

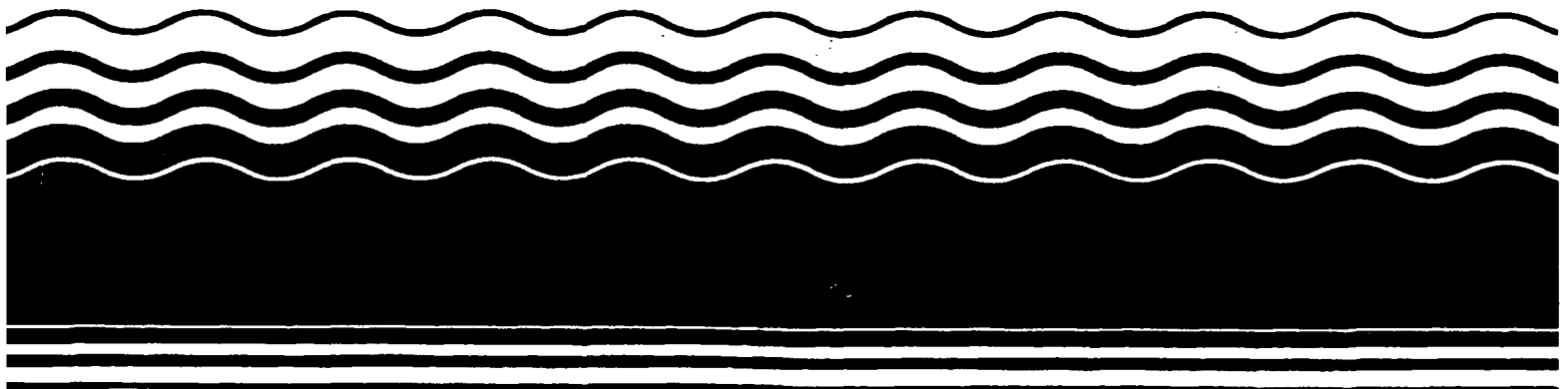
PB98-963115

EPA 541-R98-049

October 1998

EPA Superfund
Explanation of Significant Difference
for the Record of Decision:

CryoChem, Inc.
OU 3 (Contamination Soil)
Worman, PA
9/22/1998



EXPLANATION OF SIGNIFICANT DIFFERENCES

CRYOCHEM SUPERFUND SITE OPERABLE UNIT 3 (CONTAMINATED SOIL) EARL TOWNSHIP, PENNSYLVANIA

I. Introduction

This Explanation of Significant Differences (ESD) has been prepared by the U.S. Environmental Protection Agency Region III (EPA), to address contaminated soil at the CryoChem Superfund Site (the Site), located in the Earl Township, approximately 3 miles west of Boyertown, Pennsylvania. The ESD documents changes to the CryoChem Superfund Site Record of Decision (ROD) for the contaminated soil Operable Unit 3 (OU3), which was signed on September 30, 1991. The ESD is issued in accordance with Section 117(c) of the Comprehensive Environmental Response, Compensation and Liability Act, as amended (CERCLA), commonly known as Superfund, 42 U.S.C. § 9617(c), and 40 C.F.R. § 300.435(c)(2)(I).

EPA is issuing this ESD to document a change in the selected remedial action for OU3, from the utilization of soil vapor extraction to remove the contamination from the soil, to no further action. This action is protective of human health and the environment, and complies with Federal and State applicable or relevant and appropriate requirements for this action.

OU1, which addresses drinking water (see discussion below) and OU2, which addresses groundwater contamination (see discussion below), combine to address fully the threats posed by the conditions at the Site. The ESD selects a remedial action for OU3, which was originally described as Alternative 1 of the ROD for OU3. EPA's proposal is based upon the following circumstances:

- On September 30, 1991, EPA issued the ROD for OU3. The selected remedial action included, as a major component, the "utilization of soil vapor extraction to remove the contamination from the soil."
- During the Remedial Investigation (RI), elevated levels of hazardous substances were detected in surficial soils behind the fabrication building, indicating that solvent had been disposed of there, and that it may have contributed to the groundwater contamination found on- and off-site. The contaminated soil continued to contribute to the threat posed by the Site as hazardous substances leached from the soil into the groundwater and migrated into surface water via overland flow.
- EPA's subsequent investigations, completed in 1992, 1995, and 1996, revealed that significant changes have occurred since the RI was completed and the OU3 ROD was finalized. This document summarizes the rationale for selecting the original remedial alternative in the OU3 ROD, provides the results of the recent investigations, presents

conclusions regarding the anticipated efficacy of the selected remedy, and the selection of no further action as the remedial action for OU3.

