DRAFT

SOIL GAS STUDY REPORT

PREPARED FOR:

THE TORRINGTON COMPANY
3702 WEST SAMPLE STREET
SOUTH BEND, INDIANA 46619

PREPARED BY:

CAPSULE ENVIRONMENTAL ENGINEERING, INC.
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DATED:

JULY 30, 1992

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INTRODUCTION

The purpose of this report is to summarize and provide an interpretation of a soil gas survey and confirmatory soil sampling conducted at the former Torrington Company (Torrington) facility located at 3702 West Sample Street in South Bend, Indiana, (Figure 1). The soil gas survey was performed to determine the horizontal extent of chlorinated solvent and petroleum hydrocarbon contaminant migration beneath and surrounding the main manufacturing building at the facility. The soil gas survey was chosen as it would provide an efficient and effective method of determining the extent of contamination with a minimal amount of disturbance to the building structure. Confirmatory soil samples were taken to determine the edge of the contaminant plume and the accuracy of the soil gas survey.

Tracer Research Corporation (Tracer) of Tucson, Arizona, conducted the soil gas survey on April 27 through 30, 1992. Canonie Environmental Services Corporation (Canonie) of Porter, Indiana, obtained the confirmatory soil samples on April 29, 1992. Both activities were directed and overseen by Capsule Environmental Engineering, Inc. (Capsule). Aspen Research Corporation (ARC) performed the laboratory analysis of the soil samples.

The soil gas survey was initiated due to the detection of chlorinated solvents and petroleum hydrocarbon as fuel oil adjacent to the building in the "S-3" area in February 1992 (Capsule, 1992). The soil gas survey was also used for screening other areas of the building where contamination was suspected.

FIELD METHODS

Soil Gas Survey

The soil gas survey was conducted by drilling a 1-inch diameter hole through the concrete floor and inserting a hollow steel probe into the underlying soil. The depths of the probe ranged from 4 to 6 feet, depending on the moisture content of the soil and the depth to ground water. At the time of the soil gas survey, the depth to ground water was approximately 7 feet based upon the static head level in monitoring well S-3. Tracer exercised care in terminating the probe in the vadose or unsaturated zone to avoid collecting a water sample. Collection of samples in two different media such as soil as a gas or as a dissolved constituent in water does not allow for direct correlation of the relative contaminant concentrations.

To obtain the soil gas samples, a polyethylene tube was inserted through the steel probe, and a vacuum pump was used to collect the sample in a glass syringe. The collected sample was analyzed with a field gas chromatograph for selected chlorinated and petroleum hydrocarbon compounds. The compounds selected for analysis were those detected in the majority of soil samples taken in February from the S-3 area. These compounds were benzene, toluene,

samples taken in February from the S-3 area. These compounds were benzene, toluene, ethylbenzene, total xylenes (BETX), total volatile hydrocarbons (TVHC), 1,1,1 trichloroethane (TCA), 1,1 dichloroethane (DCA), and trichloroethene (TCE).

Appendix A contains Tracer's report on the soil gas survey, which provides more indepth descriptions of the sampling activities. Field gas chromatograph results of the soil gas survey and the location of the sampling points also are presented in Appendix A.

Confirmatory Sampling

Four confirmatory soil borings were taken to define the extent of contaminant migration and as a quality assurance/quality control (QA/QC) measure for the soil gas survey beneath the building. The soil samples were taken in the same location as soil gas survey points SG-22, SG-24, SG-40, and SG-42 by coring a 3-inch diameter hole through the concrete floor. A hand auger was used to obtain a soil sample from the same interval as the respective soil gas survey point.

QA/QC

It is Capsule's observation that Tracer maintained compliance with all areas of their QA/QC protocol while performing the soil gas survey. Canonie decontaminated all soil sampling equipment on site with a TSP and water wash and triple rinsed with distilled water. All decontaminated equipment was handled with fresh latex gloves between each sampling location.

Each confirmation soil sample was containerized in a 4-ounce jar under zero headspace. The soil samples were stored in a chilled cooler while on site and were shipped on ice to ARC within 24 hours of collection. ARC provided trip blanks, which accompanied the samples throughout shipment. A complete chain-of-custody was maintained throughout sample shipping.

The QA/QC measures that Tracer used are detailed in their report in Appendix A.

DISCUSSION AND INTERPRETATION OF RESULTS

Soil Gas Survey

Based upon the results of the soil gas survey, two primary areas of contamination have been identified: the previously discovered S-3 area (that Tracer refers to as "Building Rooms A and B") and a newly discovered area north of the S-3 area (referred to as "Building Room C") (Figure 2). The Tracer report in Appendix A contains isopeth maps and results of the respective screened compounds in each area.

As expected based on previously collected soil samples, TCA, DCA, TCE, and TVHC were detected in the S-3 area, although no BETX compounds were detected at any of the soil gas locations in the area. Based upon the soil gas survey results, it appears that the primary source location of the TCA, DCA, and TVHC contamination is north of the S-3 area beneath the building. The TCA, DCA, and TVHC contamination extends approximately 125 feet laterally beneath the building to the east and north of the source area. Contaminant concentrations of DCA and TVHC, 200 ug/l and 1,200 ug/l, respectively, were detected at sampling point SG-22. The highest TCA concentrations were reported at SG-20 and SG-22 at 67 ug/l and 65 ug/l, respectively. The TCA occurs at an order of magnitude less than the DCA. A TCE plume of lesser concentration (highest concentration 2 ug/l) than that in the TCA, DCA, and TVHC source area appears to originate from a different source southwest of the bermed area and adjacent to the western fence line.

DCA, TCE, and TVHC were detected in soil gas points taken in Building Room C and the outside area adjacent to the western fence line. As in the S-3 area, no BETX compounds were detected in the Building Room C area. The concentrations of TCA, DCA, and TVHC were approximately one order of magnitude less than those detected in the S-3 area. The highest DCA concentration was detected in SG-40 and SG-43 at 120 ug/l and 100 ug/l, respectively. As with the S-3 area, the TCA concentrations in Building Room C were significantly lower than the DCA concentrations, with the highest TCA concentrations reported at 37 ug/l. A TCE plume of limited concentration was also present and mimics the DCA and TCA plumes, indicating the same source area for the TCE, DCA, and TCA contamination.

Based upon the termination of the northern edge of the S-3 area DCA plume, the DCA plume in Building Room C appears to be emanating from a separate contaminant source. Although the DCA and TCA plumes resemble the TVHC plume, the TVHC plume associated with the Building Room C area appears to emanate from a separate source outside the building and has migrated easterly beneath the building. The exact source of the contaminant plumes could not be identified.

Confirmatory Sampling

The analytical data associated with the confirmatory sampling was reviewed by Capsule and determined to be suspect due to laboratory interference from methylene chloride. Therefore, no conclusions could be drawn from the data. This work will be reperformed and issued as an addendum to this report when the conclusive data is available.

CONCLUSION

Based upon the soil borings taken in the S-3 area in February, the solvent contamination appears to emanate from two locations: 1) beneath a concrete bermed area where a former aboveground waste oil/solvent tank was maintained; and 2) in an adjacent area where three underground storage tanks (two fuel oil and one cutting oil) were excavated in 1986.

The soil gas survey was instrumental in determining the extent of the primary contaminants of concern, TCA, DCA, TCE, and TVHC, in the S-3 source area. The soil gas survey also indicated a smaller, less concentrated TCE plume in an area approximately 140 feet southwest of the S-3 source area.

A previously unidentified area of contamination was discovered in the north central part of the main manufacturing building referred to as Building Room C. Although the contaminants of concern, TCA, DCA, TCE, and TVHC, are identical to those detected in the S-3 area, the source appears not to be associated with the S-3 area. The TVHC plume appears to emanate from a source separate from the TCA, DCA, and TCE.

Detection of relatively high levels of methylene chloride in the confirmatory soil samples does not allow any conclusions to be drawn from the laboratory data.

RECOMMENDATIONS

No further characterization of the horizontal extent of contamination is needed in the S-3 area. However, further investigation should be conducted to determine the sources of contamination in the Building Room C area. A second soil sampling event should be performed for confirmatory laboratory analysis.

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Figure 1

Site Location Map

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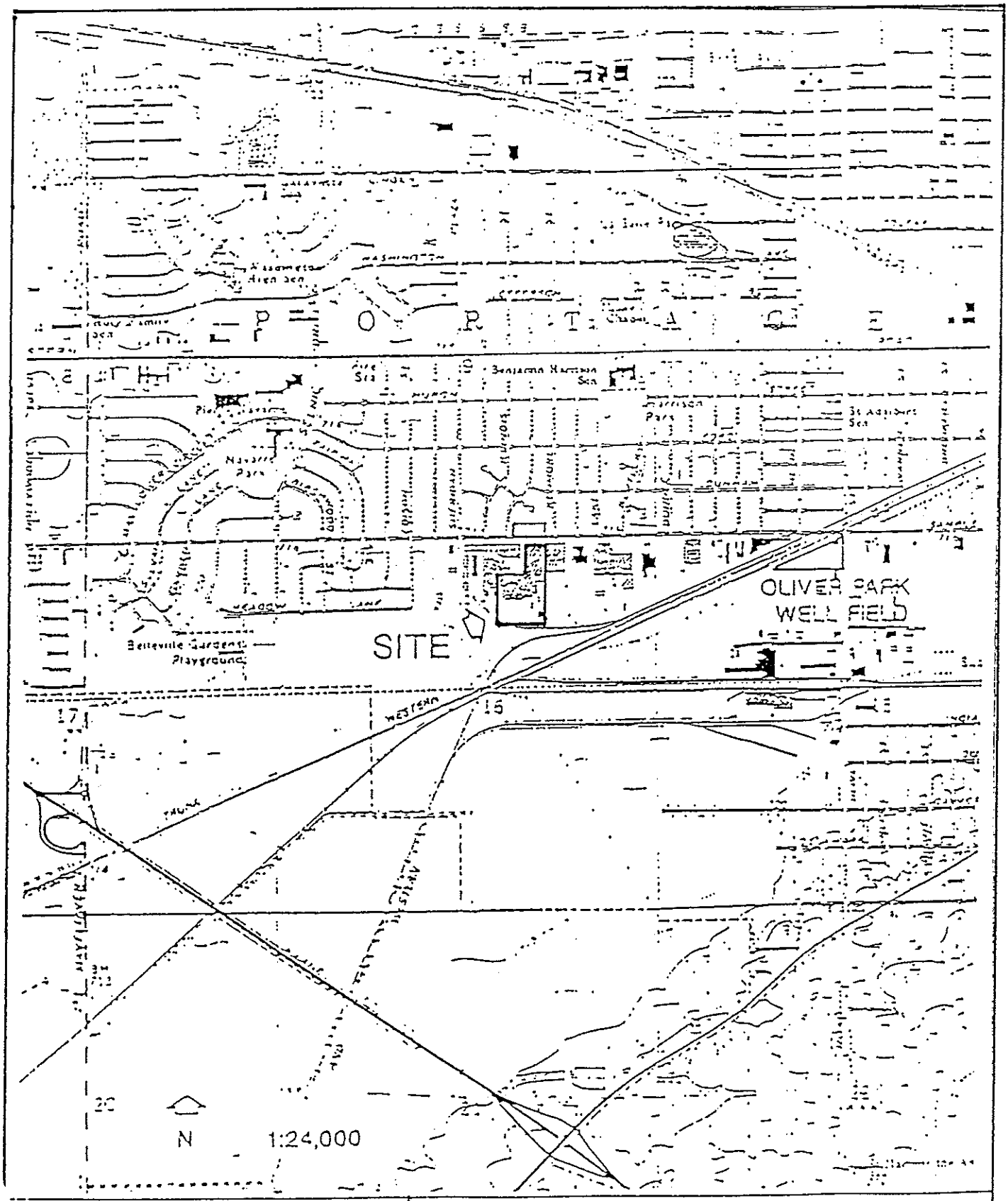

