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PRE-DESIGN INVESTIGATION
TASK A-1 BASELINE AIR SURVEY
INTERIM FINAL REPORT

INDUSTRI-PLEX SITE
WOBURN, MASSACHUSETTS

ISRT-PDI-35

Prepared for:

Industri-Plex Site Remedial Trust
36 Commerce Way
Woburn, Massachusetts

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May 1991

Project No.: 893-6255

Golder Associates Inc.
CONSULTING ENGINEERS

May 14, 1991 Project No. 893-6255

United States Environmental Protection Agency, Region I
J.F.K. Federal Building, HRS-CAN-3
Boston, Massachusetts 02203-2211

Attn: Joseph DeCola
Remedial Project Manager

RE: INDUSTRI-PLEX SITE PRE-DESIGN INVESTIGATION
TASK A-1 BASELINE AIR SURVEY - INTERIM FINAL REPORT

Gentlemen:

On behalf of the Industri-Plex Site Remedial Trust, we are submitting the attached Baseline Air Survey Interim Final Report for the Industri-Plex Site in Woburn, Massachusetts. This report is being submitted in accordance with the Pre-Design Investigation Work Plan (PDI) Task A-1 reporting requirements (PDI Sections 3.5.3.5 and 3.8.1.4.1 pgs. 112 and 130).

Please contact us if you have any questions.

Very truly yours,

GOLDER ASSOCIATES INC.

James W. Voss
Project Director

JWV/bjt
A-1CL

cc: J. Naparstek, MDEP
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1.0 INTRODUCTION

1.1 Purpose

This report is submitted in fulfillment of the Interim Final Report deliverable in accordance with the Industri-Plex Site Pre-Design Investigation Work Plan (PDWP, Golder Associates Inc., 1989a) Task A-1, Baseline Air Survey, as specified in Sections 3.5.3.5 and 3.8.1.4.1 of the PDWP (pages 112 and 130). The purpose of this Interim Final Report is to present the results of the Task A-1 data collection activities, including airborne levels of total nuisance dust, arsenic, lead, chromium, volatile organic compounds (VOCs), and volatile reduced sulfur compounds. On-Site and off-Site air quality standards for Remedial Action are proposed based on screening level exposure calculations and literature review of nuisance odor thresholds.

Section 1 of this report presents background information for Task A-1 including the Consent Decree objectives. Section 2 lists Air Data Needs identified in the PDWP based upon a review of the Consent Decree objectives, and the rationale for addressing these data needs. Section 3 presents details of the field and laboratory methods. The baseline conditions, as determined by PDI Task A-1, are presented in Section 4, and Data Quality Objectives (DQOs) are discussed in Section 5. Section 6 presents the selection of on-Site and off-Site air quality standards, and a summary is presented in Section 7. Appendices to this report contain supporting documentation.

1.2 Consent Decree Objectives

The Consent Decree (USEPA, 1989a) entered into between the Industri-Plex Site Remedial Trust (ISRT), the U.S. Environmental Protection Agency (USEPA) and the Massachusetts Department of Environmental Protection (MDEP)

on April 24, 1989, includes the Remedial Design/Action Plan (RDAP) which addresses Remedial Design/Remedial Action for the Industri-Plex Site (the Site) in Woburn, Massachusetts. The location of the Site is shown in Figure 1. The RDAP requires execution of a Pre-Design Investigation (PDI). The PDWP outlines the tasks to be performed such that sufficient data are available to support design and implementation of the Remedial Actions specified in the Consent Decree.

The objectives of PDI Task A-1 are described below and are designed to satisfy the requirements of the Future Actions as defined in the Record of Decision (ROD, USEPA, 1986), and Section E.2 of the RDAP. These objectives are given as stated in the RDAP:

> "a baseline investigation to establish an effective air monitoring program and to determine acceptable on-site and off-site air quality standards for hazardous volatile compounds and/or other odorous compounds and dust relative to planned grading, consolidation, excavation, dredging, groundwater treatment and capping activities."

The above air objectives require collection of air quality data to document the baseline conditions relative to potential types of emissions expected during Remedial Action, and to develop acceptable air quality standards with which the Remedial Action must comply. The baseline monitoring results and the proposed standards are detailed in this report.

1.3 Relationship to Other Pre-Design Investigation Tasks

The results of Task A-1 must be used in conjunction with several other PDI tasks during the Remedial Design. These include:

1. Task A-2, Gas Treatability, which assessed potential emissions from the East Hide Pile.

2. Task GW-3, Groundwater Treatability, which identified potential Hazardous Substances that could be released to the ambient air when groundwater is treated.

3. Task S-1, Hazardous Substances in Soil, which identified potential Hazardous Substances that could adhere to the airborne particulate generated from the Site.

4. Site Monitoring Plan, which proposed sampling protocol for ambient air and the East Hide Pile gas treatment system during remediation.

The results of those the above PDI tasks are presented in the respective Interim Final Reports (Golder Associates Inc., 1990a, 1990b, 1991a, 1991b).

2.0 DATA NEEDS AND RATIONALE

2.1 Data Needs

The following Air Data Needs were presented in the PDWP based upon the Consent Decree objectives:

Air Data Need No. 1

Determine source term data for East Hide Pile gas composition and emission rate;

Air Data Need No. 2

Assess areas of air quality impact for sampling;

Air Data Need No. 3

Determine baseline concentrations of hazardous volatile compounds, odorous compounds, dust and arsenic, lead, and chromium in dust at select locations;

Air Data Need No. 4

Collect Site specific meteorological data to support air concentration data reduction, treatment plant designs and correlation with hide pile gas emission rate measurements;

Air Data Need No. 5

Determine treatability of hide pile gas and air stripper off-gas; and

Air Data Need No. 6

Determine acceptable on-Site and off-Site air quality standards.

Four of the six Air Data Needs are applicable to PDI Task A-1: Air Data Need Numbers 2, 3, 4 and 6. Air Data Need Numbers 1 and 5 are applicable to PDI Task A-2 and are discussed in PDI Task A-2 Interim Final Report (Golder Associates, 1990a).

2.2 Rationale

The rationale for addressing each of the Air Data Needs applicable to this task is discussed below.

2.2.1 Air Data Need Number 2

This data need was addressed according to the rationale presented in Figure 2. The areas of maximum air quality impact from the East Hide Pile gases, Site grading and capping, the temporary gas treatment system and the interim groundwater remedy were determined in order to properly identify sampling locations which would monitor the potential impact of Remedial Actions upon on-Site and off-Site air quality. Air dispersion models are typically used for this purpose, preferably using Site-specific meteorological data if available. Although Site specific meteorological data were not available, such modeling was performed during the RI using regional meteorological data. The results of that modeling indicated that the areas of maximum impact would be within 0.3 miles of the Site in a southeast direction. This was supported by a statement in the ROD which indicated that a majority of citizen complaints associated with offensive odors from the Industri-Plex Site were received by residents southeast of the Site. These results were used to support the selection of monitoring locations.

2.2.2 Air Data Need Number 3

This data need was addressed according to the rationale presented in Figure 3. Previous data collected for the Site identified the following compounds of interest for monitoring: Target Compound List (TCL) VOCs (especially benzene and toluene); hydrogen sulfide; mercaptans; suspended dust, and arsenic, lead and chromium in the dust. The human nose can detect low-ppb concentrations of odorous compounds such as hydrogen sulfide and mercaptans. The

state-of-the-art analytical instruments and methods used for determining the concentration of these compounds in ambient air can only approach low ppb concentrations under optimum conditions. The concentrations of hazardous volatile compounds and odorous compounds were assessed by collecting air samples in 15-liter Summa passivated samplers over a period of 24 hours. VOCs were analyzed according to EPA Method TO-14. Sulfur compounds were analyzed according to California Air Resources Board Method 16 and methane was analyzed according to (California) South Coast Air Quality Management District Method 25.2. A sampling time of 24 hours was used because the community potentially affected includes residential areas and their exposure is determined by 24-hour air quality patterns. Total nuisance dust samples were collected on filter cassettes over a period of 24 hours and analyzed according to NIOSH Method 0500. The sampling pump was programmed to run for 8 hours (per NIOSH Method 0500) over a period of 24 hours by turning on and off at regular intervals. Arsenic, lead and chromium in dust were determined by NIOSH Method 7300. The planned number of samples is given in Table 1.

2.2.3 Air Data Need Number 4

This data need was addressed according to the rationale presented in Figure 4. Meteorological data were needed to reduce the raw concentration data collected pursuant to Air Data Need Number 3, and to support correlation of gas emission rate measurements with barometric pressure under PDI Task A-2. An instrumented weather station was located at the intersection of Commerce Way and Atlantic Avenue to collect data for the following parameters:

1. Wind speed and direction;
2. Fluctuation in wind direction;
3. Barometric pressure;

4. Temperature; and,
5. Relative humidity.

The weather station location is near the center of the Site and is not obstructed by any large hills or buildings which could cause local conditions to vary from the average conditions on the Site. Precipitation data was not considered necessary for the reduction of the concentration data for the air samples.

2.2.4 Air Data Need Number 6

This data need was addressed according to the rationale presented in Figure 5. The treatability of hide pile gas and groundwater air stripper off gas are being assessed as part of PDI Tasks A-2 and GW-3, respectively, and draft designs for these processes are described in the 60% Design Report (Golder Associates, 1991c). Other remediation activities involving digging and capping of soils are also described in the 60% Design Report. The air quality standards are proposed based on the results of the baseline air monitoring and risk calculations. During remedial construction, the best available technology will be used to control dust and odor emissions, if needed. However, if the best control technologies cannot achieve the air quality standards, then alternative remediation procedures and/or revised air quality standards might need to be proposed.

2.2.5 Rationale For Sampling Locations and Frequency

Locations chosen in the PDWP for sampling pursuant to Air Data Need Number 3 are shown in Figure 6. Twelve sample locations were selected based upon the location of potential on-Site source areas, the dominant wind direction and the locations of past odor complaints as defined in the ROD. Preliminary dispersion modeling conducted during the

RI/FS indicated that concentrations decrease by one order of magnitude within 0.6 miles downwind of the East Hide Pile and that maximum concentrations, for gas treatment systems with a stack height up to 12 meters, should occur within 0.5 miles of the East Hide Pile. The farthest site chosen for monitoring is located approximately 2 miles from the East Hide Pile. At least two upwind sites were planned for each sampling round. One sample was collected within 250 feet of the East Hide Pile. According to the ROD, most of the prior odor complaints were from areas southeast of the hide piles because the prevailing wind direction is from the northwest. An array of downwind sample locations were selected to cover both on-Site and off-Site locations, including industrial and residential properties.

Based upon a field inspection by Mr. Bob Glazier (Golder Associates Task Leader) and Mr. Arnie Ostrofsky (NUS Project Manager), some of the selected sampling points were relocated slightly. Figure 7 shows the location of the actual sampling points.

The meteorological station is located near the intersection of Atlantic Avenue and Commerce Way. The station is near the center of the Site and is not adjacent to any features which might severely impact the measurements. The wind speed and direction sensors are located at the top of a tower (30 feet) in accordance with EPA requirements (USEPA, 1989b).

3.0 METHOD OF INVESTIGATION

3.1 Field Methods

As part of the PDI Task A-1, meteorological data, including wind speed, wind direction, fluctuation in wind direction, relative humidity, temperature and barometric pressure were recorded by the Site weather station starting on 19 April 1990. The meteorological data are taken at 1 second intervals, averaged and recorded every 15 minutes continuously over a 24-hour period. Specifications of the meteorological equipment used in this program are included in Appendix A. The meteorological data are presented in Appendix B.

Air samples were collected in accordance with the procedures given in the Pre-Design Investigation Project Operations Plan (Golder Associates Inc. 1989b). These procedures are included in Appendix C.

Samples were taken during a 24-hour period beginning in late morning to early afternoon of the first day of sampling through late morning or early afternoon of the next day. Sampling dates for all four sampling periods are listed below:

Sampling Period 1:	15 May 1990	16 May 1990
Sampling Period 2:	6 Aug. 1990	7 Aug. 1990
Sampling Period 3:	5 Nov. 1990	6 Nov. 1990
Sampling Period 4:	26 Feb. 1991	27 Feb. 1991

Sampling locations are shown in Figure 7.

The sampler inlets were positioned at least three feet above average grade by either placing them on top of large isolated boulders at sampling locations 2, 6, 7, 8 and 12 or suspending them from low tree branches at locations 1,

3, 4, 5 (and duplicate location 13) and 11, such that other nearby branches did not obstruct the sampler inlet ports. The samplers at location 10 were suspended from the top of unused playground equipment in the middle of an open field. At location 9, the samplers were positioned on top of a overhang above the school doorway on the side of the school facing the Industri-Plex Site.

All sampler inlets were facing into the wind at the start of sampling. A duplicate sample (labelled location 13) was collected for all analyses at location 5, and a trip blank canister and filter cassette(s) accompanied the samplers on the round trip from the lab to the Site and back to the lab.

TCL VOCs, methane, and volatile reduced sulfur compounds were collected in 15-liter Summa passivated canisters. The vacuum flow regulators were calibrated to approximately 7 or 8 milliliters per minute by the laboratory and the flow rate/vacuum pressure was recorded by the laboratory on the canister chain-of-custody record prior to shipping. The vacuum pressure was checked and recorded in the field prior to and after sampling. Upon receipt by the laboratory, the vacuum pressure and vacuum flow regulator calibration were checked and recorded. These checks are documented on canister chain of custody forms (given in Task A-1 Interim Reports No. 1, 2 and 3 for Sampling Periods 1, 2, and 3 respectively, and Appendix D of this report for Sampling Period 4). Sampling was initiated by removing the inlet valve dust cover and opening the valve. The valve was closed and the inlet dust cover replaced approximately 24 hours later. Chain of custody documentation was completed and the samples were sealed in shipping containers and sent by overnight courier to Enseco's Air Toxics laboratory in El Monte, California.

Dust was collected on filter cassette cartridges using an SKC Model 224-PCXR7 programmable personal sampling pump. The pump was set to a flow rate of 2 liters per minute just prior to sampling using a rotameter which had been calibrated to a primary standard (1000-ml film type flowmeter). Correction of the flow rate to standard dry air conditions (760 millimeters mercury, 298 Kelvin [25 degrees Celsius], 0 percent relative humidity) resulted in a flow rate of 2024 ml/min for Sampling Period 1, 1978 ml/min for Sampling Period 2, 2094 ml/min for Sampling Period 3 and 2180 ml/min for Sampling Period 4, using the time-weighted-average conditions taken from the meteorological data for each of the sampling periods. The correction equation and values used for the calibration of corrected flow rates are shown in Table 2.

The dust sampling pump was programmed to alternately pump for one minute then shut down for two minutes resulting in the target volumes of air for sampling of approximately 1,000 liters. Two separate pumps were used to collect field duplicate dust samples at location 5 (the duplicate sample is labeled as location 13). Twenty four hours after the start of sampling, the pumps shut down and the inlet caps were replaced on the cassettes. The cassettes were shipped under chain of custody by overnight courier to Enseco-East in Somerset, New Jersey for Sampling Periods 1 and 2, to Radian Corporation in North Carolina for Sampling Period 3, and to Environmental Testing and Technologies, Inc. in New Jersey for Sampling Period 4.

