DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

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

Facility Name: **Former Allegro Microsystems, Inc.**
Facility Address: **3900 Welsh Rd., Willow Grove, PA 19090**
Facility EPA ID #: **PAD000765800**

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).

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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.

☐ 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):

From 2003 to 2005 and under the supervision of the Pennsylvania Department of Environmental Protection (PADEP), Allegro Microsystems, Inc. (Allegro) completed the investigation and remediation of the property in accordance with the PADEP Land Recycling and Environmental Remediation Standards Act (Act 2). The Pennsylvania Statewide Health Standards (SHS), which are equivalent to the EPA residential standards and deemed protective of public heath, were applied to the investigation and remediation.

The investigation evaluated six areas of concern (AOCs) at the former Facility that potentially posed an environmental concern. The six AOCs comprised of four solid waste management units (SWMUs), one aboveground storage tank (AST) and one underground storage tank (UST). PADEP oversaw and certified the closures of the SWMUs, AST and UST in 2003.

A site characterization was conducted to determine the potential environmental impacts within, or immediately adjacent to the property that may resulted from past operations. The site characterization consisted of a site-wide groundwater monitoring and surface and subsurface soil samples for the constituents of concerns (COCs) that consisted of heavy metals, polycyclic aromatic hydrocarbons (PAHs), and volatile organic compounds (VOCs). The investigation concluded that the soil results for the COCs were below the SHS and do not pose an unacceptable risk to human health. Furthermore and with the exception of the element barium, groundwater results for the COCs were also below the SHS.

Allegro never used barium or its related compounds in any of their industrial processes. However, barium was detected at varies levels throughout the property. Barium exceedances above the SHS of 2000 mg/L were detected in five of the twenty-four monitoring wells and twelve temporary well points. The exceedances range from 2,400 mg/L to 7,000 mg/L.

(References: Act 2 Site Characterization/Final Report, Allegro Microsystems, Inc., September 2003, Act 2 Streamlined Remedial Investigation/Final Report, Allegro Microsystems, Inc., December 2004, Act 2 Remedial Investigation/Final Report, Allegro Microsystems, Inc., January 2005)

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):

Groundwater monitoring data indicate that barium exceedances in groundwater are localized in the shallow aquifer and are confined within a one acre area located in the southeastern quadrant of the former Facility and the boundary of the unnamed tributary.

(References: Act 2 Site Characterization/Final Report, Allegro Microsystems, Inc., September 2003, Act 2 Streamlined Remedial Investigation/Final Report, Allegro Microsystems, Inc., December 2004, Act 2 Remedial Investigation/Final Report, Allegro Microsystems, Inc., January 2005)

[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):

The localized area with elevated barium concentrations in groundwater discharges to the unnamed tributary. PADEP applied a mass-balance water quality analysis model (PENTOXSD model) to evaluate the impact of contaminated groundwater discharge to surface water. PADEP determined that the barium levels in groundwater do not adversely impact the unnamed tributary. The investigation did not identify any potential onsite or offsite sources for the barium levels detected in groundwater. The Facility never used barium in its manufacturing processes. PADEP concluded that the barium detections in groundwater are naturally occurring in nature.

(References: Act 2 Site Characterization/Final Report, Allegro Microsystems, Inc., September 2003, Act 2 Streamlined Remedial Investigation/Final Report, Allegro Microsystems, Inc., December 2004, Act 2 Remedial Investigation/Final Report, Allegro Microsystems, Inc., January 2005)

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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)?

☒ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentrations 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 concentrations 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 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):

A mass-balance water quality analysis model (PENTOXSD model) to evaluate diffuse groundwater discharge to surface water concludes that the barium levels in groundwater do not adversely impact the unnamed tributary. The investigation did not identify any potential onsite or offsite sources for the barium levels detected in groundwater. The Facility never used barium in its manufacturing processes. PADEP concluded that the barium detections in groundwater are naturally occurring in nature.

(References: Act 2 Site Characterization/Final Report, Allegro Microsystems, Inc., September 2003, Act 2 Streamlined Remedial Investigation/Final Report, Allegro Microsystems, Inc., December 2004, Act 2 Remedial Investigation/Final Report, Allegro Microsystems, Inc., January 2005)

[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 – provide an explanation

☐ If unknown - enter "IN" status code in #8.

Rationale and Reference(s):

Historic groundwater results confirm that the elevated barium levels in groundwater are confined in the shallow aquifer and are stabilized within a one acre area. Allegero never used barium in its manufacturing processes. The investigation did not identify any potential onsite or offsite sources for the barium levels detected in groundwater. PADEP concluded that the barium detections in groundwater are naturally occurring in nature. Furthermore, PADEP and EPA conclude that the levels of barium detected in groundwater do not adversely impact the surrounding environment.

The former Facility has since been redeveloped into a shopping center that consists of several big box retailers. The property is zoned for non-residential use and will remain non-residential for the foreseeable future. A deed restriction on the property prohibits the use of onsite groundwater for any purposes and therefore, prevents direct human exposures to barium.

(References: Act 2 Site Characterization/Final Report, Allegro Microsystems, Inc., September 2003, Act 2 Streamlined Remedial Investigation/Final Report, Allegro Microsystems, Inc., December 2004, Act 2 Remedial Investigation/Final Report, Allegro Microsystems, Inc., January 2005, Allegro Microsystems, Inc., Allegro Microsystems, Inc. Statement of Basis 2013)

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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 **Former Allegro Microsystems, Inc. facility,** EPA ID # **PAD000765800**, located at **3900 Welsch Rd., Willow Grove, Pennsylvania 19090.** 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) Khai M. Dao Date 9/10/13
(print) Khai M. Dao
(title) EPA Project Manager

Supervisor (signature) Paul Gotthold Date 9/12/13
(print) Paul Gotthold
(title) Associate Director, PA Remediation Branch
(EPA Region or State) EPA Region 3

Locations where References may be found:

US EPA Region III
Waste & Chemicals Management Division
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