CAPSULE
ENVIRONMENTAL ENGINEERING INC.

THE TORRINGTON COMPANY
SOUTH BEND, INDIANA FACILITY

SITE LOCATION MAP

FIGURE 1

Figure 2

Site Map

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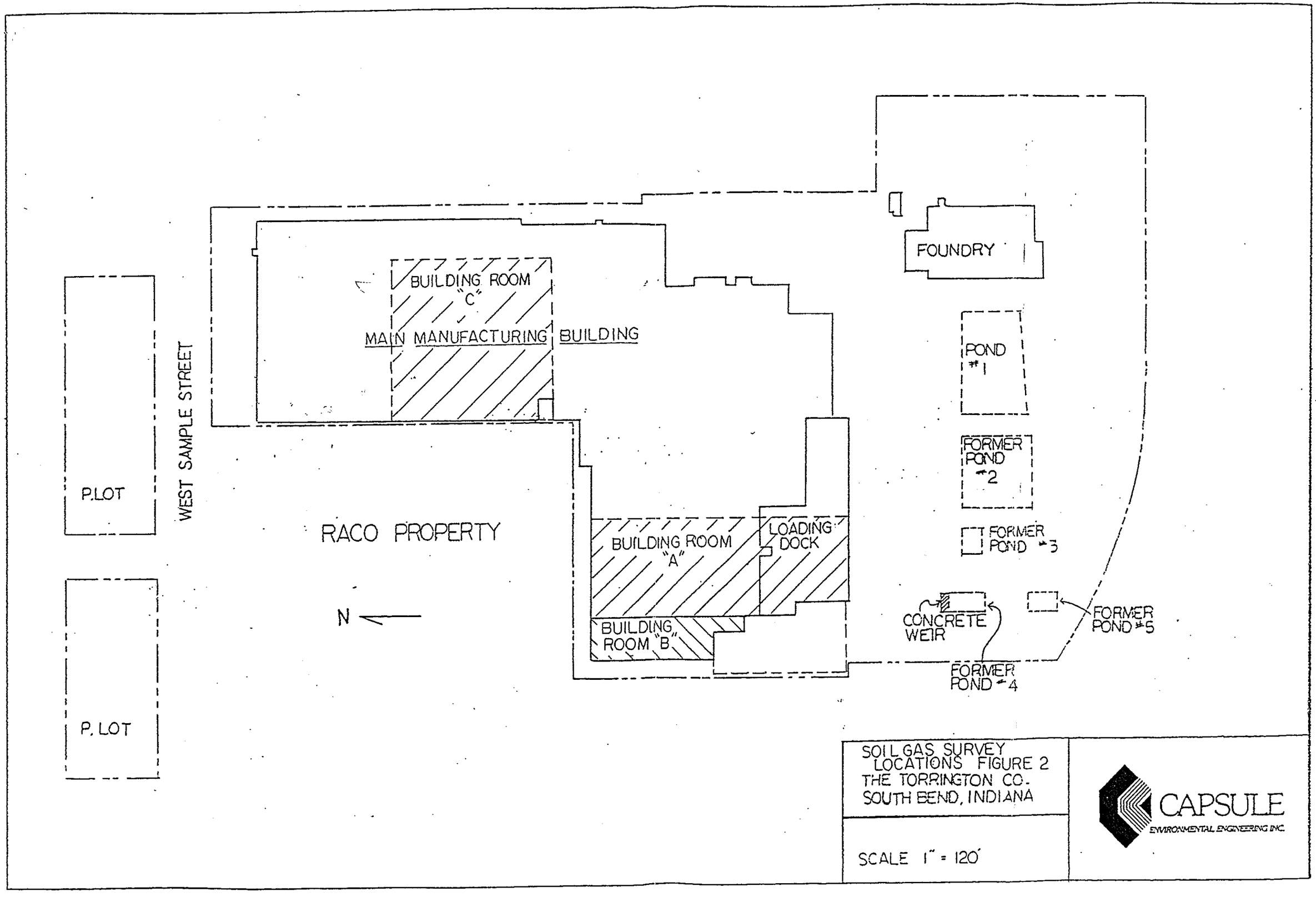

SOIL GAS SURVEY
LOCATIONS FIGURE 2
THE TORRINGTON CO.
SOUTH BEND, INDIANA

SCALE 1" = 120'

CAPSULE
ENVIRONMENTAL ENGINEERING INC.

Appendix A

Tracer Research Corporation Report

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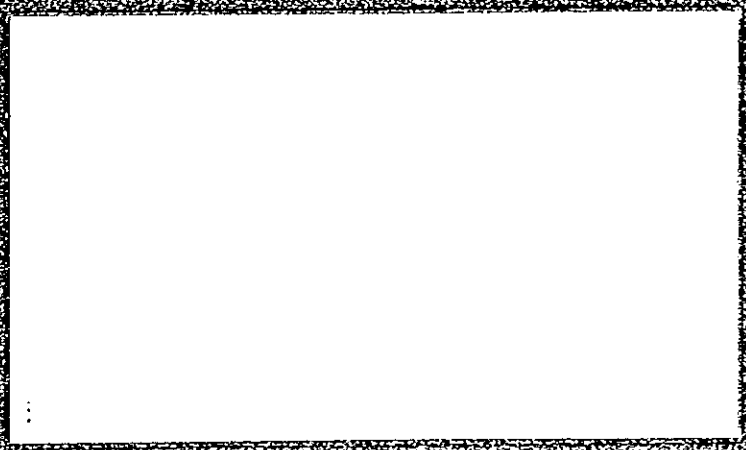
Tracer Research Corporation



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Shallow Soil Gas Investigation

TORRINGTON MANUFACTURING
3702 N. Sample Street
South Bend, Indiana
April 27-30, 1992

Submitted by:

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1-92-239-S

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TABLES

1.0 TORRINGTON SITE INVESTIGATION

Tracer Research Corporation (Tracer Research) performed a shallow soil gas investigation at the Torrington Manufacturing Plant, an abandoned manufacturing site at 3702 N. Sample Street in South Bend Indiana. The investigation was conducted April 27 through 30, 1992, for Capsule Environmental Engineering Incorporated.

1.1 Objective

The purpose of the investigation was to characterize and determine the extent of the plume at this site by screening shallow soil gas for the presence of volatile organic chemicals (VOCs). Soil gas samples were collected and analyzed for the following halocarbons and hydrocarbons.

1,1-dichloroethane (1,1-DCA)
trichloroethene (TCE)
benzene, toluene, ethylbenzene, and xylenes (BTEX)
total volatile hydrocarbons (TVHC)

1.2 Overview of Results

For this investigation, 47 soil gas samples were collected at depths of 4 to 6 feet below grade from 47 locations. No BTEX compounds were detected in any of the samples. TVHC was detected in a majority of the samples in concentrations from 0.6 to 1,200 micrograms per liter (ug/l). Concentrations of 1,1-DCE were detected in more than half of the samples in concentrations from 0.01 to 200 ug/l. Low levels of TCE were detected at several sampling locations in concentrations from 0.002 to 2 ug/l.

2.0 SITE DESCRIPTION

The site of this investigation is an abandoned manufacturing plant. Samples were collected from beneath the concrete surface of much of the site. Samples were also collected from inside the abandoned manufacturing plant building.

Environmental Engineering representatives reported the subsurface was made up of sands and gravels. The depth to groundwater was reported to occur at 8 feet below grade.

3.0 SAMPLING PARAMETERS

Soil gas sampling probes consisted of 7-foot lengths of 3/4-inch diameter hollow steel pipe. The probes were fitted with detachable drive tips and advanced to depths of 4 to 6 feet below ground surface (bgs). A rock drill had to be used to drill through concrete varying in thickness from 4 to 36 inches. The probes at sample locations SG-21 and SG-23 were hand pounded to the desired depth. The probe at sample location SG-20 met with refusal at 1.5 feet bgs, but a following attempt was successful and a soil gas sample was collected. The remaining probes were hydraulically pushed to the desired depth.

The aboveground end of each probe was fitted with an aluminum reducer (manifold) and a length of polyethylene tubing leading to a vacuum pump. Soil gas was pulled by the vacuum pump into the probe. Samples were collected in a glass syringe by inserting a syringe needle through a silicone rubber segment in the evacuation line and down into the steel probe. The vacuum was monitored by a vacuum gauge to ensure an adequate gas flow from the vadose zone was maintained.

The volume of air within the probe was purged by evacuating 2 to 5 probe volumes of gas. The evacuation time in minutes versus the vacuum in inches of mercury (Hg) was used to calculate the necessary evacuation time. The vacuum in inches Hg was recorded at each sampling location.

