Appendix Z
Tracer Report and Soil Gas Technical Memorandum

MEMORANDUM CH2MHILL

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Ms. Jane Connet/TRC/Alliance

COPIES: Mr. Jeffrey Bartlett/Stepan Co.
Mr. Roger Julin/Stepan Co.

FROM: Mary Manto/CH2M HILL
Scott Vozza/CH2M HILL

DATE: August 26, 1993

SUBJECT: Preliminary Soil Gas Investigation Results And Proposed Soil Boring Locations For Stepan Co. Property

PROJECT: NJO 22948.ST.SG

RESPOND BY: August 27, 1993

INTRODUCTION

Tracer Research Corporation (Tracer) and CH2M HILL performed a soil gas investigation at the Stepan Co. Property located at 100 West Hunter Avenue in Maywood, New Jersey. The investigation was conducted within areas designated by CH2M HILL as the Central Tank Farm Area and the Aromatic and Essential Oils Manufacturing Area (Figure 1, Appendix A). The investigation took place July 26 through August 6, 1993.

The objectives of the investigation are as follows:

- Evaluate the presence and lateral extent of volatile organic compound (VOC) contamination in soils around potential source areas.
- Aid in evaluating the lateral extent of shallow groundwater contamination with VOCs.
- Sample shallow soils in areas with high VOC contamination in soil gas relative to other areas at the site to obtain information on hot spot soil contamination that may be a source of groundwater contamination.
- Supply data to aid in the effective placement of soil boring and potential groundwater monitoring wells in areas of high VOC concentrations in soil gas.

The purpose of this memorandum is to present the preliminary findings of the soil gas investigation and recommend soil boring locations. Efforts were made to locate the borings so as to verify the results of the soil gas investigation, delineate potential hot spot areas and to collect additional data needed to complete the soils feasibility study. The figures and tables presented with this memorandum have been taken from Tracer's Draft Soil Gas Investigation Report. These data have not yet been subject to a complete QA/QC review, and should be considered preliminary.

SOIL GAS INVESTIGATION

During the investigation, seventy soil gas samples were analyzed from seventy-one sampling locations (Figure 1, Sampling Locations, Appendix A). Twenty-two samples were analyzed from twenty-three locations within the Central Tank Farm Area and forty-eight samples were analyzed from forty-eight locations within the Aromatics and Essential Oils Manufacturing Area. The grid spacing in the Central Tank Farm and Aromatics and Essential Oils Manufacturing Area was generally 30 and 40 feet, respectively. The spacing of soil gas locations varied slightly due to varying field conditions.

Two soil gas samples were collected from each location. A deep sample was collected just above the estimated depth of the water table, approximately six feet below ground surface (bgs). A shallow sample was collected at half of this depth, approximately three feet bgs. Each sample was tested for total VOCs using a photoionization detector (PID). The results of the total VOC scan were used as the criteria for selecting the sample to be analyzed from each location. If no PID response was observed, the deeper sample was generally analyzed. The PID results are summarized in Appendix B. Samples were not collected from location CT-20 due to the presence of a water line that was damaged during drilling.

All soil gas samples were analyzed (except where noted in the data as "NA") for the following target compounds: benzene, toluene, ethylbenzene, xylene (BTEX); total volatile hydrocarbons (TVHC); vinyl chloride, total 1,2 dichloroethene (total 1,2 DCE); carbon dioxide; oxygen; and methane. In addition, five samples (CT-7-6', CT-8-6', CT-12-3', CT-13-6', and CT-14-6'.) collected in the Central Tank Farm Area were also analyzed for naphthalene. Boring CT-14 was located near the former 2,000 gallon No.2 fuel oil underground storage tank (UST). Because naphthalene is a component of fuel oil and is very difficult to detect in soil gas, samples collected in the Central Tank Farm Area were also analyzed for carbon dioxide, oxygen and methane. These gases may be biodegradation products of fuel oil. Samples collected in the Aromatics and Essential

Oils Manufacturing Area were also analyzed for these gases. These gases may also be products of decaying organic matter that is not necessarily related to petroleum products.

TVHC is a parameter that is commonly targeted during soil gas surveys conducted by Tracer. TVHC includes all aliphatic, alicyclic, and aromatic hydrocarbons with four to nine carbons. This parameter was added to the list of target compounds in order to collect more information regarding potential significant hot spots in soil. It should be noted that the TVHC results can be significantly impacted by decaying organic matter in the subsurface or compounds that may or may not be related to past operations at the site. Therefore, care should be exercised when evaluating these results.

A condensed summary of the results of the investigation are presented in Table 1 (Appendix C). This table presents the number of samples in which each target compound was detected, the lowest concentration detected above the minimum detection limit, the highest concentration detected, and the respective sample designation. The analytical results from all samples are summarized in tabular form in Appendix C. 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., <0.01 ppb. Soil gas samples are identified by sample location and sampling depth. For example, CT-1-6' represents a soil gas sample collected at location CT-1 at a depth of 6 feet bgs. The concentration maps (Figures 2 to 11) for the target compounds are included in Appendix D. Isoconcentration contours were not drawn for vinyl chloride (Figure 2), carbon dioxide (Figure 8) or oxygen (Figure 9) because concentrations above ambient air concentrations were not detected.

DISCUSSION OF RESULTS

The highest concentrations of the target compounds in the Central Tank Farm Area were detected at sampling locations CT-18 and CT-21. The isoconcentration contours indicate that elevated concentrations of VOCs in the subsurface between the Hot Oil Shed and the northern corner of Building No. 10. Isolated concentrations of methane and TVHC were also detected at location CT-6.

Elevated concentrations of the target VOCs were also detected in the Aromatic and Essential Oils Manufacturing Area. The highest detected concentrations center around sampling locations AR-1 and AR-25. Detected concentrations extend from the Electric Building (see Figure 1) to the existing building foundation (former Aromatics Building) and over to the west of the former toluene USTs.

The presence of an unknown VOC was indicated in some borings, but not positively identified or quantified. The VOC was tentatively identified as trichloroethene (TCE) and was detected at sampling locations AR-23, AR-24, AR-44, AR-45, AR-46, AR-47, CT-21, and CT-23.

SOIL BORING PROGRAM

The objectives of the soil boring program are as follows:

- Confirm the results of the soil gas investigation in areas where "significant concentrations" of target compounds were identified. These areas will be considered "potential hot spot areas".

- Delineate the boundaries of the "potential hot spot areas". For purposes of this investigation "hot spot" is defined as the location of a soil with VOC concentrations that may result in contamination of groundwater at a level exceeding potential cleanup criteria.

- Assist in estimating soil volumes for the feasibility study.

Based on these objectives Stepan proposes to install a total of fourteen soil borings at the site. The locations of the borings have been placed onto Figure 3 (Benzene Map, Appendix E). Nine soil borings, designated SG-1 through SG-9, are proposed for the Aromatic and Essential Oils Manufacturing Area and five soil borings, designated SG-10 through SG-14, are proposed for the Central Tank Farm Area. The borings will be located in areas that should enable Stepan to delineate the boundaries of "significant concentrations" of soil contamination as suggested by the configuration by the soil gas plume and confirm the results of the soil gas investigation.

At each of the fourteen soil boring locations, continuous split spoon samples will be collected (every 2 feet) from the ground surface to water table (approximately 6 feet). Borings will be advanced behind the 2-inch diameter split spoon sampler with 4.25-inch I.D. hollow stem augers. Stepan proposes to collect a maximum of one sample from each boring based on visual observations, field screening using a PID, and soil gas results. The selected sample from each boring will be submitted for chemical analysis. The samples, including the QA/QC samples, will be analyzed for TCL VOCs. The same QA/QC procedures that were used during the initial Remedial Investigation will be followed. Because fourteen samples will be collected for chemical analysis, one matrix spike/matrix spike duplicate (MS/MSD) and one field duplicate will be collected. Because split spoons and other sampling equipment will be decontaminated in the field,

a field equipment rinse blank will be collected daily. Stepan proposes to use TCT St. Louis/Huntington Laboratory (St. Louis, Missouri) for the chemical analysis.

Sample collection, preparation, and equipment decontamination will be conducted in accordance with the standard operating procedures (SOPs) and task instructions used during the previous RI soil boring program.

During the soil boring program three surface soil samples will be collected in vicinity of soil boring C-41. The purpose of the three samples is to delineate the horizontal extent of polynuclear aromatic hydrocarbon (PAH) contamination that was identified during the initial soil boring program at C-41. The samples will be collected from the 0-to-2-foot interval. The samples will be collected approximately five feet north, ten feet east, and fifteen feet west of C-41. One MS/MSD and one field duplicate will be collected in this area. The samples will be collected using dedicated stainless steel trowels.

Tracer Research Corporation

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Shallow Soil Gas Investigation

STEPAN COMPANY PROPERTY
Maywood, New Jersey

July 26 through August 6, 1993

Tracer Research Corporation

Shallow Soil Gas Investigation

STEPAN COMPANY PROPERTY
Maywood, New Jersey

July 26 through August 6, 1993

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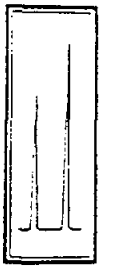
2-93-246-S



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1.0 STEPAN COMPANY PROPERTY INVESTIGATION

Tracer Research Corporation (Tracer Research) performed a shallow soil gas investigation at the Stepan Company Property located at 100 West Hunter Avenue in Maywood, New Jersey. The investigation was conducted within areas designated by CH2M Hill as the Central Tank Farm Area and the Aromatic and Essential Oils Manufacturing Area (see Figure 1). The investigation took place July 26 through August 6, 1993 for CH2M Hill of Parsippany, New Jersey.

1.1 Objectives

Purposes of the investigation were to 1) evaluate the presence and lateral extent of volatile organic compound (VOC) contamination in soils around potential source areas; 2) aid in evaluating the lateral extent of shallow groundwater contamination with VOCs; and 3) supply data to aid in the effective placement of soil borings and potential groundwater monitoring wells in areas of high VOC levels in the soil gas.

These objectives were accomplished by screening the shallow soil gas for the presence of VOCs. The soil gas samples were collected and analyzed for the following analyte classes and target compounds:

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

Analyte Class: Halocarbon
vinyl chloride
total 1,2 dichloroethene (total 1,2 DCE)

Analyte Class: Fixed Gases
carbon dioxide
oxygen
methane

All of the soil gas samples were analyzed for the above listed compounds, except when noted in the data as "NA". In addition, five samples (CT-7-6', CT-8-6', CT-12-3', CT-13-6', and CT-14-6') collected in the Central Tank Farm Area were also analyzed for naphthalene. CT-14-6' was located near the former 2,000 gallon

No. 2 Fuel Oil underground storage tank. Because naphthalene is a component of fuel oil and is very difficult to detect in the soil gas, samples collected in the Central Tank Farm Area were also analyzed for carbon dioxide, oxygen and methane. These gases are degradation products of fuel oil. Samples collected in the Aromatic and Essential Oils Manufacturing Area were analyzed for these fixed gases to determine if any additional information about the subsurface could be obtained. These gases are indications of degradation activities of organic materials that may not necessarily be related to petroleum products. Detection of methane can indicate that biodegradation of organic material, such as peat, fill, low lying swamp and/or reclaimed meadows is occurring.