EPA is the lead agency for Site activities and the Pennsylvania Department of Environmental Protection (PADEP) is the support agency for the Site. PADEP was provided with a copy of the technical report summarizing the investigations and the proposed ESD. PADEP had no comments on the technical report, as noted in a letter dated April 4, 1997, and concurred with the ESD, as noted in a letter August 31, 1998..

This document presents a summary of the changes to the remedy selection in the ROD for OU3, and a synopsis of information regarding the Site. The ESD will become part of the Administrative Record file pursuant to 40 C.F.R. § 300.825(a)(2), which includes the complete documentation relating to the CryoChem Site. A copy of the Administrative Record file is located at:

U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103
Hours: Monday-Friday 9:00-4:00
215-566-3157

and

Earl Township Supervisors Building
RD#3, Box 571
Boyertown, PA 19512

II. Summary of Site History, Contamination Problems, and Selected Remedy

The CryoChem Superfund Site is located along Route 562 in Earl Township, Berks County, Pennsylvania and is approximately 3 miles west of Boyertown in Earl Township (Figure 1). CryoChem, Inc. has been manufacturing metal products at the Site since 1962. CryoChem's metal fabrication process previously included the use of a chemical solvent (containing at least 93.5% 1,1,1 trichloroethane) to clean dye used to check for faulty welds. The solvent was spilled into shop drains and discarded at the rear of the fabrication building resulting in contamination to a limited area of soil behind the fabrication building, and subsequently to the local ground water system.

The Site is approximately nineteen acres in size, with CryoChem's manufacturing plant and office buildings located on the southern four acres. Groundwater under the Site flows from northwest to southeast and is controlled primarily by fractures in the bedrock.

Environmental samples collected between 1981 and 1987 by PADEP, EPA, and other parties, documented contamination of soil, ground water, and surface water near the Site and several residential wells downgradient to the Site. Specifically, 1,1,1-trichloroethane (TCA), 1,1-dichloroethane (DCA), tetrachloroethene (PCE), trichloroethene (TCE) and 1,1-dichloroethene (DCE) were detected in on-site soils and ground water wells.

On October 4, 1989, EPA included the CryoChem Site on the National Priorities List (54 FR 41015). CryoChem, Inc. and several other potentially responsible parties (PRPs) conducted a Remedial Investigation/ Feasibility Study at the Site under the supervision of EPA pursuant to an Administrative Order by Consent signed by the PRPs and EPA in 1988. A Remedial Investigation/ Feasibility Study was completed by the JACA Corporation in June 1990 on behalf of the PRPs, consisting of investigations and studies to characterize the type and extent of contamination related to the Site to develop alternatives to address the contamination problems. A Focused Feasibility Study, which specifically addressed remedial alternatives for the soil, was completed in May 1991 by the PRC Corporation, on behalf of EPA.

The major findings of the Remedial Investigation include:

- a plume of ground water extending from the Site to several springs located nearly 2500 feet southeast of the Site is contaminated by TCA, DCA, PCE, TCE, and DCE. Nearby residential wells and an on-site production well are affected.
- a small area of shallow soil (approximately 70 yd³) in a confined area approximately 25 by 50 feet along the north wall of the fabrication building (near the containment pad storing CryoChem Inc.'s fuel oil tank) contains TCA, TCE, PCE, DCA, ethylbenzene and xylene.

On September 29, 1989, EPA issued the ROD for OU1. The major components of this ROD, which addressed drinking water at and near the Site, included:

1. Continued operation and maintenance, until a permanent clean water supply is developed, of dual activated-carbon units installed at 20 homes affected by the Site.
2. Installation, operation, and maintenance, until a permanent clean water supply is developed, of dual activated-carbon units at homes affected by contamination from the Site that are not currently equipped with carbon units.
3. Installation, operation, and maintenance of dual activated carbon units at residential wells which become affected by contamination from the Site.
4. Development, construction, and operation of a new clean water supply well and distribution system to provide clean water to affected and potentially affected

homes and businesses. The new water supply would include an air stripper or carbon adsorption unit(s) to treat the water if necessary.

EPA issued an ESD for OU1 on September 22, 1994, to change the selected remedial action, from the development and construction of an alternate water supply, to the continued use of carbon treatment units. EPA has continued to install, operate, and maintain dual activated carbon units as necessary.