High vacuums were recorded at depths greater than 5 feet bgs. Most sample probe vacuums ranged from 2 to 5 inches Hg. The maximum pump vacuum recorded was 22 inches Hg.

After retrieval of the probe from sample location SG-1, water and sand were evident on the probe. Also, black oily water was visible on the end of the probe at sample location SG-4 after the sample was collected.

4.0 ANALYTICAL PARAMETERS

During this investigation, 6 to 10 milliliters (ml) of soil gas were collected for each sample and immediately analyzed in the Tracer Research analytical van. Subsamples (duplicates) from these samples were injected into the gas chromatograph (GC) in volumes of 50 to 500 microliters (ul).

4.1 Analyte Class

The soil gas samples were analyzed for the following analyte classes and compounds:

Analyte Class: Hydrocarbon
benzene, toluene, ethylbenzene, xylenes (BTEX)
total volatile hydrocarbons (TVHC)

Analyte Class: Halocarbon
1,1-dichloroethane (1,1-DCA)
trichlorethene (TCE)

4.2 Chromatographic System

A Varian 3300 gas chromatograph, equipped with an electron capture detector (ECD), a flame ionization detector (FID), and two computing integrators, was used for the soil gas analyses. Halocarbons were separated in the GC on a 6 foot by 1/8 inch outer diameter (OD) packed analytical column (Alltech OV101 10% liquid phase bonded to 80/100 mesh Chromosorb W support) in a temperature controlled oven and detected on the ECD. Hydrocarbons were separated on a 3 foot by 1/8 inch diameter column with chromosorb (OV101) and detected on the FID. Nitrogen was used as the carrier gas.

The instrument calibrations were checked periodically throughout each day to monitor the response factor and retention time. The following paragraphs explain the GC, ECD, and FID processes.

GC Process

The soil gas vapor is injected into the GC where it is swept through the analytical column by the carrier gas. The detector senses the presence of a component different from the carrier gas and converts that information to an electrical signal. The components of the sample pass through the column at different rates, according to their individual properties, and are detected by the detector. Compounds are identified by the time it takes them to pass through the column (retention time).

ECD Process

The ECD captures low energy thermal electrons that have been ionized by beta particles. The flow of these captured electrons into an electrode produces a small current, which is collected and measured. When the halogen atoms (halocarbons) are introduced into the detector, electrons that would otherwise be collected at the electrode are captured by the sample, resulting in decreased current. The current causes the computing integrator to record a peak on a chromatogram. The area of the peak is compared to the peak generated by a known standard to determine the concentration of the analyte.

FID Process

The FID utilizes a flame produced by the combustion of hydrogen and air. When a component, which has been separated on the GC analytical column, is introduced into the flame, a large increase in ions occurs. A collector with a polarizing voltage is applied near the flame and the ions are attracted and produce a current, which is proportional to the amount of the sample compound in the flame. The electrical current causes the computing integrator to record a peak on a chromatogram. By measuring the area of the peak and comparing that area to the integrator response of a known aqueous standard, the concentration of the analyte in the sample is determined.

4.3 Analyses

The detection limits for target compounds depend on the sensitivity of the detector to the individual compound as well as the volume of the injection. The detection limits of the target compounds were calculated from the response factor, the sample size, and the calculated minimum peak size (area) observed under the conditions of the analyses. If any compound was not detected in an analysis, the detection limit is given as a "less than" value, e.g., <0.1 ug/L. The approximate detection limits for the target compounds are presented in the table on the following page.

Table 1. Detection Limits for Soil Gas Compounds

Compound	Detection Limits (ug/l)
Benzene	0.06
Toluene	0.1
Ethylbenzene	0.3
Xylenes	0.4
Total volatile hydrocarbons	0.3
1,1-dichloroethane	0.001
Trichlorethene	0.07

5.0 QUALITY ASSURANCE AND QUALITY CONTROL

Tracer Research's Quality Assurance (QA) and Quality Control (QC) program was followed to maintain data that was reproducible through the investigation. An overview presenting the significant aspects of this program is presented below.

Soil Gas Sampling Quality Assurance

To ensure consistent collection of soil gas samples, the following procedures are performed:

- Sampling Manifolds

Tracer Research's custom designed sampling manifold connects the sample probe to the vacuum line and pump. The manifold is designed to eliminate sample exposure to the polymeric (plastic) materials that connect the probe to the vacuum pump.

The sampling manifold attached to the end of the probe, forming an air tight union between the probe and the silicon tubing septum. The septum connect the manifold to the pump vacuum line and permits syringe sampling.

This sampling system allows the sample to be taken upstream of the sampling pump, manifold, and septum. Since cross contamination of sampling equipment can be a major problem, Tracer Research replaces the materials (probe and syringe), between sampling points, that contact the soil gas before or during sampling. If the equipment is contaminated, all the components are replaced. At the end of each day the manifold is cleaned with soap and water and baked in the GC oven.

-Sampling Probes

Steel probes are used only once each day. To eliminate the possibility of cross contamination, they are washed with high pressure soap and hot water spray, or steam-cleaned. Enough sampling probes are carried on each van to avoid the need to re-use any during the day.

-Glass Syringes

Glass syringes are usually used for only one sample a day and are washed and baked out at night. If they must be used twice, they are purged with carrier gas (nitrogen) and baked out between probe samplings.

-Sampling Efficiency

Soil gas pumping is monitored by a vacuum gauge to ensure that an adequate flow of gas from the vadose zone is maintained. A reliable gas sample can be obtained if the sample vacuum gauge reading is at least 2 inches Hg less than the maximum measured vacuum of the vacuum pump.

Analytical Quality Assurance Samples

Quality assurance samples are performed at the below listed, or greater, frequencies according to the number of soil gas samples analyzed:

Table 2. Quality Assurance Samples

Sample type	Frequency
Ambient Air Samples	2 per day or per site
Analytical Method Blanks	5% (1 per 20 samples or 1 a day)
Continuing Calibration Check	20% (1 every 5 samples)
Field System Blank	10% (1 every 10 samples or 1 a day)
Reagent Blank	1 per set of working standards
Replicate Samples	20% to 100% of all soil gas samples

The ambient air samples are obtained on site by sampling the air immediately outside the mobile analytical van and directly injecting it into the GC. Analytical method blanks are taken to demonstrate that the analytical instrumentation is not contaminated. These are performed by injecting carrier gas (nitrogen) into the GC with the sampling syringe. Subsampling syringes are also checked in this fashion.

The injector port septa through which soil gas samples are injected into the GC are replaced daily to prevent possible gas leaks from the chromatographic column. All sampling and subsampling syringes are decontaminated after use and are not used again until they have been decontaminated by washing in anionic detergent and baking at 100°C.

Field system blanks are analyzed to check for contamination of the sampling apparatus, e.g., probe and sampling manifold. A sample is collected using standard soil

gas sampling procedures, but without putting the probe into the ground. The results are compared to those obtained from a concurrently sampled ambient air analysis.

If the blanks detect compounds of interest at concentrations that indicate equipment contamination or concentrations that exceed normal background levels (ambient air analysis), corrective actions are performed. If the problem cannot be corrected, an out-of-control event is documented and reported.

A reagent blank is performed to ensure the solvent used to dilute the stock standards is not contaminated. Analytical instruments are calibrated daily using fresh working standards made from National Institute of Sciences and Technology traceable standards and reagent blanked solvents.

Quantitative precision is assured by duplicating analysis of at least 20 percent of the soil gas samples. Duplicate analyses are performed by subsampling vapors from the original syringe. If short analysis times are involved, 100 percent of the samples are analyzed in duplicate.

6.0 RESULTS

The analytical results from this soil gas investigation are condensed in Appendix A. The data are presented by location and by analyte concentration. When the compound was not detected, the detection limit is presented as a "less than" value, e.g., <0.0001 ug/l. Isoconcentration maps of the targeted compounds are included in Appendix B.

Soil gas samples are identified by sample location and sampling depth. For example, SG-1-5' represents soil gas sample number one, collected at a depth of 5 feet below the ground surface. A summary of the soil gas investigation is presented in a table on page 10 of this report.

6.1 Discussion of Data

Concentrations of 1,1-DCA, TCE, and TVHC were detected in soil gas samples collected around Rooms A, B, and C. No benzene, toluene, ethylbenzene, nor xylenes were detected in any of the 47 soil gas samples collected.

1,1-DCA and TVHC plumes covered most of the sampling area around Rooms A and B (Figures 1A and 1C in Appendix B). The highest concentrations of 1,1-DCA were detected in the northern section of Room B inside the building at sample locations SG-22

(200 ug/L) and SG-23 (110 ug/L). See Figure 1A in Appendix B. High concentrations of TVHC were also centered around sample locations SG-22 (1,200 ug/L) and SG-23 (500 ug/L) as well as east of the loading dock in the yard at location SG-6 (1,000 ug/L). See Figure 1C in Appendix B. A smaller TCE plume appears to be confined to the northeast portion of this area in the yard (Figure 1B). The highest concentration of TCE occurred at sample location SG-4 (2 ug/L).

Similar shaped 1,1-DCA and TVHC plumes were detected in and around Room C. The highest concentrations of these compounds were detected in the southeast corner of Room C and in the southeast concrete area outside of Room C. The highest concentrations of 1,1-DCA were detected at sample locations SG-40 (120 ug/L) and SG-43 (100 ug/L). See Figure 2A in Appendix B. The highest TVHC concentrations were detected at sample locations SG-40 (170 ug/L) and SG-42 (140 ug/L). See Figure 2C in Appendix B. TCE was detected in only two of the samples collected in and around Room C (Figure 2B).

6.2 Conclusions

The 1,1-DCA and TVHC plumes are similar in shape and distribution around Rooms A, B, and C. The TCE plumes are smaller and appear to be unrelated to the 1,1-DCA and TVHC plumes.