TVHC includes all aliphatic, alicyclic, and aromatic hydrocarbons that have four to nine carbons. BTEX compounds, for example, are alicyclic. The analytical equipment used by Tracer Research can detected any VOC that burns using a Flame Ionization Detector.

1.2 Overview of Results

For this investigation, seventy samples were analyzed from seventy-one sampling locations. Two samples were collected from each sampling location. A deep sample was collected just above the estimated depth of the groundwater table, approximately 6 feet below ground surface (bgs). A shallow sample was collected at half of the deep depth, approximately 3 feet bgs. The CH2M Hill field representative tested each sample for total VOCs using a photoionization detector (PID). The results of the total VOC scan were used as the criteria for selecting which of the samples from each location was analyzed. Generally, the sample exhibiting the highest PID response was selected for analysis. If no PID response was observed, the deeper sample was generally analyzed. Samples were not collected from location CT-20 due to the presence of a water line that was damaged during drilling. A summary of the results of the investigation is presented in Table 1.

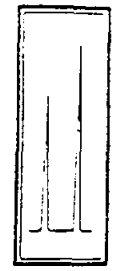
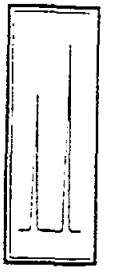


Table 1. Soil Gas Sample Summary

Compound	# of samples in which compound was detected	Low conc. µg/L[a]	High conc. µg/L	Sample(s) with high conc.
vinyl chloride	1	NA	0.6	AR-23-3'
benzene	32	0.05	17,000	AR-1-6'
toluene	19	0.03	11,000	CT-21-5.5'
ethylbenzene	2	100	770	AR-25-3'
xylene	6	0.6	3,000	AR-25-3'
TVHC	43	0.06	60,000	CT-21-5.5'
carbon dioxide	69	7,700	540,000	AR-24-3'
oxygen	70	13,000	250,000	CT-3-6'
methane	27	3,800	290,000	CT-21-5.5'
total 1,2 DCE	22	0.07	35	CT-21-5.5'
naphthalene	0	NA	NA	NA

NA = Not Applicable

[a] lowest concentration detected above the minimum detection limit



2.0 SITE DESCRIPTION

The soil gas samples were collected in two specific areas of the site. Twenty-three locations were in the Central Tank Farm Area (CT) and forty-eight locations were in the Aromatic and Essential Oils Manufacturing Area (AR). Generally the samples collected in the CT area were on 30-foot spacings while the samples collected in the AR area were generally on 40-foot spacings. The spacing of soil gas locations varied slightly due to varying field conditions. Samples were collected through asphalt, gravel and concrete.

3.0 SOIL GAS 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 hydraulically pushed and/or pounded to depths of 3 to 6 feet bgs. An electric rotary hammer drill and an air compressor with a rock drill were used to drill holes through the asphalt and concrete.

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 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.

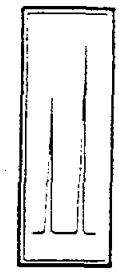
The volume of air within the probe was purged by evacuating 2 to 5 probe volumes of gas. The evacuation time in minutes versus the vacuum in inches of mercury (Hg) was used to calculate the necessary evacuation time. The vacuum in inches Hg was recorded at each sampling location.

Sample probe vacuums ranged from 2 to 11 inches Hg. The vacuum capacity of the pump was approximately 22 inches Hg.

Once sampling was completed and the probe was removed, the bore hole was filled with bentonite and the area was restored with gravel, asphalt or concrete mix.

4.0 ANALYTICAL PARAMETERS

During this investigation, up to 10 milliliters (mL) of soil gas were collected



for each sample and immediately analyzed in the Tracer Research analytical van. Subsamples (replicates) from these samples were injected into the gas chromatograph (GC) in volumes of 1 to 1000 microliters (µL).

Analytical instruments were calibrated daily using fresh working standards made from National Institute of Sciences and Technology (NIST) traceable standards and reagent blanked solvents and a gas standard from Scott Specialty Gases.

4.1 Chromatographic System

A Hewlett Packard 5890 Series II gas chromatograph, equipped with a flame ionization detector (FID), an electron capture detector (ECD), and two computing integrators, was used for the soil gas analyses. Naphthalene, halocarbon, and hydrocarbon compounds were separated in the GC on either a 3-or 6-foot by 1/8 inch outer diameter (OD) packed analytical column (1% SP1000 stationary phase bonded to 60/80 mesh Carbopack B support) in a temperature controlled oven. The vinyl chloride, naphthalene and the hydrocarbons were detected on the FID and total 1,2 DCE was detected on the ECD. Nitrogen was used as the carrier gas.

A Tracor gas chromatograph , equipped with a thermal conductivity detector (TCD) and one computing integrator, was used for the analyses of the fixed gases. The compounds were separated on a dual packed 6-foot by 1/4 inch OD packed analytical column over a 1/8 inch OD packed analytical column (mole sieve support in the outer column and porous polymer support in the inner column). The column for the TCD was kept at ambient air temperature. Hydrogen was used as the carrier gas for the TCD.

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

GC Process

The soil gas 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).

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.

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.

TCD Process

The TCD responds to any compounds whose thermal conductivity differs from that of the carrier gas in the GC. Under constant applied voltage, a filament in the cell of the TCD heats up and its resistance increases. As the carrier gas passes over the filament, it maintains constant temperature and therefore constant resistance in the filament. The addition of the sample to the cell results in increased temperature and increased filament resistance. This change is measured by the detector and the integrator produces a peak on a chromatogram.

4.2 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 sample injection. The detection limits of the target compounds were calculated from the response factor, the sample injection 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., <0.01 µg/L. The approximate detection limits for the target compounds are presented in Table 2.

Table 2. Detection Limits for Target Compounds

Compound	Detection Limits (µg/L)
vinyl chloride	0.1
benzene	0.02
toluene	0.01
ethylbenzene	0.02
xylene	0.04
TVHC	0.06
carbon dioxide	1100
oxygen	700
methane	750
total 1,2 DCE	0.03
naphthalene	0.05

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. All of the QA and QC data indicate that there were no problems or deviations from the program. An overview presenting the significant aspects of this program is presented below.

Soil Gas Sampling Quality Assurance

To ensure consistent collection of 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 is attached to the end of the probe, forming an air tight union between the probe and the silicone tubing septum. The septum connects 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 effect usability of the data, Tracer Research replaces the materials (probe and syringe), between sampling points, that contact the soil gas before or during sampling.

-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 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 soil 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 minimum frequencies listed in Table 3. The actual frequency depends on the number of samples analyzed each day and the length of time of the survey.

Table 3. Quality Assurance Samples

Sample type	Frequency
Ambient Air Samples	3 per day or 1 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	1 per day
Reagent Blank	1 per set of working standards
Replicate Samples	10 to 100% of all 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 90°C.

Field system blanks are analyzed to check for contamination of the sampling apparatus, e.g., probe and sampling syringe. 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. Field system blanks are not performed every day if clean probes are still available. Field system blanks are performed after any probe decontamination process.

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 replicating analysis of 10 to 100 percent of the samples. The percentage is based on the sample analysis time. Replicate analyses are performed by subsampling vapors from the same sampling syringe.

6.0 RESULTS

The analytical results from this soil gas investigation are summarized in tabular form 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., <0.01 µg/L. Soil gas samples are identified by sample location and sampling depth. For example, CT-1-6' represents a soil gas sample collected at location CT-1 at a depth of 6 feet bgs.

A sampling location map (Figure 1) and concentration maps (Figures 2 to 11) for the target compounds are included in Appendix B. Isoconcentration contours were not drawn for vinyl chloride (Figure 2), carbon dioxide (Figure 8) or oxygen (Figure 9) because elevated concentrations above ambient air concentrations were not detected.

The highest concentrations of the target compounds in the Central Tank Farm Area were detected at sampling locations CT-18 and CT-21. The isoconcentration contours indicate that there are elevated concentrations of VOCs in the subsurface between the Hot Oil Shed and the northern corner of Building No. 10. Isolated concentrations of methane and TVHC were also detected at location CT-6.

Elevated concentrations of the target VOCs were also detected in the Aromatic and Essential Oils Manufacturing Area. The highest detected concentrations center around sampling locations AR-1 and AR-25. Detected concentrations extend from the Electric Building to the existing building foundation and over to the west of the former toluene underground storage tanks.

An unknown VOC was identified, but not quantified, in the field as trichloroethene (TCE). This VOC was detected at sampling locations AR-23, AR-24, AR-44, AR-45, AR-46, AR-47, CT-21, and CT-23 because the analysis time was inadvertently extended at those locations.

APPENDIX A Condensed Data

TRACER RESEARCH CORPORATION-ANALYTICAL RESULTS
CH2MHill/Stepan Company Property/Maywood, New Jersey/Job No. 2-93-246-S
07/26/93

SAMPLE	VINYL CHLORIDE µg/L	BENZENE µg/L	TOLUENE µg/L	ETHYL BENZENE µg/L	XYLENE µg/L	TVHC µg/L	CARBON DIOXIDE µg/L	OXYGEN µg/L	METHANE µg/L	TOTAL 1,2 DCE µg/L
CT 1 6'	<0.2	1	<0.05	<0.08	<0.2	51	<9500	240000	<6100	ND
CT 2 6'	INT	2	<0.01	<0.02	<0.04	7	120000	190000	<6100	ND
CT 3 6'	<0.2	0.05	<0.01	<0.02	<0.04	0.05	14000	250000	<3100	ND

INT interference with adjacent peaks
ND non-detect

Analyzed by: D. Bonner
Proofed by: K McWhirter

TRACER RESEARCH CORPORATION-ANALYTICAL RESULTS
CH2MHill/Stepan Company Property/Maywood, New Jersey/Job No. 2-93-246-S
07/27/93

SAMPLE	VINYL CHLORIDE µg/L	BENZENE µg/L	TOLUENE µg/L	ETHYL BENZENE µg/L	XYLENE µg/L	TVHC µg/L	CARBON DIOXIDE µg/L	OXYGEN µg/L	METHANE µg/L	TOTAL 1,2 DCE µg/L	NAPTHALENE µg/L
AIR	<0.2	<0.05	<0.04	<0.1	<0.1	<0.1	<1100	240000	<750	<0.04	<0.02
CT 7 6'	<0.2	<0.05	0.03	<0.2	<0.2	6	150000	130000	<1500	<0.08	<0.7
CT 8 6'	<0.2	<0.2	0.2	<0.2	<0.2	<0.2	130000	100000	<1500	<0.08	<0.05
CT 14 6'	<0.2	<0.05	<0.08	<0.2	<0.2	<0.2	200000	88000	<1500	<0.08	<0.05
AIR	<0.2	<0.05	<0.04	<0.1	<0.1	<0.1	680000	970000	<750	<0.04	<0.02
CT 13 6'	<0.2	<18	100	<0.5	<0.6	1200	55000	170000	30000	<0.08	<0.1
CT 12 3'	<0.2	<0.05	0.3	<0.2	<0.2	8	160000	140000	86000	<0.08	<0.05
CT 4 6'	<0.2	<0.05	<0.08	<0.2	<0.2	<0.2	30000	230000	<1500	<0.08	NA
CT 5 6'	<0.2	<0.02	<0.04	<0.1	<0.1	<0.1	40000	200000	<1500	<0.08	NA
CT 9 6'	<0.2	<0.02	<0.04	<0.1	<0.2	<0.1	130000	140000	<750	<0.04	NA
AIR	<0.2	<0.05	<0.04	<0.1	<0.1	<0.4	4500	260000	<750	<0.04	<0.4

