

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: IBM Manassas
Facility Address: Manassas, Virginia 20110
Facility EPA ID #: VAD 06 487 2575

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).

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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	X	___	___	_____
Air (indoors) ²	___	<u>x</u>	___	_____
Surface Soil (e.g., <2 ft)	___	___	<u>?</u>	Possibly below Building 101.
Surface Water	___	<u>x</u>	___	_____
Sediment	___	<u>x</u>	___	_____
Subsurf. Soil (e.g., >2 ft)	X	___	___	_____
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 Order, Statement of Basis, Record of Decision, Administrative Record and yearly Progress Reports. Up to 20 ppm of perchloroethylene (PCE) is present in the groundwater. The groundwater contamination extends three miles to a former public water supply well. Contamination resulted from releases from IBM’s former processes. IBM provided city water to replace five private wells where PCE was detected, provided financial and technical assistance for the installation of a groundwater treatment system at a public supply well referred to as PW-07, removed accessible contaminated soil, revised the design of its facility to include overhead rather than underground pipes for chemical flow, implemented a program to contain and remediate the contaminated groundwater, and implemented a program to remove contaminated vapor from around and below Building 101. Contamination remains in the deep subsurface and possibly below Building 101. Contamination in the subsurface around and below Building 101 has been extracted through a vapor extraction system since 1988. The average concentration of PCE in the vapor extracted through the system is greatly diminished from initial concentrations. In 1990, the average concentration of PCE in the extracted vapor was approximately 1800 parts per million by volume (ppmv). In 2001, the average concentration of PCE in the extracted vapor was 6.3 ppmv. In 1993 and 1994, IBM sampled the air in Building 101 at eight locations while the vapor extraction system was operating under three different configurations. The samples were collected and analyzed using industrial hygiene methods and the analytical results were below the detection limit for PCE (see pages 3-6 to 3-8 of “Pilot Vapor Extraction System Enhancements Well Modifications and Construction, IBM Manassas, July 29, 1994).

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Comparing the current average concentration of PCE in the vapor extraction process (6.3 ppmv during 2001) with the residential health based number for PCE in air (3.1 ug/m3 for a 1 x 10E-6 carcinogenic risk level) [using the conversion factor for PCE found in the June 1997 Niosh Pocket Guide to Chemical Hazards, (1 ppm = 6.87 mg/m3) and applying a 1000 dilution factor]:

$$6.3 \text{ ppm PCE} \times 6.87 \text{ (mg/m}^3 \text{ / 1 ppm)} \times 1000 \text{ ug/ 1 mg} \times 1000 = 43.281 \text{ ug/m}^3 \text{ PCE.}$$

it can be shown that the residential indoor air risk potentially achieves a 1 x 10E-4 carcinogenic risk which is within EPA's acceptance criteria. Because the contamination is deep below the land surface and this comparison is completed with an average concentration achieved through an active rather than a passive system, an impact to indoor or outdoor air is not anticipated. In addition, detailed conservative mathematical modeling of the potential impact to air from contaminated groundwater from the IBM facility indicates the contaminated groundwater does not present an unacceptable human health risk. As draft procedures being proposed by EPA HQ recommend confirmation sampling and as IBM has requested to discontinue operating the vapor extraction system, IBM has agreed to perform soil gas sampling when the vapor extraction system is turned off to confirm that the existing contamination from the IBM facility does not present an unacceptable impact to human health through releases to indoor and/or outdoor air.

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.

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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	_N_	_N_	_N_	_N_			_N_
Air (indoors)							
Soil (surface, e.g., <2 ft)	_N_	_N_	_N_	_N_	_N_	_N_	_N_
Surface Water							
Sediment							
Soil (subsurface e.g., >2 ft)				_N_			_N_
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.

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): IBM removed accessible contaminated soil. IBM provided city (Manassas) water hookups to replace five (5) private water supply wells where hazardous constituents associated with IBM (principally PCE) were detected, and assisted the Prince William County Service Authority in installing and monitoring a groundwater treatment system for its public supply well (PW-07). Prince William County ceased operation of its well field, including PW-07, in August 2001. IBM routinely monitors the groundwater at five public wells and seven homeowners to ensure there is no current impact. Because remaining contamination is deep below the land surface or possibly below Building 101, contact exposure is not anticipated. In addition, because PCE and its breakdown products are volatile organic chemicals which volatilize and do not bioaccumulate, an impact to home gardens is not anticipated.

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

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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.

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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): _____

