STATEMENT OF BASIS/FINAL DECISION AND RESPONSE TO COMMENTS SUMMARY

REGION I
ID# 4705

International Business Machines Corporation

Essex Junction, VT
(signed in August 1992)

Facility/Unit Type:	**Electronics Manufacturer**
Contaminants:	**Tetrachloroethylene (PCE), Trichloroethylene (TCE), Dichloroethylene (DCE), Acetone, Ethyl Benzene, Butyl Acetate, Xylene, Toluene, Dioxin-related compounds, Isopropyl alcohol (IPA)**
Media:	**Ground water, soil**
Remedy:	**Extracting, and applying air injection, carbon adsorption, and ozonation to ground water; applying in-situ vacuum extraction and air injection to contaminated soils; chemical removal and extraction**

FACILITY DESCRIPTION

In September 1986, EPA issued a HSWA Corrective Action Permit to International Business Machine Corporation (IBM) pursuant to 3004(u) of RCRA. The permit required IBM to complete an on-site and off-site investigation to determine the nature and extent of contamination from twenty-two (22) Solid Waste Management Units (SWMUs) at the Essex Junction, Vermont facility in an RFI and to conduct a CMS to evaluate cleanup alternatives.

The 735-acre facility is divided by the Winooski River and is surrounded primarily by residential land. The facility was first used by IBM in 1958 to construct wire contact relays, then was used to manufacture silicon-based memory chips and microprocessors for computers. Most manufacturing activity, ranging from chemical storage to chip assembly, takes place within the 240-acre portion of the facility on the Essex Junction-side of the Winooski River.

IBM conducted field investigations to determine if releases to the environment had occurred. Based on the field results, it was determined that releases from fourteen (14) of the twenty-two (22) SWMUs had occurred. The SWMUs of concern include an industrial waste sludge landfill located in the northwestern corner of the facility; a 1981 constructed chemical distribution center and a tank farm located in the northeastern corner of the facility; an older chemical distribution center located directly below the center; the main semiconductor chip manufacturing area; an old solvent storage area located near the center of the facility; and a fire training area located near the Winooski River.

The geology beneath the facility consists of alluvial sands and some construction fill, up to 15 feet thick, which lies over a discontinuous lacustrine silt and clay layer. This lacustrine silt and clay layer slopes north to south and is 0 to 30 feet thick. The lacustrine layer lies over a 5 to 20 foot stream sorted glacial till deposit and over a 50 to 185 foot unsorted basal till deposit. A large bowl shaped mass of fractured bedrock is under the basal till deposit. Where there is no lacustrine layer, the alluvial/fill layer is not saturated with groundwater and the reworked till layer contains the uppermost aquifer. Where the alluvial/fill is saturated with groundwater, it is the most permeable layer beneath the facility. Otherwise, the bedrock aquifer is the most permeable aquifer and the reworked till deposit is the second most permeable glacial aquifer.

IBM has already completed extensive

CONTAMINATION DETECTED AND CLEANUP GOALS

Media	Estimated Volume	Contaminant	Maximum Concentration (ppb)	Action Level	Cleanup Goal*	Point of Compliance
ground water	N/A	PCE	95,000	5 ppb	5 ppb	within source area capture zone and throughout each area of attainment
		TCE	63,000	5 ppb	5 ppb	
		DCE	760	680 ppb	680 ppb	
		Xylene	130,000	100 ppb	100 ppb	
		Ethylbenzene	17,000	not given	not given	
		Toluene	20	not given	not given	
		Freon 113	12,000	"		
soil	N/A	Xylene	2,700,000	"	100 ppm (1) 8 ppm (2)	
		Ethylbenzene	550,000	"	30 ppm (1) 13.6 ppm (2)	

* Cleanup Goals vary according to the location on the property.
(1) Building 963- Southeast Corner
(2) Building 963 Courtyard

SELECTED REMEDY

The table below summaries the selected remedies for each area of concern at the facility.

Facility Area	Media	Remedy Description
1. Landfill Area	ground water	Maintain existing fence. Maintain existing clay cap while extending the extraction trench to ensure complete capture of contaminated ground-water. Use carbon adsorption and ozonation to remove and destroy groundwater contaminants.
2. Chemical Distribution Center Compliance Area	soil	Install a vacuum extraction /air injection system to remove the organic contaminants trapped in soil. Install either a extraction trench or a series of ground-water wells to supplement this corrective measure.
	ground water	Use the extraction trench to collect contaminated ground-water in the alluvial/fill aquifer. Use carbon adsorption and ozonation to remove and destroy grounwater contaminants.

Facility Area	Media	Remedy Description
3. Building 900 Compliance Area	soil ground water	Use same soil remedy as described for Facility Area #2. Use carbon adsorption and ozonation to remove and destroy groundwater contaminants. Discharge treated ground-water to the Winooski River pursuant to NPDES permit.
4. Building 963 Compliance Area	ground water	Use the same groundwater remedy as described for Facility Area #3. Use existing plus 8 additional separate phase extraction wells to remove separate phase PCE from the reworked till aquifer. Use an extraction well to remove the shallow separate phase xylene from the groundwater. Once removed, xylene will be sent to the CDC storage. The waste material will be sent off-site to a permitted facility for incineration.
5. Building 970 Compliance Area	ground water	Maintain groundwater monitoring to ensure that concentration of the groundwater contaminants does not increase over time.
6. Fire training Compliance Area	soil ground water	Conduct a risk assessment on the residual soil at the conclusion of the corrective measures to address the groundwater contamination for this area. Use same groundwater remedy as described for Facility Area #3.

cleanup activities at the Essex Junction facility under the authority and review of the Vermont Agency of Environmental Conservation. The cleanup activities to date have included removing and treating contaminated overburden and bedrock ground water with extraction trenches and extraction wells in these areas: the sludge landfill, the chemical distribution center, and the main manufacturing areas. An underground storage tank has been removed from the old solvent storage area, a clay cap has been place over the old sludge landfill area, and contaminated soils at the facility have been removed.

The estimated capital and O&M costs to implement the remedy is approximately 1.31 million and 250,000 per year.

EXPOSURE PATHWAYS

The ground water is the primary impacted medium at the facility with ingestion being the main exposure pathway .

INNOVATIVE TECHNOLOGIES CONSIDERED

The following innovative technologies were considered, but not included in the selected remedy: in-situ soil washing and thermal soil aeration.

PUBLIC PARTICIPATION

The public comment period on EPA's proposed remedy extended from August 24, 1992 through October 8, 1992. A public meeting was held on September 23, 1992. The meeting was attended by over 30 people, including representatives from EPA, the Vermont Department of Environmental Conservation, and members of the media, and citizens.

NEXT STEPS

EPA will monitor closely the progress of corrective measures at the IBM facility. EPA will continue to monitor IBM's compliance with permit conditions.

KEY WORDS
ground water, soil; ingestion; VOCs; extraction trench, carbon adsorption, ozonation, in-situ vacuum extraction, institutional controls, chemical removal and off-site incineration

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