NA not analyzed

Analyzed by: D. Bonner
Proofed by: K. McWhinney

TRACER RESEARCH CORPORATION-ANALYTICAL RESULTS
CH2MHill/Stepan Company Property/Maywood, New Jersey/Job No. 2-93-246-S
07/28/93

SAMPLE	VINYL CHLORIDE µg/L	BENZENE µg/L	TOLUENE µg/L	ETHYL BENZENE µg/L	XYLENE µg/L	TVHC µg/L	CARBON DIOXIDE µg/L	OXYGEN µg/L	METHANE µg/L	TOTAL 1,2 DCE µg/L
AIR	<0.1	<0.08	<0.1	<0.2	<0.3	<0.3	<1200	240000	<1400	<0.01
CT 6 6'	<1	<0.8	<1	<2	<35	460	160000	90000	22000	<0.03
CT 11 6'	<0.1	<0.07	<0.1	<0.2	NA	13	51000	210000	<1400	<0.03
CT 16-5'	<0.4	<0.3	<0.4	<0.8	NA	<1	12000	240000	<1400	<0.03
CT 17-3'	<0.4	70	10	<0.4	<0.6	1100	190000	50000	8700	<0.03
CT 18 3'	<2	1200	420	<19	<52	12000	140000	43000	81000	<0.03
CT 19-3'	<0.4	<0.3	<0.4	<0.8	<1	<1	72000	170000	<1400	<0.2
AIR	<0.2	<0.1	<0.2	<0.4	<0.6	<0.7	<2300	250000	<1400	<0.06

NA not analyzed

Analyzed by: D. Bonner
Proofed by: K. Bechtel

TRACER RESEARCH CORPORATION-ANALYTICAL RESULTS
CH2MHill/Stepan Company Property/Maywood, New Jersey/Job No. 2-93-246-S
07/29/93

SAMPLE	VINYL CHLORIDE µg/L.	BENZENE µg/L.	TOLUENE µg/L.	ETHYL BENZENE µg/L.	XYLENE µg/L.	TVHC µg/L.	CARBON DIOXIDE µg/L.	OXYGEN µg/L.	METHANE µg/L.	TOTAL 1,2 DCE µg/L.
AIR	<0.1	<0.07	<0.2	<0.3	<0.6	<0.6	<1200	230000	<1600	<0.03
CT 10 6'	<0.1	<0.03	<0.2	<0.3	<0.6	<0.6	11000	240000	<1600	<0.03
CT 15 6'	<0.1	<0.07	<0.2	<0.3	<0.6	<0.6	7700	230000	<1600	<0.1
AR 1 6'	<11	17000	980	<25	<64	18000	470000	59000	97000	4
AR 2 3'	<4	<0.1	<0.3	<0.5	<1	2	55000	160000	<1600	<0.03
AR 3 6'	<0.2	<0.1	<0.3	<0.5	<1	<1	180000	75000	<1600	<0.03
AR 4 6'	<0.1	<0.07	<0.2	<0.3	<0.6	<0.6	200000	52000	<1600	<0.06
AR 5 5'	<0.1	<0.07	<0.2	<0.3	<0.6	<0.6	230000	46000	<1600	<0.06
AR 6 5'	<0.1	<0.07	<0.2	<0.3	<0.6	<0.6	54000	200000	<1600	<0.06
AIR	<0.1	<0.07	<0.2	NA	NA	NA	<1200	256000	<1600	<0.01

NA not analyzed

Analyzed by: D. Bonner
Proofed by: K. McVeigh

TRACER RESEARCH CORPORATION-ANALYTICAL RESULTS
CH2MHill/Stepan Company Property/Maywood, New Jersey/Job No. 2-93-246-S
07/30/93

SAMPLE	VINYL CHLORIDE µg/L	BENZENE µg/L	TOLUENE µg/L	ETHYL BENZENE µg/L	XYLENE µg/L	TVHC µg/L	CARBON DIOXIDE µg/L	OXYGEN µg/L	METHANE µg/L	TOTAL 1,2 DCE µg/L
AIR	<0.2	<0.1	<0.2	<0.3	<0.5	<0.6	<2400	260000	<1500	<0.02
AR-7 6'	<0.4	<0.3	<0.3	<0.6	<1	<1	130000	170000	<1500	<0.03
AR 8 6'	<0.4	<0.3	<0.3	<0.6	<1	24	150000	36000	<1500	0.1
AR-9 5'	<4	<3	<3	<6	<11	310	160000	50000	<1500	<0.06
AR 10 6'	<4	<3	<3	<6	<11	500	220000	40000	<1500	<0.03
AR 11 6'	<0.4	<0.3	<0.3	<0.6	<1	530	150000	130000	28000	<0.02
AR-12 6'	<1	<1	<2	<4	<8	750	170000	130000	30000	<0.03
AR 13 6'	<0.7	<0.5	<1	<2	<4	<4	210000	63000	<1500	<0.03
AR 14 6'	<0.2	<0.1	<0.3	<0.6	<1	20	490000	110000	<3000	3
AR-15 6'	<0.09	<0.06	<0.2	<0.3	<0.5	<0.6	25000	200000	<3000	<0.03
AR-16 6'	<0.2	0.3	<0.3	<0.6	<1	<1	100000	200000	<1500	0.4
AR-17 6'	<0.2	<0.1	<0.3	<0.6	<1	<1	140000	96000	<1500	0.4
AR-18 6'	<0.2	8	<0.3	<0.6	<1	16	260000	46000	<3000	5
AR 19 3'	<0.2	1	0.9	<0.6	<1	2	430000	210000	<3000	<0.03
AIR	<0.2	<0.1	<0.3	<0.5	<1	<1	<2400	280000	<1500	<0.02

Analyzed by: D. Bonner
Proofed by: K McWhirter

TRACER RESEARCH CORPORATION-ANALYTICAL RESULTS
CH2MHill/Stepan Company Property/Maywood, New Jersey/Job No. 2-93-246-S
08/02/93

SAMPLE	VINYL CHLORIDE µg/L	BENZENE µg/L	TOLUENE µg/L	ETHYL BENZENE µg/L	XYLENE µg/L	TVHC µg/L	CARBON DIOXIDE µg/L	OXYGEN µg/L	METHANE µg/L	TOTAL 1,2 DCE µg/L
AIR	NA	NA	NA	NA	NA	NA	2400	250000	<1500	<0.03
AR-20-6'	<0.2	1	<4	<0.7	<1	8	260000	76000	<760	<0.06
AR-21-3'	<0.2	360	<12	<33	9	890	420000	56000	200000	0.2
AR-22-3'	INT	46	<5	<12	<28	200	210000	40000	74000	0.1
AR-23-3'	0.6	3	<0.3	<0.3	0.6	41	270000	92000	3800	28
AR-24-3'	INT	19	3	<0.3	<0.6	68	540000	38000	99000	14
AR-25-3'	<7	3200	3500	770	3000	11000	270000	41000	160000	7
AR-26-3'	<19	2800	490	<70	<130	3100	220000	100000	76000	2
AR-27-5'	<19	5600	41	100	51	6900	190000	99000	190000	0.4
AR-28-3'	<2	45	<5	<7	<12	200	310000	48000	18000	<0.06
AIR	<0.09	<0.1	<0.3	<0.3	<0.6	<0.6	4700	250000	<760	<0.03

NA not analyzed
INT interference with adjacent peaks

Analyzed by: D. Bonner
Proofed by: K. McNeil

TRACER RESEARCH CORPORATION-ANALYTICAL RESULTS
CH2MHill/Stepan Company Property/Maywood, New Jersey/Job No. 2-93-246-S
08/03/93

SAMPLE	VINYL CHLORIDE µg/L	BENZENE µg/L	TOLUENE µg/L	ETHYL BENZENE µg/L	XYLENE µg/L	TVHC µg/L	CARBON DIOXIDE µg/L	OXYGEN µg/L	METHANE µg/L	TOTAL 1,2 DCE µg/L
AIR	<0.1	<0.1	<0.3	<0.4	<0.7	<0.7	<2000	240000	<670	<0.03
AR-29 6'	<0.4	<0.4	<1	<2	<3	<3	260000	42000	<1300	<0.4
AR-30 6'	<0.2	<0.2	<0.5	<0.8	<1	<1	110000	160000	<1300	<0.03
AR-31-6'	<0.1	<0.1	<0.3	<0.4	<0.7	<0.7	140000	110000	<1300	<0.03
AR-32 5'	<0.1	0.3	<0.3	<0.4	<0.7	<0.7	26000	230000	<670	<0.03
AR-33 6'	<0.1	0.1	<0.3	<0.4	<0.7	<0.7	150000	160000	<670	<0.03
AR-34 6'	<0.1	<0.1	<0.3	<0.4	<0.7	<0.7	200000	100000	<670	<0.03
AR-35 6'	<0.1	<0.1	<0.3	<0.4	<0.7	<0.7	190000	120000	<670	<0.03
AR-36 6'	<0.1	0.1	<0.3	<0.4	<0.7	<0.7	150000	100000	<670	<0.03
AR-37 6'	<0.8	1	7	<0.4	<0.7	52	150000	90000	15000	0.07
AR-38 6'	<0.4	<0.1	<0.3	<0.4	<0.7	31	160000	50000	35000	0.1
AIR	<0.1	<0.1	<0.3	<0.4	<0.7	<0.7	<1000	220000	<670	<0.06

Analyzed by: D. Bonner
Proofed by: K. McNeil

TRACER RESEARCH CORPORATION-ANALYTICAL RESULTS
CH2MHill/Stepan Company Property/Maywood, New Jersey/Job No. 2-93-246-S
08/04/93

SAMPLE	VINYL CHLORIDE µg/L.	BENZENE µg/L.	TOLUENE µg/L.	ETHYL BENZENE µg/L.	XYLENE µg/L.	TVHC µg/L.	CARBON DIOXIDE µg/L	OXYGEN µg/L.	METHANE µg/L.	TOTAL 1,2 DCE µg/L.
AIR	<0.09	<0.1	<0.1	<0.2	<0.3	<0.4	NA	NA	NA	<0.02
AR 39 6'	<3	12	<0.7	<0.8	22	240	64000	170000	30000	0.2
AR 40 5'	<3	66	<1	<2	16	390	170000	34000	100000	NA

NA not analyzed

Analyzed by: D. Bonner
Proofed by: K. McAlvain

TRACER RESEARCH CORPORATION-ANALYTICAL RESULTS
CH2MHill/Stepan Company Property/Maywood, New Jersey/Job No. 2-93-246-S
08/05/93