The flow rate of each pump was checked after sampling. The flow checks for the dust sampling pumps are documented in PDI Task A-1 Interim Reports No. 1, 2 and 3 for Sampling Periods 1, 2 and 3, respectively, and Appendix E of this report for Sampling Period 4.

3.2 Laboratory Methods

Summa canister samples and total nuisance dust cassette samples from Sampling Periods 1 and 2 were received by Enseco Air toxics and Enseco East on 17 May 1990 and 8 August 1990, respectively. Summa canister samples and total nuisance dust cassette samples from Sampling Period 3 were received by Enseco Air Toxics and Radian Corporation, respectively, on 7 November 1990. The Summa canister samples and total nuisance dust cassette samples from Sampling Period 4 were received by Enseco Air Toxics and Environmental Testing and Technologies, Inc., respectively, on 28 February 1991.

All samples, except for the total nuisance dust samples for Sampling Period 1, were analyzed in accordance with the analytical methods listed in Table 3 as well as in accordance with the procedures given in the Project Operations Plan.

It was not possible to spike the Summa canisters with both sulfur containing compounds and TCL VOCs because they would react with each other. Therefore, because the odorous sulfur compounds are of greatest concern at the Site, the canisters were only spiked with the sulfur compounds. A Summa canister identical to those used for sampling was spiked with known quantities of hydrogen sulfide, methyl mercaptan, dimethyl sulfide and dimethyl disulfide. During Sampling Period 1, the spiked canister was analyzed at different periods of time to determine the stability of the

sulfur compounds contained within the canister over time. For Sampling Periods 2, 3 and 4, the canister was spiked, analyzed and then shipped to the Site on the first day of sampling and back to the laboratory, unaltered, with the rest of the samples the following day. The spiked sample was subsequently re-analyzed upon receipt. This procedure was performed to determine if transporting the canister to and from the Site had any effect on the stability of the sulfur compounds contained within the canister.

Laboratory Control Samples and Duplicate Control Samples were analyzed with each batch of samples from the Site. These results and spiked sample results are discussed in Section 4 below.

4.0 RESULTS AND DISCUSSION

This chapter presents the baseline air quality at and adjacent to the Industri-Plex Site based upon the results of the PDI Task A-1 data collection activities.

4.1 Air Sample Collection

Summa canister flow rates and vacuum pressures were recorded before and after sampling. Summa canister calibration results for all four sampling periods are summarized in Table 4 and documented in the Canister Chain of Custody forms (given in Task A-1, Interim Report Nos. 1, 2 and 3 for Sampling Periods 1, 2 and 3 and Appendix D of this report for Sampling Period 4). Dust pump flow rates were also checked before and after sampling with results summarized in Table 5. Dust pump flow rates are documented in the Flow Pump Field Data Forms given in Task A-1, Interim Report Nos. 1, 2 and 3 for Sampling Periods 1, 2 and 3 and Appendix E of this report for Sampling Period 4.

4.2 Total Nuisance Dust and Metals Results

Total nuisance dust results for all four sampling periods are summarized in Table 6. The results for Sampling Period 1 (May 1990) were invalid and are not discussed further below. Laboratory reports giving results for Sampling Periods 1, 2 and 3 have already been submitted in fulfilling the requirements of Task A-1 Interim Reports No. 1, 2, and 3 respectively . The laboratory report for total suspended dust results for Sampling Period 4 is included in Appendix F of this report.

NIOSH Method 0500 indicates that the detection limit for this method is 200 ug under the sampling conditions used during the PDI. The laboratories reported total nuisance dust results with values less than 200 ug. These laboratory results were converted to <200 ug. Samples with

corrected total dust masses that were reported by the laboratory as not detectable or were less than 200 ug were assigned a dust concentration of 100 ug/m^3 (one half of the method detection limit) for the purposes of calculating averages and standard deviations.

Total nuisance dust results for all samples from Sampling Periods 2, 3, and 4 range from <200 ug/m^3 to 1,544 ug/m^3 with an arithmetic average of 334 ug/m^3 and a standard deviation of 336 ug/m^3. The on-Site samples for Sampling Periods 2, 3, and 4 ranged from less than 200 ug/m^3 to 1,544 ug/m^3 with an arithmetic average of 366 ug/m^3 and a standard deviation of 401 ug/m^3. Samples at off-Site locations from the three Sampling Periods ranges from less than 200 ug/m^3 to 951 ug/m^3 with an arithmetic average of 301 ug/m^3 and a standard deviation of 259 ug/m^3.

Total nuisance dust concentrations as measured by the industrial hygiene filter cassette samplers have related uncertainties for two reasons: (1) filter weight adjustments had to be made based on blank sample filter weights (as prescribed by NIOSH Method 0500) and these adjustments have an approximate 20 percent uncertainty and (2) these samplers are designed to collect high concentrations of suspended dust (>200 ug mass), such as those related to worker exposures. The dust concentrations measured at the Site are at the lower end of the useful range for these samplers.

No detectable arsenic, chromium or lead results were reported for Sampling Period 1. Detected results for Sampling Periods 2, 3, and 4 are shown in Table 7. Chromium was detected during two sampling periods at concentrations of 1.387 ug/m^3 (0.78 percent of total suspended dust concentration) and 0.351 ug/m^3 (0.58 percent

of total suspended dust concentration). These results were both detected at off-Site locations. Arsenic concentrations between 55 ug/m3 and 3,500 ug/m3 were reported for Sampling Period 4 at sampling locations 1, 2, 3, 7, and 10. The arsenic concentrations are considered to be invalid because the arsenic concentration reported for these locations ranged from 23.0 to 151.9 percent of the suspended dust concentration. All other results for arsenic, chromium and lead were not detectable. The detection limits varied for each laboratory which analyzed metals in dust and are included in the laboratory reports.

4.3 Reduced Sulfur Compounds and Methane Results

Concentrations of reduced sulfur compounds (hydrogen sulfide, methyl mercaptan, dimethyl sulfide and dimethyl disulfide) for all locations sampled during all four sampling periods were below the analytical detection limit of 20 ppbv. In addition, concentrations of methane for all locations sampled during all four sampling periods were below the detection limit of 8 ppmv. Because the East Hide Pile is the primary source of reduced sulfur compounds and methane on Site, duplicate samples (locations 5 and 13) were taken at the approximate location of the proposed future East Hide Pile flare. Samples at these locations failed to detect reduced sulfur compounds or methane. Even during sampling periods with reported rainfall (Sampling Periods 2 and 3) when water is expected to fill voids in the soil and thereby release soil gases, no concentrations of reduced sulfur compounds or methane were detected, even within 250 feet of the East Hide Pile. The laboratory reports for Sampling Periods 1, 2, and 3 were reported in the respective Interim Reports. The laboratory report for Sampling Period 4 is included in Appendix G.

4.4 Volatile Organic Compound Results

Table 8 summarizes the results over all four sampling periods. The laboratory reports for TCL VOC analyses have been submitted with Task A-1 Interim Report Nos. 1, 2 and 3 for Sampling Periods 1, 2 and 3, respectively. The laboratory report for Sampling Period 4 is included in Appendix G of this report. Only ten TCL VOCs were detected in the Summa canister samples taken during Sampling Periods 1, 2, 3, and 4. These compounds are: trichlorofluoromethane (Freon 11); 1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113); acetone; methylene chloride; 2-butanone; 1,1,1-trichloroethane; benzene; toluene; total xylenes; and 1,2,4-trimethylbenzene. Freon 11 and toluene were reported in at least one sample for all sampling periods; Freon 113, 2-butanone and 1,1,1-trichloroethane were reported in Sampling Periods 1, 2 and 3; acetone, benzene, total xylenes, and 1,2,4-trimethylbenzene were only reported in Sampling Period 1; and methylene chloride was only reported once in Sampling Period 4.

Freon 11 and 2-butanone were the most frequently detected VOC compounds. Both of these compounds are not generally associated with the Industri-Plex Site. Benzene and toluene, two compounds associated with the Site, were detected in one and seven samples, respectively. A total of 44 VOC samples were collected during this investigation.

5.0 DATA QUALITY OBJECTIVES

5.1 Total Nuisance Dust

Table 9 shows the results of arsenic, chromium and lead recoveries from matrix spike samples for Sampling Periods 1, 2, 3, and 4. Recovery percentages for the matrix spike and matrix spike duplicate for these metals were within the accuracy requirements of the QAPjP for 50 percent of the analyses. Relative percentage differences were within the precision requirements specified in the QAPjP for 67 percent of the analyses. Duplicate sample results for dust and metals are given in Table 10. Arsenic, chromium, and lead concentrations for duplicate samples collected at sampling locations 5 and 13, situated approximately 250 feet east of the East Hide Pile were not detectable and therefore cannot be compared for accuracy. The relative percent difference for duplicated suspended dust samples are 40 percent, 97 percent, and 10 percent for Sampling Periods 2, 3 and 4, respectively. The duplicate results for sampling round 2 were at or below the detection limit.

All suspended dust sample blanks had non-detectable metal results. Suspended dust results for the blank samples are shown in Table 11. The suspended dust sample blanks were used to adjust the masses of primary samples according to NIOSH Method 0500 except for the results from Sampling Period 3 which had been adjusted by the laboratory prior to reporting the results.

Only 67 percent of the required 48 primary samples for dust and 46 percent of the required samples for arsenic, lead, and chromium in the dust were achieved due to errors in the dust and metals results for Sampling Periods 1 and errors in the metals results for Sampling Period 4, resulting in a loss of twelve primary samples. In addition, sampling location 12 was eliminated after repeated vandalism and

tampering with the monitoring equipment, resulting in a loss of an additional three primary dust and metal samples over Sampling Periods 2, 3, and 4.

5.2 Reduced Sulfur Compounds and Methane

Spiked Summa canisters of reduced sulfur compounds were used to analyze the stability of the sulfur compounds in the canisters. For Sampling Periods 2, 3 and 4, the spiked canisters were analyzed immediately after spiking, shipped to the field on the day of sampling and returned to lab, unaltered, the next day with the rest of the samples. The spiked canisters were subsequently re-analyzed at various time intervals. For Sampling Period 1, the spiked canister remained at the laboratory after spiking. The results of the spiked canister analyses are shown in Table 12 and Figures 8, 9, 10, and 11 for hydrogen sulfide, methyl mercaptan, dimethyl sulfide and dimethyl disulfide, respectively. All four reduced sulfur compounds had the most accurate and precise results during for the first set of analyses from Sampling Period 1, when the canister remained at the laboratory. For the samples which were sent to the field and returned to the laboratory, the results for dimethyl sulfide and dimethyl disulfide were more accurate and precise than those for hydrogen sulfide and methyl mercaptan. Hydrogen sulfide and methyl mercaptan recoveries ranged from 20 to 118 percent, and 28 to 105 percent, respectively. Reduced sulfur compound Laboratory Control Sample (LCS) and Duplicate Control Sample (DCS) results were within control limits given in the QAPjP (Table 13). These results suggest that hydrogen sulfide and methyl mercaptan may be affected by storage and transport. Since the reduced sulfur results for all four periods of sampling were below detection limits, no correction factor can be applied. The actual method reporting limit for hydrogen sulfide and methyl mercaptan

should be on the order of 40 ppbv (as opposed to the reported detection limit of 20 ppbv) because of the low spike recoveries for these two compounds in the Summa canisters. LCS/DCS results for methane are given in Table 14 and were also within control limits given in the QAPjP.

5.3 Volatile Organic Compounds

LCS/DCS results for TCL VOCs are shown in Table 15. All of these results were within control limits indicating that laboratory precision and accuracy were satisfactory. Spike recoveries and spike duplicate recoveries were not analyzed for TCL VOCs due to potential reaction with the sulfur compounds. Data were reported for all TCL VOC analyses except for data from location 12 for Sampling Periods 2, 3, and 4.

The total number of valid samples obtained during this task are summarized in Table 16 and compared to those required as specified by the PDWP.

6.0 AIR STANDARDS

Air quality standards for remediation of the Industri-Plex Site are presented in this chapter for potential receptors at both on-Site and off-Site locations. Several factors were considered in the development of air quality standards for remediation, including nuisance odors associated with the hide deposits, and consideration of potential human health risks/effects associated with particulate emissions from Site construction activities. The same air standards apply to both on-Site and off-Site areas as measured at the Site boundary because a number of the potential receptors on-Site and off-Site are equidistant from potential odor and dust sources at the Site.

6.1 Air Quality Standard for Odor

In the following discussion, odor is defined as that response to olfactory stimulation that produces annoyance rather than pleasure and is characterized, therefore, as a malodor resulting in a nuisance effect. Odors often result in complaints regardless of the make-up of the odor constituents. The intensity of the odor is related to the number of times it must be diluted before it is at the threshold of detection. The threshold is defined as the concentration at which the odor can be detected by 50 percent of the population (as represented by an odor panel). This threshold is equal to one odor unit per cubic foot of air (1 ou/cf). For example, if a unit sample of malodorous air requires nine units of odor-free air to dilute to the odor threshold concentration of 1 ou/cf, the original sample would have an odor concentration of 10 ou/cf.

Odor thresholds may be either of two types, detection or recognition. The detection threshold is defined as the lowest concentration at which a specified percentage of the panel (usually 50 percent) detects a stimulus as being different from odor-free blanks. The recognition threshold is the lowest odorant concentration at which a specified percentage of the panel (again, usually 50 percent, or the median) can ascribe a definite character to the odor. In general, recognition thresholds are approximately three to five times higher than detection thresholds (Hellman and Small, 1974; Sha, 1991).

Amoore (1985) found the geometric mean of the annoyance/detection ratio for unpleasant odors to be 5.3 odor units (Table 17). As he concludes, this implies that when an unpleasant odor reaches an average concentration about five times its detection threshold for the individual observer, it will very likely be recognized, be judged unpleasant and cause undesirable reactions among 50 percent of the people exposed.

Hydrogen sulfide was determined to be the dominant odorous compound at the Site (USEPA, 1986). The detection odor threshold value (OTV) for hydrogen sulfide is 0.0094 ppmv. Therefore, the air quality standard for odor during remediation is five times the OTV or 0.047 ppmv (47 ppbv).

6.2 Site Particulates

The baseline air survey total nuisance dust data base developed during this PDI task is not appropriate for determining a health based air quality standard for airborne particulates. These standards will be developed in a subsequent document.

6.3 Air Quality Standards for VOCs

The primary sources of volatile organic compounds are the Groundwater Treatment Plant and the East Hide Pile. Benzene and toluene are the main VOCs which are expected from these two sources. Best Available Control Technology (BACT) will be implemented at the Groundwater Treatment Plant and the East Hide Pile to remove VOCs and odorous compounds. Therefore, specific standards for VOCs are not appropriate.

7.0 SUMMARY

The objectives of the Pre-Design Investigation Task A-1, Baseline Air Monitoring, were to establish an effective baseline air monitoring program and to determine acceptable on-Site and off-Site air quality standards. These objectives were met by reviewing the Consent Decree objectives, identifying data needs, and carrying out a sampling and analysis program to address those data needs. The baseline air quality data base assembled during the task was used to determine air quality standards based on potential odor nuisances and health related exposure factors.

