DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA750)

Migration of Contaminated Groundwater Under Control

Facility Name:	Microsemi Consortium
Facility Address:	802 Hoyt Street, Broomfield, Colorado 80020
Facility EPA ID #:	COR000012443

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 #6 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 Microsemi Consortium is responsible for remediation of volatile organic compound (VOC) groundwater contamination that exists at the property at 801 and 802 Hoyt Street in Broomfield, Colorado. The source of the groundwater contamination is releases from underground concrete tanks located adjacent to a chemical storage area along the south central site boundary of the site. The release of VOCs has resulted in contamination of the groundwater beneath the site at concentrations above State of Colorado Groundwater Standards. Since 1996, trichloroethene (TCE), chloroform and Freon-113 at concentrations greater than the Colorado Groundwater Standards have been known to exist in the shallow (alluvial deposits of the Arapahoe Formation) and deeper (upper portion of the Laramie Formation) groundwater beneath the site.

References: 1) 2004 Annual Groundwater and Activities Summary Report dated January 17, 2005; and 2) Source Mass Investigation Summary Report dated September 19, 2002.

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).

3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"[2] as defined by the monitoring locations designated at the time of this determination)?

X — If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"[2]).

Rationale and Reference(s):

The shallow (alluvial portions of the Arapahoe Formation to approximately 40 feet) groundwater contamination due to the release of TCE, chloroform and Freon 113 is known to extend approximately 2900 feet east of the Chemical Storage Building area (located near the center of the south property boundary), or approximately 2400 feet east of the eastern property boundary. Evidence of stabilization of the eastern end of the shallow groundwater plume is provided by the monitoring results from wells TW-65, TW-66, and BH-10. The northern and southern boundaries of the plume have also been established using data from a series of monitoring wells that parallel the main axis of the plume. The concentrations of VOCs related to the Microsemi Consortium Site release have been below, or just slightly above the State Groundwater Standard since groundwater monitoring began. In addition, the concentration of VOCs in the shallow groundwater plume and the size of the shallow groundwater plume east of the property boundary have been steadily decreasing since the Microsemi Consortium began operation of the Boundary Control System in November 2002. The Boundary Control System consists of a series of shallow groundwater extraction wells located along the southeastern property boundary that effectively capture the contaminant plume before it leaves the facility property.

The lower (upper portion of the Laramie Formation to a depth of approximately 50 feet) groundwater beneath the facility has relatively low concentrations of TCE (19 ug/L at monitoring well GDB-1) in a very small area southeast of the original contaminant source. The contaminated well is completely surrounded by deeper zone monitoring wells with no detectable VOCs. The Microsemi Consortium began operation of a Source Mass Area Removal System in August 2005 that will reduce the amount of contamination in the source area and decrease the potential for contaminants to migrate to the deeper groundwater zone at the facility.

References: 1) 2004 Annual Groundwater and Activities Summary Report dated January 17, 2005; 2) Source Mass Investigation Summary Report dated September 19, 2002; and Boundary Control Treatment System Performance Report dated March 14, 2003.

[2] "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

4. Does contaminated groundwater **discharge** into **surface water** bodies?

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):

The contaminated groundwater plume is believed to intersect a stream/drainage ditch located along the north side of Sixth Avenue at a point just west of Alter Street.

References: 1) Supplemental Analysis, Surface Water and Monitoring Points TW-77 and TW-78 Report dated March 25, 2003; 2) Monitored Natural Attenuation Evaluation Plan for the Microsemi Facility (pages 9 and 10) dated March 2001

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)?

X 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 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.

Rationale and Reference(s):

The contaminant concentrations within the groundwater contamination plume where it intersects a stream/drainage ditch will not cause exceedences of human health protective levels within the surface water. The concentration of trichloroethene in groundwater (3 to 20 ug/l) near where the contaminated groundwater plume intercepts the stream/storm drainage ditch will dissipate rapidly once the groundwater discharge to the surface. This assumption was confirmed via the results of surface water samples collected in March 2003 from stormwater drainage channels downstream of the facility. Trichloroethylene was not detected in surface water samples collected at the location where the contaminated groundwater seeps into the stream/stormwater ditch.

In addition, the concentration of VOCs in the shallow groundwater plume and the size of the shallow groundwater plume east of the property boundary have been steadily decreasing since the Microsemi Consortium began operation of the Boundary Control System in November 2002.

References: 1) Supplemental Analysis, Surface Water and Monitoring Points TW-77 and TW-78 Report dated March 25, 2003; 2) Monitored Natural Attenuation Evaluation Plan for the Microsemi Facility (pages 9 and 10) dated March 2001; 3). 2004 Annual Groundwater and Activities Summary Report dated January 17, 2005; and Boundary Control Treatment System Performance Report dated March 14, 2003.

[3] As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

6. Can the **discharge** of "contaminated" groundwater into surface water be shown to be "**currently acceptable**" (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented[4])?

___ If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site=s surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR 2) providing or referencing an interim-assessment,[5] appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

___ If no - (the discharge of "contaminated" groundwater can not be shown to be "**currently acceptable**") - skip to #8 and enter "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.

3 The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.

7. Will groundwater **monitoring** / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

X If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."

___ If no - enter "NO" status code in #8.

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

Rationale and Reference(s):

The July 1, 2004 Revised Site Groundwater Monitoring Program Plan specifies the monitoring requirements for the entire Microsemi Consortium project site. Specifically, monitoring wells TW-65, TW-66 and BH-10 will be used to monitor the distal end of the shallow groundwater contamination plume. Monitoring wells DB-2, DB-3, DB-11, GDB-1, GDB-2, GDB-3, and GDB-4 will be used to monitor the deeper groundwater contamination plume. Water levels and water quality are measured at numerous monitoring wells to provide data for evaluating the performance of the Boundary Control System and the Source Mass Area Removal System.

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 Microsemi Consortium facility, EPA ID # COR000012443, located at 802 Hoyt Street, Broomfield, CO. 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.

Completed by	(signature)	David Walker	Date	10/3/05
	(print)	David M. Walker		
	(title)	Environmental Protection Specialist		

Supervisor	(signature)		Date	10/4/05
	(print)	Walter Avramenko		
	(title)	Corrective Action Unit Leader		
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Locations where References may be found:
Colorado Department of Public Health and Environment Records Center 4300 Cherry Creek Drive South Denver, Colorado 80246-1530 303-692-3331

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