SAMPLE	VINYL CHLORIDE µg/L	BENZENE µg/L	TOLUENE µg/L	ETHYL BENZENE µg/L	XYLENE µg/L	TVHC µg/L	CARBON DIOXIDE µg/L	OXYGEN µg/L	METHANE µg/L	TOTAL 1,2 DCE µg/L
AIR	<0.08	<0.08	<0.2	<0.3	<0.5	<0.5	14000	240000	<1500	<0.04
AR-41 6'	<0.2	0.2	0.4	<0.2	<0.3	0.6	110000	170000	<750	<0.09
AR-42 3'	<0.4	9	5	<0.8	<1	21	240000	29000	6800	<0.04
AR-43 3'	<0.2	0.5	<0.2	<0.3	<0.5	5	110000	40000	<750	0.3
AR-44 6'	<0.08	2	0.7	<0.2	<0.3	3	72000	180000	<750	<0.2
AR-45 3'	<3	320	210	<2	<3	530	320000	50000	68000	8
AR-46 5.5'	<2	2	INT	<0.8	<51	22	320000	26000	9200	0.2
AR-47 3'	<3	130	2	<0.8	<1	390	270000	39000	74000	0.3
CT-20 no sample										
CT-21 5.5'	<13	7700	11000	<3	<5	60000	360000	13000	290000	35
CT-22 3'	<0.8	<0.8	<1	<2	<3	<3	150000	120000	<750	<0.09
AR-48 3'	<3	<0.4	<0.6	<0.8	<1	41	220000	46000	49000	3

INT interference with adjacent peaks

Analyzed by: D. Bonner
Proofed by: K. Reichelt

TRACER RESEARCH CORPORATION-ANALYTICAL RESULTS
CH2MHill/Stepan Company Property/Maywood, New Jersey/Job No. 2-93-246-S
08/06/93

SAMPLE	VINYL CHLORIDE µg/L	BENZENE µg/L	TOLUENE µg/L	ETHYL BENZENE µg/L	XYLENE µg/L	TVHC µg/L	CARBON DIOXIDE µg/L	OXYGEN µg/L	METHANE µg/L	TOTAL 1,2 DCE µg/L
AIR	<0.04	<0.04	<0.09	<0.1	<0.3	<0.3	<1100	260000	<680	<0.02
CT 2 3-4.5'	<0.9	<0.4	<0.9	<1	<3	5	260000	76000	37000	<0.04
AIR	<0.04	<0.04	<0.09	<0.1	<0.3	<0.3	8100	230000	<680	<0.02

Analyzed by: D. Bonner
Proofed by:

APPENDIX B Figures

Jim 1 thru 11

E/O

Tracer Research Corporation appreciates the opportunity of being of service to your organization. Because we are constantly striving to improve our service to you, we welcome any comments or suggestions you may have about how we can be more responsive to the needs of your organization. If you have any questions about the field work, analytical results, or this report, please give Mike Gervasini a call at (908) 274-1888.

Tracer Research Corporation

EXPLANATION

- ·AR-1 — Aromatic Essential Oils Mfg. Area Sampling Location
- ·CT-1 — Central Tank Farm Sampling Loc.
- B38W04B — Monitoring Well Location
- ——— Approximate Railroad Location
- ——— Approximate Fence Location
- (17000) — Soil Gas Sample Value (µg/l)
- (NS) — No Sample Collected
- (NA) — Not Analyzed
- (INT) — Interference With Adjacent Peaks
- 0.00 — Isoconcentration Line (µg/l)
- SG-1 — Proposed Soil Boring Locations

Building No. 67

Building No. 52 (Storage)

Building No. 4 (Boiler House)

Truck Scale

Railroad Tracks

(Warehouse/ Production/ Sample Dept.) Building No. 13

CT-1 (1) · CT-2 (2) · CT-3 (0.05) · CT-4 (<0.02) · CT-5 (<0.02) · CT-6 (<0.8) · CT-7 (<0.05) · CT-8 (<0.2) · CT-9 (<0.02) · CT-10 (<0.03) · CT-11 (<0.07) · CT-12 (<0.05) · CT-13 (<18) · CT-14 · CT-15 (<0.07)

Cooling Tower; Hot Oil Shed; B38W04B

13 (<0.05) · CT-16 (<0.3) · CT-17 (70) · CT-18 (1200) · CT-19 (<0.3) · CT-20 (NS) · CT-21 (7700) · CT-22 (<0.8) · CT-23 (<0.4)

Tank Farm

Building No. 10 (Production)

Building No. 10H (Storage)

Building No. 2

Railroad Tracks

Fence

Building Foundation

AR-2 (<0.1) · AR-3 (<0.01) · AR-4 (<0.7) · AR-5 (<0.07) · AR-6 (<0.07) · AR-29 (<0.4) · AR-30 (<0.2) · AR-31 (<0.1) · AR-32 (<0.3) · AR-33 (0.1) · AR-34 (<0.1) · AR-35 (<0.1) · AR-7 (<0.3) · AR-8 (<0.3) · AR-9 (<1) · AR-10 (<1) · AR-11 (<0.3) · AR-12 (<1) · AR-13 (<0.5) · AR-14 (<0.1) · AR-15 (<0.06) · AR-16 (0.3) · AR-17 (<0.1) · AR-18 (8) · AR-19 (1) · AR-20 (1) · AR-21 (360) · AR-22 (46) · AR-23 (3) · AR-46 (2) · AR-24 (19) · AR-25 (3200) · AR-26 (2800) · AR-27 (5600) · AR-28 (45) · AR-45 (320) · AR-47 (130) · AR-48 (<0.4) · AR-1 (170000) · AR-44 (2) · AR-36 (0.1) · AR-37 (1) · AR-38 (<0.1) · AR-39 (12) · AR-40 (66) · AR-41 (0.2) · AR-42 (9) · AR-43 (0.5)

Foundation

Electric Building

Traffic Bar

1 · 10 · 100 · 1,000

Tank Chart

1. Existing 7,500 gal Alcohol UST (Abandoned 1983)
2. Existing 250 gal Gasoline UST (Location Approx.)
3. Existing 2,500 gal Alcohol UST (Location Approx.)
4. Former 2,000 gal No.2 Fuel Oil UST (Removed 10/91)
5. Existing 50,000 gal No.4 Fuel Oil UST (Active)
6. Former (2): 10,000 gal Toluene USTS (Removed 1983)

2-93-246-2

N

0 25 50 feet

300 N · 200 N · 100 N · 0 N

0 E · 100 E · 200 E · 300 E · 400 E · 500 E

Sears Property

STEPAN CO. PROPERTY

MAYWOOD, NEW JERSEY

BENZENE

Figure 3

Proposed Boring Locations

Tracer Research Corporation

EXPLANATION

- ·AR-1 — Aromatic Essential Oils Mfg. Area Sampling Location
- ·CT-1 — Central Tank Farm Sampling Loc.
- ⌖ B38W04B — Monitoring Well Location
- ——+—— — Approximate Railroad Location
- —·—·—·— — Approximate Fence Location
- (0.000) — Soil Gas Sample Value (µg/l)
- (NS) — No Sample Collected
- (NA) — Not Analyzed
- (INT) — Interference With Adjacent Peaks
- 0.00 — Isoconcentration Line (µg/l)

Building No. 67

Building No. 4 (Boiler House)

Building No. 52 (Storage)

Truck Scale

⑤

·CT-1 ·CT-2 ·CT-3 ·CT-4 ·CT-5

①

②

B38W04B

CT-6 CT-7. ·CT-8 ·CT-9 ·CT-10

Cooling Tower

Hot Oil Shed

④

·CT-12 ·CT-13 ·CT-14 ·CT-15

CT-11·

③

(Warehouse/ Production/ Sample Dept.)

Building No. 13

Railroad Tracks

·CT-16 ·CT-17 CT-18 ·CT-19 ·CT-20

300 N

·AR-2 ·AR-3 ·AR-4 ·AR-5

Building Foundation

·AR-6 ·AR-29 ·AR-30 ·AR-31 ·AR-32 ·AR-33 ·AR-34

B38W03B

Tank Farm

CT-21. ·CT-22

·CT-23

Building No. 10 (Production)

·AR-7 ·AR-8 ·AR-9 ·AR-10 ·AR-11 ·AR-12 ·AR-13 ·AR-35

Transformer

Fence

200 N

·AR-15 ·AR-16 ·AR-17 ·AR-19 ·AR-20 ·AR-21 ·AR-22 ·AR-23 ·AR-46

·AR-14 ·AR-18 ·AR-24 ·AR-25 ·AR-26 ·AR-27 ·AR-28 ·AR-45 ·AR-47 ·AR-48

B38W08B

BRMW2

AR-1·

OBMW2

Foundation

·AR-44

·AR-36 ·AR-37 ·AR-38 ·AR-39 ·AR-40 ·AR-41

100 N

·AR-42

AR-43· Electric Building

Building No. 10H (Storage)

Building No. 2

Fence

Tank Chart

①	Existing 7,500 gal Alcohol UST (Abandoned 1983)
②	Existing 250 gal Gasoline UST (Location Approx.)
③	Existing 2,500 gal Alcohol UST (Location Approx.)
④	Former 2,000 gal No.2 Fuel Oil UST (Removed 10/91)
⑤	Existing 50,000 gal No.4 Fuel Oil UST (Active)
⑥	Former (2): 10,000 gal Toluene USTS (Removed 1983)

N

0 25 50

feet

2-93-246-S

Fence

Railroad Tracks

0 N

Sears Property

0 E 100 E 200 E 300 E 400 E 500 E

CH2MHILL

STEPAN CO. PROPERTY

MAYWOOD, NEW JERSEY

SAMPLING LOCATIONS

Figure 1

Tracer Research Corporation

EXPLANATION

- ·AR−1 — Aromatic Essential Oils Mfg. Area Sampling Location
- ·CT−1 — Central Tank Farm Sampling Loc.
- ⌖ B38W04B — Monitoring Well Location
- ——+—— — Approximate Railroad Location
- ——— — Approximate Fence Location
- (<11) — Soil Gas Sample Value (µg/l)
- (NS) — No Sample Collected
- (NA) — Not Analyzed
- (INT) — Interference With Adjacent Peaks
- 0.00 — Isoconcentration Line (µg/l)

Building No. 67

Building No. 4 (Boiler House)

Building No. 52 (Storage)

Truck Scale

(Warehouse/ Production/ Sample Dept.) Building No. 13

CT−1 (<0.2) · CT−2 (INT) · CT−3 (<0.2) · CT−4 (<0.2) · CT−5 (<0.2)

B38W04B

CT−6 (<1) · CT−7 (<0.2) · CT−8 (<0.2) · CT−9 (<0.2) · CT−10 (<0.1)

Cooling Tower · Hot Oil Shed

CT−11 (<0.1) · CT−12 (<0.2) · CT−13 (<0.2) · CT−14 (<0.2) · CT−15 (<0.1)

Railroad Tracks

CT−16 (<0.4) · CT−17 (<2) · CT−18 (<2) · CT−19 (<0.4) · CT−20 (NS)

CT−21 (<13) · CT−22 (<0.8) · CT−23 (<0.9)

Tank Farm

Building No. 10 (Production)