Table 3. Soil Gas Sample Summary

Compound	# of samples in which compound was detected	Low conc. ug/L	High conc. ug/L	Sample(s) with high conc.
Benzene	0	NA	NA	NA
Toluene	0	NA	NA	NA
Ethylbenzene	0	NA	NA	NA
Total xylenes	0	NA	NA	NA
TVHC	37	0.6	1,200	SG-22-5'
1,1-DCA	30	0.01	200	SG-22-5'
TCE	10	0.002	2	SG-4-5'

APPENDIX A Condensed Data

TRACER SEARCH CORPORATION - ANALYTICAL DATA
CAPSULE ENGINEERING/TORRINGTON/SOUTH BEND,INDIANA/JOB #1-92-239-S
APRIL 27,1992

SAMPLE	1,1 DCA ug/l	TCE ug/l	BENZENE ug/l	TOLUENE ug/l	ETHYL BENZENE ug/l	XYLENES ug/l	TVHC ug/l
AIR	<0.007	<0.0003	<0.03	<0.06	<0.2	<0.2	<0.2
SG-1-4'	0.01	<0.0006	<0.06	<0.1	<0.3	<0.4	<0.3
SG-2-5'	0.7	0.02	<0.06	<0.1	<0.3	<0.4	2
SG-3-5'	<0.01	<0.0006	<0.06	<0.1	<0.3	<0.4	0.9
SG-4-4'	5	2	<0.06	<0.1	<0.3	<0.4	17
SG-5-4'	3	0.1	<0.06	<0.1	<0.3	<0.4	2
SG-6-4'	64	0.1	<0.1	<0.3	<0.8	<1	1000
SG-7-4'	12	0.1	<0.6	<1	<3	<4	<3
SG-8-5'	0.1	0.06	<0.06	<0.1	<0.3	<0.4	<0.3
SG-9-4'	<0.07	<0.003	<0.1	<0.3	<0.8	<1	<0.9
SG-10-4'	<0.01	0.002	<0.05	<0.1	<0.3	<0.4	<0.3
AIR	<0.007	<0.0006	<0.03	<0.06	<0.2	<0.2	<0.2

Analyzed by: K. Wilhelmsen
Proofed by: PWR

Tracer Research Corporation

TRACER RESEARCH CORPORATION - ANALYTICAL RESULTS
CAPSULE ENGINEERING/TORRINGTON/SOUTH BEND, INDIANA/JOB #1-92-239-S
APRIL 28,1992

SAMPLE	1,1 DCA ug/l	TCE ug/l	BENZENE ug/l	TOLUENE ug/l	ETHYL BENZENE ug/l	XYLENES ug/l	TVHC ug/l
AIR	<0.01	<0.0005	<0.06	<0.1	<0.3	<0.4	<0.3
SG-11-5'	<0.05	<0.2	<0.3	<0.7	<1	<2	9
SG-12-5'	0.8	<0.09	<0.1	<0.3	<0.7	<0.9	7
SG-13-5'	5	<0.2	<0.1	<0.3	<0.7	<0.9	10
SG-14-5'	0.02	<0.09	<0.06	<0.1	<0.3	<0.4	7
SG-15-5'	<0.09	<0.005	<0.1	<0.3	<0.7	<0.9	4
SG-16-5'	31	<0.4	<0.1	<0.3	<0.7	<0.9	32
SG-17-5'	0.03	<0.005	<0.1	<0.3	<0.7	<0.9	5
SG-18-5'	4	<0.005	<0.1	<0.3	<0.7	<0.9	8
SG-19-5'	64	0.04	<0.1	<0.3	<0.7	<0.9	65
AIR	<0.01	<0.0005	<0.06	<0.1	<0.3	<0.4	3

Analyzed by: K. Wilhelmsen
Proofed by: PWR

Tracer Research Corporation

TRACE ESEARCH CORPORATION - ANALYTICAL RESULTS
CAPSULE ENGINEERING/TORRINGTON/SOUTH BEND, INDIANA/JOB #1-92-239-S
APRIL 28,1992

SAMPLE	1,1 DCA ug/l	TCE ug/l	BENZENE ug/l	ETHYL TOLUENE ug/l	BENZENE ug/l	XYLENES ug/l	TVHC ug/l
AIR	<0.01	<0.0005	<0.05	<0.1	<0.2	<0.2	<0.2
SG-20-5'	30	<2	<0.1	<0.2	<0.5	<0.7	60
SG-21-5'	62	<3	<0.1	<0.2	<0.5	<0.7	56
SG-22-5'	200	<11	<0.1	<0.2	<0.5	<0.7	1200
SG-23-5'	110	<0.08	<0.1	<0.2	<0.5	<0.7	500
SG-24-5'	0.1	<0.009	<0.1	<0.2	<0.5	<0.7	0.6
SG-25-5'	<0.07	<0.002	<0.1	<0.2	<0.5	<0.7	9
SG-26-5'	0.2	<0.3	<0.1	<0.2	<0.5	<0.7	5
AIR	<0.03	<0.0009	<0.04	<0.09	<0.2	<0.3	<0.3

Analyzed by: K. Wilhelmsen
Proofed by: PWR

Tracer Research Corporation

TRACER RESEARCH CORPORATION - ANALYTICAL RESULTS
CAPSULE ENGINEERING/TORRINGTON/SOUTH BEND, INDIANA/JOB #1-92-239-S
APRIL 29,1992

SAMPLE	1,1DCA ug/l	TCE ug/l	BENZENE ug/l	TOLUENE ug/l	ETHYL BENZENE ug/l	XYLENES ug/l	TVHC ug/l
AIR	<0.02	<0.0006	<0.5	<0.1	<0.2	<0.3	<0.3
SG-27-5'	0.1	<0.001	<0.03	<0.07	<0.1	<0.2	1
SG-28-5'	<0.04	0.7	<0.1	<0.3	<0.6	<0.7	7
SG-29-5'	1	<0.1	<0.1	<0.3	<0.6	<0.7	10
SG-30-5'	3	<0.06	<0.1	<0.3	<0.6	<0.7	4
SG-31-4'	<0.04	<0.001	<0.1	<0.3	<0.6	<0.7	1
SG-32-5'	0.9	0.1	<0.1	<0.3	<0.6	<0.7	<0.8
AIR	<0.01	<0.0006	<0.05	<0.1	<0.2	<0.3	<0.3
SG-33-5'	0.3	<0.001	<0.1	<0.3	<0.6	<0.7	1
SG-34-5'	0.7	<0.001	<0.1	<0.3	<0.6	<0.7	<0.8
SG-35-5'	<0.04	<0.001	<0.1	<0.3	<0.6	<0.7	<0.8
SG-36-6'	0.5	<0.1	<0.1	<0.3	<0.6	<0.7	4
SG-37-5'	3	<0.1	<0.1	<0.3	<0.6	<0.7	10
SG-38-5'	13	0.02	<0.1	<0.3	<0.6	<0.7	4
SG-39-5'	<0.04	<0.001	<0.1	<0.3	<0.6	<0.7	7
SG-40-6'	120	<0.4	<0.1	<0.3	<0.6	<0.7	170
SG-41-6'	0.6	<0.07	<0.1	<0.3	<0.6	<0.7	4
AIR	<0.02	<0.0006	<0.05	<0.1	<0.2	<0.3	7

Analyzed by: K. Wilhelmsen
Proofed by: PWR

Tracer Research Corporation

TRACER RESEARCH CORPORATION - ANALYTICAL RESULTS
CAPSULE ENGINEERING/TORRINGTON/SOUTH BEND, INDIANA/JOB #1-92-239-S
APRIL 30,1992

SAMPLE	1,1 DCA ug/l	TCE ug/l	BENZENE ug/l	TOLUENE ug/l	ETHYL BENZENE ug/l	XYLENES ug/l	TVHC ug/l
AIR	<0.02	<0.0006	<0.05	<0.1	<0.3	<0.4	0.8
SG-42-5'	71	<2	<0.1	<0.3	<0.7	<1	140
SG-43-5'	100	<0.02	<0.2	<0.6	<1	<2	38
SG-44-5'	0.1	<0.001	<0.1	<0.3	<0.7	<1	1
SG-45-5'	36	0.1	<0.1	<0.3	<0.7	<1	14
SG-46-5'	<0.1	<0.003	<0.1	<0.3	<0.7	<1	<0.9
SG-47-5'	13	<0.4	<0.1	<0.3	<0.7	<1	23
AIR	<0.02	<0.0006	<0.05	<0.1	<0.3	<0.4	1

Analyzed by: K. Wilhelmsen
Proofed by: KWR

Tracer Research Corporation

TRACER RESEARCH CORPORATION - ANALYTICAL RESULTS
CAPSULE ENGINEERING/TORRINGTON/SOUTH BEND, INDIANA/JOB #1-92-239-S
4/27/92

SAMPLE	TCA ug/l
AIR	0.009
SG-1-4'	0.6
SG-2-5'	6
SG-3-5'	0.004
SG-4-4'	13
SG-5-5'	0.2
SG-6-4'	9
SG-7-4'	0.2
SG-8-5'	0.6
SG-9-5'	<0.005
SG-10-4'	0.006
AIR	0.006

Analyzed by: K. Wilhelmsen
Proofed by: RWR

TRACER RESEARCH CORPORATION - ANALYTICAL RESULTS
CAPSULE ENGINEERING/TORRINGTON/SOUTH BEND, INDIANA/JOB #1-92-239-S
4/28/92

SAMPLE	TCA ug/l
AIR	0.005
SG-11-5'	14
SG-12-5'	6
SG-13-5'	12
SG-14-5'	5
SG-15-5'	8
SG-16-5'	16
SG-17-5'	8
SG-18-5'	8
SG-19-5'	11
AIR	0.01
SG-20-5'	67
SG-21-5'	23
SG-22-5'	65
SG-23-5'	45
SG-24-5'	3
SG-25-5'	1
SG-26-5'	5
AIR	<0.0001

Analyzed by: K. Wilhelmsen
Proofed by: PWR

Tracer Research Corporation

TRACER RESEARCH CORPORATION - ANALYTICAL RESULTS
CAPSULE ENGINEERING/TORRINGTON/SOUTH BEND, INDIANA/JOB #1-92-239-S
4/29/92

SAMPLE	TCA ug/l
AIR	0.002
SG-27-5'	4
SG-28-5'	4
SG-29-5'	7
SG-30-5'	6
SG-31-4'	4
SG-32-5'	2
AIR	0.0008
SG-33-5'	4
SG-34-5'	2
SG-35-5'	1
SG-36-6'	6
SG-37-5'	7
SG-38-5'	4
SG-39-5'	0.04
SG-40-6'	1
SG-41-6'	6
AIR	0.008