Total suspended dust results are presented in Table 6. For the three Sampling Period Numbers 2, 3 and 4, the suspended dust concentration range from less than 200 ug/m^3 to 1544 ug/m^3 with an arithmetic average of 334 ug/m^3 and a standard deviation of 336 ug/m^3. Chromium concentrations were detected in Sampling Periods 2 and 3 and ranged form 0.35 ug/m^3 to 1.387 ug/m^3. Lead was consistently below detection limits for all three sampling periods. Arsenic was detected during the fourth sampling period but these data were considered to be invalid.

Ten TCL VOC compounds were detected during the four sampling periods. These compounds and their concentration ranges are listed below:

Compound	Range (ppbv)
Trichlorofluoromethane (Freon 11)	1.3 - 78
1,1,2 Trichloro-1,1,2 Trifluoroethane (Freon 113)	2.5 - 32
Acetone	11 (1 sample only)
Methylene Chloride	51 (1 sample only)

Compound	Range (ppbv)
2-Butanone	3.4 - 56
1,1,1-Trichlorethane	2.0 - 32
Benzene	4.3 (1 sample only)
Toluene	6.4 - 23
Total Xylenes	6.9 - 12
1,2,4-Trimethylbenzene	4.6 (1 sample only)

An air quality standard for odor was determined to be five times the odor threshold value for hydrogen sulfide based upon a review of published odor literature.

The baseline air survey total nuisance dust data base developed during this PDI task is not appropriate for determining a health based air quality standard for airborne particulates. These standards will be developed in a subsequent document.

Air Data Need Numbers 2, 3, 4, and 6 have been satisfied by the Task A-1 results. However, the baseline PM_{10} concentration at the Site needs to be determined.

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Table 1
Sampling and Analysis Requirements
Task A-1, Baseline Air Survey

Analysis	Primary Samples Required (1)	Duplicate Samples Required	Blank Samples Required	Lab-Spiked Samples Required
VOCs	48	4	4	4
H2S/Mercaptans	48	4	4	4
Dust	48	4	4	4
As,Pb,Cr	48	4	4	4

Note: (1) Total number of primary samples reflects 12 sample locations multiplied by four sampling results.

Table 2
Total Nuisance Dust Sample Flow Corrections to Standard Conditions

	Period 1 May 15-16, 1990	Period 2 Aug. 6-7, 1990	Period 3 Nov 5-6, 1990	Period 4 Feb. 26-27, 1991
Flow rate under field conditions (F)	2000 ml/min	2000 ml/min	2000 ml/min	2000 ml/min
Average temperature during sampling (Tavg)	291.5 (Kelvin)	295.4 (Kelvin)	281.4 (Kelvin)	272.0 Kelvin
Average pressure during sampling (Pavg)	762 mm Hg	762 mm Hg	759 mm Hg	759 mm Hg
Average humidity during sampling (R.H.avg)	62%	84%	90%	76%
Vapor pressure of water in saturated air (Pstd,t)	15.9 mm Hg	20.2 mm Hg	8.8 mm Hg	4.2 mm Hg
Standardized flow rate during sampling (f)	2024 ml/min	1978 ml/min	2094 ml/min	2180 ml/min

Note: 1. All averages were taken between 10:00 on the first day of sampling and 15:00 on the second day, except for Sampling Period 2 in which they were taken between 10:00 on the first sampling day and 10:00 on the second sampling day due to insufficient meteorological data.

2. Relative humidity data for Sampling Period 1 and Sampling Period 4 are taken from the Logan Airport meteorological station.

3. Pstd,t is taken from the Weast, 1982.

4. The equation used to calculate f is:
$f = F \times (298.1/Tavg) \times ((Pavg - Pstd,t \times R.H.avg)/760)$.

Table 3
Analytical Methods and PARCC Data for Air Samples

Measurement Parameter	Method Reference	Targets		
		Precision	Accuracy	Completeness
Volatile Organics - TCL	EPA-TO-14	0-30	80-115	85
Hydrogen Sulfide	GC/FPD	0-20	80-115	85
Mercaptans	GC/FPD	0-20	80-115	85
Methane	GC/FID	0-20	80-115	85
Total Dust	NIOSH 0500	0-10	90-110	85
As, Cr, Pb in Dust	NIOSH 7300	0-20	80-120	85

Table 4
Summa Canister Calibration Results

Sampling Date	Location	Flow Rate (ml/min)			Vacuum Pressure (inches of Hg)					
					Before Sampling		After Sampling		% Change	
		Initial	Final	% Change	Lab	Field	Field	Lab	Before	After
15-May-90	1	7.3	7.5	3	30	30	16	16	0	0
to	2	7.0	6.8	-3	30	31	16	15	3	-6
16-May-90	3	6.9	7.0	1	30	29	16	15	-3	-6
	4	7.4	6.6	-11	30	31	15	14	3	-7
	5	7.2	6.8	-6	30	30	12	11	0	-8
	6	7.4	7.3	-1	30	30	15	15	0	0
	7	7.1	6.9	-3	30	30	16	16	0	0
	8	6.9	6.8	-1	30	30	16	15	0	-6
	9	7.0	6.8	-3	30	31	18	18	3	0
	10	7.0	7.0	0	30	31	18	16	3	-11
	11	7.1	7.1	0	30	30	16	16	0	0
	12	7.4	8.6	16	30	30	18	12	0	-33
	13	7.3	6.8	-7	30	30	17	15	0	-12
			Average:	-1				Average:	1	-7
			Range:	-11 to 16				Range:	-3 to 3	-33 to 0
06-Aug-90	1	8.0	7.8	-3	30	30	18	15	0	-17
to	2	8.1	8.0	-1	30	30	12	12	0	0
07-Aug-90	3	8.0	7.4	-7	30	30	15	14	0	-7
	4	8.2	7.6	-7	30	30	12	12	0	0
	5	8.0	8.0	0	30	30	16	15	0	-6
	6	8.2	8.0	-2	30	30	14	14	0	0
	7	7.9	7.2	-9	30	30	8	8	0	0
	8	8.2	7.0	-15	30	30	14	14	0	0
	9	8.2	8.6	5	30	30	16	15	0	-6
	10	8.2	7.6	-7	30	30	12	11	0	-8
	11	8.1	7.4	-9	30	30	10	9	0	-10
	12	NA	NA	NA	NA	NA	NA	NA	NA	NA
	13	8.0	7.4	-7	30	30	14	14	0	0
			Average:	-5				Average:	0	-5
			Range:	-15 to 5				Range:	0 to 0	-17 to 0

Table 4 (continued)
Summa Canister Calibration Results

Sampling Date	Location	Flow Rate (ml/min)			Vacuum Pressure (inches of Hg)					
					Before Sampling		After Sampling		% Change	
		Initial	Final	% Change	Lab	Field	Field	Lab	Before	After
05-Nov-90	1	7.1	6.7	-6	30	30	12	12	0	0
to	2	7.3	6.9	-5	30	30	15	14	0	-7
05-Nov-90	3	7.2	6.7	-7	30	30	18	16	0	-11
	4	7.3	8.0	10	30	30	16	15	0	-6
	5	7.3	7.3	0	30	30	12	12	0	0
	6	7.1	7.1	0	30	30	15	15	0	0
	7	7.5	5.7	-24	30	30	15	15	0	0
	8	7.5	7.0	-7	30	30	16	14	0	-13
	9	7.3	7.5	3	30	30	14	12	0	-14
	10	7.3	6.9	-5	30	30	17	13	0	-24
	11	7.2	7.3	1	30	30	16	13	0	-19
	12	NA	NA	NA	NA	NA	NA	NA	NA	NA
	13	7.3	6.8	-7	30	30	16	15	0	-6
			Average:	-4				Average:	0	-8
			Range:	-24 to 10				Range:	0 to 0	-24 to 0
26-Feb-91	1	7.2	6.5	-10	30	30	18	17.2	0	-4
to	2	7.2	6.7	-7	30	30	19	18	0	-5
27-Feb-91	3	7.2	6.9	-4	30	30	19	18	0	-5
	4	7.0	7.1	1	30	30	16	15.6	0	-3
	5	7.2	7.7	7	30	30	17	15.8	0	-7
	6	7.4	7.0	-5	30	30	18	18	0	0
	7	7.3	7.2	-1	30	30	17	16	0	-6
	8	7.3	6.8	-7	30	30	20	19.8	0	-1
	9	7.4	7.9	7	30	30	18	17.7	0	-2
	10	7.0	6.7	-4	30	30	18.5	17.9	0	-3
	11	7.3	7.5	3	30	30	17	16	0	-6
	12	NA	NA	NA	NA	NA	NA	NA	NA	NA
	13	7.2	7.0	-3	30	30	19	18	0	-5
			Average:	-2				Average:	0	-4
			Range:	-10 to 7				Range:	0 to 0	-7 to 0

Table 5
Dust Pump Flow Rate Calibrations

Sampling Date	Location	Flow Rate (Rotameter Reading)		
		Initial	Final	% Change
15-May-90 to 16-May-90	1	56.0	55.0	-2
	2	56.0	53.0	-5
	3	56.0	51.0	-9
	4	56.0	55.0	-2
	5	56.0	57.0	2
	6	56.0	52.0	-7
	7	56.0	54.0	-4
	8	56.0	54.0	-4
	9	56.0	53.0	-5
	10	56.0	54.0	-4
	11	56.0	51.0	-9
	12	56.0	54.0	-4
	13	56.0	56.0	0
			Average:	-4
			Range:	-9 to 2
06-Aug-90 to 07-Aug-90	1	56.0	52.0	-7
	2	56.0	56.0	0
	3	56.0	55.0	-2
	4	56.0	53.0	-5
	5	56.0	57.0	2
	6	56.0	55.0	-2
	7	56.0	53.0	-5
	8	56.0	56.0	0
	9	56.0	53.0	-5
	10	56.0	54.0	-4
	11	56.0	57.0	2
	12	NA	NA	NA
	13	56.0	54.0	-4
			Average:	-3
			Range:	-7 to 2

Table 5 (continued)
Dust Pump Flow Rate Calibrations

Sampling Date	Location	Flow Rate (Rotameter Reading)		
		Initial	Final	% Change
05–Nov–90	1	57	57	0
to	2	57	50	–12
06–Nov–90	3	57	60	5
	4	57	56	–2
	5	57	61	7
	6	57	57	0
	7	57	57	0
	8	57	58	2
	9	57	60	5
	10	57	57	0
	11	57	58	2
	12	NA	NA	NA
	13	57	57	0
			Average:	1
			Range:	–12 to 7
26–Feb–91	1	57	55	–4
to	2	57	57	0
27–Feb–91	3	57	56	–2
	4	57	57	0
	5	57	57	0
	6	57	53	–7
	7	57	54	–5
	8	57	54	–5
	9	57	54	–5
	10	57	56	–2
	11	57	55	–4
	12	NA	NA	NA
	13	57	54	–5
			Average:	–3
			Range:	–7 to 0

Table 6
Total Nuisance Dust Results for the PDI

Location	Date	Time Running (Min.)	Total Flow (m3)	Uncorrected Total Dust (ug)	Corrected Total Dust (ug)	Dust Conc. (ug/m3)
1 (off-site)	06-Aug-90	477	0.944	570	897	951
2 (off-site)	to	479	0.947	340	667	704
3 (off-site)	07-Aug-90	475	0.940	340	667	710
4 (on-site)		222	0.438	350	677	1544
5 (on-site)		477	0.944	210	537	569
6 (on-site)		469	0.928	60	387	417
7 (on-site)		476	0.942	100	427	453
8 (on-site)		181	0.358	110	437	1221
9 (off-site)		474	0.937	-160	<200	<200
10 (off-site)		477	0.944	90	417	442
11 (off-site)		472	0.933	-50	277	297
13 (on-site)		477	0.944	30	357	379
14 (Trip blank)		NA	0	-310	NA	NA
15 (Matrix Spike)		NA	0	-280	NA	NA
16 (Trip blank)		NA	0	-310	NA	NA
17 (Trip blank)		NA	0	-330	NA	NA
18 (Trip blank)		NA	0	-320	NA	NA
19 (Trip blank)		NA	0	-340	NA	NA
20 (Trip blank)		NA	0	-400	NA	NA
1 (off-site)	05-Nov-90	479	1.003	NA	<200	<200
2 (off-site)	to	479	1.004	NA	<200	<200
3 (off-site)	06-Nov-90	480	1.005	NA	200	199
4 (on-site)		475	0.995	NA	<200	<200
5 (on-site)		404	0.846	NA	<200	<200
6 (on-site)		475	0.995	NA	<200	<200
7 (on-site)		478	1.002	NA	<200	<200
8 (on-site)		440	0.922	NA	<200	<200
9 (off-site)		480	1.005	NA	<200	<200
10 (off-site)		476	0.997	NA	<200	<200
11 (off-site)		480	1.005	NA	<200	<200
13 (on-site)		477	0.998	NA	<200	<200
Field Blank (14)		NA	0	NA	100	NA
Matrix Spike (15)		NA	0	NA	10	NA
Matrix Spike (16)		NA	0	NA	20	NA
Method Blank (20)		NA	0	NA	10	NA

Table 6 (continued)
Total Nuisance Dust Results for the PDI

Location	Date	Time Running (Min.)	Total Flow (m3)	Uncorrected Total Dust (ug)	Corrected Total Dust (ug)	Dust Conc. (ug/m3)
1 (off-site)	26-Feb-91	477	1.040	390	257	247
2 (off-site)	to	479	1.044	480	347	332
3 (off-site)	27-Feb-91	13	0.028	310	<200	<200
4 (on-site)		480	1.046	400	267	255
5 (on-site)		480	1.046	430	297	284
6 (on-site)		480	1.046	350	217	207
7 (on-site)		480	1.046	390	257	245
8 (on-site)		476	1.038	300	<200	<200
9 (off-site)		473	1.031	330	<200	<200
10 (off-site)		480	1.046	370	237	226
11 (off-site)		480	1.046	460	327	312
13 (on-site)		480	1.046	460	327	312
12 (Blank)		NA	0	320	NA	NA
14 (Blank)		NA	0	330	NA	NA
15 (Blank)		NA	0	20	NA	NA
16 (Blank)		NA	0	50	NA	NA
17 (Blank)		NA	0	40	NA	NA
18 (Blank)		NA	0	40	NA	NA

Note 1. The method detection limit is 200 ug/m3 (EPA Method 0500).

2. Reported results for 5 November 1990 to 6 November 1990 were previously corrected by the laboratory.

3. Samples with masses reported as non-detectable or less than 200 ug were assumed to have a concentration of 100 ug/m3 (one half of the method detection limit) for use in summary statistics.

Table 7
Metals Results

Date	Location	Volume Sampled (m3)	Dust Conc. (ug/m3)	Arsenic		Chromium		Lead	
				Conc. (ug/m3)	% of Dust Conc.	Conc. (ug/m3)	% of Dust Conc.	Conc. (ug/m3)	% of Dust Conc.
06-Aug-90 to 07-Aug-90	9 (off-site)	0.937	178	ND	NA	1.387	0.78%	ND	NA
05-Nov-90 to 06-Nov-90	10 (off-site)	0.997	60	ND	NA	0.351	0.58%	ND	NA
26-Feb-91 to 27-Feb-91	1 (off-site)	1.040	247	221	89.5%	ND	NA	ND	NA
	2 (off-site)	1.044	332	70	21.0%	ND	NA	ND	NA
	3 (off-site)	0.028	6321	3500	55.4%	ND	NA	ND	NA
	7 (on-site)	1.046	246	55	22.6%	ND	NA	ND	NA
	10 (off-site)	1.046	227	344	151.9%	ND	NA	ND	NA

Note: 1. All results not shown for sampling locations 1-11 and 13 were not detectable.

