DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA725)

Current Human Exposures Under Control

Facility Name: **GENERAL ELECTRIC SILICONES**
Facility Address: **WATERFORD, SARATOGA COUNTY NEW YORK**
Facility EPA ID #: **No. NYD002080034**

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, 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

FACILITY DESCRIPTION

The General Electric Company owns and operates a silicone manufacturing facility on an approximately 800 acre site in the Town of Waterford, Saratoga County, New York. The facility is located approximately 2 miles north of the Village of Waterford along routes 4 and 32, (Figure 1). The facility manufactures and markets silicone products from basic raw materials to a wide variety of finished products. Hazardous and non-hazardous waste is generated at this site as a result of these manufacturing processes. The management of hazardous waste at this facility requires a New York State 6NYCRR Part 373 hazardous waste management permit. The facility is only permitted to manage hazardous waste which is generated at this site. This permit was originally issued in 1989 and authorizes the facility to store hazardous waste in tanks and containers, operate two hazardous waste incinerators and operate a hazardous waste landfill. It also required the facility to implement Final Corrective Measures.

NEW YORK STATE REQUIREMENTS FOR CORRECTIVE ACTION AT THE GE SILICONES FACILITY

In 1977, New York State filed suit in Federal Court to require GE to investigate and remediate releases of hazardous wastes at the Waterford facility. Subsequently, under the auspices of a Federal Consent Decree, the company performed an extensive investigation of the facility, including the installaton of more than 600 wells, the collection of numerous soil and surface water samples and the collection of indoor air samples from residential buildings in the vicinity of an off-site plume of groundwater contamination. In July 1987, GE and the State of New York signed a Federal Consent Decree, Civil Action No. 83-CV-77, that required GE to implement a Remedial Plan designed to

address contamination at the site. Subsequently, the Remedial Plan (December 1987) was incorporated as part of the Final Corrective Measures under the facility's RCRA Permit. *(See GW and Land Monitoring 1976; GW and Land Monitoring Feb. 20, 1979; SPDES Discharge Summary Volatile Organic Compounds June 1984, GW Monitoring Nov. 29, 198;, Hydrogeologic Report Vol. 1 & 2 Nov. 1985; Remedial Feasibility Studies Vol. 1 & 2 Nov. 1985; Well Validation Nov. 29, 1985; Core Monitoring Plan Vol. 1 & 2, Nov. 1985; RCRA 1985 Annual Report Interim Status report GW Assessment Activities Feb. 28, 1986; APS Area Phase I Report June 1986; Landfill #1 and #3 Supplemental Monitoring Program Results, 1987; Remediation Plan Dec. 1, 1987; Solid Waste Management Unit Evaluation Report April 1990-Aug. 1991; Report of Landfill 2 Historical Development Aug..13, 1990; for background information.)*

The Remedial Plan required GE to: (1) install systems of groundwater recovery wells in each of nine designated areas on the Waterford site and install additional groundwater monitoring wells; (2) operate each of the groundwater recovery systems to create a hydraulic barrier that meets specific hydraulic criteria and to attain specified cleanliness standards and guidelines (see Table 1 and Table 2); (3) treat and discharge the extracted groundwater into the Hudson River through existing outfalls 001 and 002 in compliance with the NYSPDES permit and (4) monitor the performance of the groundwater recovery systems. The Plan also required GE to reduce the concentration of site specific hazardous constituents in the groundwater by 50 % in five years and by 75 % in ten years.

Table 1
Hydraulic Criteria

Internal (A) Well No. or River Gauge (RG)	External (A) Well No.	Remedial Area	Required Elevation Difference
445	316	APS Area (1)	0.01
444	446	APS Area (1)	0.01
444	312	APS Area (1)	0.01
242	282(CR)	WWTP	0.01
242	255	WWTP	0.01
214	240	WWTP	0.01
214	255	WWTP	0.01
321 (CR)	RG (CR)	WWTP	0.01
456	457	RBS	0.01
458	321(CR)	RBS	0.01
455	RG(CR)	RBS	0.01
252	RG(CR)	RBS of LF4	0.01
314	RG(CR)	RBN of LF4	0.01
478	480	RBN	0.01
482	387	RBN	0.01
483	484	RBN	0.01
477	RG(CR)	RBN	0.01
479	RG(CR)	RBN	0.01
481	387	RBN	0.01
470	291	N.E.M.A. (4)	0.30
471	230	N.E.M.A. (4)	0.30
472	232	N.E.M.A. (4)	0.30
513	303	SOBO (1)	0,01
511	399	SOBO (1)	0.01
508	509	SOBO (1)	0.01
505	506	SOBO (1)	0.01
507	517	SOBO (1)	0.01
507	328	SOBO	0.01
505	504	SOBO (1)	0.01
143	228	LF4	0.50
362	141	LF4	0.50
365	309(CR)	LF4	0.50
465	189	LF4	0.50
163	125	LF2 (4)	0.50
347	494	LF2 (4)	050

