



DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

**RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA725)****Current Human Exposures Under Control**

Facility Name: Unitrode
Facility Address: 2 Eisenhower Drive, Westbrook, ME04092
Facility EPA ID #: MED083184051

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?

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 "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).

**Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)**

Page 2

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)?

| | <u>Yes</u> | <u>No</u> | <u>?</u> | <u>Rationale / Key Contaminants</u> |
|--------------------------------|------------|-----------|----------|---|
| Groundwater | <u>X</u> | ___ | ___ | <u>VOC-contaminated aquifer</u> |
| Air (indoors) ² | <u>X</u> | ___ | ___ | _____ |
| Surface Soil (e.g., <2 ft) | <u>X</u> | ___ | ___ | <u>VOC-contaminated soil, under slab</u> |
| Surface Water | ___ | <u>X</u> | ___ | _____ |
| Sediment | ___ | <u>X</u> | ___ | _____ |
| Subsurf. Soil (e.g., >2 ft) | <u>X</u> | ___ | ___ | <u>VOC pathways to aquifer, former dump</u> |
| Air (outdoors) | ___ | <u>X</u> | ___ | _____ |

___ 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 attached Tables 1, 2 and 3. Table 1 lists VOC groundwater contaminants from the last reported sampling that exceeded state and/or federal groundwater standards (*2009 Annual Operation, Maintenance and Monitoring Report, Former Unitrode Facility, May 2010*). A report by Environmental Resources Management titled *Source Area Characterization Activities, Former Unitrode Facility* dated December 31, 2007 listed VOC contaminants detected in soil beneath the factory slab. Table 2 lists soil contaminant concentrations in that report that exceeded Maine's Residential Remedial Action Guidelines. Contaminated sub-slab soil is being treated with a soil vapor extraction (SVE) system. Table 3 lists contaminants detected in air samples within the former Unitrode facility that exceeded Maine's Indoor Air Targets (air sampling results also in *2009 Annual Operation, Maintenance and Monitoring Report, Former Unitrode Facility, May 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 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.

**Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)**

Page 3

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?

Summary Exposure Pathway Evaluation Table

Potential Human Receptors (Under Current Conditions)

| <u>"Contaminated" Media</u> | Residents | Workers | Day-Care | Construction | Trespassers | Recreation | Food ³ |
|-------------------------------|-----------|----------|----------|--------------|-------------|------------|-------------------|
| Groundwater | <u>N</u> | <u>N</u> | <u>N</u> | <u>N</u> | | | <u>N</u> |
| Air (indoors) | <u>N</u> | <u>Y</u> | <u>N</u> | | | | |
| Soil (surface, e.g., <2 ft) | <u>N</u> | <u>N</u> | <u>N</u> | <u>N</u> | <u>N</u> | <u>N</u> | <u>N</u> |
| Surface Water | — | — | | | — | — | — |
| Sediment | — | — | | | — | — | |
| Soil (subsurface e.g., >2 ft) | | | | — | | | <u>N</u> |
| Air (outdoors) | — | — | — | — | — | | |

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.

- ___ 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).
- X 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): VOC contamination beneath the concrete slab creates potential for soil vapor intrusion into the factory building operated by Pratt Abbott cleaners. A soil vapor extraction (SVE) system has been installed in the contaminated sub-slab area. The low-occupancy warehouse area above slab is subject to quarterly air sampling. SVE performance and indoor air quality are presented in *2009 Annual Operation, Maintenance and Monitoring Report, Former Unirode Facility, May 2010*. Results from six (6) air sampling rounds in 2009 and 2010 are attached in Table 3.

Footnotes:

³ Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

**Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)**

Page 4

- 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."

 X 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): If left untreated, sub-slab VOC vapor intrusion above acceptable levels into low-occupancy warehouse area is possible: hence the sub-slab SVE treatment system. Indoor air quality data are presented in *2009 Annual Operation, Maintenance and Monitoring Report, Former Unitrode Facility, May 2010*. Indoor air quality data are presented in Table 3 (attached).