2. Detection limits for Sampling Period 2 are: 2.0 ug for arsenic, 0.40 ug for chromium, and 2.5 ug for lead.

3. Detection limits for Sampling Period 3 are: 0.80 ug for arsenic, 0.1 ug for chromium, and 1.0 ug for lead.

4. Detection limits for Sampling Period 4 are: 50 ug for arsenic, 2.5 ug for chromium, and 5.0 ug for lead.

Table 8
Summary of VOC Results for all Sampling Periods

Compound	Trichloro-fluoro-methane (Freon 11)		1,1,2-Trichloro-1,2,2-Trifluoro-ethane (Freon 113)		Acetone		Methylene Chloride		2-Butanone		1,1,1-Trichloro-ethane		Benzene		Toluene		Total Xylenes		1,2,4-Trimethyl-benzene	
	Range (1)	No. (2)	Range (1)	No. (2)	Range (1)	No. (2)	Range (1)	No. (2)	Range (1)	No. (2)	Range (1)	No. (2)	Range (1)	No. (2)	Range (1)	No. (2)	Range (1)	No. (2)	Range (1)	No. (2)
ALL SAMPLES																				
Sampling Period 1	1.3-8.8	8	5.6	1	11.0	1	NA	0	3.4-21.0	10	2.0-5.9	2	4.3	1	9.6-18.0	2	6.9-12.0	2	4.6	1
Sampling Period 2	72.0	1	2.5-32.0	2	NA	0	NA	0	4.8-56.0	3	32.0	1	NA	0	6.7-20.0	2	NA	0	NA	0
Sampling Period 3	2.9-78.0	8	5.9	1	NA	0	NA	0	19.0	1	3.0	1	NA	0	6.4-23.0	2	NA	0	NA	0
Sampling Period 4	2.4-42.0	7	NA	0	NA	0	51.0	1	NA	0	NA	0	NA	0	8.2	1	NA	0	NA	0
ON-SITE SAMPLES																				
Sampling Period 1	1.3-3.4	4	NA	0	NA	0	NA	0	3.6-10.0	4	NA	0	NA	0	NA	0	NA	0	NA	0
Sampling Period 2	72.0	1	32.0	1	NA	0	NA	0	4.8-11.0	2	32.0	1	NA	0	6.7	1	NA	0	NA	0
Sampling Period 3	2.9-68.0	4	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0
Sampling Period 4	3.3-42.0	4	NA	0	NA	0	51.0	1	NA	0	NA	0	NA	0	8.2	1	NA	0	NA	0
OFF-SITE SAMPLES																				
Sampling Period 1	1.5-8.8	4	5.6	1	11.0	1	NA	0	3.4-21.0	6	2.0-5.9	2	4.3	1	9.6-18.0	2	6.9-12.0	2	4.6	1
Sampling Period 2	NA	0	2.5	1	NA	0	NA	0	56.0	1	NA	0	NA	0	20.0	1	NA	0	NA	0
Sampling Period 3	10.0-78.0	4	5.9	1	NA	0	NA	0	19.0	1	3.0	1	NA	0	6.4-23.0	2	NA	0	NA	0
Sampling Period 4	2.4-10.0	3	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0

Note 1: All concentration ranges are in parts per billion by volume (ppbv).

2: This column refers to the number of samples with concentrations above detection limits.

Table 9
Metals Matrix Spike Recoveries

Sampling Period	Parameter	Recovery (%)		
		Matrix Spike	Matrix Spike Dulpicate	Relative Percent Difference (RPD)
15-May-90 to 16-May-90	Arsenic	30	43	43
	Chromium	23	33	43
	Lead	13	39	200
06-Aug-90 to 07-Aug-90	Arsenic	65	47	28
	Chromium	89	89	0
	Lead	83	85	2
05-Nov-90 to 06-Nov-90	Arsenic	85.2	78.6	8
	Chromium	87.2	81.5	7
	Lead	17.0	19.6	15
26-Feb-91 to 27-Feb-91	Arsenic	123	102	17
	Chromium	120	126	5
	Lead	98	100	2
	Control Limits	80-120	80-120	20

Note: 1. For Sampling Period 1 (15 May 1990 - 16 May 1990):
6 of 6 recovery percentages fall outside of control limits
3 of 3 relative percent differences fall outside of control limits

2. For Sampling Period 2 (6 August 1990 - 7 August 1990):
2 of 6 recovery percentages fall outside of control limits (both for arsenic)
1 of 3 relative percent differences fall outside of control limits (for arsenic)

3. For Sampling Period 3 (5 November 1990 - 6 November 1990):
2 of 6 recovery percentages fall outside of control limits (both for lead)
0 of 3 relative percent differences fall outside of control limits

4. For Sampling Period 4 (26 February 1990 - 27 February 1990):
2 of 6 recovery percentages fall outside of control limits
(one for arsenic, one for chromium)
0 of 3 relative percent differences fall outside of control limits

Table 10
Duplicate Sample Results for Total Nuisance Dust and Metals

	Total Dust (ug/m3)		Arsenic (ug/m3)		Chromium (ug/m3)		Lead (ug/m3)	
	Conc.	D.L.	Conc.	D.L.	Conc.	D.L.	Conc.	D.L.
August 6-7, 1990								
Location 5	569	212	ND	2.1	ND	0.42	ND	2.6
Location 13	379	212	ND	2.1	ND	0.42	ND	2.6
November 5-6, 1990								
Location 5 (1)	201	236	ND	1.0	ND	0.11	ND	1.2
Location 13	70	200	ND	0.8	ND	0.10	ND	1.1
February 26-27, 1991								
Location 5	309	191	ND	52	ND	2.6	ND	5.2
Location 13	340	191	ND	52	ND	2.6	ND	5.2

Note: 1. The sampling pump at location 5 for November 5-6, 1990 stopped prematurely.

2. D.L.=Detection Limit

Table 11
Blank Sample Total Nuisance Dust Results

Sampling Date	Sample Location	Blank Mass Difference (ug)	
		Mass	D.L.
06-Aug-90 to 07-Aug-90	14	-310	200
	15	-280	200
	16	-310	200
	17	-330	200
	18	-320	200
	19	-340	200
	20	-400	200
06-Nov-90 to 07-Nov-90	14	100	200
	15	ND	200
	16	20	200
	20	ND	200
26-Feb-91 to 27-Feb-91	12	320	200
	14	330	200
	15	20	200
	16	50	200
	17	40	200
	18	40	200

D.L.=Detection Limit

Table 12
Reduced Sulfur Spike Recoveries

Sampling Period	Parameter	Recovery (%)		Relative Percent Difference (RPD)
		Matrix Spike	Matrix Spike Duplicate	
15-May-90	Hydrogen Sulfide	100	100	0
to	Methyl Mercaptan	100	100	0
16-May-90	Dimethyl sulfide	104	104	0
	Dimethyl Disulfide	104	107	4
06-Aug-90	Hydrogen Sulfide	118	63	47
to	Methyl Mercaptan	108	51	53
07-Aug-90	Dimethyl sulfide	109	109	0
	Dimethyl Disulfide	100	127	27
05-Nov-90	Hydrogen Sulfide	77	20	74
to	Methyl Mercaptan	65	38	42
06-Nov-90	Dimethyl sulfide	100	109	9
	Dimethyl Disulfide	127	118	7
26-Feb-91	Hydrogen Sulfide	62	44	29
to	Methyl Mercaptan	41	28	32
27-Feb-91	Dimethyl sulfide	91	100	10
	Dimethyl Disulfide	118	127	8
CONTROL LIMITS:		80-115	80-115	20

Table 13
Reduced Sulfur Compounds LCS/DCS Results

Compound	Date Analyzed	Lab Control Sample	Duplicate Control Sample	Recovery Percentage Difference
HYRDOGEN SULFIDE	17-May-90	91	89	2
		92	89	4
		96	89	8
		95	94	1
	08-Aug-90	88	98	11
		90	95	6
	08-Nov-90	95	89	7
	28-Feb-90	100	99	2
	Range:	88 to 100	89 to 99	1 to 11
	Limit:	80 to 115	80 to 115	20
METHYL MERCAPTAN	17-May-90	97	93	4
		95	93	2
		98	93	5
		99	99	0
	08-Aug-90	86	89	3
		84	87	4
	08-Nov-90	99	99	0
	28-Feb-90	88	88	0
	Range:	84 to 99	87 to 99	0 to 5
	Limit:	80 to 115	80 to 115	20
DIMETHYL SULFIDE	17-May-90	99	99	0
		100	99	1
		100	99	1
		102	104	2
	08-Aug-90	93	90	3
		95	95	0
	08-Nov-90	103	104	1
	28-Feb-90	95	93	2
	Range:	93 to 103	90 to 104	0 to 3
	Limit:	80 to 115	80 to 115	20

Table 14
Methane LCS/DCS Results

Compound	Date Analyzed	Lab Control Sample	Duplicate Control Sample	Recovery Percentage Difference
METHANE	08-Aug-90	100	99	1
	12-Nov-90	96	95	1
	28-Feb-91	100	94	6
		92	91	1
	Range:	92 to 100	91 to 99	1 to 6
	Limit:	80 to 115	80 to 115	20

Note 1: Methane control samples were not reported for Sampling Period 1 because the laboratory was building a historical database with which to set control limits for methane.

Table 15
VOC LCS/DCS Results

Compound	Date Analyzed	Lab Control Sample	Duplicate Control Sample	Recovery Percentage Difference
METHYLENE CHLORIDE	17-May-90	90	88	3
		86	87	1
		98	95	2
	08-Aug-90	108	103	5
		98	98	0
		91	93	3
	08-Nov-90	106	105	1
		97	105	8
	28-Feb-91	111	110	1
		114	115	2
	Range:	86 to 114	87 to 115	0 to 8
	Limit:	80 to 115	80 to 115	20
1,1 DICHLORO-ETHENE	17-May-90	92	89	3
		90	92	2
		92	92	1
	08-Aug-90	96	93	3
		94	96	2
		84	90	7
	08-Nov-90	107	107	1
		100	105	5
	28-Feb-91	107	104	2
		106	106	1
	Range:	84 to 107	89 to 107	1 to 7
	Limit:	80 to 115	80 to 115	20
TRICHLORO-ETHENE	17-May-90	94	95	1
		96	105	9
		101	99	1
	08-Aug-90	100	101	1
		102	98	4
		89	90	2
	08-Nov-90	102	102	1
		106	105	1
	28-Feb-91	112	106	3
		105	112	6
	Range:	89 to 112	90 to 112	1 to 9
	Limit:	80 to 115	80 to 115	20

Table 15 (continued)
VOC LCS/DCS Results

Compound	Date Analyzed	Lab Control Sample	Duplicate Control Sample	Recovery Percentage Difference
TOLUENE	17-May-90	89	88	1
		90	94	4
		92	96	4
	08-Aug-90	91	95	4
		95	92	3
		83	83	0
	08-Nov-90	100	100	0
		112	112	1
	28-Feb-91	103	99	4
		96	95	1
	Range:	83 to 112	83 to 112	0 to 4
	Limit:	80 to 115	80 to 115	20
1,1,2,2-TETRA-CHLOROETHANE	17-May-90	98	102	4
		98	106	9
		98	107	9
	08-Aug-90	99	100	2
		94	95	1
		81	87	7
	08-Nov-90	100	104	4
		112	115	3
	28-Feb-91	115	114	1
		103	106	9
	Range:	81 to 115	87 to 115	1 to 9
	Limit:	80 to 115	80 to 115	20

Table 16
Number of Valid Samples Achieved vs. Number Required
Task A-1, Baseline Air Survey

Analysis	Primary Sample		Duplicate Sample		Blank Sample		Lab-Spiked Sample	
	No. Required	No. Achieved	No. Required	No. Achieved	No. Required	No. Achieved	No. Required	No. Achieved
VOC	48	44	4	4	4	4	4	0
H2S/Mercaptans	48	44	4	4	4	4	4	4
Dust	48	32	4	3	4	11	4	0
As,Pb,Cr	48	22	4	2	4	11	4	2

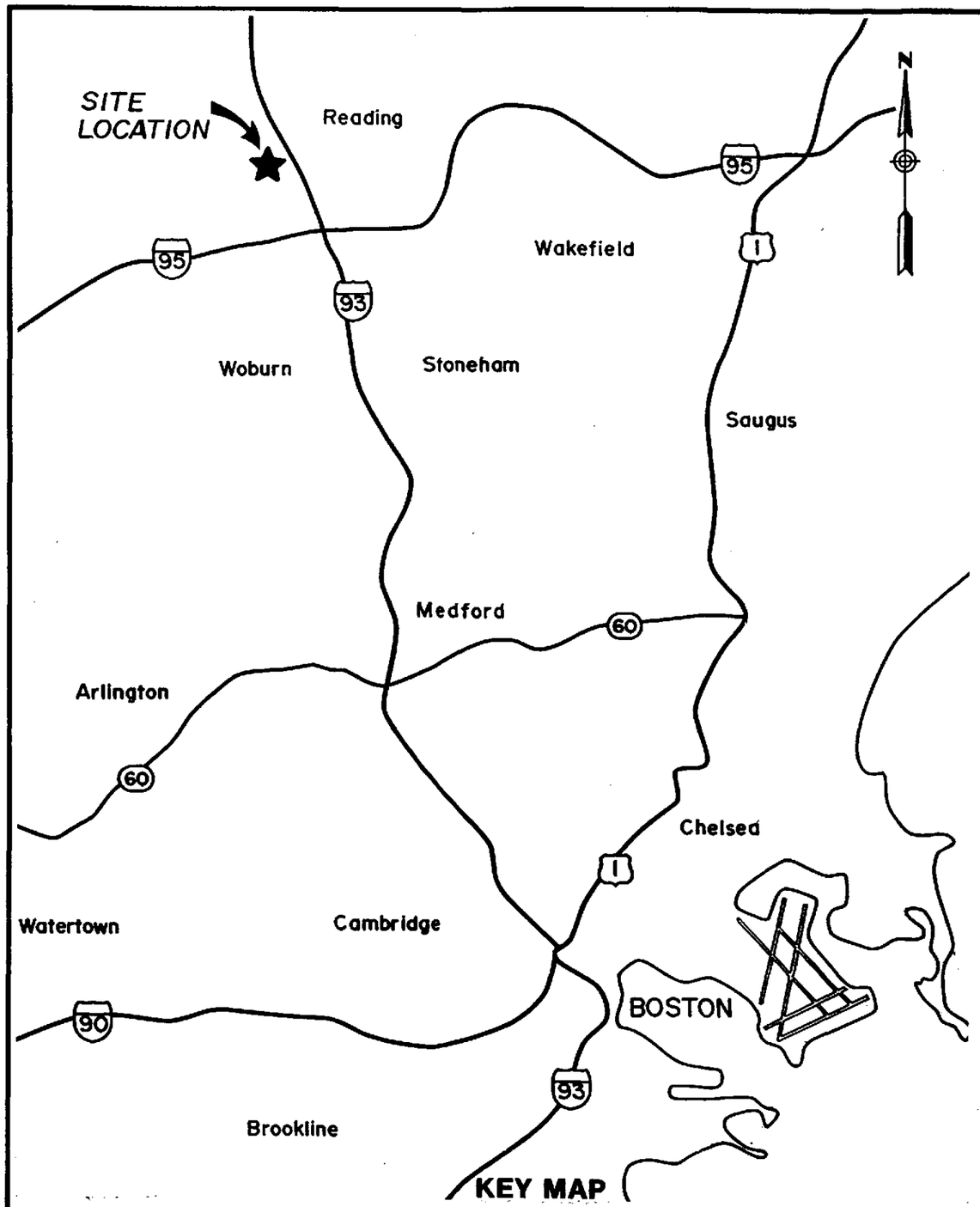
Table 17
Basis for Estimating the Ratio of Annoyance Threshold to Detection Threshold for Unpleasant Odors