Building No. 2

Building No. 10H (Storage)

300 N

200 N

100 N

0 N

Fence

· AR−2 (<4) · AR−3 (<0.2) · AR−4 (<0.1) · AR−5 (<0.1)

Building Foundation

· AR−6 (<0.1) · AR−29 (<0.4) · AR−30 (<0.2) · AR−31 (<0.1) · AR−32 (<0.1) · AR−33 (<0.1) · AR−34 (<0.1)

B38W03B

· AR−7 (<0.4) · AR−8 (<0.4) · AR−9 (<4) · AR−10 (<4) · AR−11 (<0.4) · AR−12 (<1) · AR−13 (<0.7) · AR−35 (<0.1)

Transformer

· AR−15 (<0.09) · AR−16 (<0.2) · AR−17 (<0.2) · AR−19 (<0.2) · AR−20 (<0.2) · AR−21 (<0.2) · AR−22 (INT) · AR−23 (0.6) · AR−46 (<2)

· AR−14 (<0.2) · AR−18 (<0.2) · AR−24 (INT) · AR−25 (<7) · AR−26 (<19) · AR−27 (<19) · AR−28 (<2) · AR−45 (<3) · AR−47 (<3) · AR−48 (<3)

Foundation

B38W06B · BEMW2 · GEMW2

AR−1 (<11)

· AR−44 (<0.08)

· AR−36 (<0.1) · AR−37 (<0.8) · AR−38 (<0.4) · AR−39 (<3) · AR−40 (<3) · AR−41 (<0.2) · AR−42 (<0.4)

AR−43 (<0.2)

Electric Building

Tank Chart

1. Existing 7,500 gal Alcohol UST (Abandoned 1965)
2. Existing 250 gal Gasoline UST (Location Approx.)
3. Existing 2,500 gal Alcohol UST (Location Approx.)
4. Former 2,000 gal No.2 Fuel Oil UST (Removed 10/91)
5. Existing 50,000 gal No.4 Fuel Oil UST (Active)
6. Former (2): 10,000 gal Toluene USTs (Removed 1983)

2-93-248-S

N

0 25 50 feet

Fence

Railroad Tracks

Sears Property

0 E 100 E 200 E 300 E 400 E 500 E

STEPAN CO. PROPERTY

MAYWOOD, NEW JERSEY

VINYL CHLORIDE (C_2H_3CL)

Figure 2

Tracer Research Corporation

EXPLANATION

- ·AR−1 — Aromatic Essential Oils Mfg. Area Sampling Location
- ·CT−1 — Central Tank Farm Sampling Loc.
- ⌖ B38W04B — Monitoring Well Location
- Approximate Railroad Location
- Approximate Fence Location
- (17000) — Soil Gas Sample Value (µg/l)
- (NS) — No Sample Collected
- (NA) — Not Analyzed
- (INT) — Interference With Adjacent Peaks
- 0.00 — Isoconcentration Line (µg/l)

Building No. 67

Building No. 4 (Boiler House)

Building No. 52 (Storage)

Truck Scale

Railroad Tracks

(Warehouse/ Production/ Sample Dept.) Building No. 13

Cooling Tower

Hot Oil Shed

Tank Farm

Building No. 10 (Production)

Building No. 10H (Storage)

Building No. 2

Building Foundation

Foundation

Electric Building

Transformer

Fence

Railroad Tracks

Sears Property

300 N

200 N

100 N

0 N

0 E 100 E 200 E 300 E 400 E 500 E

N

0 25 50 feet

AR−1 (17000)	AR−2 (<0.1)	AR−3 (<0.01)	AR−4 (<0.7)	AR−5 (<0.07)
AR−6 (<0.07)	AR−7 (<0.3)	AR−8 (<0.3)	AR−9 (<3)	AR−10 (<3)
AR−11 (<0.3)	AR−12 (<1)	AR−13 (<0.5)	AR−14 (<0.1)	AR−15 (<0.08)
AR−16 (0.3)	AR−17 (<0.1)	AR−18 (8)	AR−19 (1)	AR−20 (1)
AR−21 (360)	AR−22 (46)	AR−23 (3)	AR−24 (19)	AR−25 (3200)
AR−26 (2800)	AR−27 (5600)	AR−28 (45)	AR−29 (<0.4)	AR−30 (<0.2)
AR−31 (<0.1)	AR−32 (<0.3)	AR−33 (0.1)	AR−34 (<0.1)	AR−35 (<0.1)
AR−36 (0.1)	AR−37 (1)	AR−38 (<0.1)	AR−39 (12)	AR−40 (66)
AR−41 (0.2)	AR−42 (9)	AR−43 (0.5)	AR−44 (2)	AR−45 (320)
AR−46 (2)	AR−47 (130)	AR−48 (<0.4)		

CT−1 (1)	CT−2 (2)	CT−3 (0.05)	CT−4 (<0.02)	CT−5 (<0.02)
CT−6 (<0.8)	CT−7 (<0.05)	CT−8 (<0.2)	CT−9 (<0.02)	CT−10 (<0.03)
CT−11 (<0.07)	CT−12 (<0.05)	CT−13 (<18)	CT−14 (<0.05)	CT−15 (<0.07)
CT−16 (<0.3)	CT−17 (70)	CT−18 (1200)	CT−19 (<0.3)	CT−20 (NS)
CT−21 (7700)	CT−22 (<0.8)	CT−23 (<0.4)		

B38W03B ⌖ B38W04B ⌖ B38W05B ⌖

1 10 100 1,000

Tank Chart

① Existing 7,500 gal Alcohol UST (Abandoned 1983)
② Existing 250 gal Gasoline UST (Location Approx.)
③ Existing 2,500 gal Alcohol UST (Location Approx.)
④ Former 2,000 gal No.2 Fuel Oil UST (Removed 10/91)
⑤ Existing 50,000 gal No.4 Fuel Oil UST (Active)
⑥ Former (2): 10,000 gal Toluene USTS (Removed 1983)

2-93-248-3

STEPAN CO. PROPERTY

MAYWOOD, NEW JERSEY

BENZENE

Figure 3

Tracer Research Corporation

EXPLANATION

- ·AR-1 — Aromatic Essential Oils Mfg. Area Sampling Location
- ·CT-1 — Central Tank Farm Sampling Loc.
- ⌖ B38W04B — Monitoring Well Location
- Approximate Railroad Location
- Approximate Fence Location
- (980) — Soil Gas Sample Value (µg/l)
- (NS) — No Sample Collected
- (NA) — Not Analyzed
- (INT) — Interference With Adjacent Peaks
- 0.00 — Isoconcentration Line (µg/l)

Building No. 67

Building No. 4 (Boiler House)

Building No. 52 (Storage)

Truck Scale

⑤

·CT-1 (<0.05)

(<0.01) CT-3

·CT-2 (<0.01)

·CT-4 (<0.08)

·CT-5 (<0.04)

(Warehouse/ Production/ Sample Dept.) Building No. 13

B38W04B

CT-6 (<1)

CT-7 (0.03)

·CT-8 (0.2)

·CT-9 (<0.04)

·CT-10 (<0.2)

Cooling Tower

Hot Oil Shed

·CT-11 (<0.1)

·CT-12 (0.3)

·CT-13 (100)

·CT-14 (<0.08)

·CT-15 (<0.2)

Railroad Tracks

·CT-16 (<0.4)

·CT-17 (10)

CT-18 (420)

·CT-19 (<0.4)

·CT-20 (NS)

·CT-21 (11000)

·CT-22 (<1)

·CT-23 (<0.9)

1,000

100

10

10,000

Tank Farm

Building No. 10 (Production)

Building No. 2

Fence

300 N

200 N

100 N

0 N

·AR-2 (<0.3)

·AR-3 (<0.3)

·AR-4 (<0.2)

·AR-5 (<0.2)

Building Foundation

·AR-6 (<0.2)

B38W03B

·AR-29 (<1)

·AR-30 (<0.5)

·AR-31 (<0.3)

·AR-32 (<0.3)

·AR-33 (<0.3)

·AR-34 (<0.3)

·AR-7 (<0.3)

·AR-8 (<0.3)

·AR-9 (<3)

·AR-10 (<3)

·AR-11 (<0.3)

·AR-12 (<2)

·AR-13 (<1)

Transformer

·AR-35 (<0.3)

·AR-15 (<0.2)

·AR-16 (<0.3)

·AR-17 (<0.3)

·AR-19 (0.9)

·AR-20 (<4)

·AR-21 (<12)

·AR-22 (<5)

·AR-23 (<0.3)

·AR-46 (INT)

·AR-14 (<0.3)

·AR-18 (<0.3)

·AR-24 (3)

·AR-25 (3600)

·AR-26 (490)

·AR-27 (41)

·AR-28 (<5)

(210) ·AR-45

·AR-47 (2)

B38W06B

BRMW2

AR-1 (980)

ORMW2

Foundation

·AR-44 (<0.1)

·AR-36 (<0.3)

·AR-37 (7)

·AR-38 (<0.3)

·AR-39 (<0.7)

·AR-40 (<1)

·AR-41 (0.4)

·AR-42 (5)

AR-43 (<0.2)

Electric Building

·AR-48 (<0.6)

Building No. 10H (Storage)

Tank Chart

①	Existing 7,500 gal Alcohol UST (Abandoned 1983)
②	Existing 250 gal Gasoline UST (Location Approx.)
③	Existing 2,500 gal Alcohol UST (Location Approx.)
④	Former 2,000 gal No.2 Fuel Oil UST (Removed 10/91)
⑤	Existing 60,000 gal No.4 Fuel Oil UST (Active)
⑥	Former (2): 10,000 gal Toluene USTS (Removed 1983)

N

0 25 50 feet

Fence

Railroad Tracks

Sears Property

0 E 100 E 200 E 300 E 400 E 500 E

2-93-248-S

STEPAN CO. PROPERTY

MAYWOOD, NEW JERSEY

TOLUENE

Figure 4

Tracer Research Corporation

EXPLANATION

- ·AR−1 — Aromatic Essential Oils Mfg. Area Sampling Location
- ·CT−1 — Central Tank Farm Sampling Loc.
- B38W04B — Monitoring Well Location
- Approximate Railroad Location
- Approximate Fence Location
- (<25) — Soil Gas Sample Value (µg/l)
- (NS) — No Sample Collected
- (NA) — Not Analyzed
- (INT) — Interference With Adjacent Peaks
- 0.00 — Isoconcentration Line (µg/l)

Building No. 67

Building No. 4 (Boiler House)

Building No. 52 (Storage)

Truck Scale

(Warehouse/ Production/ Sample Dept.) Building No. 13

Railroad Tracks

Building Foundation

Tank Farm

Building No. 10 (Production)

Building No. 2

Building No. 10H (Storage)

Foundation

Transformer

Electric Building

Fence

Sears Property

·CT−1 (<0.08)	·CT−2 (<0.02)	(<0.02) CT−3	·CT−4 (<0.2)	·CT−5 (<0.1)
·CT−6 (<2)	·CT−7 (<0.2)	B38W04B	·CT−8 (<0.2)	·CT−9 (<0.2)	·CT−10 (<0.3)
·CT−11 (<0.2)	·CT−12 (<0.2)	·CT−13 (<0.5)	·CT−14 (<0.2)	·CT−15 (<0.3)
·CT−16 (<0.8)	·CT−17 (<0.4)	CT−18 (<19)	(<0.8) ·CT−19	(NS) ·CT−20
CT−21 (<3)	·CT−22 (<2)	·CT−23 (<1)		