On September 28, 1990, EPA issued a ROD for OU2. The major components of this ROD, which addressed the ground water contamination at and near the Site, included:

1. Completion of a ground water remedial design study to determine the most efficient design for a ground water treatment system.
2. Installation, operation, and maintenance of ground water extraction wells to remove contaminated ground water from beneath the Site and to prevent contaminants from migrating to currently unaffected areas.
3. Installation, operation, and maintenance of air stripping towers to treat ground water to applicable levels.
4. Construction, operation, and maintenance of a pipeline from the air stripping towers to surface water near the Site to discharge treated ground water.
5. Periodic ground water monitoring to ensure that the remedy is effective.

EPA completed construction of the ground water treatment system on May 23, 1998. EPA anticipates that this system will remain operational for several years.

On September 30, 1991, EPA issued a ROD for OU3. The major components of this ROD, which addressed the soil contamination at the Site, included:

1. Sampling the contaminated area (and sampling two other areas) to better define the extent of the contamination.
2. Utilization of soil vapor extraction to remove the contamination from the soil.
3. Confirmation sampling.

III. Description of Significant Differences and the Basis for those Differences

EPA is issuing this ESD to change the selected remedial action for OU3 from the

utilization of soil vapor extraction to remove the contamination from the soil to no further action. The newly selected remedial action for OU3, as originally described as Alternative 1 of the ROD for OU3, is protective of human health and the environment, and complies with Federal and State applicable or relevant and appropriate requirements to this action.

The remedial alternatives for OU3 were developed to meet the remedial objectives of the Site. These objectives were to protect public health, welfare, and environment, prevent further migration of contaminants from the soil to the groundwater, and to prevent soil-contaminant migration into unaffected areas. Since the contaminated soils found behind the fabrication building were considered a potential source area, this area was targeted as the focus of OU3.

EPA evaluated five potentially applicable remedial technologies, management or process options, and the requirement set forth in the NCP, 40 C.F.R. 300.430 (e)(6) to evaluate a No-Action Alternative. EPA selected sampling of the contaminated soils, implementation of a soil vapor extraction (SVE) procedure (i.e., in-situ or ex-situ), and subsequent confirmatory sampling of the treated area. The Record of Decision specified that soil remediation would be considered complete when the concentration of each contaminant identified for removal decreased to less than 2 parts per million (ppm).

Post -ROD OU3 Investigations

Soil Sampling

In support of the pre-remedial design sampling requirement, EPA conducted two rounds of soil sampling in the OU3 target area in 1992 and 1995. The sampling locations were selected to be near the locations sampled during the RI. These locations, which were originally selected to coincide with solvent disposal areas, are shown on Figure 2. Table 1 provides a summary of the analytical results from the 1992 and 1995 sampling rounds, and the historic analytical data from the RI sampling in 1989. The results from the 1992 and 1995 sampling events indicate significant reductions in contaminant concentrations since the 1989 event, and each of the contaminants identified for removal were below the remediation goal of 2 ppm. These reductions could be attributed to a combination of vertical migration into the groundwater, overland transport into surface water bodies, and the natural breakdown of the contaminants into non-hazardous substances.

Soil Gas Study

Based upon a clear indication of contaminant level reductions in the SVE target area over the 6-year soil sampling period, a passive soil-gas study was performed in May 1996. The SVE target area was evaluated to determine contaminant concentrations and whether the contaminants present in the soil vapor could be effectively removed by the soil vapor extraction alternative selected in the ROD.

The sample collectors were deployed at four locations within the SVE target area behind

the fabrication building. Figure 3 shows the soil gas sampling locations. The collectors were deployed on May 17, 1996 and retrieved on May 21, 1996. Analyses were performed on the cartridges to quantify the concentration of five site-related contaminants: 1,1-dichloroethane (DCA), 1,1-dichloroethene (DCE), tetrachloroethene (PCE), 1,1,1-trichloroethane (TCA), and trichloroethene (TCE). Table 2 provides the quantitation levels for the constituents analyzed and the soil-gas concentrations of the detected constituents.

Based on the analytical results of the soil-gas assessment, the following conclusions were reached:

- Site-related volatile contaminants were detected in all four of the soil-gas samples collected behind the fabrication building;
- The detection of site-related VOCs in the area behind the fabrication building is consistent with previous analytical results of soil samples from the same area;
- The concentrations of individual soil-gas constituents were very low, ranging from 0.00000012 to 0.00000151 milligrams per liter (mg/l, or ppm); and
- The maximum total VOC concentration from a single sample location was 0.00000373 mg/l. SVE is more typically implemented when VOC concentrations are significantly greater to effectively remove contaminants from the soil.