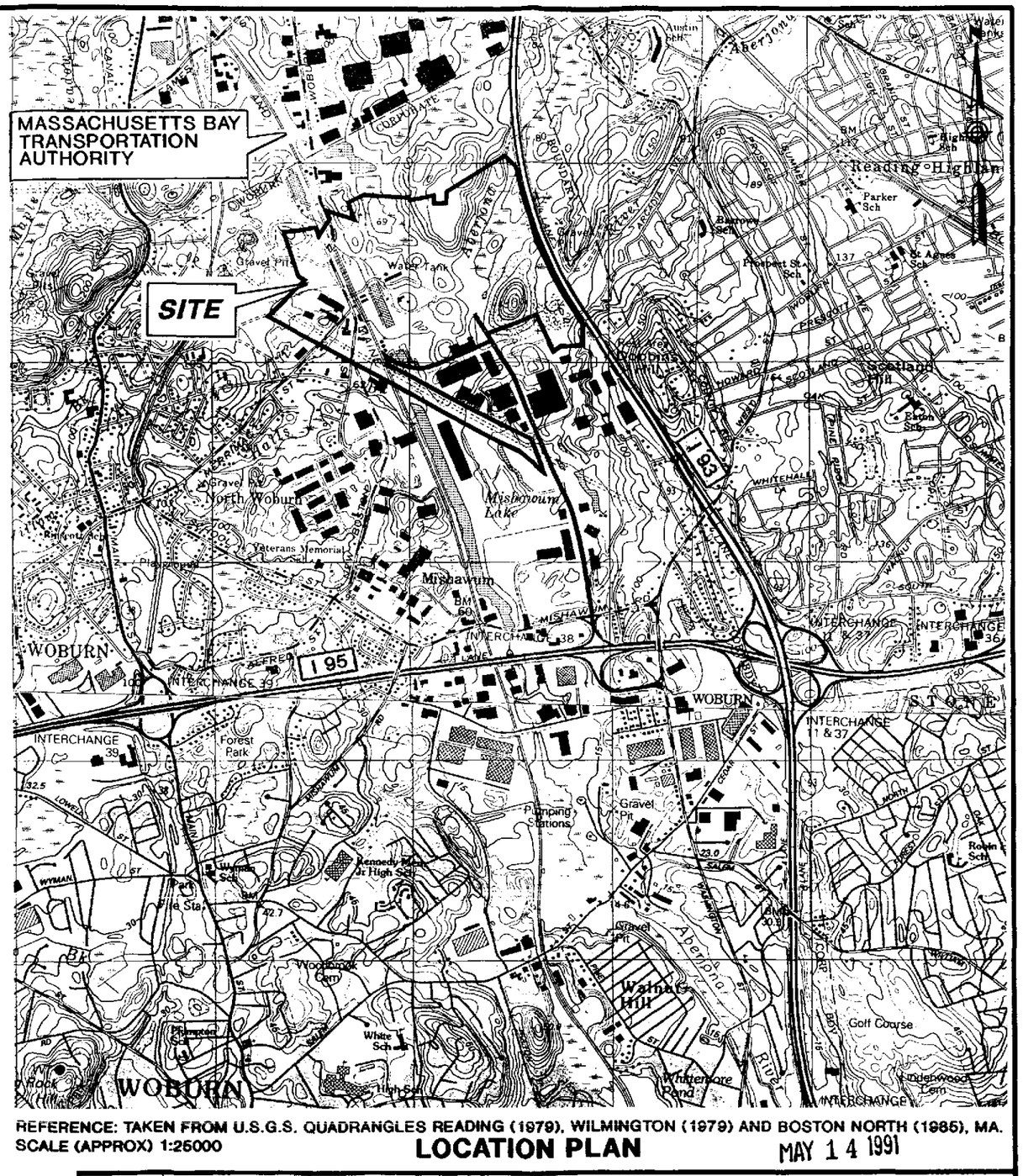
Odorous Substance	People Tested	Judgement Criterion	Annoyance to Detection Ratio	Source of Data (Author, year)
Hydrogen sulfide	Laboratory panel	Odor recognition	10	Winkler, 1975
34 unpleasant petrochemicals	Laboratory panel	Odor recognition	3.1	Hellman, 1974
Hydrogen sulfide	County fair visitors	Judged unpleasant	1.6	Adams, 1968
Kraft stack gases	Paper mill workers	Judged unpleasant	6	NCASI, 1971
Phenolics	Factory neighbors	Occasional headache, nausea	5	Winneke, 1977
Hydrocarbons & sulfur compounds	Factory neighbors	Occasional headache, nausea	15	Winneke, 1977

Geometric mean: 5.3 odor units

Standard deviation = x +/- 2

Source: Abstracted from AMOORE, John E., 1985.





REFERENCE: TAKEN FROM U.S.G.S. QUADRANGLES READING (1979), WILMINGTON (1979) AND BOSTON NORTH (1985), MA.
SCALE (APPROX) 1:25000

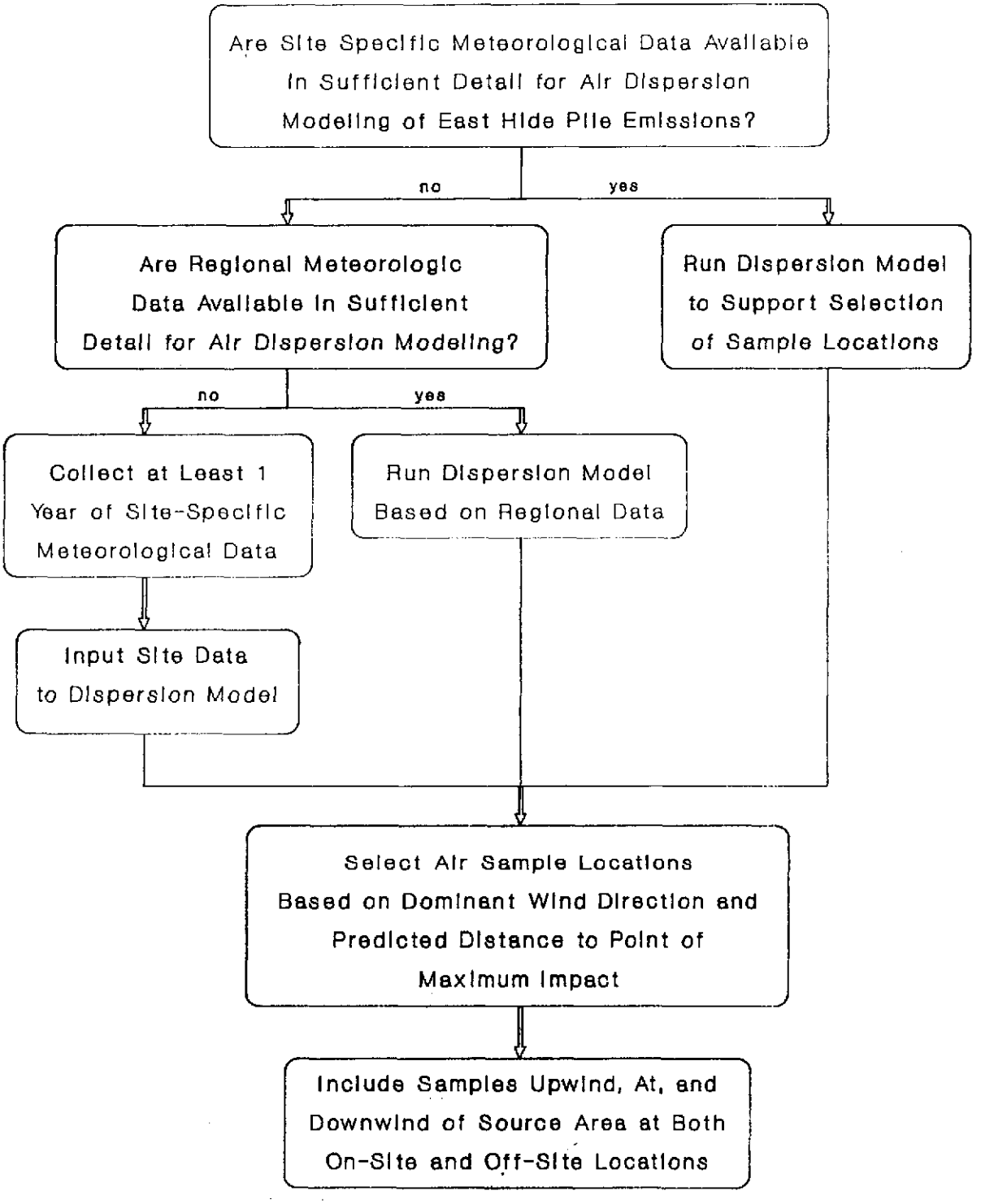
LOCATION PLAN

MAY 14 1991

JOB NO. 893-6255	SCALE AS SHOWN	KEY MAP AND LOCATION PLAN	
DRAWN LAS	DATE 04/18/91		
CHECKED MDS 5/6/91	DWG. NO. MA01-585		
Golder Associates		INDUSTRI-PLEX SITE REMEDIAL TRUST	FIGURE 1

152110

Assess Areas of Air Quality Impact for Sampling

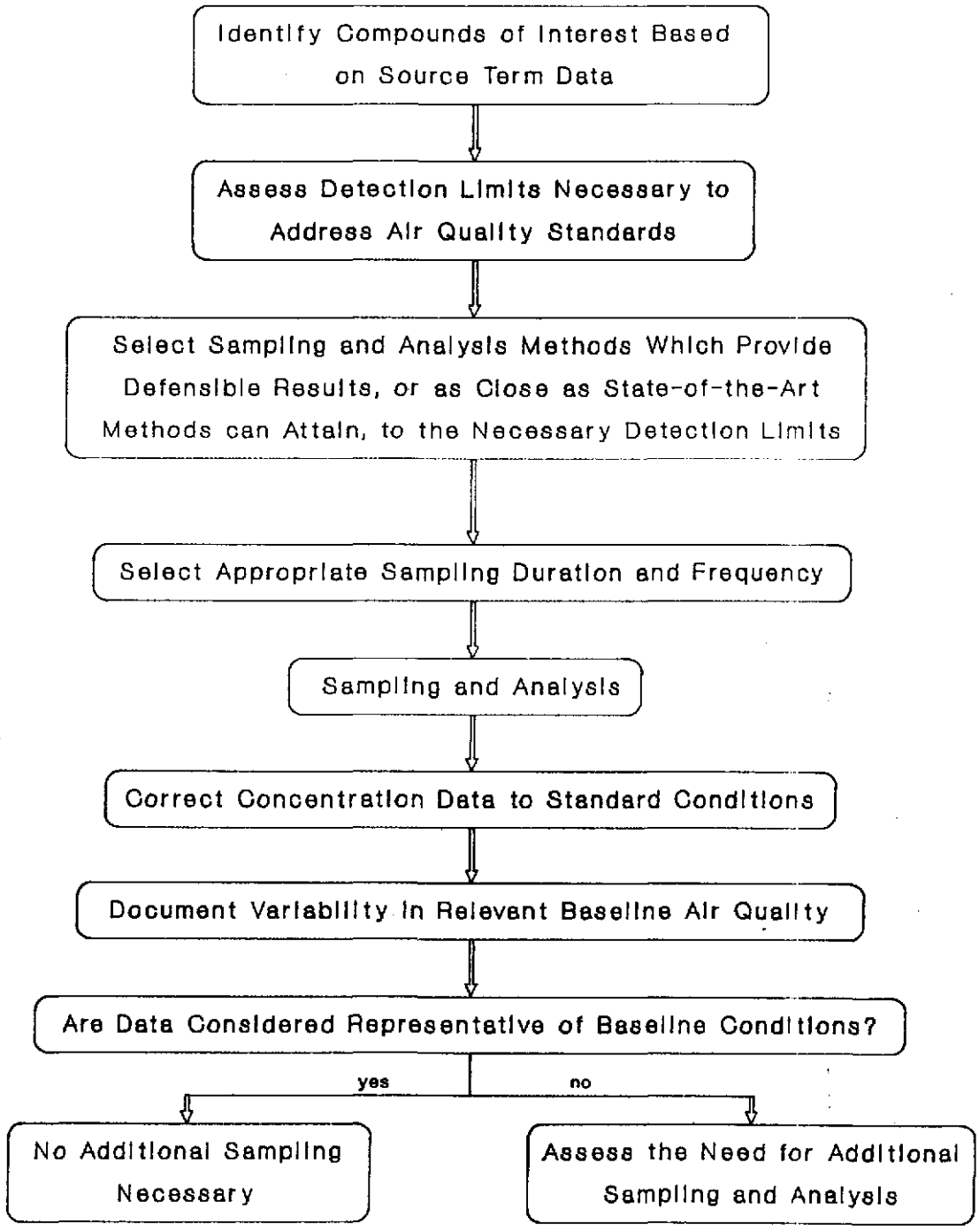


MAY 14 1991

JOB NO. 893-6255	SCALE N/A	**RATIONALE FOR ADDRESSING AIR DATA NEED No. 2**	
DRAWN MRM	DATE 11/17/89		
CHECKED	DWG. NO. MA01-067		
Golder Associates		INDUSTRI-PLEX SITE REMEDIAL TRUST	FIGURE 2

182978

Determine Baseline Concentration of Hazardous Volatile Compounds, Odorous Compounds, Dust, As, Pb, Cr in Dust at Selected Air Sampling Locations

