent groundwater seep/spring. The maximum concentration of each constituent detected during 2006 and 2007 in groundwater monitoring wells MW-11, MW-12 and MW-13 are summarized:

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¹MW-11 Overburden Aquifer

<u>Constituent</u>	<u>GW Conc.</u>		<u>MCL</u>
Carbon Tetrachloride	0.013 mg/L	is greater than	0.05 mg/L
1,1-DCE	0.410 mg/L	is greater than	0.07 mg/L
Vinyl Chloride	0.032 mg/L	is greater than	0.02 mg/L

¹MW-12 Overburden Aquifer

<u>Constituent</u>	<u>GW Conc.</u>		<u>MCL</u>
Carbon Tetrachloride	0.011 mg/L	is greater than	0.05 mg/L

¹MW-13 Top of Rock Aquifer

<u>Constituent</u>	<u>GW Conc.</u>		<u>MCL</u>
Carbon Tetrachloride	0.021 mg/L	is greater than	0.05 mg/L

²MW-11 Overburden Aquifer

<u>Constituent</u>	<u>GW Conc.</u>		<u>MCL</u>
1,1-DCE	0.380 mg/L	is greater than	0.07 mg/L
Vinyl Chloride	0.022 mg/L	is greater than	0.02 mg/L

²MW-12 Overburden Aquifer

<u>Constituent</u>	<u>GW Conc.</u>		<u>MCL</u>
1,1-DCE	0.170 mg/L	is greater than	0.07 mg/L
Carbon Tetrachloride	0.016 mg/L	is greater than	0.05 mg/L

²MW-13 Top of Rock Aquifer

<u>Constituent</u>	<u>GW Conc.</u>		<u>MCL</u>
1,1-DCE	0.450 mg/L	is greater than	0.07 mg/L
Carbon Tetrachloride	0.025 mg/L	is greater than	0.05 mg/L

Therefore, the discharge of VOCs from groundwater to surface water would be expected to be insignificant for carbon tetrachloride. However, 1,1-DCE and vinyl chloride are present at concentrations greater than 10 times the MCL in the groundwater.

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As a comparison to the groundwater concentrations previously mentioned, the highest VOC concentrations detected in 2006 in Betsy Creek were detected in surface water sample SW-11 (1,1-DCE at a concentration 20 ug/L and carbon tetrachloride at a concentration of 5.7 ug/L.) Surface water sampling in 2007 detected 1,1-DCE at SW-3A at 390 ug/L and tetrachloroethane (PCE) at 6.4 ug/L in November 2007 as compared to non-detect in 2006.

References:

- ¹2006 Annual Groundwater and Surface Water Monitoring Report (February 8, 2007)
- ²2007 Annual Groundwater and Surface Water Monitoring Report (February 5, 2008)

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 implemented⁴)?

_____ 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.

X_____ If no - (the discharge of "contaminated" groundwater cannot 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):

Based on this evaluation, the discharge of VOCs to Betsy Creek should be considered significant because the concentrations of 1,1-DCE exceed the ecological screening value for SW-3a. It should be noted that the concentrations is considerably reduced down gradient of SW-3A. Owens Corning needs to continue sampling surface water downstream of the existing surface water sampling transects to measure surface water concentrations to determine where the deep bedrock aquifer discharges to Betsy Creek. An ecological risk assessment may need to be performed.

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 (Reference 9).

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 (Reference 9).

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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?"
- 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):

Site monitoring will continue per the requirements of the RCRA Consent Order in place between U.S. EPA and Owens Corning. This monitoring will include sampling of both groundwater and surface water.

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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 _____ facility, EPA ID # _____, located at _____. 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	
	(print)	James H. Smith		
	(title)	Corrective Action Specialist		

Completed by	(signature)		Date	
	(print)	D. Karen Knight, CHMM Chief, Corrective Action Section, RUST Branch		
		EPA Region 4		

Locations where References may be found: Environmental Protection Agency, 61 Forsyth St., Atlanta, GA. 303043

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