**DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION**

**RCRA Corrective Action**
**Environmental Indicator (EI) RCRIS code (CA750)**
**Migration of Contaminated Groundwater Under Control**

**Facility Name:** **GE Fanuc Automation**
**Facility Address:** **2500 Austin Drive, Charlottesville, VA 22906**
**Facility EPA ID #:** **VAD980551782**

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).

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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 and Reference(s):

**General Facility Information:**

The GE Fanuc Automation Facility (hereinafter referred to as Facility) is located at 2500 Austin Drive in Charlottesville, Albermarle County, Virginia. The Facility is on 74 acres in the Piedmont region of Virginia approximately one mile from Pine Mountain (in the Blue Ridge Mountains). The Facility began operations on December 4, 1978 as the General Electric Company and manufactured printed circuit boards which included electroplating operations. On December 29, 1986, the Facility was renamed GE Fanuc Automation as part of a joint venture between General Electric Company and Fanuc Ltd., a Japanese company. The joint venture was dissolved on December 11, 2009 and the Facility in now operating independently under GE Intelligent Platforms. GE Intelligent Platforms manufactures various industrial products including programmable controllers, numerical controls, industrial computers, manufacturing software, factory automation systems, printed circuit boards, and data communications networks. The Facility also conducts research and development.

**Soil and/or Groundwater Investigations:**

*Etchant Tank Area*

In April 1995, the Facility modified its Etchant Tank Area (ETA) by: (1) removing and replacing its virgin and waste etchant tanks, (2) removal and replacement of the concrete secondary containment structure surrounding the etchant tanks, and (3) coating/sealing the new concrete floor and secondary containment structure. After the etchant tanks were removed, stains were observed on the floor underlying the former waste etchant tank. Since several cracks were also detected in the concrete floor of the ETA secondary containment area, the Facility initiated as assessment of the underlying soils and closure of the ETA. VADEQ was notified of the planned closure in April 1995.

In accordance with GE Fanuc's Closure Plan and the Virginia Hazardous Waste Management Regulations (VAHWMR), the soils beneath the ETA were assessed to determine whether soil impact had occurred. The assessment included a statistical evaluation of soil quality data for the ETA and background soil samples collected from the background area (BA) designated in the Facility's Closure Plan. Soil samples were collected from the ETA and BA on three separate occasions and analyzed for arsenic, barium, cadmium, chromium, lead, selenium, silver, ammonia and pH. Results of the soil assessment identified constituents that may be characteristic of virgin and waste etchant material. These constituents were identified to a depth of 13.5 feet below land surface in the ETA. The results of the statistical evaluation indicated that concentrations of metals detected in soil samples collected from the ETA were statistically higher than concentrations of the metals in the background soil samples collected from the BA. However, analytical results for virgin etchant and waste etchant samples collected at the site indicate concentrations of the metals of concern are generally significantly lower than metal concentrations detected in the ETA soils. Therefore, it was concluded that the statistically higher metals levels in the ETA soils are naturally occurring, and thus, not the result of a release of etchant material from the ETA.

*Tanks #1 and #2*

In 2005, the Facility closed two underground storage tanks, referred to as Tank #1 and Tank #2. Tank #1 and Tank #2 were identified as Solid Waste Management Units (SWMUs) by the United States Environmental Protection Agency (USEPA) in a 1991 RCRA Facility Assessment. Specifically, Tank #1 was identified as SWMU #1 and #7 and Tank #2 was identified as SWMU #11. During closure of Tanks #1 and #2, a sampling program was conducted the week of July 19, 2004 to evaluate the soil and ground water quality surrounding the tanks and piping.

A Geoprobe® was used to perform soil sampling and temporary well installation. A total of twenty-four borings were completed to evaluate whether historical releases had occurred from the tanks and/or associated pipe lines. Four soil borings were installed to evaluate Tank #1, four soil borings were installed to evaluate Tank #2, and sixteen soil borings were installed to evaluate the integrity of the pipelines. Groundwater was encountered in the vicinity of Tank #1 and Tank #2 at approximately 20 feet below surface (fbs) and temporary monitoring wells were installed.
Soil and groundwater samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), RCRA metals plus mercury, and cyanide. Analytical results were compared to the USEPA Region III Risk Based Concentrations (USEPA Region III, April 14, 2004). These Risk Based Concentrations (RBCs) are calculated and published by the Region III EPA for use in screening of potential human health risk at contaminated sites. Soil analytical results were compared to the RBCs for industrial sites as well as the soil to groundwater screening levels. Groundwater sample results were compared directly to the RBCs for tap water.

A variety of VOCs, SVOCs, metals, and cyanide were detected in the soil samples; however, all of the VOC, SVOC and cyanide concentrations were below the RBC for industrial soil as well as the soil to groundwater screening level. Arsenic and chromium were the only constituents detected at consistent concentrations above RBCs. Arsenic was detected at concentrations above the industrial RBC or soil to groundwater screening level in all samples analyzed. Soil observed at the site can be described as silty and has arsenic concentrations ranging from 1.1 milligram per kilogram (mg/kg) to 12 mg/kg. Natural arsenic levels vary in silty soils from 0.7 parts per million (ppm) to 15 ppm. Therefore it is very likely that the elevated arsenic concentrations are indicative of natural soil conditions and not associated with a release from Tank #1 or Tank #2.