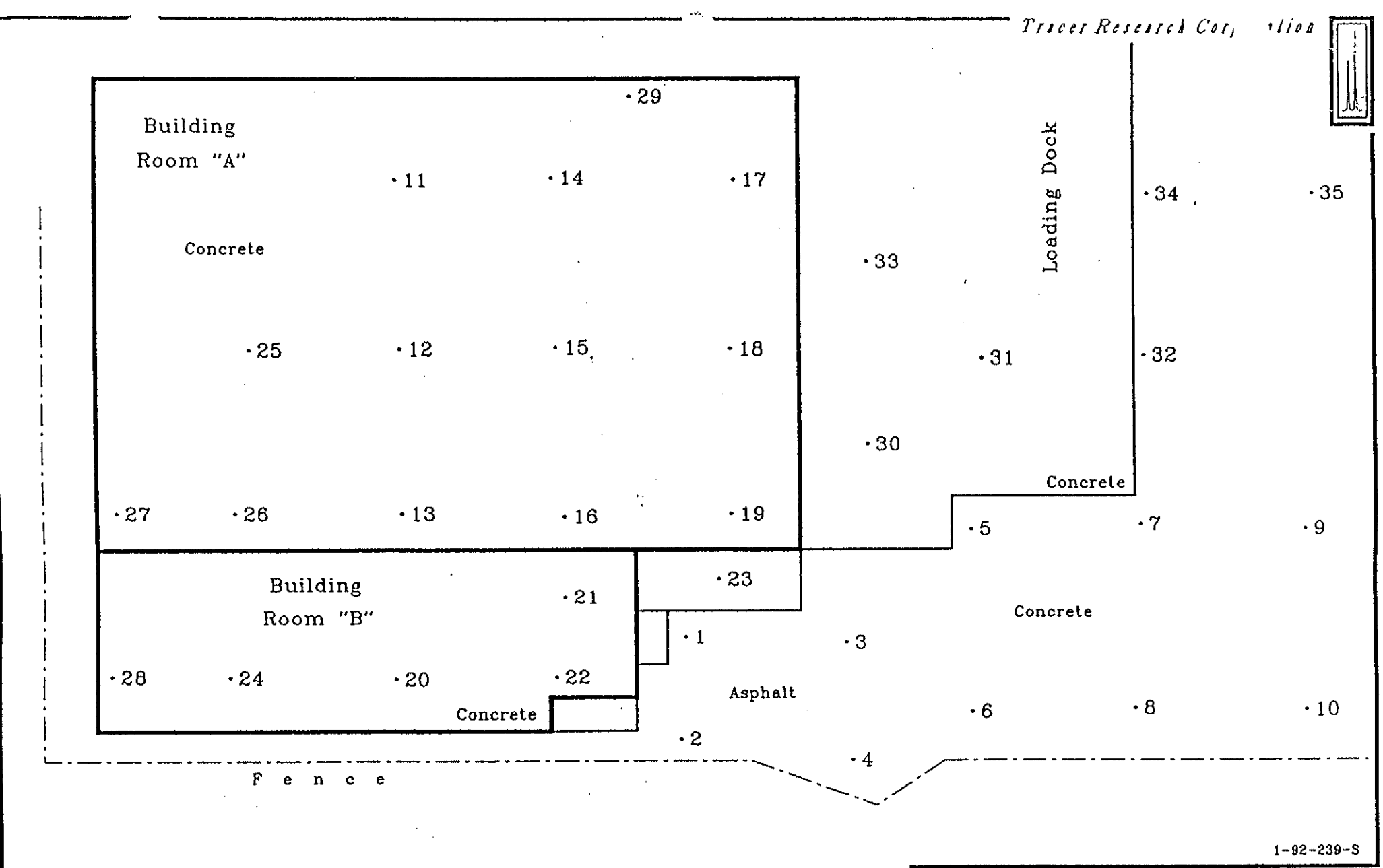
Analyzed by: K. Wilhelmsen
Proofed by: PWR

TRACER RESEARCH CORPORATION - ANALYTICAL RESULTS
CAPSULE ENGINEERING/TORRINGTON/SOUTH BEND, INDIANA/JOB #1-92-239-S
4/30/92

SAMPLE	TCA ug/l
AIR	0.006
SG-42-5'	37
AIR	0.008
SG-44-5'	0.2
SG-43-5'	20
SG-45-5'	1
SG-46-5'	0.002
SG-47-5'	13
AIR	0.004

Analyzed by: K. Wilhelmsen
Proofed by: PWR

APPENDIX B Maps



1-92-239-S

N →

EXPLANATION

·1 Sampling Probe Location

0 25 50

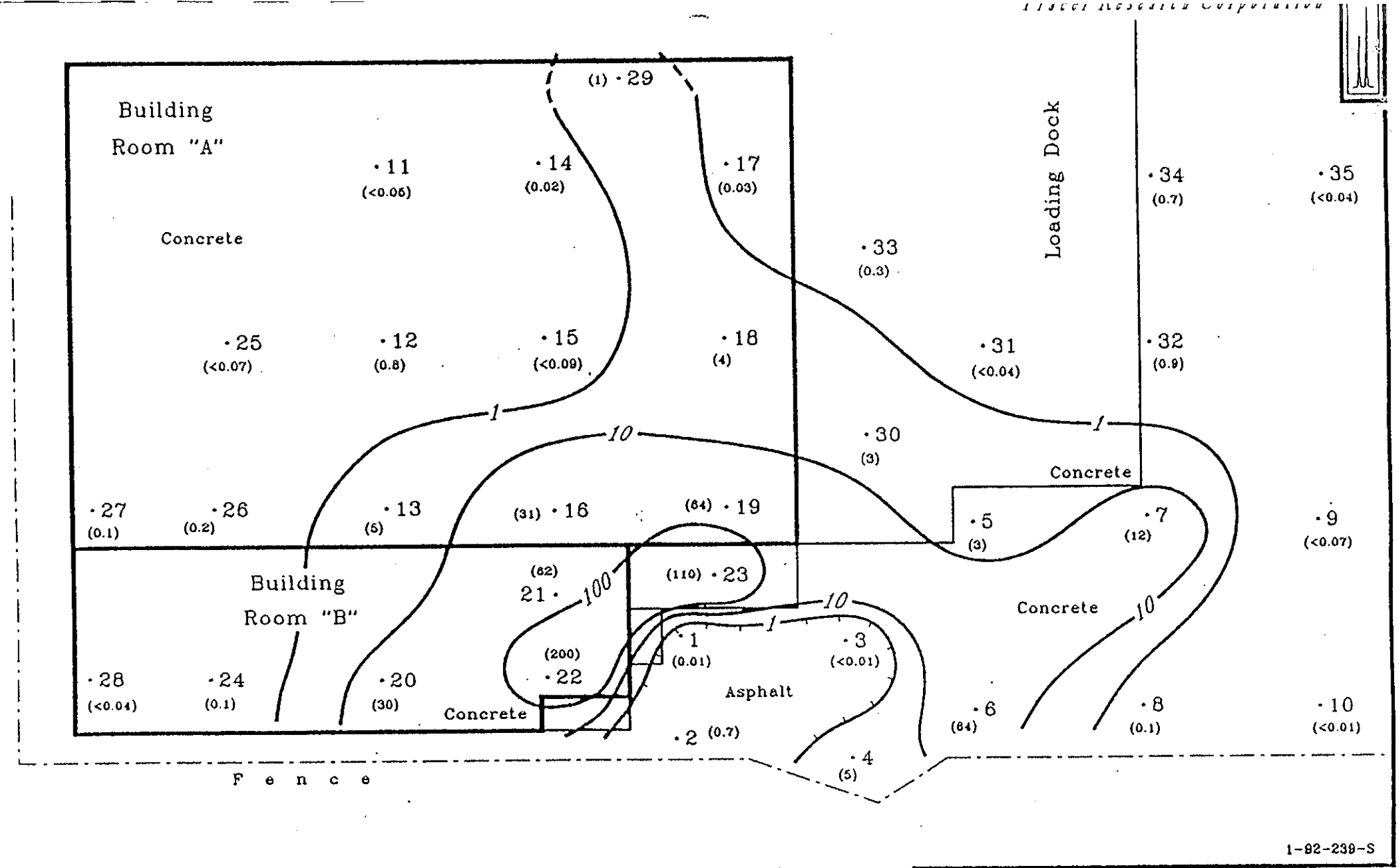
f e e t

TORRINGTON
ROOMS A & B

SOUTH BEND, INDIANA

SAMPLING LOCATIONS

Figure 1



EXPLANATION

- ·1 Sampling Probe Location
- (0.01) Soil Gas Sample Value (µg/l)
- 100 Isoconcentration Line (µg/l)