Hydrogeology and Groundwater Levels

A monitoring well, RI-2D, was installed within the OU3 source area during the RI phase of Site activity. Well logs for RI-2D indicate that the following lithologies were encountered from the surface to the well's total depth of 38 feet: 0-1 feet, gravel pavement; 1-25 feet, weathered, highly fractured gray sandstone, limestone, and quartz with voids at 18-20 feet; and, 25-38 feet, highly fractured sandstone, and limestone with quartz and fault breccia. Groundwater was encountered at 3 feet in the weathered bedrock but the majority of water entering the well was from a depth of 34 to 38 feet. The well was constructed as open-borehole from 28 to 38 feet. A 6-inch steel isolation casing was grouted into place from 28 feet below the surface to about 2.5 feet above the surface.

Water levels in RI-2D were measured on a few occasions since the well was constructed in 1989. The water levels varied from about 5 feet below grade to a few inches below grade. During 1996, all of the water levels were within 1.5 feet of the surface. Because SVE design typically requires 5-10 feet of unsaturated conditions, the depth to water became a serious concern for SVE implementation.

To further investigate the concerns for a shallow water table, a cone penetrometer (CPT) was diverted from an onsite sinkhole investigation in August 1996, to evaluate conditions behind the fabrication building. CPT testing was attempted in two locations behind the fabrication building. Of the two test locations, the first encountered refusal about 1 foot below the ground surface while the second test successfully penetrated to the desired depth of 5 feet below the

surface. When the cone was removed from the second test hole, groundwater rose quickly in the hole and stabilized at a depth of 14 inches. The water level remained constant for the 24-hour period that the hole was left open. This indicates that the groundwater levels measured in the well were similar to groundwater levels in the weathered bedrock adjacent to the well, and that the SVE design would require modification, to include groundwater extraction and treatment, or elimination of the remedial action.

Groundwater Quality

Groundwater from monitoring well RI-2D was sampled in 1989, soon after well completion. The analytical results are shown in the last column of Table 1. Since the groundwater only contained a trace amount of VOC contamination, the well may not be hydraulically connected to the subsurface path that water flows from the surface to the groundwater, or water from roof drains and hillslope seeps in the area may have already transported the contaminants into the groundwater and downgradient of the well. In either situation, downgradient groundwater extraction wells, installed for Operable Unit 2, were designed to collect and treat site-wide groundwater contamination, including contaminants entering the subsurface behind the fabrication building.

SVE Pilot Study

In support of the selected remedial alternative, EPA prepared specifications for a soil vapor extraction pilot study that would test the implementability of a full-scale system. This pilot study would obtain information on the total quantity of volatile organics removed, treatment system efficiency, and the need to proceed with full-scale SVE implementation.

Critical design assumptions for the SVE pilot study included:

- An unsaturated zone existed from the surface to approximately 5 feet below grade. This zone would accommodate vapor extraction and vapor monitoring wells installed between 2.5- and 3.5-feet below grade.
- The quantity of water extracted with the SVE system would be kept to a minimum. A separate groundwater pump and treat system would be installed downgradient of the SVE target area to address contaminated groundwater, but it would not be available during the SVE pilot study.
- The initial concentration of soil vapor constituents would be sufficiently high so that removal of contaminants would be both measurable and supportive of the remedial action objectives.

Based on a design vapor extraction rate of 20 cubic feet per minute, and a maximum contaminant concentration of 0.00000373 mg/l, a SVE system would only recover a total of 3 mg of contaminants per day (0.000007 lbs/day). This rate is significantly lower than typical SVE removal rates and would not be measurable during a SVE pilot study. Attachment A provides

the annotated contaminant removal calculation.

Conclusions

Based on the information obtained from the analysis of soil and soil-gas samples, and the physical characteristics of the area considered for soil vapor extraction, EPA has determined that implementing the selected remedy for OU3 is not needed to protect human health, welfare, and the environment. This ESD selects no further action as the remedial alternative for OU3.

During both surficial soil sampling events in 1992 and 1995, the concentrations of VOC contaminants identified for removal were already below the target cleanup level of 2 ppm as specified in the Record of Decision. A subsequent pre-design investigation to evaluate the subsurface soil-gas concentrations determined that contaminant levels were significantly below the operating norm for a vapor extraction system, and that the amount of recoverable VOCs did not warrant implementation.