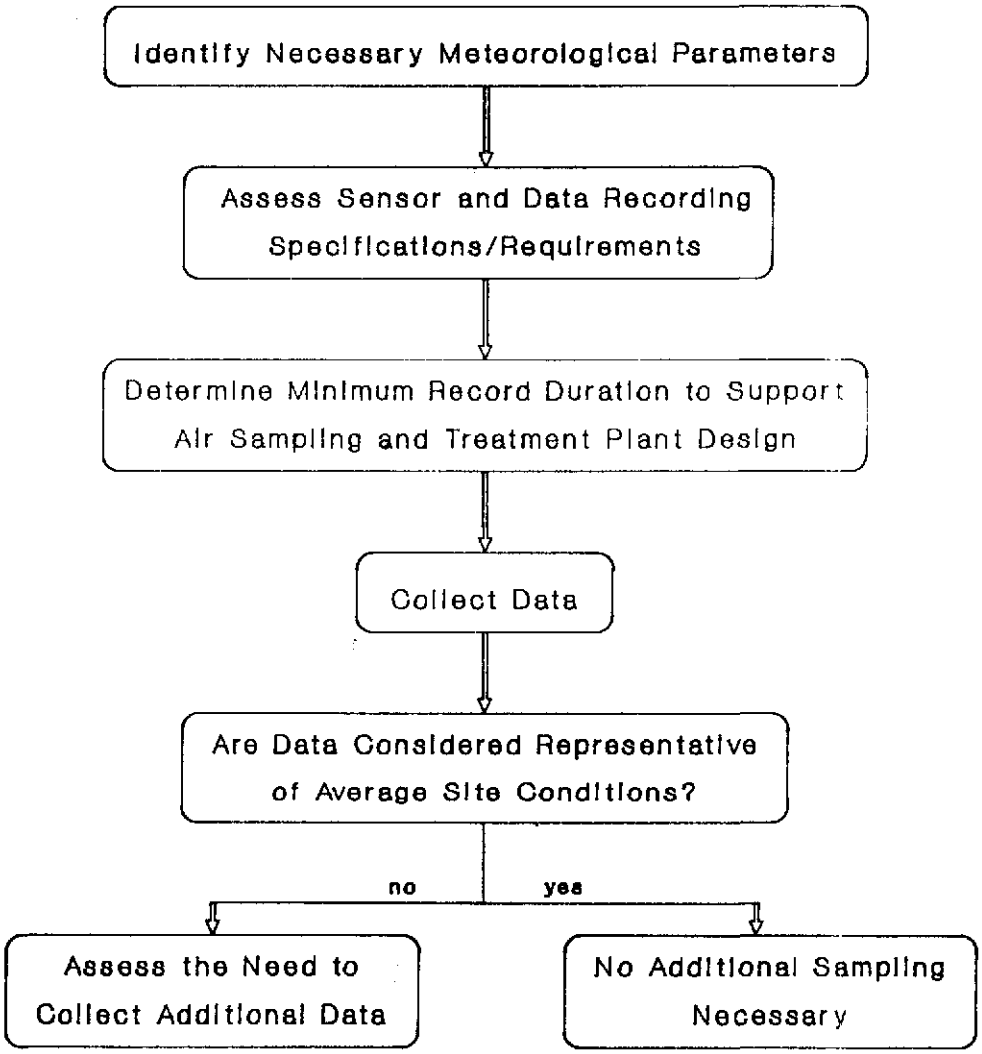


MAY 1 4 1991

JOB NO. 893-6255	SCALE N/A	**RATIONALE FOR ADDRESSING AIR DATA NEED No. 3**	
DRAWN MRM	DATE 11/17/89		
CHECKED	DWG. NO. MA01-068		
Golder Associates		INDUSTRI-PLEX SITE REMEDIAL TRUST	FIGURE 3

182078

Collect Site Specific Meteorological Data to Support Air Concentration Data Reduction, Treatment Plant(s) Design, and Correlation with Hide Pile Gas Emission Rate Measurements

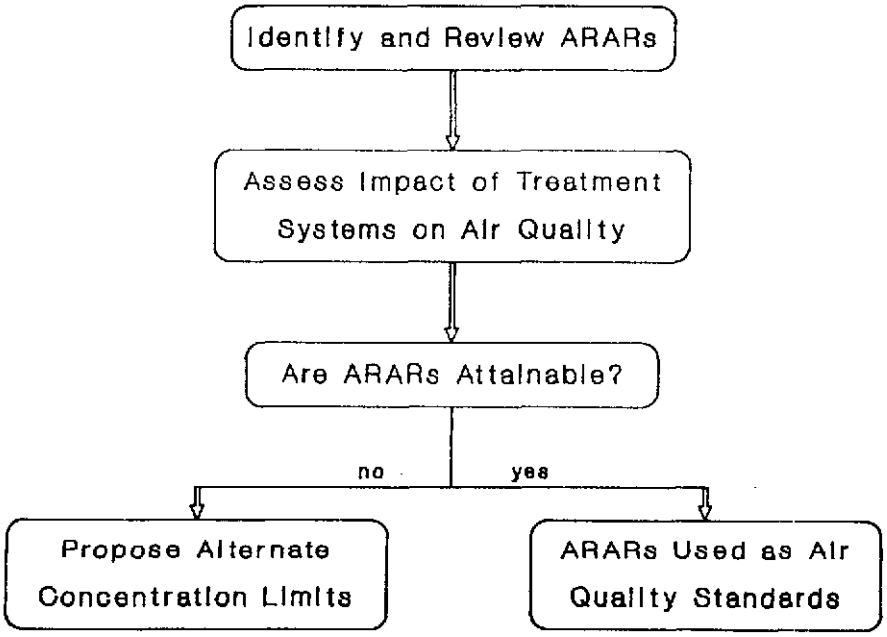


MAY 14 1991

JOB NO. 893-6255	SCALE N/A	RATIONALE FOR ADDRESSING AIR DATA NEED No. 4	
DRAWN MRM	DATE 11/17/89		
CHECKED	DWG. NO. MA01-072		
Golder Associates		INDUSTRI-PLEX SITE REMEDIAL TRUST	FIGURE 4

182978

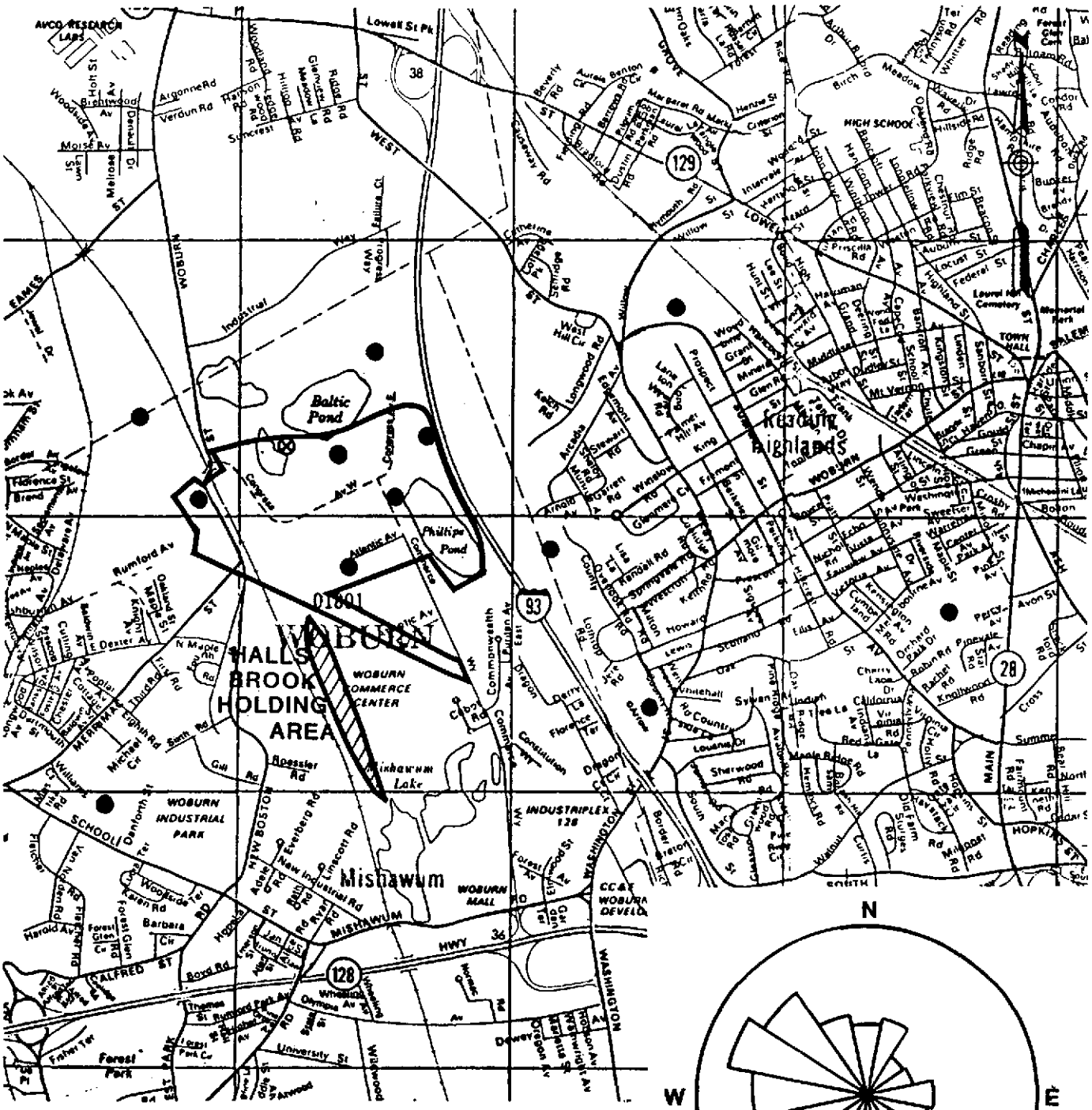
Determine Acceptable On-Site and Off-Site Air Quality Standards



MAY 1 4 1991

JOB NO. 893-6255	SCALE N/A	RATIONALE FOR ADDRESSING AIR DATA NEED No. 6	
DRAWN MRM	DATE 11/17/89		
CHECKED	DWG. NO. MA01-074		
Golder Associates		INDUSTRI-PLEX SITE REMEDIAL TRUST	FIGURE 5

183078



⊗ ODOR SOURCE AREA

● TENTATIVE SAMPLE LOCATION SUBJECT TO ACCESS

APPROXIMATE SITE BOUNDARY

0.2 0 0.2 0.4

scale miles

WIND ROSE DIAGRAM
BOSTON, MA

MAY 14 1991

JOB NO.	893-6255	SCALE	AS SHOWN
DRAWN	MRM	DATE	04/22/91
CHECKED		DWG. NO.	MA01-637

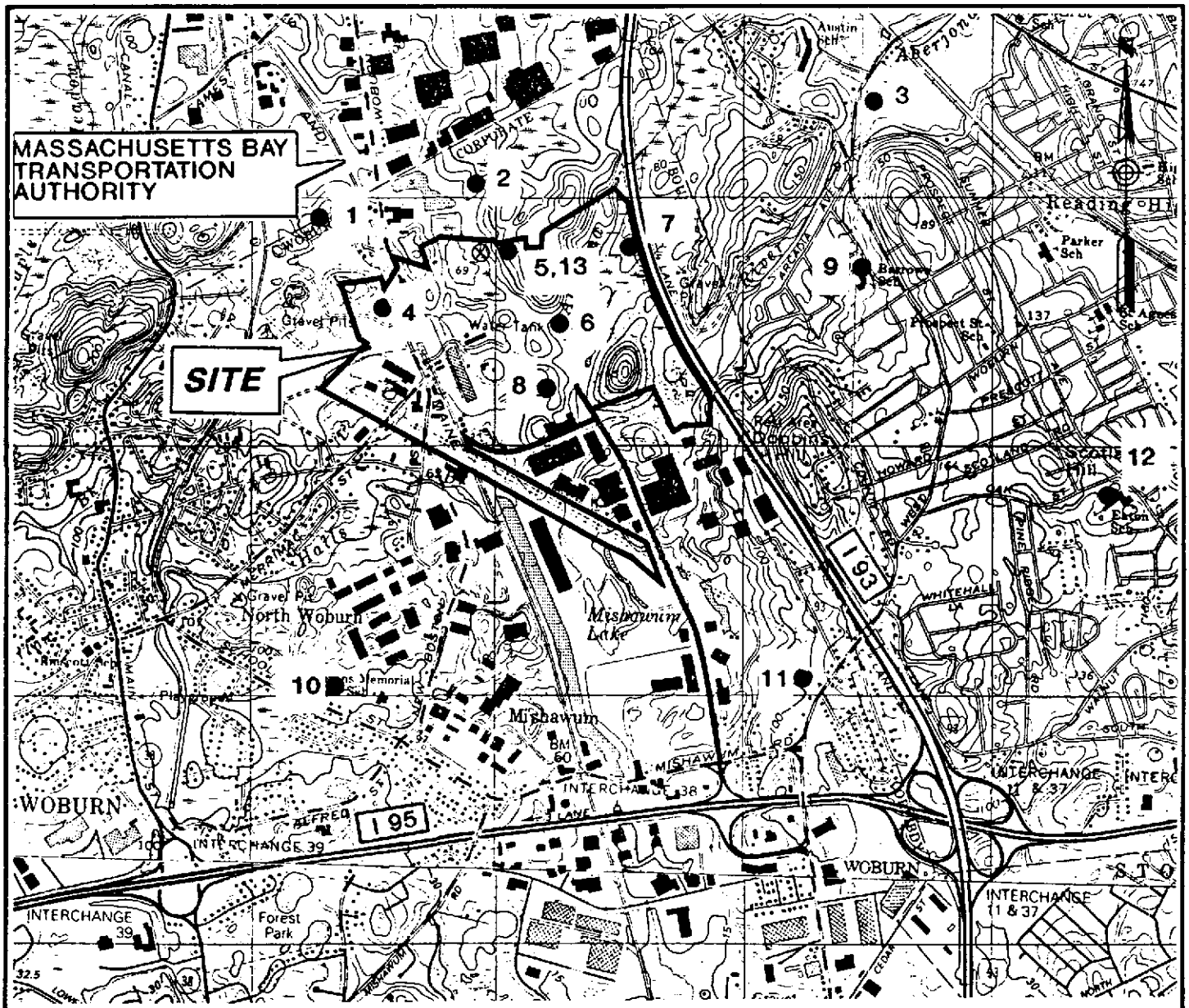
WORK PLAN AIR SAMPLE LOCATIONS

Golder Associates

INDUSTRI-PLEX SITE REMEDIAL TRUST

FIGURE 6

152978



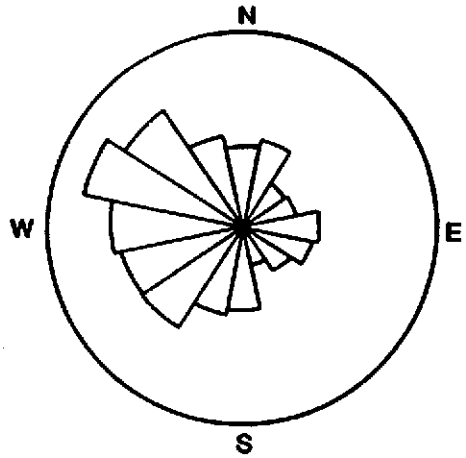
REFERENCE: TAKEN FROM U.S.G.S. QUADRANGLES READING (1979), AND BOSTON NORTH (1985), MA.
SCALE (APPROX) 1"=2000'