Footnotes:

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.

**Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)**

Page 5

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).

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): Unitrode is a RCRA site under the supervision of the Maine Department of Environmental Protection (MDEP). VOC contaminants released from a leaking sub-slab piping system under the former Unitrode building contaminated sub-slab soil as well as groundwater. The leak occurred beneath the concrete floor in a warehouse section of the building that is now occupied by Pratt Abbott Cleaners. The warehouse is separated from adjacent Pratt Abbot work areas by a solid wall. Pratt Abbott washes uniforms in work areas with soap and water only, and does not use any cleaning chemicals.

Texas Instruments (the responsible party for the Unitrode site) reported the results of *Source Area Characterization Activities* in a letter report dated December 31, 2007. The highest sub-slab soil VOC concentrations were found directly beneath the warehouse contaminant discharge point. A detectable VOC plume in sub-slab soil extends approximately 25 ft from the discharge location in a circular pattern. A low-concentration portion of the plume was detected in sub-slab soil beneath a work area on the other side of the wall separating the work area from the warehouse.

Indoor air sampling is conducted quarterly at a location in the warehouse immediately above the VOC discharge point. The most recent Unitrode indoor air quality data are presented in *2009 Annual Operation, Maintenance and Monitoring Report, Former Unitrode Facility, May 2010*. Table 3 lists reported contaminants from the last six (6) quarters that exceeded Indoor Air Targets listed in *Maine Department of Environmental Protection, Bureau of Remediation, Vapor Intrusion Guidance, January 13, 2010, Appendix B, Tables B6 and B8*. Table B6 lists Indoor Air Targets for Chronic Commercial Scenarios, Multi-Contaminant sites; Table B8 lists Indoor Air Targets for Sub-Chronic Commercial Scenarios, Multi-Contaminant sites. Indoor Air Targets from Tables B6 and B8 are shown in Table 3.

CALCULATION OF SITE-SPECIFIC INDOOR AIR TARGETS

Low-Occupancy Warehouse

The warehouse is rented to various businesses for miscellaneous storage consisting mostly of company records. The warehouse where the air sampling is located is subjected to only occasional use for moving containers and is considered a low-occupancy area. According to the Pratt Abbott owner, the warehouse is used sporadically for "...just storage and only 3 to 6 people spend an hour or two per day and not every day."

Site-Specific Indoor Air Targets

Indoor Air Targets in Tables B6 and B8 are designed for conventional work places and assume an exposure of eight (8) hours per day for 250 days per year. Indoor Air Targets may also be calculated for specific site conditions such as the low-occupancy conditions in the warehouse. Site-Specific Indoor Air Targets were calculated for the warehouse using an exposure of two (2) hours per day, for 50 days per year to reflect the infrequent use of this low occupancy area. Site-Specific Chronic and Sub-Chronic Indoor Air Targets are also shown in Table 3.

Selection of the Site-Specific, Sub-Chronic Indoor Air Target Standard

MDEP Indoor Air Target guidelines state that if concentrations are greater than Chronic, but less than Sub-Chronic, "...mitigation or remediation is needed and should proceed at a measured pace." A Site-Specific Sub-Chronic standard is therefore appropriate since a soil vapor extraction (SVE) system presently functioning at the Unirode facility serves as mitigation/remediation. Since the sample location is in a low-occupancy, little-used warehouse that is physically separated from any work area, Site-Specific Sub-Chronic Indoor Air Targets are appropriate to conclude that "significant" exposures are within acceptable limits: *i.e.* no concentrations exceeded the Site-Specific, Sub-Chronic Indoor Air Targets (see Table 3). In addition, concentrations shown in Table 3 have been generally decreasing over the last five quarters, with none over the Site-Specific, Chronic Indoor Air Target for the last three sample rounds.

CONTAMINANT SUMMARY

Chloroform

No concentrations exceeded the Site-Specific Sub-Chronic Indoor Air Target. Concentrations have generally decreased, with concentrations from the last three (3) quarters below all but the Chronic Indoor Air Target (Table B6).