Table 2
Groundwater Protection Standards

Well No.	Benzene	Chloro-Benzene	Ethyl-Benzene	Toluene	!,2,Trans DCE	TCE	Vinyl Chloride	Total Xylenes	Total VIP
Groundwater Protection Standard µg/l	1	5	50	50	50	10	5	50	100

Considering organic compounds and metals concentrations and their potential for off-site migration, the areas selected for installation of the groundwater recovery systems were (Figure 2):

- APA Area
- Wastewater Treatment Plant Area
- River Boundary - Near Landfill 4
- River Boundary - South of Landfill 4
- Northeast Manufacturing Area
- River Boundary - North of Landfill 4
- Landfill 2 - Inward Gradient
- Landfill 4 - Inward Gradient
- Southern Boundary - Solid Waste Management Area

The Remedial System went into full operation in May 1988. Since that time, GE has submitted to the State and to the USEPA, Quarterly Reports which describe the results of operational and monitoring activities required under the Remedial Plan. Periodically (3-4 times/year), representatives from the State have met with GE staff to discuss the Quarterly Reports and to evaluate the progress of the remedial program.

Additional Corrective Measures

GE has been monitoring groundwater in the vicinity of Landfill 1 and Landfill 3 since 1978. In 1991, the State determined that corrective measures were needed at Landfill 1. Subsequently, GE began operation of two groundwater recovery wells at the downgradient boundary of Landfill 1. Because the capture zone associated with those wells was not extensive enough, a January 1993 Permit Modification required GE to install an additional recovery well at Landfill 1. That well began operation in 1994. At the present time, GE is pumping approximately 150 gpm from the Landfill 1 recovery system.

Although minor groundwater contamination has been observed downgradient of Landfill 3, the State determined that an enhancement of the existing site-wide remedial program was not necessary to address the contamination. As set forth in the January 1993 Permit Modification, GE is required to perform semi-annual monitoring of the groundwater quality in the vicinity of the landfill.

In addition, GE has been conducting periodic monitoring of Mudderkill Creek, a small stream located on the north side of the facility. It appears that the creek has been impacted by infiltration of contaminated groundwater from the vicinity of Landfill 3. Low level (2-20) ppb concentrations of VOCs have been observed in a small reach of the stream, but disipate downstream. GE will continue to monitor the stream periodically. Corrective measures will be required if significant concentrations of VOCs are observed in the creek.

GE has also implemented source control measures by removing a substantial number of underground chemical storage tanks and excavating contaminated soils in their vicinity.

Contamination: The primary hazardous wastes currently generated at this facility are chlorinated hydrocarbons associated with the silicone manufacturing operations. Operations at the facility have contaminated both subsurface soil and groundwater. Representative constituents and groundwater concentrations from wells throughout the facility are listed in Table 3. See Figure 1 for the location of the wells.