Physical limitations in the area considered for vapor extraction also decreased the applicability of such a SVE system. Weathered bedrock and groundwater were encountered less than 1.5 feet below the surface. If a vapor extraction system were implemented under these conditions, excessive amounts of water would be generated, and treatment costs would increase significantly. Also, since groundwater is being collected downgradient of the intended SVE area for OU2, and the VOC concentrations in the groundwater from monitoring well RI-2D were negligible, recovery of groundwater in the SVE area is not warranted.

Since site conditions and contaminant levels in the SVE target area have changed significantly from the pre-ROD conditions, the selected remedial alternative for OU3 is no longer appropriate or warranted.

IV. Support Agency Comments

EPA is the lead agency for Site activities and PADEP is the support agency for the Site. PADEP was provided with a copy of the proposed ESD, and provided its concurrence in a letter dated August 31, 1998. PADEP was provided a copy of the revised technical report summarizing the investigations, and had no comments as noted in a letter dated April 4, 1997.

VI. Affirmation of the Statutory Determinations

EPA believes that the ESD remedy (Alternative 1) is protective of human health and the environment, and complies with Federal and State applicable or relevant and appropriate requirements for this action.

VIII. Signature

U.S. ENVIRONMENTAL PROTECTION AGENCY

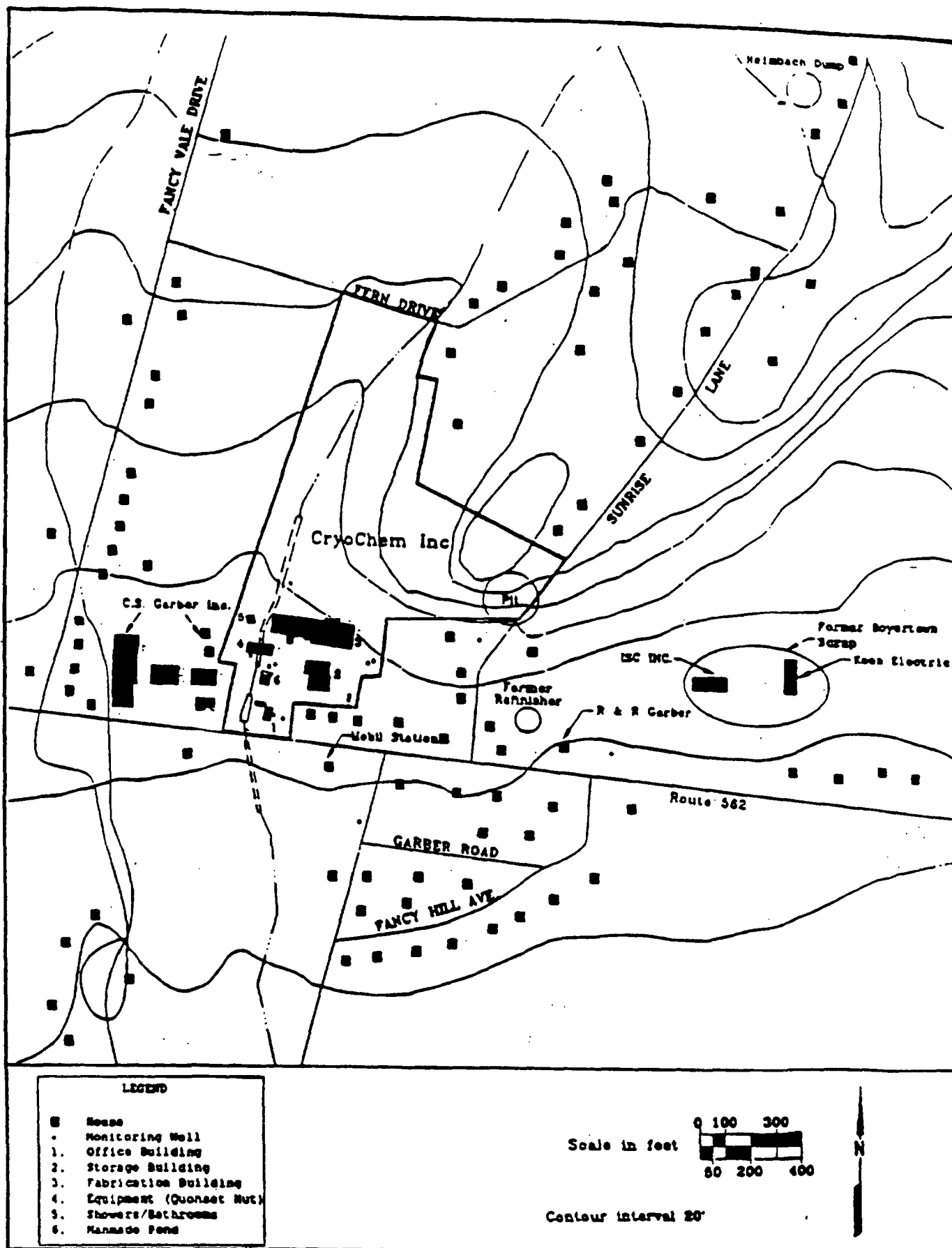
09/22/98

Date

Abraham Ferdas

Abraham Ferdas, Director
Hazardous Site Cleanup Division

Figures

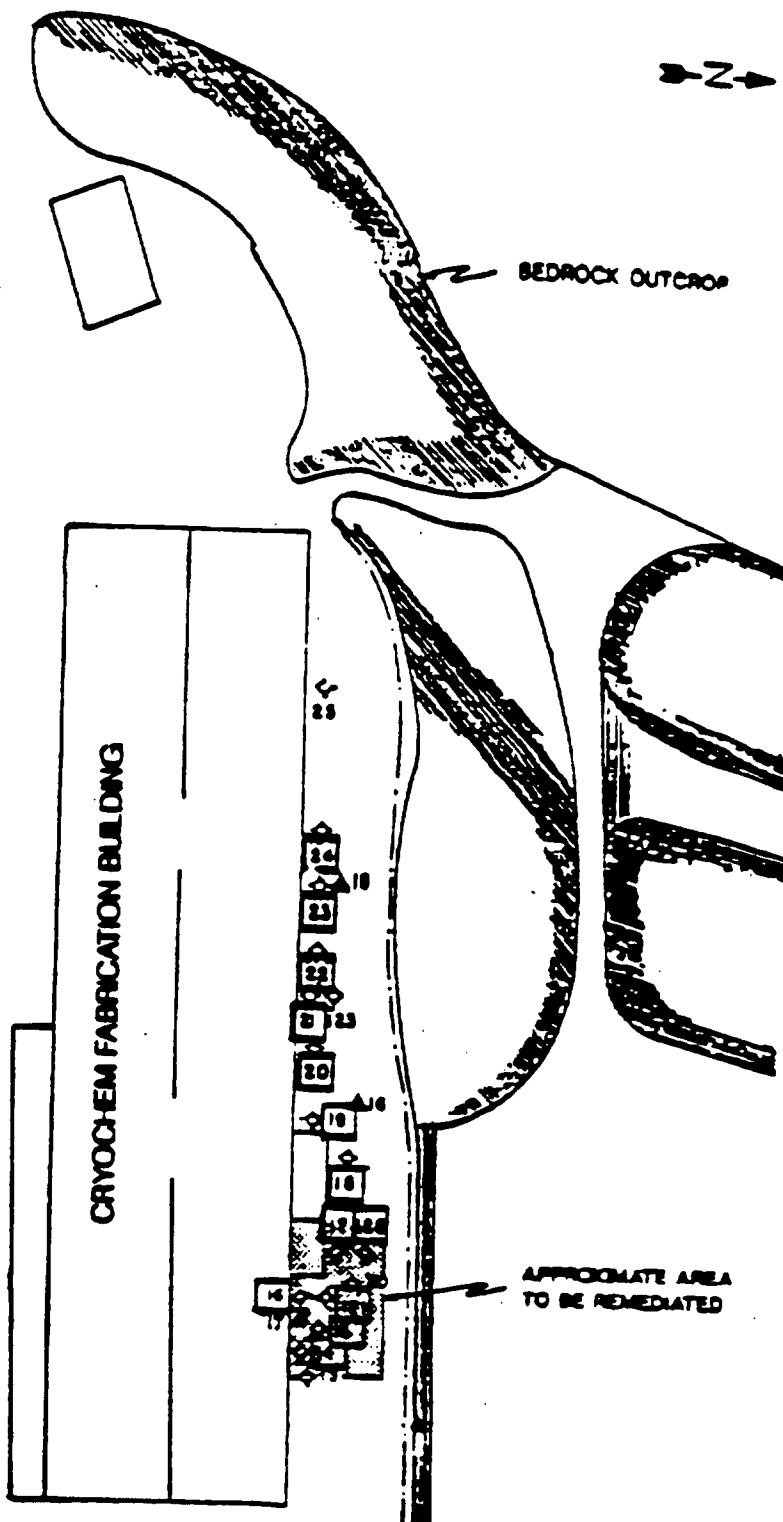


Source: Draft RI, 1989

Figure 1
Site Map
CryoChem Inc



QUONSET HUT



LEGEND

- ◆ Soil Vapor Sample Site
- Site with Soil Vapor Conc. Greater Than Background
- ▲ Surface Soil Sample Location