LEGEND

⊗ EAST HIDE PILE

● SAMPLE LOCATION

——— APPROXIMATE SITE BOUNDARY



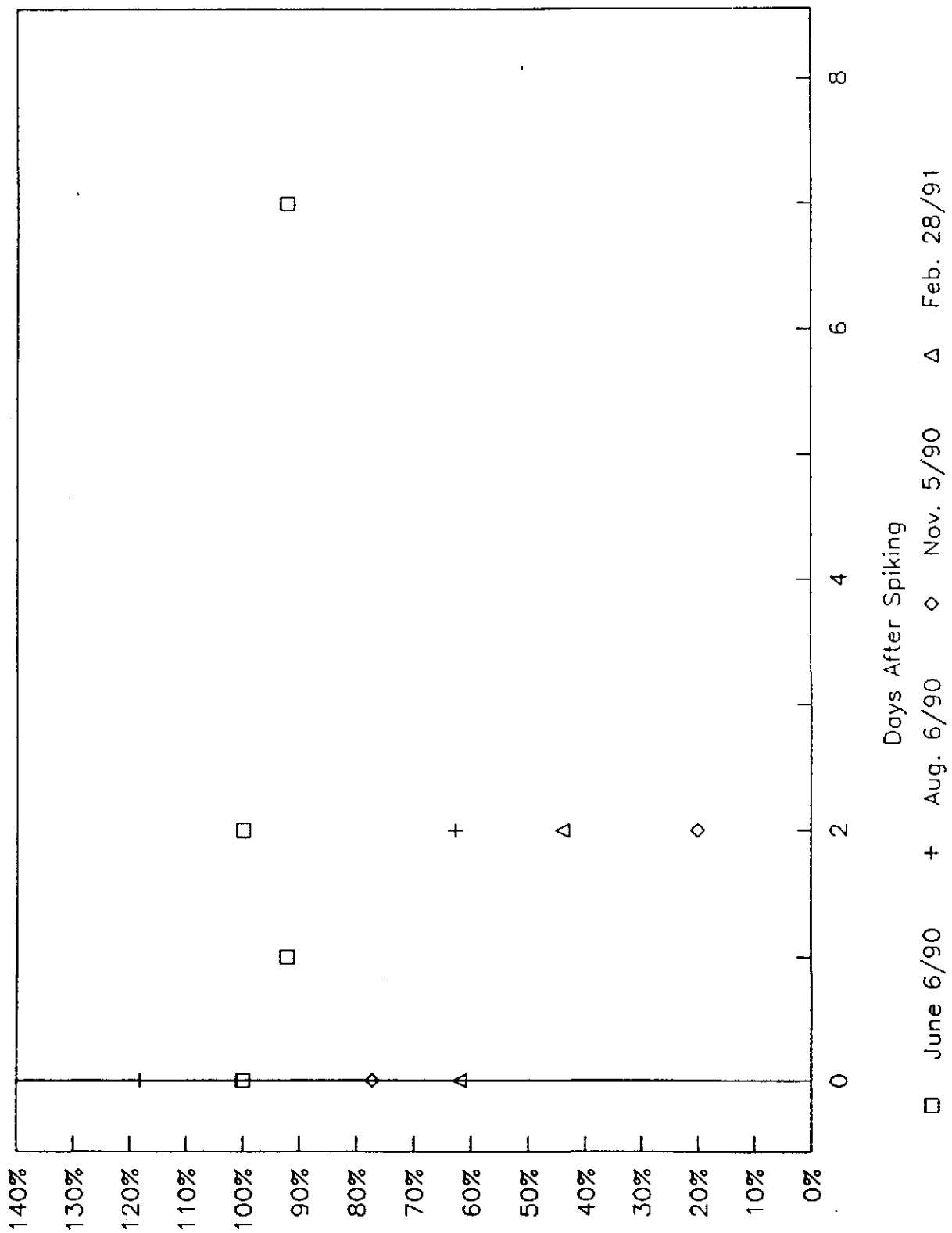
2000 0 2000
scale feet

MAY 14 1991

WIND ROSE DIAGRAM
BOSTON, MA

JOB No.: 893-6255	SCALE: AS SHOWN	**ACTUAL AIR SAMPLE LOCATIONS**	
DRAWN: JSG	DATE: 04/26/91		
CHECKED: 4/26/91	DWG. No.: MA01-593		
Golder Associates	INDUSTRI-PLEX SITE REMEDIAL TRUST	FIGURE 7	

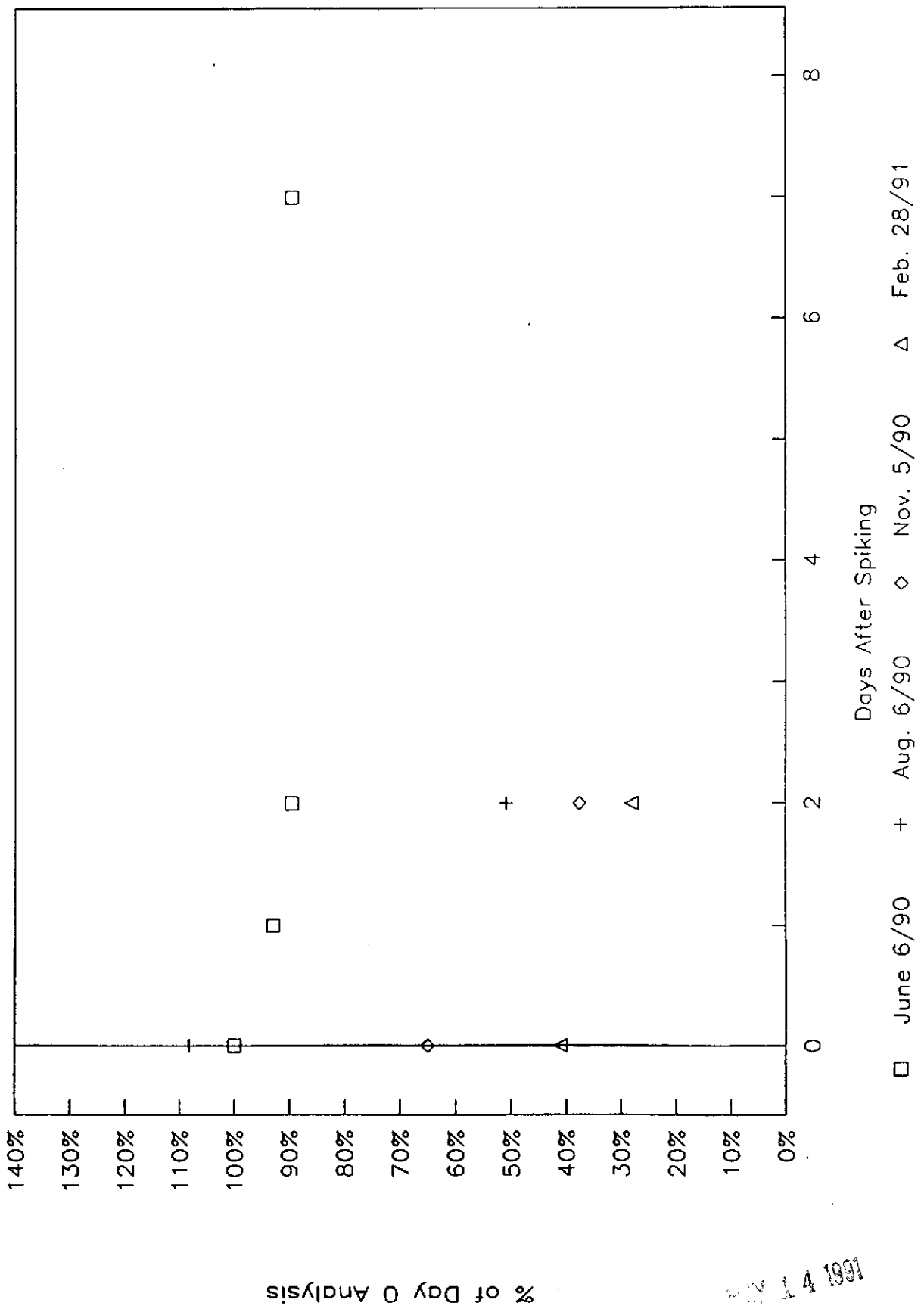
156696



MAY 1 4 1991

JOB No.: 893-6255	SCALE: N/A	**HYDROGEN SULFIDE STABILITY**	
DRAWN: RDT	DATE: 04/22/91		
CHECKED:	DWG. No.: MA01-641		
Golder Associates		INDUSTRI-PLEX SITE REMEDIAL TRUST	FIGURE: 8

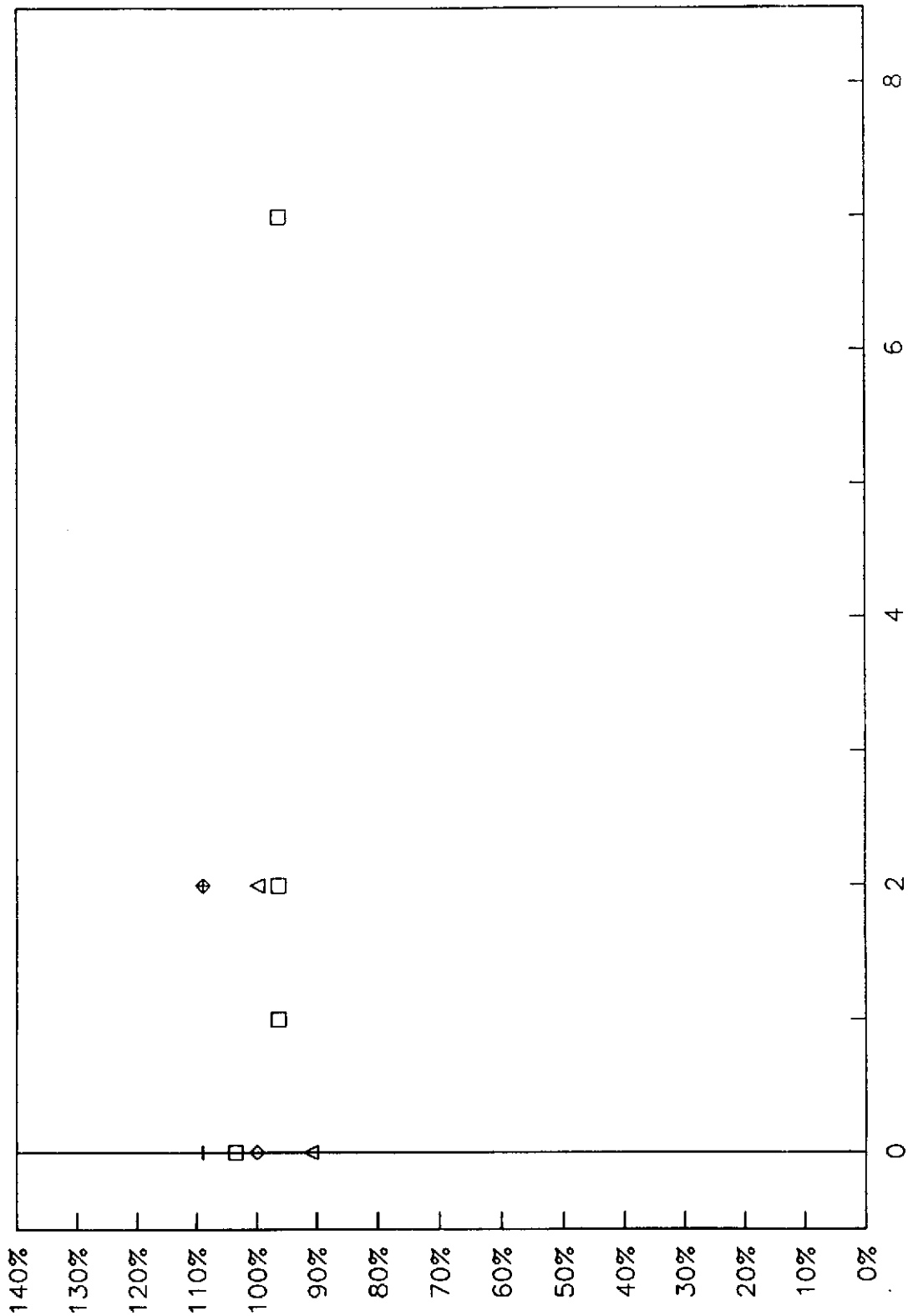
158696



MAY 14 1991

JOB No.: 893-6255	SCALE: N/A	**METHYL MERCAPTAN STABILITY**	
DRAWN: RDT	DATE: 04/22/91		
CHECKED:	DWG. No.: MA01-642		
Golder Associates		INDUSTRI-PLEX SITE REMEDIAL TRUST	FIGURE 9

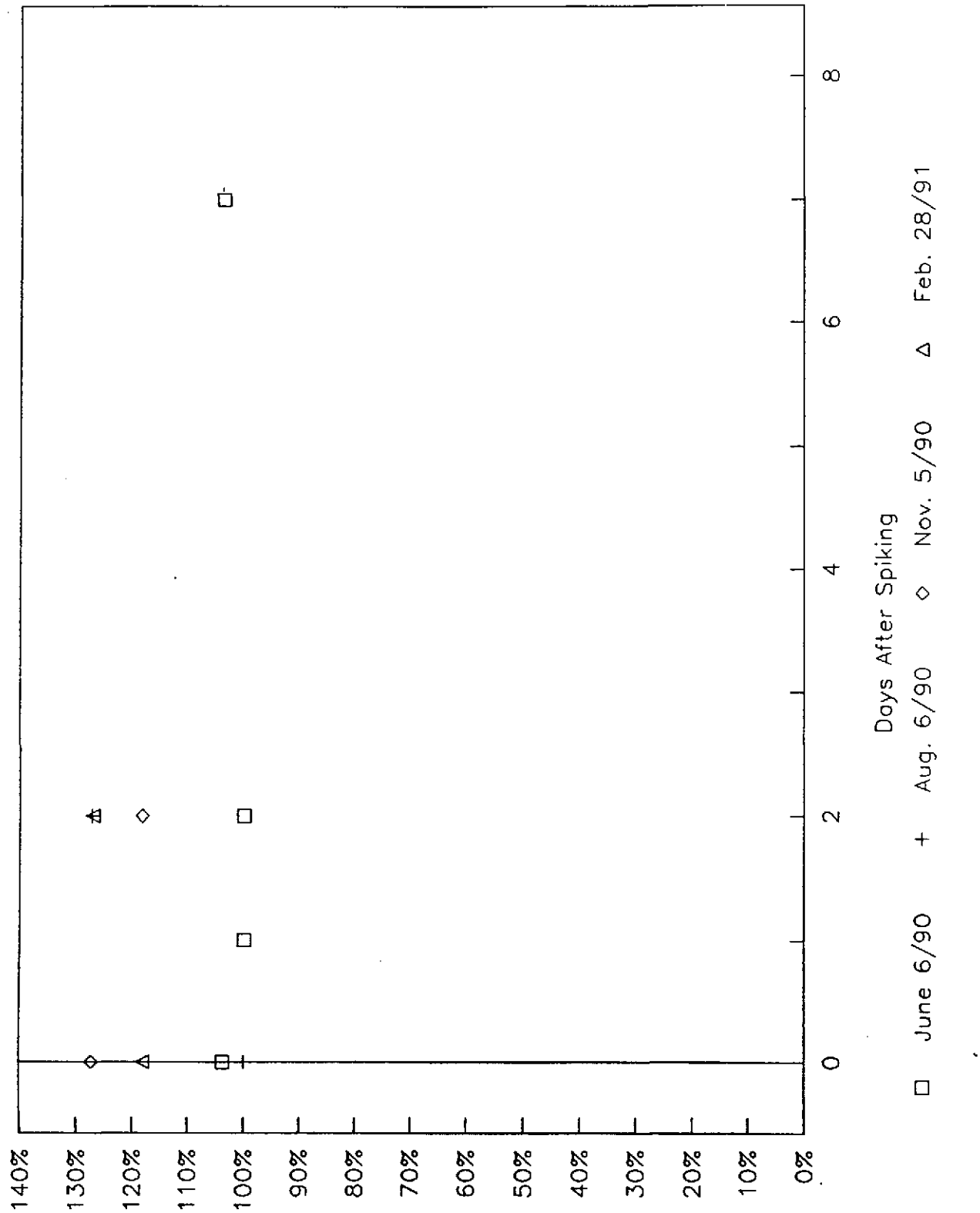
158696



MAY 1 4 1991

JOB No.: 893-6255	SCALE: N/A	**DIMETHYL SULFIDE STABILITY**	
DRAWN: RDT	DATE: 04/22/91		
CHECKED:	DWG. No.: MA01-643		
Golder Associates		INDUSTRI-PLEX SITE REMEDIAL TRUST	FIGURE 10

158898



MAY 1 4 1991

JOB No.: 893-6255	SCALE: N/A	**DIMETHYL DISULFIDE STABILITY**	
DRAWN: RDT	DATE: 04/22/91		
CHECKED:	DWG. No.: MA01-644		
Golder Associates		INDUSTRI-PLEX SITE REMEDIAL TRUST	FIGURE 11

158696

APPENDIX A

Specifications for the Equipment Used in the Collection of Meteorological Data

CLIMA CORPORATION

IMP-860 DATALOGGER

- o Direct sensor inputs
- o Control outputs
- o User programmable
- o Built-in data instruction set
- o Large internal data storage
- o Solid-state data cartridges
- o Phone line, dedicated line or radio telemetry
- o PC compatible
- o Low power
- o Choice of enclosures
- o Built-in surge protection

The IMP-860 Datalogger is an extremely versatile, state-of-the-art, digital data acquisition system designed for environmental monitoring applications. It can function as a remote, stand-alone station or can be operated with a central computer either by itself or in a network with other units.