Tetrachloroethene

No concentrations exceeded the Site-Specific Sub-Chronic Indoor Air Target. Concentrations have generally decreased, with the last four (4) quarters below all standards, except for March 10 greater than the Chronic Indoor Air Target (Table B6).

Trichloroethene

No concentrations exceeded the Site-Specific Sub-Chronic Indoor Air Target. The last three (3) sampling rounds have not exceeded the Site-Specific Chronic Indoor Air Target. Concentrations have generally decreased, with the last four (4) quarters in Table 3 below all standards, except for September 09 greater than the Chronic Indoor Air Target (Table B6).

FUTURE ACTION

Texas Instrument's 2007 contamination source area characterization delineated the contaminants and their concentrations in sub-slab soil. This information is useful for determining which contaminants and concentrations are present that may lead to vapor intrusion. The highest concentrations (total VOCs up to 13,960 ppm) were found directly beneath the pipe leak in the warehouse, and dropped significantly in the portion of the plume beneath the work area: *e.g.* all concentrations in the work area were below Maine soil Remedial Action Guidelines (RAGs) except for one sample that had Tetrachloroethene (0.530 mg/kg) slightly higher than the soil RAG (0.43 mg/kg).

Due to the low concentrations in soil below the work area, and the fact that contaminant concentrations measured in air have generally decreased over the last five quarters, it is unlikely that Chronic Indoor Air Targets (Table B6, the most stringent) would be exceeded in the work area. Nevertheless, MDEP will

require that Texas Instruments conduct additional air sampling in the work area above the plume to confirm that concentrations do not exceed Chronic Indoor Air Targets (Table B6), and require Texas Instruments to improve SVE performance with the objective of lowering all VOC concentrations below the Chronic Indoor Air Targets (Table B6), including the warehouse area.

MDEP will also require Texas Instruments to modify the existing air sampling program to better comply with the Maine's Indoor Air Targets: specifically a) to set reporting detection limits (RDLs) below the Chronic Indoor Air Target standards (Table B6), and b) to add Indoor Air Target analytes from Table B6 not previously reported.

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)

Page 6

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):

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 Unitrode facility, EPA ID # MED083184051, located at 2 Eisenhower Drive, Westbrook, ME 04092 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.

Completed by (signature) Harold D. Nilsson Date 9/28/10
(print) Harold D. Nilsson
(title) Environmental Specialist III

Supervisor (signature) Stacy A. Ladner Date 9/28/10
(print) Stacy A. Ladner
(title) Environmental Specialist IV
(EPA Region or State) Region 1

Locations where References may be found:

File Room: Maine Department of Environmental Protection, Ray Building, Augusta, Maine

Contact telephone and e-mail numbers

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(e-mail) harold.d.nilsson@maine.gov

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.

Reviewed by James S. C.
Chief RCRA Corrective Action
2/28/11

TABLE 1
UNITRODE SITE
GROUNDWATER VOC EXCEEDENCES (1)
Westbrook, Maine

| CONTAMINANT | LOCATIONS | VALUE $\mu\text{g/L}$ | MEG $\mu\text{g/L}$ (2) | MCL $\mu\text{g/L}$ (3) |
|--------------------------|-----------|-----------------------|-------------------------|-------------------------|
| 1,1-Dichloroethylene | MW14A | 0.68 | 0.6 | 7 |
| | MW17 | 1.3 | 0.6 | 7 |
| | MW24 | 2.1 | 0.6 | 7 |
| Trichloroethylene | MW3D | 8.5 | 32 | 5 |
| | MW10S | 10 | 32 | 5 |
| | MW14A | 79 | 32 | 5 |
| | MW17 | 6.9 | 32 | 5 |
| Vinyl Chloride | MW23 | 190 | 32 | 5 |
| | MW10S | 2.5 | 0.2 | 2 |
| | MW11 | 2000 | 0.2 | 2 |
| Trans-1,2-Dichloroethene | MW23 | 190 | 140 | 100 |
| Cis-1,2-Dichloroethene | MW11 | 140 | 70 | 70 |
| | MW14A | 74 | 70 | 70 |
| | MW23 | 730 | 70 | 70 |
| | MW24 | 110 | 70 | 70 |