SCALE NOT PROVIDED

Source: Modified from JACA, 1990

CRYO CHEM SITE
FOCUSED FEASIBILITY STUDY-OPERABLE UNIT 3
EARL TOWNSHIP, PENNSYLVANIA

Figure 2

APPROXIMATE AREA OF CONTAMINATION

EMC ENVIRONMENTAL MANAGEMENT, INC.

- ★ Cone Penetrometer Test Points
- Soil Gas Sample Points
- Monitoring Well RI-2D

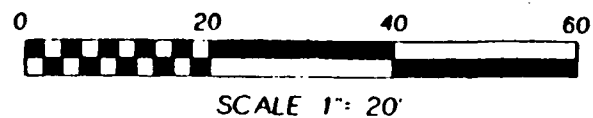
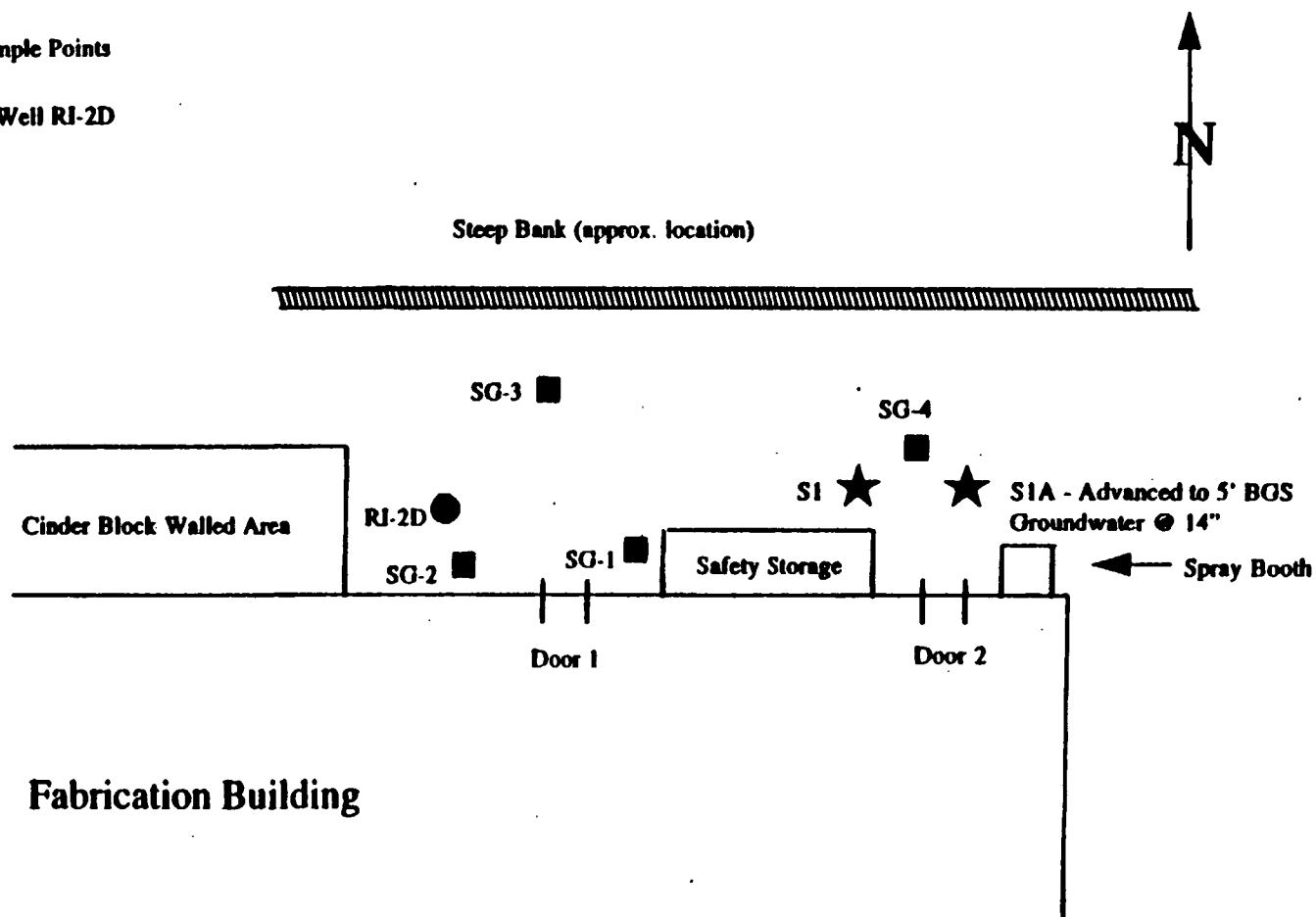


Figure 3
Soil Gas and Cone Penetrometer Test Locations
CryoChem Inc.