N

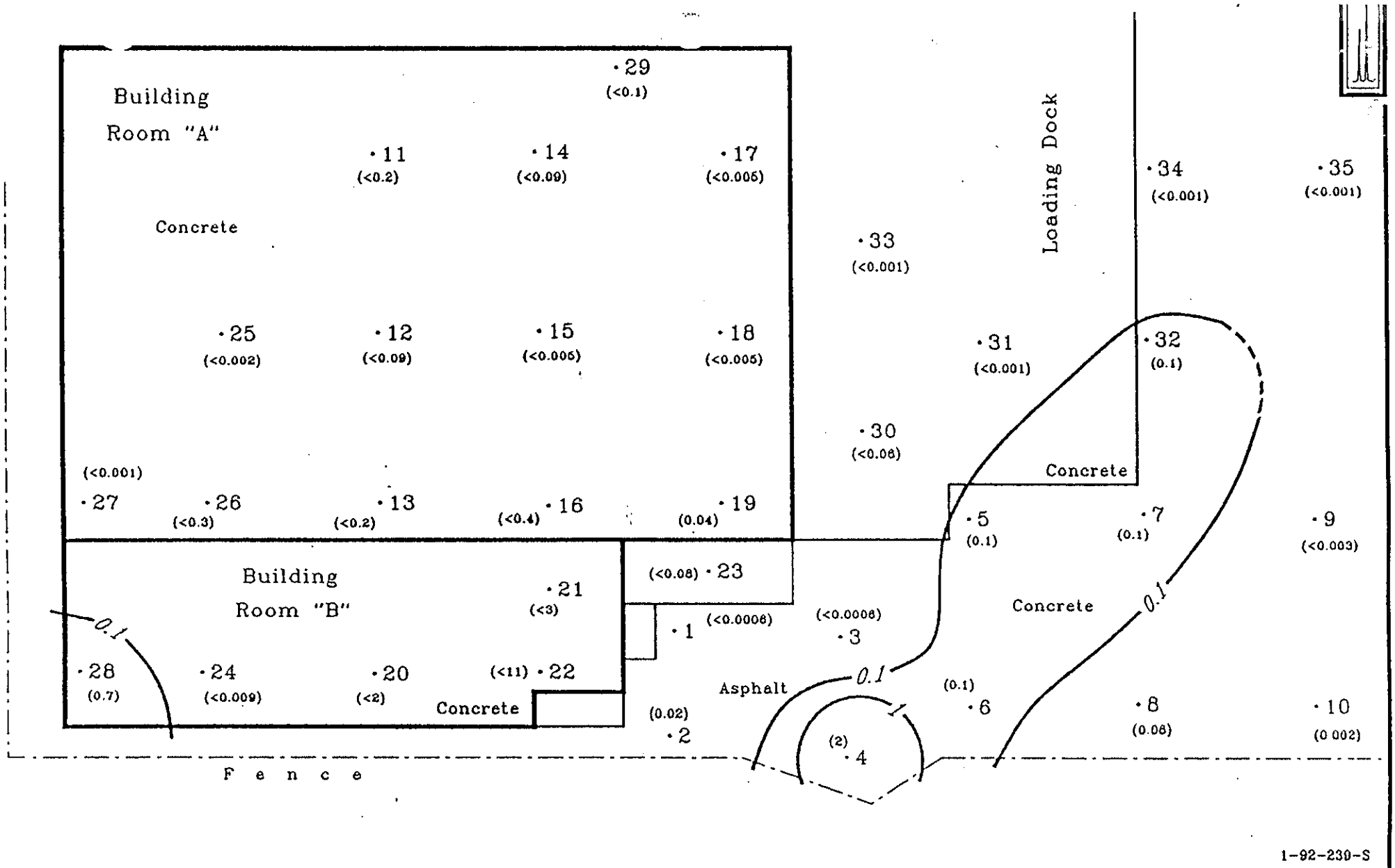
0 25 50
feet

TORRINGTON
ROOMS A & B

SOUTH BEND, INDIANA

1,1-DICHLOROETHANE (DCA)

Figure 1a



EXPLANATION

·1 Sampling Probe Location

(<0.0008) Soil Gas Sample Value (µg/l)

0.01 Isoconcentration Line (µg/l)

N

0 25 50

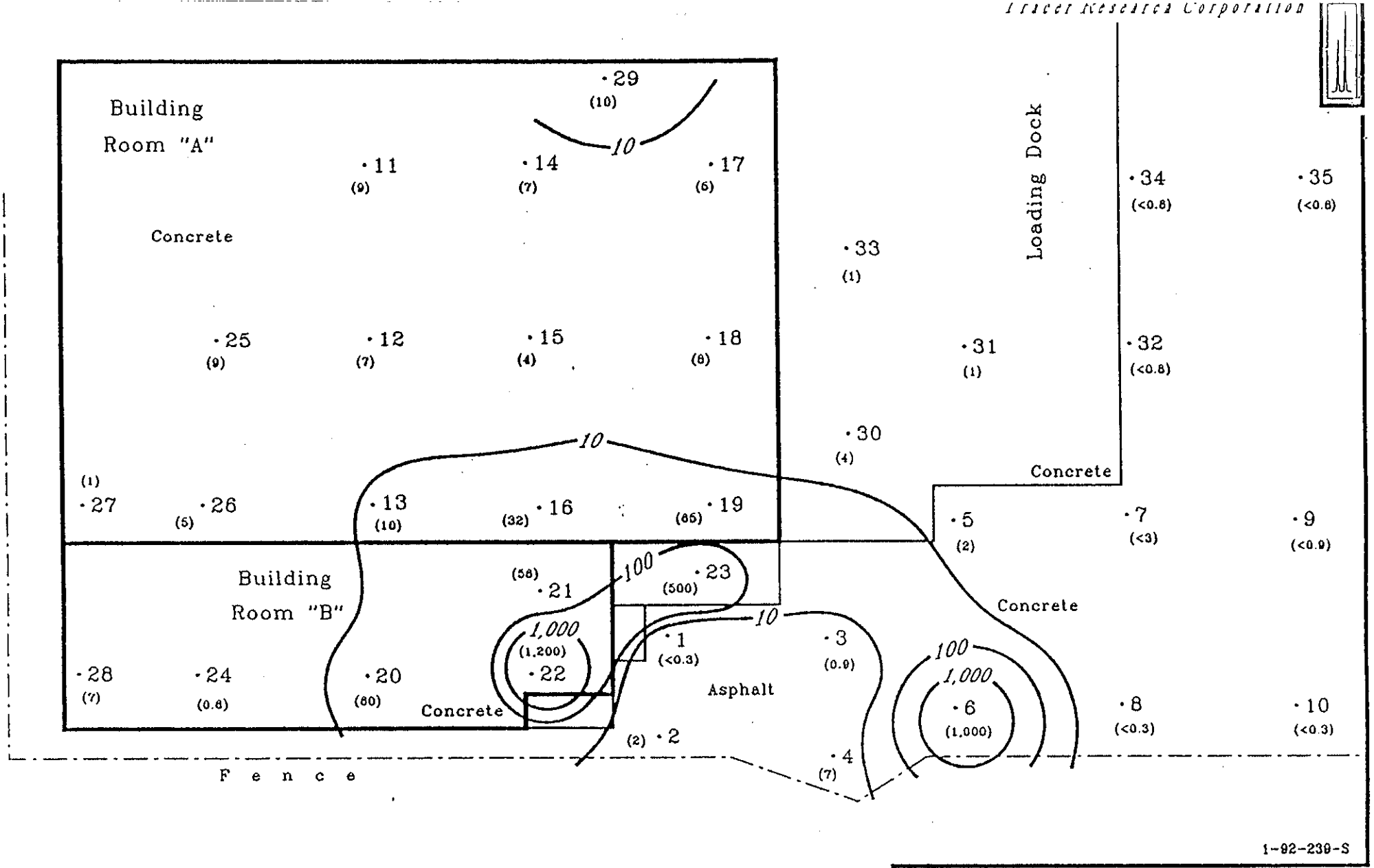
feet

TORRINGTON ROOMS A & B

SOUTH BEND, INDIANA

TRICHLOROETHENE (TCE)

Figure 1b



EXPLANATION

·1 Sampling Probe Location

(<0.3) Soil Gas Sample Value (µg/l)

0.01 Isoconcentration Line (µg/l)

N

0 25 50

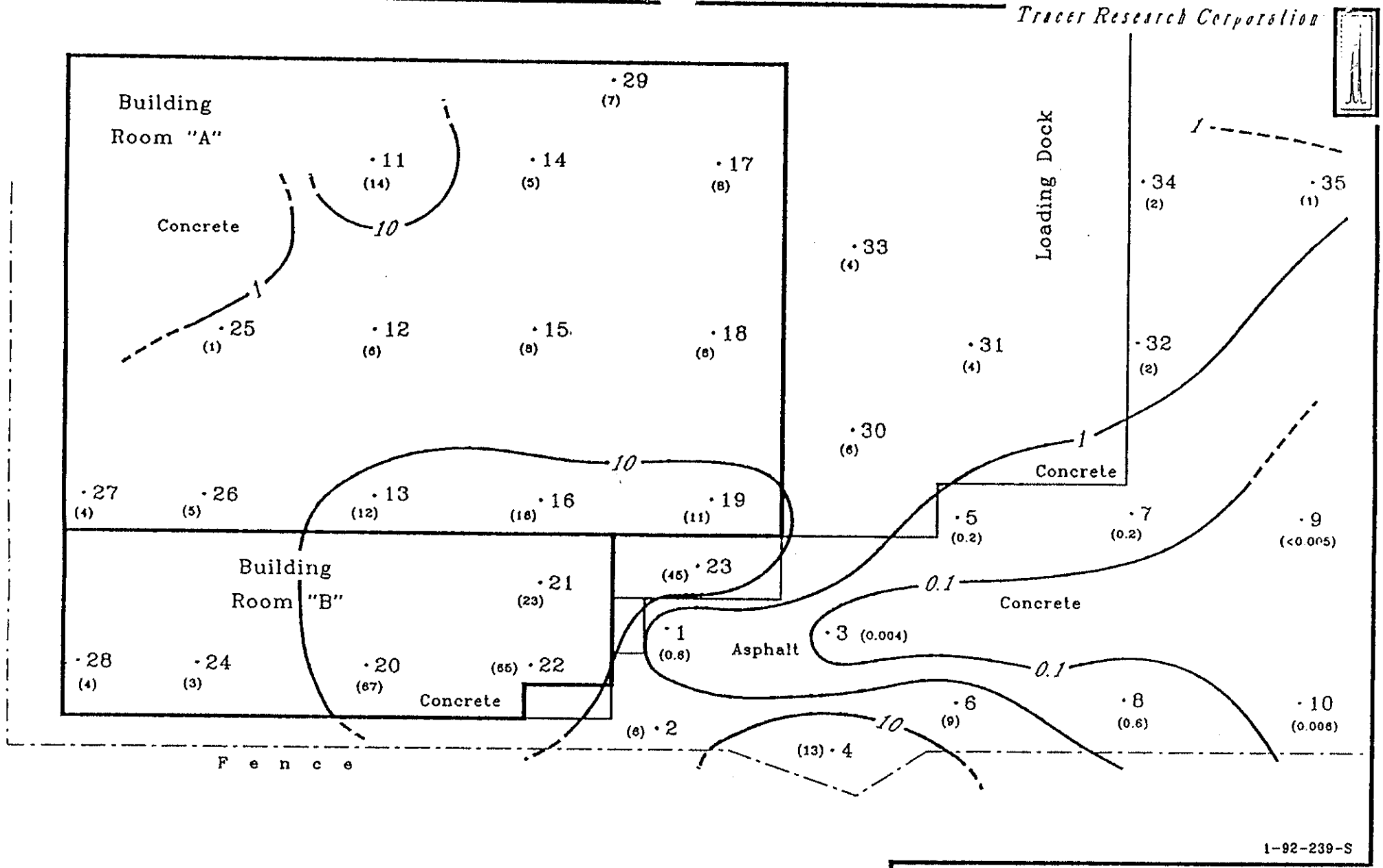
feet

TORRINGTON
ROOMS A & B

SOUTH BEND, INDIANA

TVHC

Figure 1c



EXPLANATION

·1 Sampling Probe Location

(0.6) Soil Gas Sample Value (µg/l)