- (1) November 2009, 2009 Annual Operation, Maintenance and Monitoring Report, May 2010
(2) Maine's Maximum Exposure Guideline (MEG)
(3) Federal Maximum Contaminant Level (MCL)

TABLE 2
UNITRODE SITE
SUB-SLAB SOIL VOC EXCEEDENCES (1)
Westbrook, Maine

| VOC | RAG (2) (mg/kg) | Highest Value (mg/kg) | Highest Location | Total Locations |
|---------------------|--------------------|--------------------------|---------------------|--------------------|
| 1,2-Dichlorobenzene | 12 | 12,000 | ERM5, 7-7.3ft | 2 |
| 1,4-Dichlorobenzene | 4 | 5.1 | ERM5, 6.3-6.8ft | 1 |
| Ethylbenzene | 0.81 | 740 | MW8, 11-13ft | 5 |
| Xylene | 0.26 | 4,200 | MW8, 4-5.5ft | 5 |
| Tetrachloroethene | 0.43 | 960 | MW8, 11-13ft | 4 |
| Trichloroethene | 1.5 | 13,000 | MW8, 11-13ft | 4 |

- (1) Source Area Characterization Activities, Former Unitrode Facility, December 31, 2007, Environmental Resources Management report
(2) Maine Remedial Action Guidelines (RAGs) for Soil Contaminated with Hazardous Substances, Appendix 3, Multiple Contaminants

TABLE 3
UNITRODE SITE
INDOOR AIR CONTAMINANT CONCENTRATIONS EXCEEDING
MAINE'S INDOOR AIR TARGET STANDARDS (1)

| Analyte | Maine Indoor Air Targets | | | | | | | | | |
|-------------------|--------------------------|----------------------|----------------------|---------------------|-----------------------|----------------------|----------------------|--------------------------|----------------------|--------------------------|
| | | | | | | | Table B6 (2) | Table B8 (3) | Site-Specific | |
| | March 09 μ/m^3 | June 09 μ/m^3 | Sept 09 μ/m^3 | Nov 09 μ/m^3 | March 10 μ/m^3 | June 10 μ/m^3 | Chronic μ/m^3 | Sub-Chronic μ/m^3 | Chronic μ/m^3 | Sub-Chronic μ/m^3 |
| Chloroform | 4.44 | 26.2 | 13.5 | ND | 1.58 | ND | 0.53 | 1.9 | 11 | 38 |
| Tetrachloroethene | 70.5 | 32.1 | 6.1 | ND | 6.93 | ND | 2.1 | 7.4 | 42 | 150 |
| Trichloroethene | 13.8 | 22.2 | 18.0 | ND | 8.39 | ND | 6.1 | 22.0 | 120 | 440 |

(1) Maine Department of Environmental Protection, Bureau of Remediation, Vapor Intrusion Evaluation Guidance, January 13, 2010

(2) Indoor Air Targets for Chronic Commercial Scenario, Multi-Contaminant Sites (in reference 1 above)

(3) Indoor Air Targets for Subchronic Commercial Scenario, Multi-Contaminant Sites (in reference 1 above)

BOLD – Values over Site-Specific Chronic Indoor Air Targets

Note: No values exceed the Site-Specific, Sub-Chronic Indoor Air Targets

| Exposure Assumptions | Maine Indoor Air Targets | | | |
|------------------------------------|--------------------------|-------------------------|---------------|-------------|
| | Table B6 Chronic | Table B8 Sub-Chronic | Site-Specific | |
| | | | Chronic | Sub-Chronic |
| Exposure Time (hr/day) | 8 | 8 | 2 | 2 |
| Exposure Frequency (days per year) | 365 | 365 | 50 | 50 |
| Exposure Duration (years) | 25 | 7 | 25 | 7 |