Table 3: Indicator Parameter Concentration Trends

AREA/WELL	TOTAL INDICATOR (1) CONC. (ug/L)	DATE	3Q98	4Q98	1Q99	2Q99	3Q99	4Q99	1Q00	2Q00	3Q00	4Q00	1Q01	2Q01	5 YR 50% (2) REDUCTION GOAL	MEETING 5 YR 50% GOALS	10 YR 75% (2) REDUCTION GOAL	MEETING 10 YR 75% GOALS
NEMA/234	2829	8/87	---	---	—	1009	---	---	—	2987	---	---	—	910	1414	YES	707	NO
NEMA/291	6697	2/86-2/87	---	---	---	35	---	---	---	36	---	---	---	24.4	3348	YES	1674	YES
NEMA/226	24	8/87	---	---	---	ND	---	---	---	ND	---	---	---	5.6	50	YES	25	YES
NEMA/230	7092	2/87	---	---	---	3276	---	---	---	2075	---	---	---	3090	3546	YES	1773	NO
NEMA/232	146915	8/87	---	---	---	11233	---	---	---	2364	---	---	---	3470	73458	YES	36729	YES
RBN-LF4/387	21022	2/86-2/87	---	ND	---	ND	---	ND	---	ND	---	7.5	---	ND	10511	YES	5256	YES
RBN-LF4/486	32	2/88	6 (7)	---	BMDL	---	14	16(9)	2	---	54	18 (9)	24	---	50	YES	25	YES
RBN-LF4/484	17600	2/88	---	BMDL	---	ND	---	5	---	ND	---	3	---	6.6	8800	YES	4400	YES
RBN-LF4/381	5	8/87	---	ND	---	ND	---	ND	---	ND	---	3	---	ND	50	YES	25	YES
SB/328 (3)	100	2/86-2/87	---	---	---	7	---	---	---	2	---	---	---	ND	50	YES	25	YES
SB/509 (3)	15	2/89	---	---	---	ND	---	---	---	ND	---	---	---	ND	50	YES	25	YES
SB/513 (3)	ND	2/89	---	---	---	NS(6)	---	---	---	ND	---	---	---	ND	ND	YES	ND	YES
SB/518 (3)	6	2/89	---	---	---	ND	---	---	---	ND	---	---	---	ND	50	YES	25	YES
APS/446	76	11/87	---	8	---	8	---	8	---	4	---	4	---	ND	50	YES	25	YES
APS/447	3	8/87	---	---	---	6	---	---	---	5	---	---	---	ND	50	YES	25	YES
APS/448	3	2/87	---	---	---	ND	---	---	---	ND	---	---	---	ND	50	YES	25	YES
APS/449	1	2/88	---	---	---	ND	---	---	---	ND	---	---	---	ND	50	YES	25	YES
NEAR LF 4/314	265800	2/86-2/87	---	62	---	91	---	102	---	67	---	85	---	66	132900	YES	66450	YES
RBS-LF4/455	40120	8/87	---	21	---	21	---	36	---	117	---	128	---	7	20060	YES	10030	YES
RBS-LF4/457	8515	11/86	---	11	---	2	---	14	---	19	---	17	---	6.5	4258	YES	2129	YES
WWTP/240	7600	4/86	---	---	---	2	---	---	---	ND	---	---	---	ND	3800	YES (2)	1900 (2)	YES (2)
WWTP/242	8000	4/86	---	---	---	4	---	---	---	1	---	---	---	ND	4000	YES (2)	2000 (2)	YES (2)
WELLS IN CLEAN-OUT AREAS																		
APS/312 (4)	539	2/86-2/87	---	164	---	128	---	93	---	122	---	162	---	ND	270	YES	135	NO (2)
LF4/141 (5)	69	11/87	NS(6)	---	---	---	NS(6)	---	---	---	291	---	---	---	(4)	(4)	(4)	(4)
RBS/LF4/309(4)	130040	2/86-2/87	533	512	453	431	548	399	351 (10)	410	297	379	518 (11)	652	65020	YES	32510	YES
WWTP/282 (4)	825	2/86-2/87	23	14	10	15	17	21	2	22	24	14	13 (12)	14	412	YES (2)	206 (2)	YES (2)
WWTP/321 (4)	3419	2/86-2/87	---	678(8)	---	954	---	930	---	1200	---	1273	---	1200	1710	YES (2)	855 (2)	NO (2)

NOTES:

(1) For existing wells, highest total VIP concentration for one year prior to system startup will be used as baseline concentration.

(2) For WWTP 50% reduction goal is 8 years, 75% reduction goal is 15 years.

(3) Alternate POE Well conceptually accepted by the State, April 18, 1990.

Key: --- No sample required
ND Not Detected
NS No sample collected
BMDL Below Method Detection

		Limit
(4)	Wells subject to cleanliness standards (Table IIIA Remedial Plan) 30 months after equilibrium.	
	RBN well 141- 30 month period ended 8/93	
	APS/WWTP wells 282,312, and321 are not subject to clearliness standards at this time based on agreement with the State in 2Q93.	
	RBS well 309 is no longer designated a cleanout well based on a State letter dated April 24, 1992	
(5)	Not in Table IIG of Remedial Plan- included here for completeness	
(6)	Well was dry and not sampled.	
(7)	Well 486 is one of eight wells for which duplicate ground-water samples were obtained by diffusion bag sampling method.	
(8)	Well 321 was also sampled by GES/LAW on December 12, 1998 as part of an assessment study of the 321 area. The result for total VIP was 1500 ug/L.	
(9)	Well 486 was resampled during the 4Q99 and 4Q00 due to suspect data from the 3Q99 and 3Q00 sampling.	
(10)	Data from split sample analyses performed by Scilab.	
(11)	Data from split sample analyses for 3Q00, 1Q01 performed by Adirondack Laboratory.	
(12)	Data from duplicate sample analyses for 1Q01 performed by GESLaboratory.	