0.01 Isoconcentration Line (µg/l)

N

0 25 50

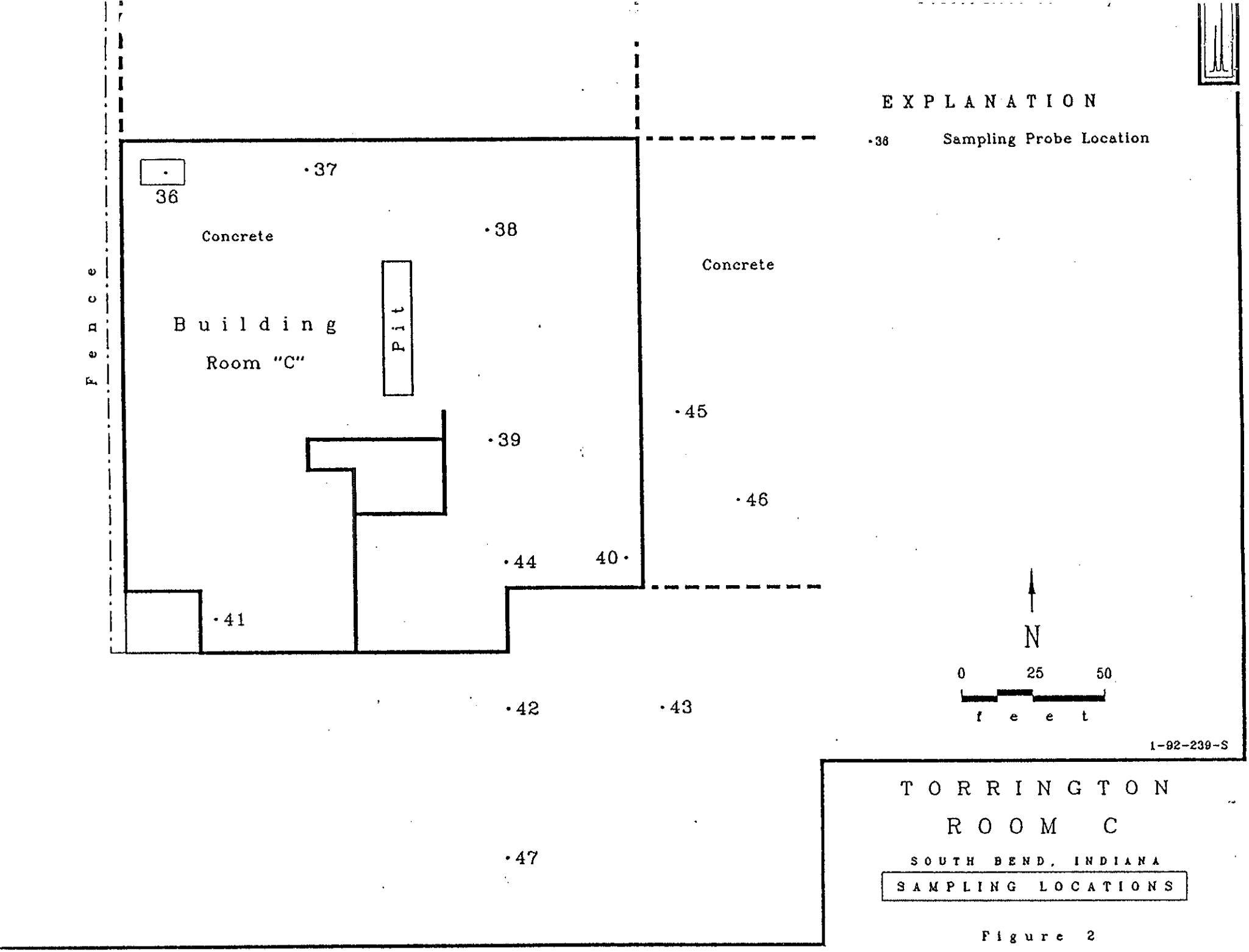
f e e t

TORRINGTON ROOMS A & B

SOUTH BEND, INDIANA

TRICHLOROETHANE (TCA)

Figure 1d



TORRINGTON
ROOM C
SOUTH BEND, INDIANA
SAMPLING LOCATIONS

Figure 2

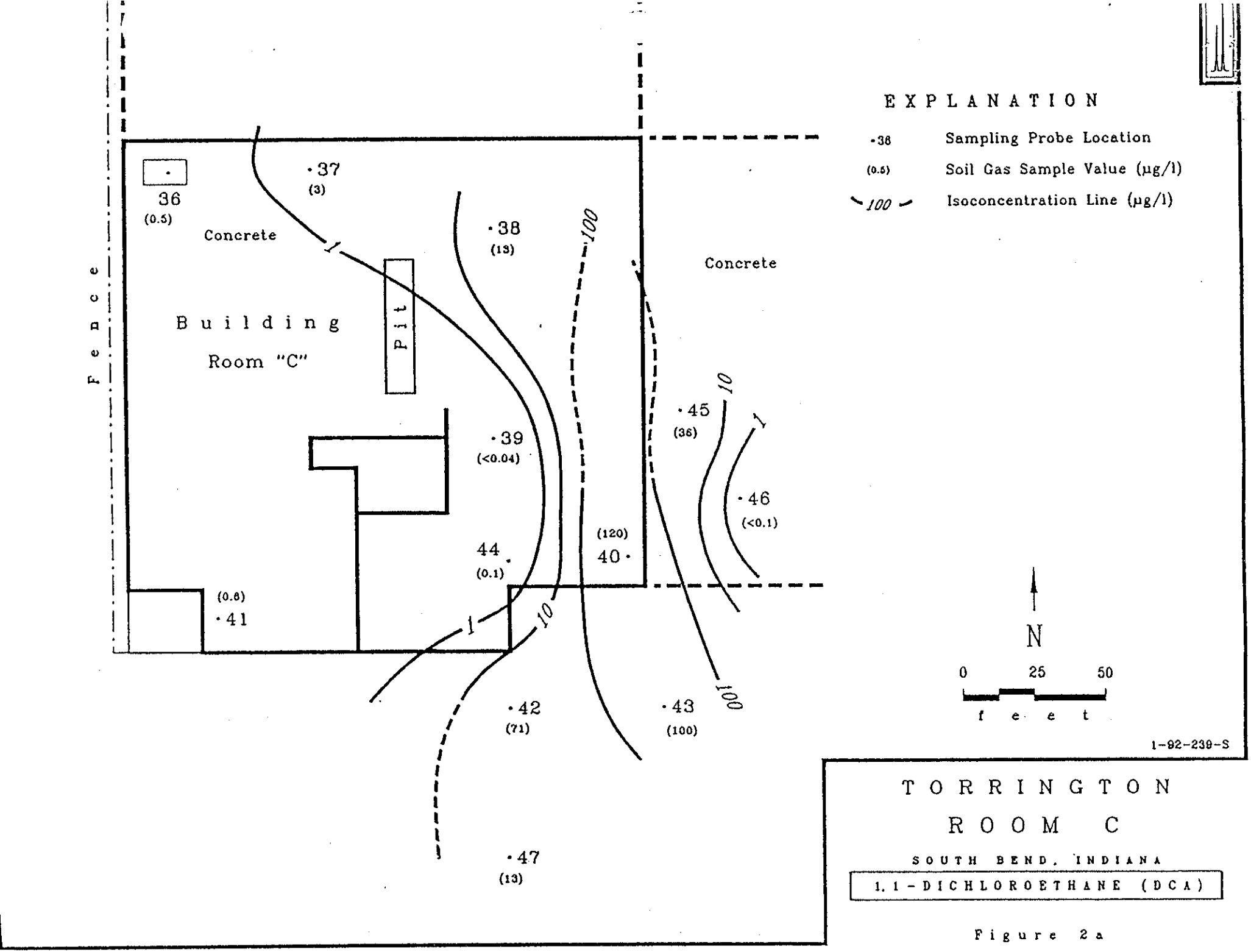
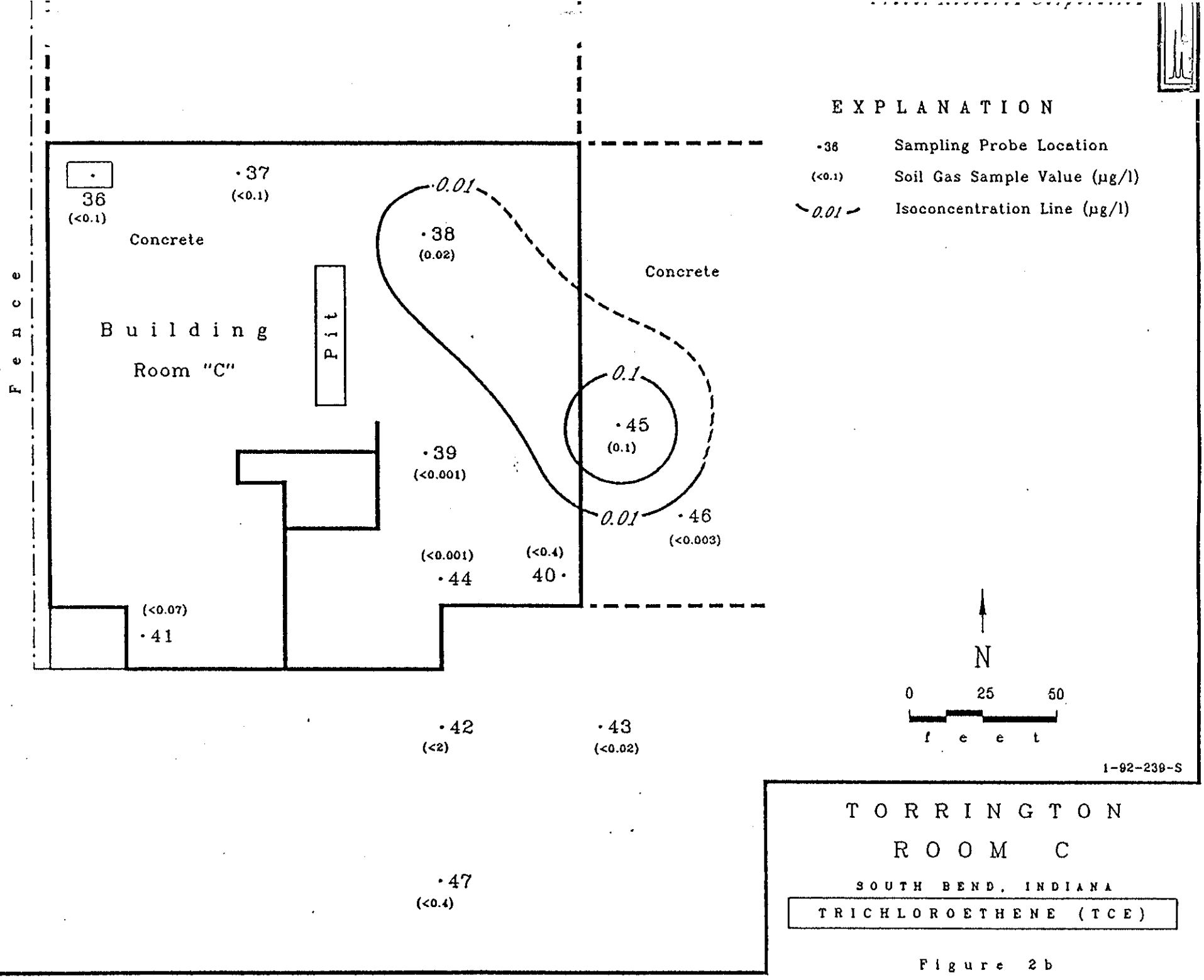