Tables

Table 1
Soil and Groundwater Sampling Results Behind the Fabrication Building
CryoChem Inc. - Operable Unit 3

Contaminant Identified for Removal	Maximum Allowable Soil Concentrations*	Soils										Groundwater
		RI		CH2M HILL								RI
		January 1989		November 1992			June 1995					May 1989
		Loc # 16	Loc # 17	Loc #13	Loc #17 to #22	Loc #18	Loc #13	#13 DUP	Loc #17	Loc #22	Loc #18	RI - 2D^
1,1,1-TCA	26	0.019	22	ND	ND	ND	0.166	0.081	0.0006 J	ND	ND	ND
TCE	0.53	0.001	0.6	ND	ND	ND	ND	ND	ND	ND	ND	0.001 J
PCE	2	0.053	0.46	ND	ND	ND	ND	0.003 J	ND	ND	ND	ND
1,1-DCA	88	ND	4	ND	ND	ND	0.092	0.056	ND	ND	ND	ND
Ethylbenzene	654	-	0.92	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene	2,020	ND	11	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	-	-	-	0.047	0.004 J	0.029	0.003 J	0.002 J	0.002 J	0.002 J	0.002 J	ND

Notes:

All concentrations in mg/kg (parts per million).

* : Summers Model calculations presented in the ROD, based on RI sampling data and MCLs

ND : Non-Detect

J: Contaminant present. Reported value is estimated, because concentration is outside range for accurate quantitation.

^ : RI-2D is the groundwater monitoring well within the SVE Target Area. This analytical result is for the only groundwater sample collected at this well.

Table 2
Soil-Gas Concentrations (mg/l)
CryoChem Inc. - Operable Unit 3

SAMPLE LOCATION	Q.L.	1	2	3	4
CONTAMINANTS					
1,1-Dichloroethane	0.0000017	0.00000078	0.00000070	ND	ND
1,1-Dichloroethene	0.0000009	0.00000131	ND	ND	0.00000037
Tetrachloroethene	0.0000009	0.00000013	0.00000024	0.00000012	0.00000025
1,1,1-Trichloroethane	0.0000014	0.00000151	0.00000046	0.00000031	0.00000026
Trichloroethene	0.0000010	ND	ND	ND	0.00000022

NOTES:

Contaminant concentrations provided in mg/l (ppm).

- 1) Values listed under "Q.L." are reported soil-gas concentration quantitation levels.
- 2) "ND" denotes contaminant not detected at the reported quantitation level.
- 3) While 1,1,1-Trichloroethane was targeted in this survey, it is important to note that this compound co-elutes with Carbon Tetrachloride. Therefore the two cannot be distinguished.

Attachment A
Soil Gas Contaminant-Removal Calculations

Attachment A
CryoChem Inc. Site - Operable Unit 3
Soil Gas Contaminant Removal Calculation

Assumptions:

SVE Extraction Rate = 20 cubic feet per minute (CFM)
 1 cubic foot = 28.32 liters
 1 cubic foot/minute = 0.472 liters/second
 1 milligram = 0.0000022 pounds
 Maximum Contaminant Concentration = 0.00000373 mg/l (Soil gas sample location 1)

Calculations:

<i>Vacuum Rate</i> @ 1 CFM	<i>Conversion</i> <i>Factor</i>	<i>Volume of Air Extracted</i> <i>Daily</i>
0.472 L/s x	86,400 s/day = 40,781 L/day	= 815,620 L/day @ 20 CFM

<i>Soil Gas</i> <i>Volume Extracted</i> <i>Daily</i>	<i>Maximum</i> <i>Contaminant</i> <i>Concentration</i>	<i>Anticipated</i> <i>Contaminant</i> <i>Removal Rate</i>
815,620 L/day x	0.00000373 mg/L = 3 mg/day	= 3 mg/day
		= 0.000007 lbs/day