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 Control" 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 "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

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. Are groundwater, soil, surface water, sediments, or air **media** 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 (from SWMUs, RUs or AOCs)?

	Yes	No	?	Rationale / Key Contaminants
Groundwater	X			**See accompanying background information**
Air (indoors)[2]		X		
Surface Soil (e.g., <2 ft)		X		
Surface Water	X			
Sediment	X			
Subsurf. Soil (e.g., >2 ft)	X			
Air (outdoors)		X		

_____ If no (for all media) - skip to #6, and enter "YE," status code after providing or citing appropriate "levels," and referencing sufficient supporting documentation demonstrating that these "levels" are not exceeded.

__X___ If yes (for any media) - continue after identifying key contaminants in each "contaminated" medium, citing appropriate "levels" (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

_____ If unknown (for any media) - skip to #6 and enter "IN" status code.

Rationale and Reference(s): **See background information above**.

[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 appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

[2] Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

3. Are there **complete pathways** between "contamination" and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions? **NO**

Summary Exposure Pathway Evaluation Table Potential **Human Receptors** (Under Current Conditions)

"Contaminated" Media	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food[3]
Groundwater	No	No	No No		No	No	No
Air (indoors)	No	No	No	No			
Soil (surface, e.g., <2 ft)	No	No	No	No		No	No	No
Surface Water	No	No	No	No		No	No	No
Sediment	No	No	No	No	No	No	No
Soil (subsurface e.g., >2 ft)	No	No	No	No		No	No
Air (outdoors)	No	No	No	No		No	

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors' spaces for Media which are not "contaminated") as identified in #2 above.

2. enter "yes" or "no" for potential "completeness" under each "Contaminated" Media -- Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential "Contaminated" Media - Human Receptor combinations (Pathways) do not have check spaces ("___"). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

_X__ If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

_____ If yes (pathways are complete for any "Contaminated" Media - Human Receptor combination) - continue after providing supporting explanation.

_____ If unknown (for any "Contaminated" Media - Human Receptor combination) - skip to #6 and enter "IN" status code

Rationale and Reference(s): **The ongoing remedial program effectively precludes human exposures to the contaminated media. In addition, historic measurements of indoor air from nearby a nearby residial area demonstrated that volatization of hazardous constituents from the groundwater was not a public health problem.** ***(See Quarterly reports)***

4 Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **"significant"**[4] (i.e., potentially "unacceptable" because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable "levels" (used to identify the "contamination"); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable "levels") could result in greater than acceptable risks)?

_____ If no (exposures can not be reasonably expected to be significant (i.e., potentially "unacceptable") for any complete exposure pathway) - skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

_____ If yes (exposures could be reasonably expected to be "significant" (i.e., potentially "unacceptable") for any complete exposure pathway) - continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

_____ If unknown (for any complete pathway) - skip to #6 and enter "IN" status code

Rationale and Reference(s):_____

[4] If there is any question on whether the identified exposures are "significant" (i.e., potentially "unacceptable") consult a human health Risk Assessment specialist with appropriate education, training and experience.

5 Can the "significant" **exposures** (identified in #4) be shown to be within **acceptable** limits?

_____ If yes (all "significant" exposures have been shown to be within acceptable limits) - continue and enter "YE" after summarizing and referencing documentation justifying why all "significant" exposures to "contamination" are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

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_____ If no (there are current exposures that can be reasonably expected to be "unacceptable") - continue and enter "NO" status code after providing a description of each potentially "unacceptable" exposure.

_____ If unknown (for any potentially "unacceptable" exposure) - continue and enter "IN" status code

Rationale and Reference(s):____

6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

_X_ YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the General Electric Facility, EPA ID #, located at,Waterford NY under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

____ NO - "Current Human Exposures" are NOT "Under Control."

____ IN - More information is needed to make a determination.

Rationale and Reference(s):____

GE has been monitoring the performance of the remedial systems since they were installed in 1988. The Remedial program is achieving its design objectives. Although the State has periodically required GE to enhance certain remedial components at the facility in order to remain in compliance, overall, GE has achieved the performance objectives required under the Remedial Plan. The remedial system has been responsible for a substantial decrease in the concentration of hazardous constituents in the groundwater at the facility (Table 3), and should ultimately result in restoration of the aquifer beneath the facility. ***(See Quarterly reports)***

Completed by (signature)_____ Date August 30, 2001
(print) William E. Wertz, Ph.D.
(title) Senior Engineering Geologist

Supervisor (signature)_____ Date
(print) Paul J. Merges
(title) Director, Bureau of Radiation &Hazardous Site Management
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FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.