Cooling Tower

Hot Oil Shed

·AR−2 (<0.5)	·AR−3 (<0.5)	·AR−4 (<0.3)	·AR−5 (<0.5)	
(<0.3) ·AR−6	·AR−29 (<2)	·AR−30 (<0.8)	·AR−31 (<0.4)	·AR−32 (<0.4)	·AR−33 (<0.4)	·AR−34 (<0.4)
·AR−7 (<0.6)	·AR−8 (<0.6)	·AR−9 (<6)	·AR−10 (<6)	·AR−11 (<0.6)	·AR−12 (<4)	·AR−13 (<2)	·AR−35 (<0.4)
·AR−15 (<0.3)	·AR−16 (<0.6)	·AR−17 (<0.6)	·AR−19 (<0.6)	·AR−20 (<0.7)	·AR−21 (<33)	·AR−22 (<12)	·AR−23 (<0.3)	·AR−46 (<0.8)
AR−14· (<0.6)	·AR−18 (<0.6)	·AR−24 (<0.3)	·AR−25 (770)	·AR−26 (<70)	(100) ·AR−27	(<7) ·AR−28	(<2) ·AR−45	·AR−47 (<0.8)	·AR−48 (<0.8)
AR−1· (<25)							·AR−44 (<0.2)	
·AR−36 (<0.4)	·AR−37 (<0.4)	·AR−38 (<0.4)	·AR−39 (<0.8)	·AR−40 (<2)	·AR−41 (<0.2)	
AR−43· (<0.3)					·AR−42 (<0.8)	

B38W03B · B38W06B · BBMW2 · GBMW2

Tank Chart

1. Existing 7,500 gal Alcohol UST (Abandoned 1983)
2. Existing 250 gal Gasoline UST (Location Approx.)
3. Existing 2,500 gal Alcohol UST (Location Approx.)
4. Former 2,000 gal No.2 Fuel Oil UST (Removed 10/91)
5. Existing 50,000 gal No.4 Fuel Oil UST (Active)
6. Former (2): 10,000 gal Toluene USTS (Removed 1983)

N

0 25 50 feet

300 N · 200 N · 100 N · 0 N

0 E · 100 E · 200 E · 300 E · 400 E · 500 E

2-93-246-S

STEPAN CO. PROPERTY

MAYWOOD, NEW JERSEY

ETHYL BENZENE

CH2MHILL

Figure 5

Tracer Research Corporation

EXPLANATION

- ·AR-1 — Aromatic Essential Oils Mfg. Area Sampling Location
- ·CT-1 — Central Tank Farm Sampling Loc.
- B38W04B — Monitoring Well Location
- Approximate Railroad Location
- Approximate Fence Location
- (<64) — Soil Gas Sample Value (µg/l)
- (NS) — No Sample Collected
- (NA) — Not Analyzed
- (INT) — Interference With Adjacent Peaks
- 0.00 — Isoconcentration Line (µg/l)

Building No. 67

Building No. 4 (Boiler House)

Building No. 52 (Storage)

Truck Scale

(Warehouse/ Production/ Sample Dept.) Building No. 13

Railroad Tracks

Tank Farm

Building No. 10 (Production)

Building No. 10H (Storage)

Building No. 2

Building Foundation

Foundation

Electric Building

Transformer

Cooling Tower

Hot Oil Shed

Fence

Sears Property

300 N

200 N

100 N

0 N

0 100 E 200 E 300 E 400 E 500 E

N

0 25 50 feet

·CT-1 (<0.2) ·CT-2 (<0.04) (<0.04) CT-3 ·CT-4 (<0.1) ·CT-5 (<0.1)

B38W04B

CT-6 (<35) ·CT-7 (<0.2) ·CT-8 (<0.2) ·CT-9 (<0.1) ·CT-10 (<0.6)

·CT-11 (NA) ·CT-12 (<0.2) ·CT-13 (<0.5) ·CT-14 (<0.2) ·CT-15 (<0.6)

·CT-16 (NA) ·CT-17 (<0.6) CT-18 (<52) (<1) ·CT-19 (NS) ·CT-20

CT-21 (<5) ·CT-22 (<3) ·CT-23 (<3)

·AR-2 (<1) ·AR-3 (<1) ·AR-4 (<0.6) ·AR-5 (<0.6)

(<0.6) ·AR-6 ·AR-29 (<3) ·AR-30 (<1) ·AR-31 (<0.7) ·AR-32 (<0.7) ·AR-33 (<0.7) ·AR-34 (<0.7)

B38W03B

·AR-7 (<1) ·AR-8 (<1) ·AR-9 (<11) ·AR-10 (<11) ·AR-11 (<1) ·AR-12 (<8) ·AR-13 (<4) ·AR-35 (<0.7)

·AR-15 (<1) ·AR-16 (<1) ·AR-17 (<1) ·AR-19 (<1) ·AR-20 (<1) ·AR-21 (9) ·AR-22 (<28) ·AR-23 (0.6) ·AR-46 (<51)

AR-14 (<1) ·AR-18 (<1) ·AR-24 (<0.6) 1,000 ·AR-25 (3000) 100 ·AR-26 (<130) (51) ·AR-27 (<12) ·AR-28 (<3) ·AR-45 (<1) ·AR-47 (<1) AR-48 (<1)

B38W06B

BRMW2

AR-1 (<64) OBMW2

·AR-44 (<0.3)

·AR-36 (<0.7) ·AR-37 (<0.7) ·AR-38 (<0.7) ·AR-39 (22) ·AR-40 (16) ·AR-41 (<0.3)

10 ·AR-42 (<1)

AR-43 (<0.5)

Tank Chart

1. Existing 7,500 gal Alcohol UST (Abandoned 1983)
2. Existing 250 gal Gasoline UST (Location Approx.)
3. Existing 2,500 gal Alcohol UST (Location Approx.)
4. Former 2,000 gal No.2 Fuel Oil UST (Removed 10/91)
5. Existing 50,000 gal No.4 Fuel Oil UST (Active)
6. Former (2): 10,000 gal Toluene USTS (Removed 1983)