Samples were analyzed for total chromium, which consists of a mixture of trivalent (Chromium III) and hexavalent (Chromium VI) chromium. Chromium was detected above the soil to groundwater screening level, but below the RBC for Chromium VI in two of the soil samples (BH-4 and BH-5); however, much, if not all, of the chromium detected is likely to be Chromium III. Detected concentrations are all several orders of magnitude below the soil to groundwater screening level for Chromium III (which is 2,000,000,000 mg/kg). Groundwater samples were also collected from BH-4 and BH-5, and chromium was detected below the tap water RBC for Chromium VI in both samples. Based on these results, these two isolated occurrences of elevated chromium in soil were not indicative of a release and more than likely reflect natural variations.

A variety of organic compounds were detected in the groundwater samples. Ten VOCs were detected, three – chloroform, tetrachloroethene (PCE), and trichloroethene (TCE) – at concentrations above the tap water RBCs. PCE and TCE were detected in only one groundwater sample from BH-5, and these detections were "J" flagged indicating that the constituents were detected at a concentration above the instrument detection limit, but below the quantitation limit, therefore the exact concentration could not be quantified, only estimated. Chloroform was detected above the RBC in the groundwater samples collected from BH-4 and BH-5 (J-value). Two SVOCs were detected in the groundwater sample from BH-4, with only bis(2-ethylhexyl)phthalate detected at a "J" flagged value exceeding the tap water RBC.

While none of these organic compounds are naturally occurring, they are ubiquitous in industrial settings and the extremely low (most "J" flagged) concentrations detected are not necessarily indicative of a release from Tank #1 or Tank #2. PCE and TCE, in particular, were not detected in either the tank fluids, or the soil surrounding the tanks or pipe lines. Bis(2-ethylhexyl)phthalate was detected in the soil surrounding the tanks and pipe lines at concentrations below the RBC and soil to groundwater screening levels. This constituent is highly insoluble, and its detection in groundwater was suspect. The detection of this constituent is more likely representative of its presence in soil.

Eleven metals were detected in groundwater, three – arsenic, lead, and zinc – at concentrations exceeding the tap water RBC. These constituents are naturally occurring and were found at concentrations several orders of magnitude higher in the surrounding soil. As such, the detection of these constituents in groundwater was determined to be naturally occurring and not the result of a release from Tank #1 or Tank #2.

*SWMUs #7 and #18*
On November 4, 2004, GE Fanuc Automation agreed to participate in EPA Region 3's Facility Lead Agreement (FLA). The FLA was developed by EPA to address RCRA corrective action facilities and encourage such facilities to take the lead in addressing corrective action using a generic, non-enforceable, agreement which includes the same requirements, and relies on the same scope of work and policy as a permit or an order. Corrective action facilities invited into the program generally meet a number of the following factors: good enforcement record, state approval, financial and technical capability, a proactive approach to clean up, and a willingness to work with the Agency.

Under the FLA, GE Fanuc Automation collected and analyzed groundwater samples to assess the groundwater quality in the vicinity of (1) the former Wastewater Treatment (IWT) Tank #1, which is identified as SWMU No. 7; and (2) the former wastewater drain field at SWMU No. 18. On January 11, 2010, one groundwater monitoring well was installed downgradient of and adjacent to SWMU No. 7 and SWMU No. 18. Soil samples were collected during construction of each of the monitoring wells and screened for total volatile organic compound (VOC) vapors using a photoionization detector (PID). Readings of 5 parts per million (ppm) or less were detected by the PID, and the soil samples showed no visual or olfactory evidence of anthropogenic impact. Therefore, no soil samples were retained for laboratory analysis.

Groundwater sampling of the monitoring wells, identified as MW-1 for SWMU No. 18 and MW-2 for SWMU No. 7, was conducted on January 25, 2010. The groundwater samples were analyzed for Target Compound List (TCL) VOCs, TCL Semi-volatile Organic Compounds (SVOCs), and dissolved (i.e., field filtered) Priority Pollutant List (PPL) metals. Other than a trace amount of chloroform at an estimated concentration of 2 micrograms per liter (µg/L), TCL VOCs were not detected in any of the groundwater samples. Chloroform, which is a common laboratory cross contaminant, is currently not used at the Facility, nor has it been used by the Facility in the past. Furthermore, the chloroform value is listed as a J value, indicating it is an estimated value. Therefore, it was determined that the chloroform detection is not representative of the groundwater quality at the site. TCL SVOCs were not detected in any of the groundwater samples. Trace concentrations of copper, nickel and zinc were detected; however, all of the reported concentrations were well below EPA and VADEQ's screening levels.

Based on the findings of the sampling, EPA has concluded that the soil and groundwater quality within the vicinity of SWMU's No. 7 and 18 does not pose any potential for harm to human health or the environment.

References:


(1) RCRA Facility Assessment of GE Fanuc Automation, May 1991
(2) Assessment Report for Etchant Tank Area, May 1995
(3) GE Fanuc Closure Work Plan, September 2004
(4) GE Fanuc Work Plan Implementation Report, April 2010


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]).

☐ 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.

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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):

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5. Is the **discharge** of "contaminated" groundwater into surface water likely to be **"insignificant"** (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

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☐ 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.

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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 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.

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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?"

☐ 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):

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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).

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 GE Fanuc Automation facility, EPA ID # VAD980551782, located at 2500 Austin Drive, Charlottesville, Virginia. 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) signed 6/21/2010 Date _____
(print) Jeanna R. Henry
(title) Remedial Project Manager

Supervisor (signature) signed 6/21/2010 Date _____
(print) Luis Pizarro
(title) Associate Director
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