EXPLANATION
-38 Sampling Probe Location
(0.5) Soil Gas Sample Value (µg/l)
100 Isoconcentration Line (µg/l)
Fence
Concrete
Concrete
Building
Room "C"
Pit
·37
(3)
36
(0.5)
·38
(13)
·39
(<0.04)
·45
(36)
·46
(<0.1)
44
(0.1)
(120)
40
(0.6)
·41
·42
(71)
·43
(100)
·47
(13)
100
10
1
N
0 25 50
f e e t
1-92-239-S
TORRINGTON
ROOM C
SOUTH BEND, INDIANA
1,1-DICHLOROETHANE (DCA)

Figure 2a

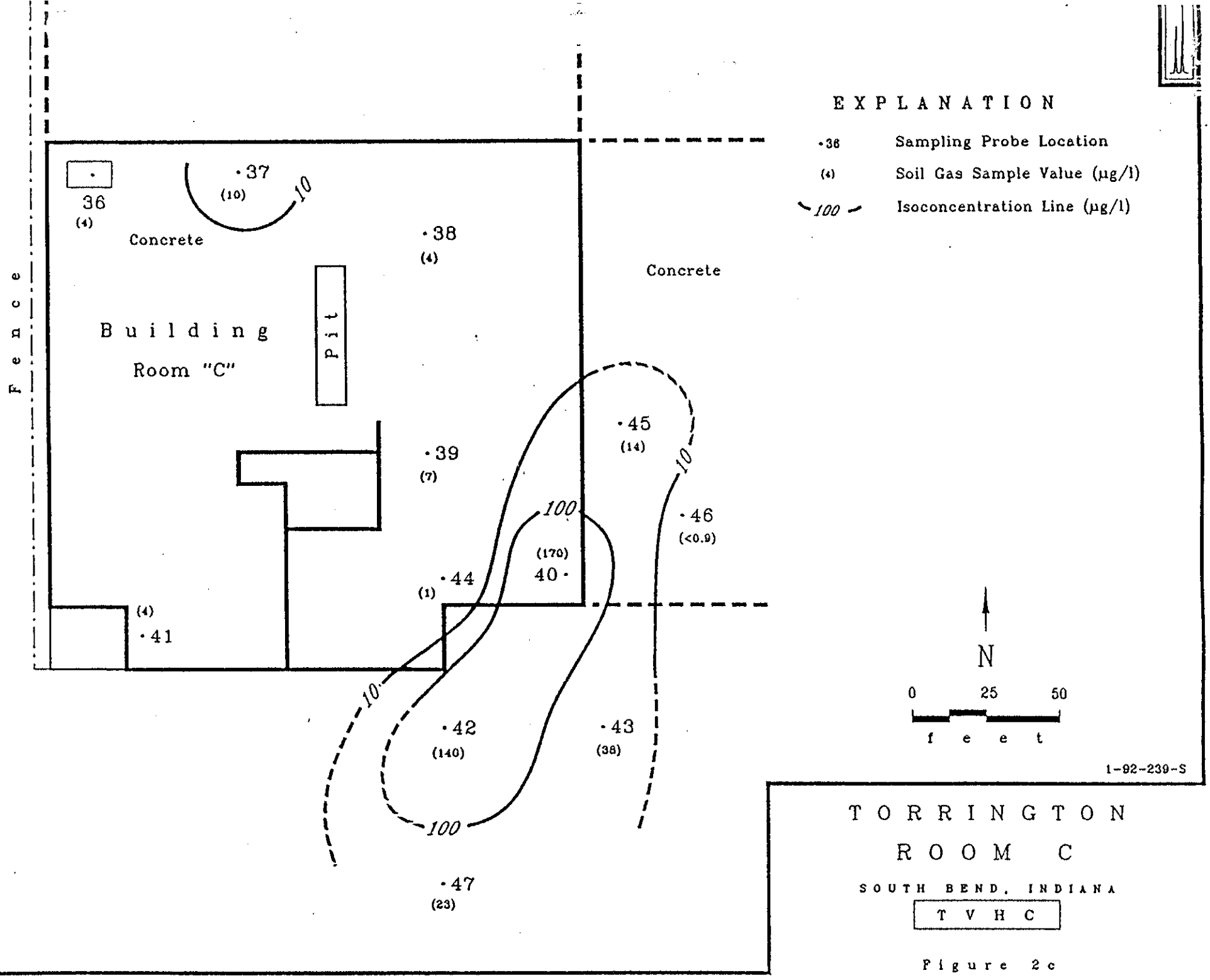


TORRINGTON
ROOM C

SOUTH BEND, INDIANA

TRICHLOROETHENE (TCE)

Figure 2b



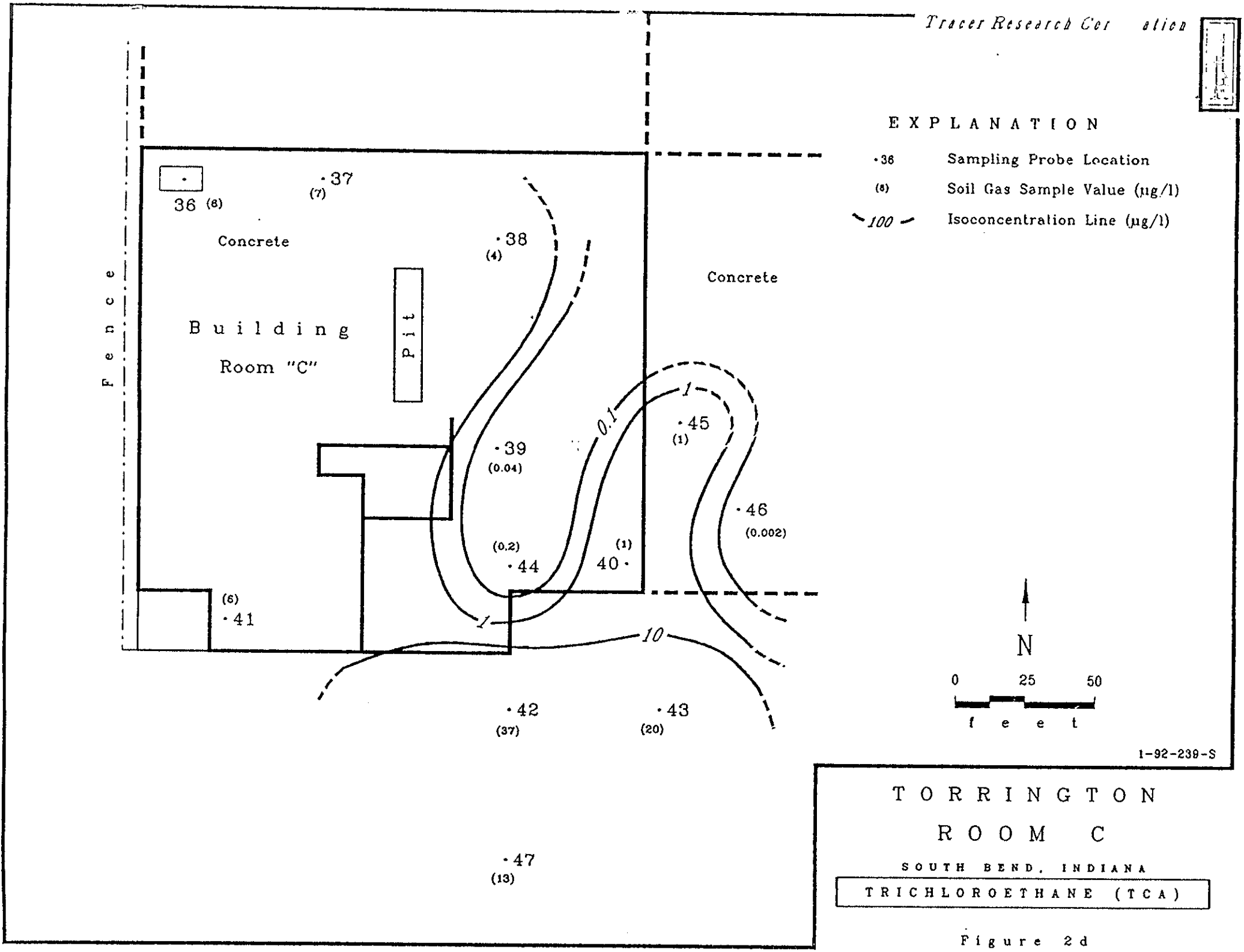
TORRINGTON

ROOM C

SOUTH BEND, INDIANA

TVHC

Figure 2c



TORRINGTON
ROOM C

SOUTH BEND, INDIANA

TRICHLOROETHANE (TCA)

Figure 2d