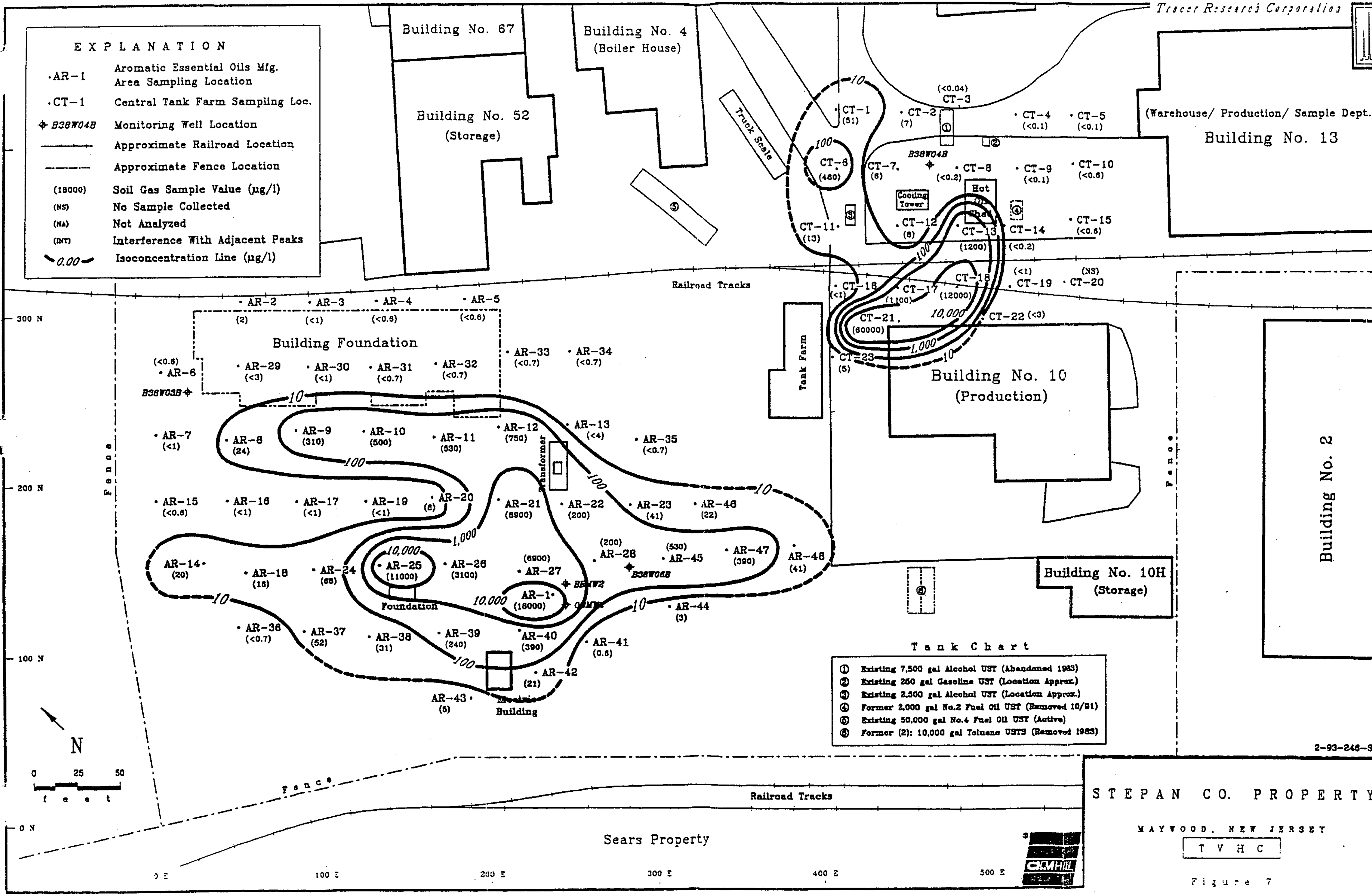
2-93-248-S

STEPAN CO. PROPERTY

MAYWOOD, NEW JERSEY

XYLENES

Figure 5

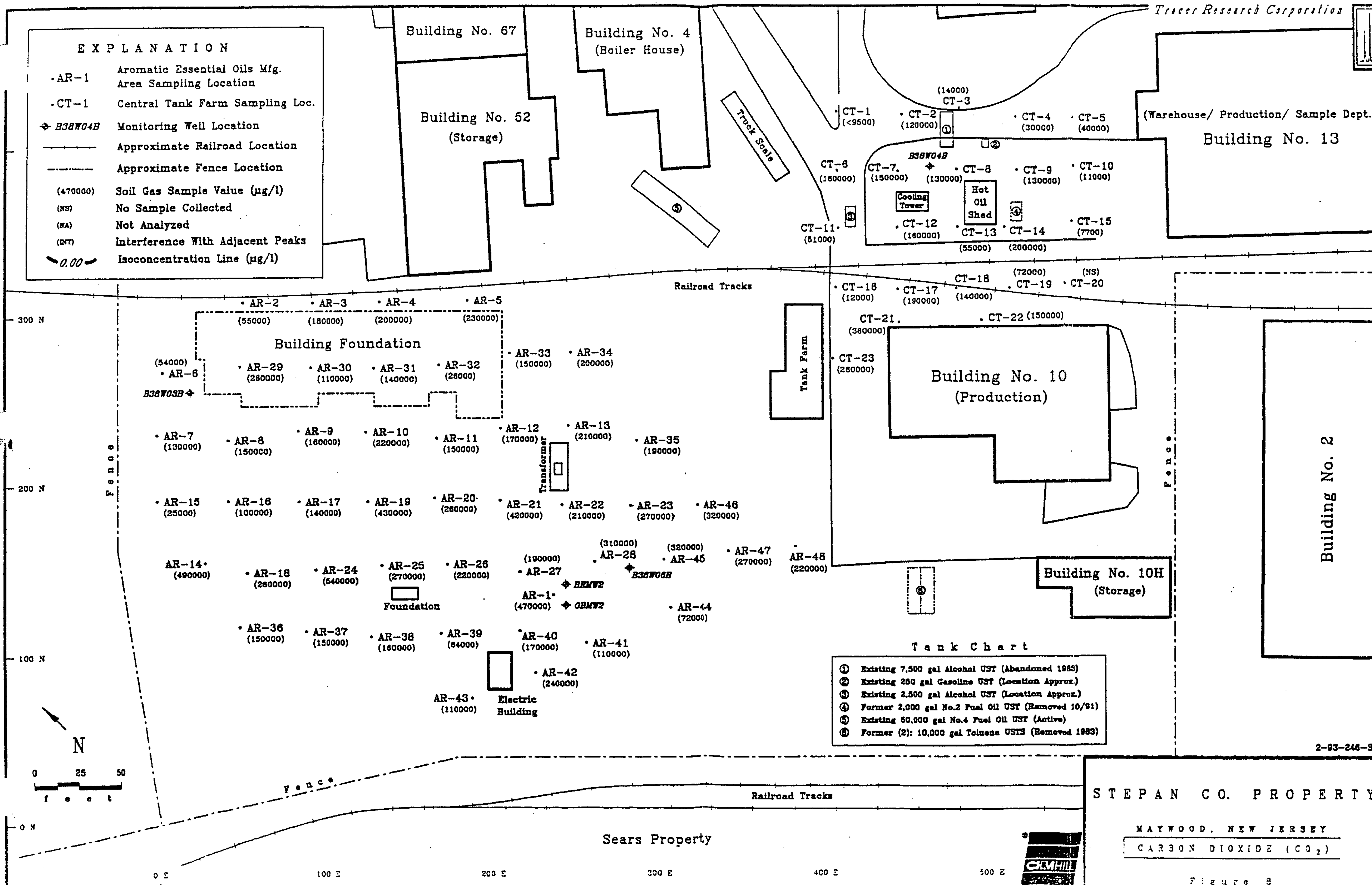


STEPAN CO. PROPERTY

MAYWOOD, NEW JERSEY

TVHC

Figure 7


Tracer Research Corporation
EXPLANATION
· AR-1 Aromatic Essential Oils Mfg. Area Sampling Location
· CT-1 Central Tank Farm Sampling Loc.
B38W04B Monitoring Well Location
Approximate Railroad Location
Approximate Fence Location
(470000) Soil Gas Sample Value (µg/l)
(NS) No Sample Collected
(NA) Not Analyzed
(INT) Interference With Adjacent Peaks
0.00 Isoconcentration Line (µg/l)
Building No. 67
Building No. 4 (Boiler House)
Building No. 52 (Storage)
Truck Scale
(Warehouse/ Production/ Sample Dept.)
Building No. 13
CT-1 (<9500)
CT-2 (120000)
CT-3 (14000)
CT-4 (30000)
CT-5 (40000)
CT-6 (160000)
CT-7 (150000)
B38W04B
CT-8 (130000)
CT-9 (130000)
CT-10 (11000)
Cooling Tower
Hot Oil Shed
CT-11 (51000)
CT-12 (160000)
CT-13 (55000)
CT-14 (200000)
CT-15 (7700)
Railroad Tracks
CT-16 (12000)
CT-17 (190000)
CT-18 (140000)
CT-19 (72000)
CT-20 (NS)
CT-21 (360000)
CT-22 (150000)
CT-23 (260000)
Tank Farm
Building No. 10 (Production)
AR-2 (55000)
AR-3 (180000)
AR-4 (200000)
AR-5 (230000)
Building Foundation
AR-6 (54000)
B38W03B
AR-29 (260000)
AR-30 (110000)
AR-31 (140000)
AR-32 (26000)
AR-33 (150000)
AR-34 (200000)
AR-7 (130000)
AR-8 (150000)
AR-9 (160000)
AR-10 (220000)
AR-11 (150000)
AR-12 (170000)
AR-13 (210000)
Transformer
AR-35 (190000)
Fence
AR-15 (25000)
AR-16 (100000)
AR-17 (140000)
AR-19 (430000)
AR-20 (260000)
AR-21 (420000)
AR-22 (210000)
AR-23 (270000)
AR-46 (320000)
AR-14 (490000)
AR-18 (260000)
AR-24 (540000)
AR-25 (270000)
AR-26 (220000)
AR-27 (190000)
AR-28 (310000)
B38W06B
AR-45 (320000)
AR-47 (270000)
AR-48 (220000)
BEMW2
OBMW2
AR-1 (470000)
Foundation
AR-44 (72000)
Building No. 10H (Storage)
Building No. 2
AR-36 (150000)
AR-37 (150000)
AR-38 (160000)
AR-39 (84000)
AR-40 (170000)
AR-41 (110000)
AR-42 (240000)
AR-43 (110000)
Electric Building
Tank Chart
① Existing 7,500 gal Alcohol UST (Abandoned 1983)
② Existing 260 gal Gasoline UST (Location Approx.)
③ Existing 2,500 gal Alcohol UST (Location Approx.)
④ Former 2,000 gal No.2 Fuel Oil UST (Removed 10/91)
⑤ Existing 50,000 gal No.4 Fuel Oil UST (Active)
⑥ Former (2): 10,000 gal Toluene USTS (Removed 1983)
2-93-246-3
300 N
200 N
100 N
0 N
N
0 25 50
feet
Fence
Railroad Tracks
Sears Property
0 E
100 E
200 E
300 E
400 E
500 E
CH2M HILL
STEPAN CO. PROPERTY
MAYWOOD, NEW JERSEY
CARBON DIOXIDE (CO_2)
Figure 8

EXPLANATION

- ·AR–1 — Aromatic Essential Oils Mfg. Area Sampling Location
- ·CT–1 — Central Tank Farm Sampling Loc.
- ⌖ B38W04B — Monitoring Well Location
- Approximate Railroad Location
- Approximate Fence Location
- (59000) — Soil Gas Sample Value (µg/l)
- (NS) — No Sample Collected
- (NA) — Not Analyzed
- (INT) — Interference With Adjacent Peaks
- 0.00 — Isoconcentration Line (µg/l)

Tracer Research Corporation

Building No. 67

Building No. 4 (Boiler House)

Building No. 52 (Storage)

Truck Scale

(Warehouse/ Production/ Sample Dept.) Building No. 13

CT–1 (240000) · CT–2 (190000) · (250000) CT–3 · CT–4 (230000) · CT–5 (200000)

CT–6 (91000) · CT–7 (180000) · B38W04B · CT–8 (100000) · CT–9 (140000) · CT–10 (240000)

Cooling Tower · Hot Oil Shed

CT–11 (210000) · CT–12 (140000) · CT–13 (170000) · CT–14 (88000) · CT–15 (230000)

Railroad Tracks

CT–16 (240000) · CT–17 (50000) · CT–18 (43000) · (170000) CT–19 · (NS) CT–20

CT–21 (19000) · CT–22 (120000) · CT–23 (76000)

Tank Farm

Building No. 10 (Production)

Building No. 10H (Storage)

Building No. 2

Fence

300 N · 200 N · 100 N · 0 N

AR–2 (160000) · AR–3 (75000) · AR–4 (52000) · AR–5 (46000)

Building Foundation

AR–6 (200000) · AR–29 (42000) · AR–30 (160000) · AR–31 (110000) · AR–32 (230000) · AR–33 (150000) · AR–34 (100000)

B38W03B

AR–7 (170000) · AR–8 (36000) · AR–9 (50000) · AR–10 (40000) · AR–11 (130000) · AR–12 (130000) · AR–13 (63000) · AR–35 (120000)

Transformer

AR–15 (200000) · AR–16 (200000) · AR–17 (96000) · AR–19 (210000) · AR–20 (76000) · AR–21 (75000) · AR–22 (40000) · AR–23 (92000) · AR–46 (26000)

AR–14 (110000) · AR–18 (46000) · AR–24 (36000) · AR–25 (41000) · AR–26 (100000) · (99000) AR–27 · (48000) AR–28 · (50000) AR–45 · AR–47 (39000) · AR–48 (46000)

Foundation

BRMW2 · OBMW2 · AR–1 (69000)

B38W08B

AR–36 (100000) · AR–37 (90000) · AR–38 (50000) · AR–39 (170000) · AR–40 (34000) · AR–41 (170000) · AR–42 (29000) · AR–43 (40000) · AR–44 (180000)

Electric Building

Tank Chart

1. Existing 7,500 gal Alcohol UST (Abandoned 1983)
2. Existing 250 gal Gasoline UST (Location Approx.)
3. Existing 2,500 gal Alcohol UST (Location Approx.)
4. Former 2,000 gal No.2 Fuel Oil UST (Removed 10/91)
5. Existing 50,000 gal No.4 Fuel Oil UST (Active)
6. Former (2): 10,000 gal Toluene USTS (Removed 1983)

2-93-248-S

N

0 25 50

feet

Fence

Railroad Tracks

Sears Property

0 E · 100 E · 200 E · 300 E · 400 E · 500 E

STEPAN CO. PROPERTY

MAYWOOD, NEW JERSEY

OXYGEN (O_2)

Figure 9

CH2MHILL

EXPLANATION

- ·AR–1 — Aromatic Essential Oils Mfg. Area Sampling Location
- ·CT–1 — Central Tank Farm Sampling Loc.
- ⌖ B38W04B — Monitoring Well Location
- Approximate Railroad Location
- Approximate Fence Location
- (97000) — Soil Gas Sample Value (µg/l)
- (NS) — No Sample Collected
- (NA) — Not Analyzed
- (INT) — Interference With Adjacent Peaks
- 0.00 — Isoconcentration Line (µg/l)

Tracer Research Corporation

Building No. 67

Building No. 4 (Boiler House)

Building No. 52 (Storage)

Truck Scale

(Warehouse/ Production/ Sample Dept.) Building No. 13

Railroad Tracks

Building Foundation

Foundation

Tank Farm

Building No. 10 (Production)

Building No. 10H (Storage)

Building No. 2

Fence

Fence

Fence

Railroad Tracks

Sears Property

300 N

200 N

100 N

0 N

0 E

100 E

200 E

300 E

400 E

500 E

N

0 25 50

f e e t

·AR–1	(97000)	
·AR–2	(<1600)	
·AR–3	(<1600)	
·AR–4	(<1600)	
·AR–5	(<1600)	
·AR–6	(<1600)	
·AR–7	(<1500)	
·AR–8	(<1500)	
·AR–9	(<1500)	
·AR–10	(<1500)	
·AR–11	(28000)	
·AR–12	(30000)	
·AR–13	(<1500)	
·AR–14	(<3000)	
·AR–15	(<3000)	
·AR–16	(<1500)	
·AR–17	(<1500)	
·AR–18	(<3000)	
·AR–19	(<3000)	
·AR–20	(<760)	
·AR–21	(200000)	
·AR–22	(74000)	
·AR–23	(3600)	
·AR–24	(99000)	
·AR–25	(160000)	
·AR–26	(76000)	
·AR–27	(190000)	
·AR–28	(18000)	
·AR–29	(<1300)	
·AR–30	(<1300)	
·AR–31	(<1300)	
·AR–32	(<670)	
·AR–33	(<670)	
·AR–34	(<670)	
·AR–35	(<670)	
·AR–36	(<670)	
·AR–37	(15000)	
·AR–38	(35000)	
·AR–39	(30000)	
·AR–40	(120000)	
·AR–41	(<750)	
·AR–42	(5800)	
·AR–43	(<750)	
·AR–44	(<750)	
·AR–45	(68000)	
·AR–46	(9200)	
·AR–47	(74000)	
·AR–48	(48000)	
B38W03B		
B38W02B		
B38W01B		
OB10W2		
B38W04B		
·CT–1	(<6100)	
·CT–2	(<6100)	
·CT–3	(<3100)	
·CT–4	(<1500)	
·CT–5	(<1500)	
·CT–6	(22000)	
·CT–7	(<1500)	
·CT–8	(<1500)	
·CT–9	(<750)	
·CT–10	(<1600)	
·CT–11	(<1400)	
·CT–12	(86000)	
·CT–13	(30000)	
·CT–14	(<1500)	
·CT–15	(<1600)	
·CT–16	(<1400)	
·CT–17	(8700)	
·CT–18	(81000)	
·CT–19	(<1400)	
·CT–20	(NS)	
·CT–21	(290000)	
·CT–22	(<750)	
·CT–23	(37000)	

1,000 — 10,000 — 100,000

Hot Oil Shed

Cooling Tower

Transformer

Electric Building

Tank Chart

① Existing 7,500 gal Alcohol UST (Abandoned 1983)
② Existing 250 gal Gasoline UST (Location Approx.)
③ Existing 2,500 gal Alcohol UST (Location Approx.)
④ Former 2,000 gal No.2 Fuel Oil UST (Removed 10/91)
⑤ Existing 50,000 gal No.4 Fuel Oil UST (Active)
⑥ Former (2): 10,000 gal Toluene USTS (Removed 1983)

2-93-246-3

STEPAN CO. PROPERTY

MAYWOOD, NEW JERSEY

METHANE

CH2MHILL

Figure 10

Tracer Research Corporation

EXPLANATION

- ·AR−1 — Aromatic Essential Oils Mfg. Area Sampling Location
- ·CT−1 — Central Tank Farm Sampling Loc.
- ⌖ B38W04B — Monitoring Well Location
- Approximate Railroad Location
- Approximate Fence Location
- (4) — Soil Gas Sample Value (µg/l)
- (NS) — No Sample Collected
- (NA) — Not Analyzed
- (INT) — Interference With Adjacent Peaks
- 0.00 — Isoconcentration Line (µg/l)

Building No. 67

Building No. 52 (Storage)

Building No. 4 (Boiler House)

Truck Scale

(Warehouse/ Production/ Sample Dept.) Building No. 13

(Non-Detect) ·CT−1

(Non-Detect) CT−3

·CT−2 (Non-Detect)

·CT−4 (<0.08)

·CT−5 (<0.08)

B38W04B

CT−6 (<0.03)

CT−7 (<0.08)

·CT−8 (<0.08)

·CT−9 (<0.04)

·CT−10 (<0.03)

Cooling Tower

Hot Oil Shed

CT−11 (<0.03)

·CT−12 (<0.08)

CT−13 (<0.08)

·CT−14 (<0.08)

·CT−15 (<0.1)

Railroad Tracks

·CT−16 (<0.03)

·CT−17 (<0.03)

CT−18 (<0.03)

(<0.2) ·CT−19

(NS) ·CT−20

·CT−22 (<0.09)

10 CT−21 (35)

·CT−23 (<0.04)

Tank Farm

Building No. 10 (Production)

Building No. 2

Building Foundation

·AR−2 (<0.03) ·AR−3 (<0.03) ·AR−4 (<0.06) ·AR−5 (<0.06)

(<0.06) ·AR−6

·AR−29 (<0.4) ·AR−30 (<0.03) ·AR−31 (<0.03) ·AR−32 (<0.03)

B38W03B

·AR−33 (<0.03) ·AR−34 (<0.03)

·AR−7 (<0.03) ·AR−8 (0.1) ·AR−9 (<0.06) ·AR−10 (<0.03) ·AR−11 (<0.02) ·AR−12 (<0.03) ·AR−13 (<0.03)

Transformer

·AR−35 (<0.03)

·AR−15 (<0.03) ·AR−16 (0.4) ·AR−17 (0.4) ·AR−19 (<0.03) ·AR−20 (<0.06) ·AR−21 (0.2) ·AR−22 (0.1)

·AR−23 (28) (0.2) ·AR−46

·AR−14 (3) ·AR−18 (5) ·AR−24 (14) ·AR−25 (7) ·AR−26 (2) (0.4) ·AR−27 (4)

·AR−28 (<0.06)

B38W05B

·AR−45 (8) ·AR−47 (0.3) ·(3) AR−48

·AR−1

1RMW2

0RMW2

Foundation

·AR−44 (<0.2)

·AR−36 (<0.03) ·AR−37 (0.07) ·AR−38 (0.1) ·AR−39 (0.2) AR−40 (NA) ·AR−41 (<0.09)

·AR−42 (<0.04)

AR−43 (0.3)

Electric Building

Building No. 10H (Storage)

Tank Chart

1. Existing 7,500 gal Alcohol UST (Abandoned 1983)
2. Existing 250 gal Gasoline UST (Location Approx.)
3. Existing 2,500 gal Alcohol UST (Location Approx.)
4. Former 2,000 gal No.2 Fuel Oil UST (Removed 10/91)
5. Existing 60,000 gal No.4 Fuel Oil UST (Active)
6. Former (2): 10,000 gal Toluene USTS (Removed 1983)

2-93-246-S

Fence

300 N

200 N

100 N

0 N

N

0 25 50 feet

Railroad Tracks

Sears Property

0 E 100 E 200 E 300 E 400 E 500 E

STEPAN CO. PROPERTY

MAYWOOD, NEW JERSEY

1,2-DICHLOROETHENE (DCE)

CH2M HILL

Figure 11

Tracer Research Corporation

EXPLANATION

- ·AR-1 — Aromatic Essential Oils Mfg. Area Sampling Location
- ·CT-1 — Central Tank Farm Sampling Loc.
- ⌖ B38W04B — Monitoring Well Location
- Approximate Railroad Location
- Approximate Fence Location
- (1) — Soil Gas Sample Value (µg/l)
- (NS) — No Sample Collected
- (NA) — Not Analyzed
- (INT) — Interference With Adjacent Peaks
- 0.00 — Isoconcentration Line (µg/l)
- (BMDL) — Below minimum detection limit

Building No. 67

Building No. 4 (Boiler House)

Building No. 52 (Storage)

Truck Scale

Railroad Tracks

(Warehouse/ Production/ Sample Dept.) Building No. 13

Cooling Tower

Tank Farm

Building No. 10 (Production)

Building No. 2

Building No. 10H (Storage)

Building Foundation

Foundation

Transformer

Electric Building

Fence

Sears Property

300 N
200 N
100 N
0 N
0 E
100 E
200 E
300 E
400 E
500 E

N
0 25 50
f e e t

·CT-1 (1)	·CT-2 (2)	(0.05) ·CT-3	·CT-4 (BMDL)	·CT-5 (BMDL)
·CT-6 (BMDL)	·CT-7 (0.03)	⌖ B38W04B	·CT-8 (0.2)	·CT-9 (BMDL)
·CT-10 (BMDL)	·CT-11 (BMDL)	·CT-12 (0.3)	·CT-13 (100)	·CT-14 (BMDL)
·CT-15 (BMDL)	·CT-16 (BMDL)	(80) ·CT-17	·CT-18 (1,820)	(BMDL) ·CT-19
(NS) ·CT-20	·CT-21 (18,735)	·CT-22 (BMDL)	·CT-23 (BMDL)	

·AR-2 (BMDL)	·AR-3 (BMDL)	·AR-4 (BMDL)	·AR-5 (BMDL)	
(BMDL) ·AR-6	·AR-29 (BMDL)	·AR-30 (BMDL)	·AR-31 (BMDL)	·AR-32 (0.3)
·AR-33 (0.1)	·AR-34 (BMDL)			
·AR-7 (BMDL)	·AR-8 (0.1)	·AR-9 (BMDL)	·AR-10 (BMDL)	·AR-11 (BMDL)
·AR-12 (BMDL)	·AR-13 (BMDL)	·AR-35 (BMDL)		
·AR-15 (BMDL)	·AR-16 (0.7)	·AR-17 (0.4)	·AR-19 (1.9)	·AR-20 (1)
·AR-21 (369.2)	·AR-22 (46.1)	·AR-23 (32.2)	·AR-46 (2.2)	
(45) ·AR-28	(538) ·AR-45	·AR-47 (132.3)	·AR-48 (3)	
·AR-14 (3)	·AR-18 (13)	·AR-24 (36)	·AR-25 (10,477)	(3,292) ·AR-26
(5792.4) ·AR-27	·AR-1 (17,984)	·AR-44 (2.7)		
·AR-36 (0.1)	·AR-37 (8.07)	·AR-38 (0.1)	·AR-39 (34.2)	·AR-40 (82)
·AR-41 (0.6)	·AR-42 (14)	·AR-43 (0.8)		

10 · 100 · 1,000 · 10,000

⌖ B38W06B · ⌖ BRMW2 · ⌖ OBMW2

Tank Chart

1. Existing 7,500 gal Alcohol UST (Abandoned 1983)
2. Existing 250 gal Gasoline UST (Location Approx.)
3. Existing 2,500 gal Alcohol UST (Location Approx.)
4. Former 2,000 gal No.2 Fuel Oil UST (Removed 10/91)
5. Existing 50,000 gal No.4 Fuel Oil UST (Active)
6. Former (2): 10,000 gal Toluene USTS (Removed 1983)

Note: Total Targeted VOCs include Total BTEX, Vinyl Chloride and DCE

2-93-246-S

STEPAN CO. PROPERTY

MAYWOOD, NEW JERSEY

Total Targeted Volatile Organic Compounds

CH2MHILL

Figure 12