Sensor inputs are accepted directly by the IMP-860, thereby eliminating the need for additional signal conditioning equipment. The signals will be processed as necessary, computations will be performed as required, and the data will be stored in internal memory for later retrieval by a remote computer or on a removable storage medium for manual retrieval.

User programming of the IMP-860 is easily accomplished using either an IBM PC-compatible computer or an operational, portable keyboard/display unit. A comprehensive set of programming instructions is included which allows a multitude of calculations to be performed on any desired channel, including interactions between channels. A standard program is available and can be modified by the user at any time.

The following electrical specifications are valid for an ambient temperature range of -25 °C to +50 °C unless otherwise specified.

ANALOG INPUTS

NUMBER OF CHANNELS: 12 single ended or 6 differential with any combination, software selectable.

CHANNEL EXPANSION: Increments of 32 channels multiplexed through a single **IMP-860** channel with the Model **CAM32 Relay Scanner. Maximum of 6 CAM32s possible.**

ACCURACY OF VOLTAGE MEASUREMENTS AND ANALOG OUTPUT VOLTAGES: 0.2% of FSR, 0.1% of FSR (0 to 40 °C).

RANGE AND RESOLUTION: Ranges are software selectable for any channel. Resolution for single ended measurements is twice the value shown.

Full Scale Range	Resolution
±2.50 volts	333. microvolts
±0.25 volts	33.3 microvolts
±25.0 millivolts	3.33 microvolts
± 7.5 millivolts	1.00 microvolts
± 2.5 millivolts	0.33 microvolts

INPUT SAMPLE RATES: The fast or slow A/D conversion uses a 250 us or 16.666 ms signal integration time (16.666 ms is one AC power line cycle). Differential measurements include a second sampling with reversed input polarity to reduce thermal offset and common mode errors. Input sample rates are the time required to measure and convert the result to engineering units. Times do not include the self-calibration measurement which occurs once per instruction.

Fast single ended voltage:	2.4 ms
Fast differential voltage:	3.7 ms
Slow single ended voltage:	18.8 ms
Slow differential voltage:	37.0 ms
Fast dif. thermocouple:	8.3 ms

INPUT NOISE VOLTAGE:
Fast differential — 0.83 microvolts RMS
Slow differential — 0.10 microvolts RMS

COMMON MODE RANGE: ±2.5 volts.

DC COMMON MODE REJECTION: >140 dB.

NORMAL MODE REJECTION: 70 dB (60 Hz with slow differential measurement).

INPUT CURRENT: 3 nanoamps max.

INPUT RESISTANCE: 200 gigohms.

EXCITATION OUTPUTS

DESCRIPTION: The IMP-860 has 3 switched excitations, active only during measurement, with only one output active at any time. The off state is high impedance.

RANGE: ±2.5 volts.

RESOLUTION: 0.67 millivolts.

ACCURACY: Same as voltage input.

OUTPUT CURRENT: 20 mA @ ± 2.5 V, 35 mA @ ± 2.0 V, 50 mA @ ± 1.5 V.

FREQUENCY SWEEP FUNCTION: A swept frequency square wave output between 0 and 2.5 volts is provided for vibrating wire transducers. Timing and frequency range are specified by the instruction.

PERIOD AVERAGING MEASUREMENTS

DEFINITION: The time period for a specified number of cycles of an input frequency is measured, then divided by the number of cycles to obtain the average period of a single cycle.

INPUTS: Any single ended analog channel with configuration defined in the user program. Signal dividing may be required to eliminate interference with measurements on adjacent channels.

INPUT FREQUENCY RANGE:

Range Code	Preamp Gain	Input Hysteresis	Maximum Frequency
4	1	10 mV	200 kHz
3	10	1 mV	50 kHz
2	33	300 uV	20 kHz
1	100	100 uV	8 kHz

REFERENCE ACCURACY: ±20 ppm.

RESOLUTION: ±60 nanoseconds divided by the number of cycles measured. Resolution is reduced by signal noise and for signals with a slow transition through the zero voltage threshold.

TIME REQUIRED FOR MEASUREMENT: Signal period times the number of cycles measured plus 1.5 cycles; minimum measurement time is 2 ms.

RESISTANCE AND CONDUCTIVITY MEASUREMENTS

ACCURACY: 0.015% of full scale bridge output, limited by the matching bridge resistors. The excitation voltage should be programmed so the bridge output matches the full scale input voltage range.

MEASUREMENT TYPES: 6 wire and 4 wire full bridge; 4 wire, 3 wire, and 2 wire half bridge. Bridge measurements are ratiometric and dual polarity to eliminate thermal emf's. AC resistance measurements use a dual polarity 750 us excitation pulse for ionic depolarization, with the signal integration occurring over the last 250 us.

PULSE COUNTERS

NUMBER OF PULSE COUNTER CHANNELS: 2 eight bit or 1 sixteen bit selectable.

MAXIMUM COUNT RATE: 2000 Hz, eight bit counters; 250 kHz, sixteen bit counters. Pulse counter channels scanned at 8 Hz.

MODES: Switch closure, high frequency pulse, and low level AC.

SWITCH CLOSURE MODE
Minimum Switch Closed Time: 5 ms.
Minimum Switch Open Time: 6 ms.
Maximum Bounce Time: 1 ms open without count.

HIGH FREQUENCY PULSE MODE
Minimum Pulse Width: 2 us.
Maximum Input Frequency: 250 kHz.
Voltage Thresholds: Count upon transition from below 1.5 V to above 3.5 V.
Maximum Input Voltage: ±20 V.

LOW LEVEL AC MODE
(Typical of magnetic pulse flow sensors, selected anemometers, etc.)

Min. AC Input Voltage: 6 mV RMS.
Input Hysteresis: 11 mV.
Max. AC Input Voltage: 20 V RMS.

Frequency Range:

AC Input (RMS)	Range
20 millivolts	1 Hz to 100 Hz
50 millivolts	0.5 Hz to 400 Hz
150 millivolts to 20 V	0.3 Hz to 1000 Hz

(Consult factory if higher frequencies are desired.)

DIGITAL I/O PORTS

8 ports, software selectable as binary inputs or control outputs.

OUTPUT VOLTAGES (no load):
high — 5 V ± 0.1 V; low — < 0.1 V.

OUTPUT RESISTANCE: 500 ohms.

INPUT STATE: high — > 3 V; low — < 0.8 V.

INPUT RESISTANCE: 100 kohms.

TRANSIENT PROTECTION

All input and output connections to the **IMP-860** module are protected using RC filters or transzorbs connected to a heavy copper bar between the circuit card and the case. The **IMP-860** Wiring Panel includes additional spark gap and transzorb protection.

CPU AND INTERFACE

PROCESSOR: Hitachi 6303.

MEMORY: 32k ROM, 16k RAM expandable to 64k.

DISPLAY: 8 digit LCD (0.5" digits).

PERIPHERAL INTERFACE: 9 pin D-type connector for keyboard/display, storage module, cassette, modem, printer, and RS232 adapter. Baud rates selectable at 300, 1200, 9600, and 76,800.

CLOCK ACCURACY: ±1 minute per month.

MAXIMUM PROGRAM EXECUTION RATE: System tasks initiated in sync with real-time up to 64 Hz. One measurement with tape transfer is possible at this rate without interruption.

SYSTEM POWER REQUIREMENTS

VOLTAGE: 9.6 to 16 volts.

TYPICAL CURRENT DRAIN: 0.5 mA quiescent, 13 mA during processing, and 35 mA during analog measurement.

BATTERIES: 7.5 Ahr alkaline D-cells or 5 Ahr rechargeable lead acid batteries, standard.

PHYSICAL SPECIFICATIONS

SIZE: 7.8" x 3.5" x 1.5"; 9" x 3.5" x 2.9" with **IMP-860** Wiring Panel. Input connectors extend length 0.15".

WEIGHT: 2 lbs.

WARRANTY

Two years against defects in materials and workmanship.

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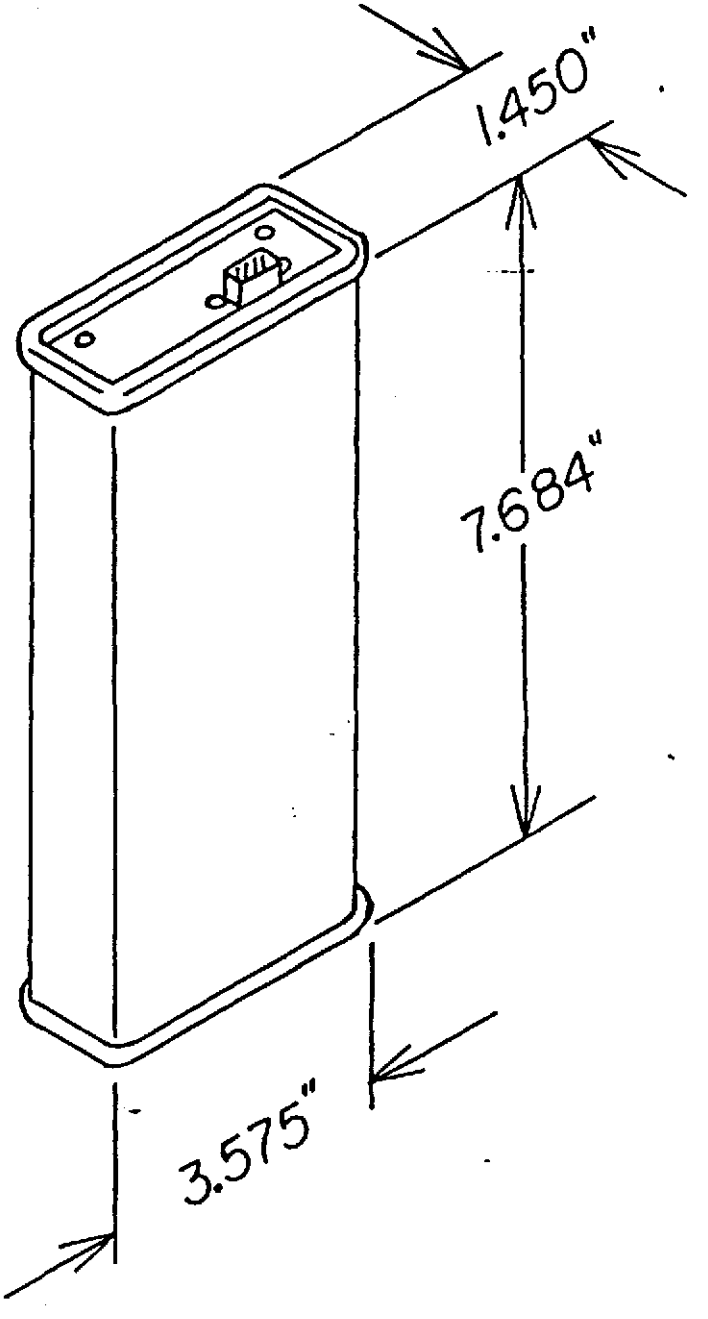
Storage Modules

The Climatronics P/N CSM192 and P/N CSM716 Solid State Storage Modules are designed for use with Climatronics IMP-850 and IMP-860 Data Loggers. The storage modules contain battery-backed, solid state CMOS RAM in a stainless steel cannister. The P/N CSM192 has 192,976 bytes and the P/N CSM716 has 716,672 bytes of RAM for data and program storage. While use with the IMP-850 data logger permits only data and program storage, the IMP-860 allows access to the data in a storage module via various telecommunication links. Up to 8 addressable storage modules can be connected in an IMP-860 system.

Please consult the factory for specific applications.



CSM192 and CSM716 STORAGE MODULES

STORAGE CAPACITY
CSM192 - 192,000 bytes; 96,000 Final Storage locations
CSM716 - 716,000 bytes; 358,000 Final Storage locations

PACKAGING
Sealed, stainless steel cannister.
Dimensions: 7.8in. x 3.5in. x 1.5in.

POWER REQUIREMENTS
5 VDC supplied by the data logger on pin 1 of the 9-pin connector.
Typical current drain:
when active and processing - 18 ma
active but not processing - 3 ma
standby state ("asleep" but still connected to data logger) - 250 ua

MEMORY BACKUP POWER
3.5 VDC lithium thionyl chloride battery. Battery life is temperature-dependent; 5 - 10 years @ 25 deg C, 4 - 8 years @ -25 deg C; and 2 -3 years @ 50 deg C.

MEMORY CONFIGURATION
User selectable for either ring-style or fill-and-stop memory.

FILE MARK
A File Mark is automatically placed in the data when the Storage Module is first connected to a data logger or upon command from the IMP-860 when it compiles a program. The user can place a File Mark in the data in the #9 Mode in the IMP-860.

BAUD RATE
IMP-850 - 76,800 or 9,600 baud, detected by the Storage Module.
IMP-860 - 9.600 baud unless directed otherwise by the CR10.

NOTE: The rate at which the Storage Module can store continuous (no pause between transmissions) data is 5,600 bytes per second.

DATA RETRIEVAL
Retrieval of data from the Storage Module can be accomplished either:
1) automatically with the CPC201 cord and program SMCOM or
2) through the use of the telecommunication commands in program TERM. TERM is supplied with the CPC206 data logger support software.
3) Automatically with the CSM232A-Storage Module-RS232 interface and CPC206 software with program SMCOM

CLIMATRONICS CORPORATION

Wind Mark III Wind Sensors

- **Low Threshold**
- **Low Cost**
- **Low Power CMOS Design**
- **Lightweight**
- **Optional External Heaters**

Climatronics' Wind Mark III (WM-III) Wind Sensors combine accuracy and reliability with low cost.

The WM-III sensors meet Environmental Protection Agency's (EPA) Prevention of Significant Deterioration (PSD) requirements. They are also well suited for general wind monitoring applications.

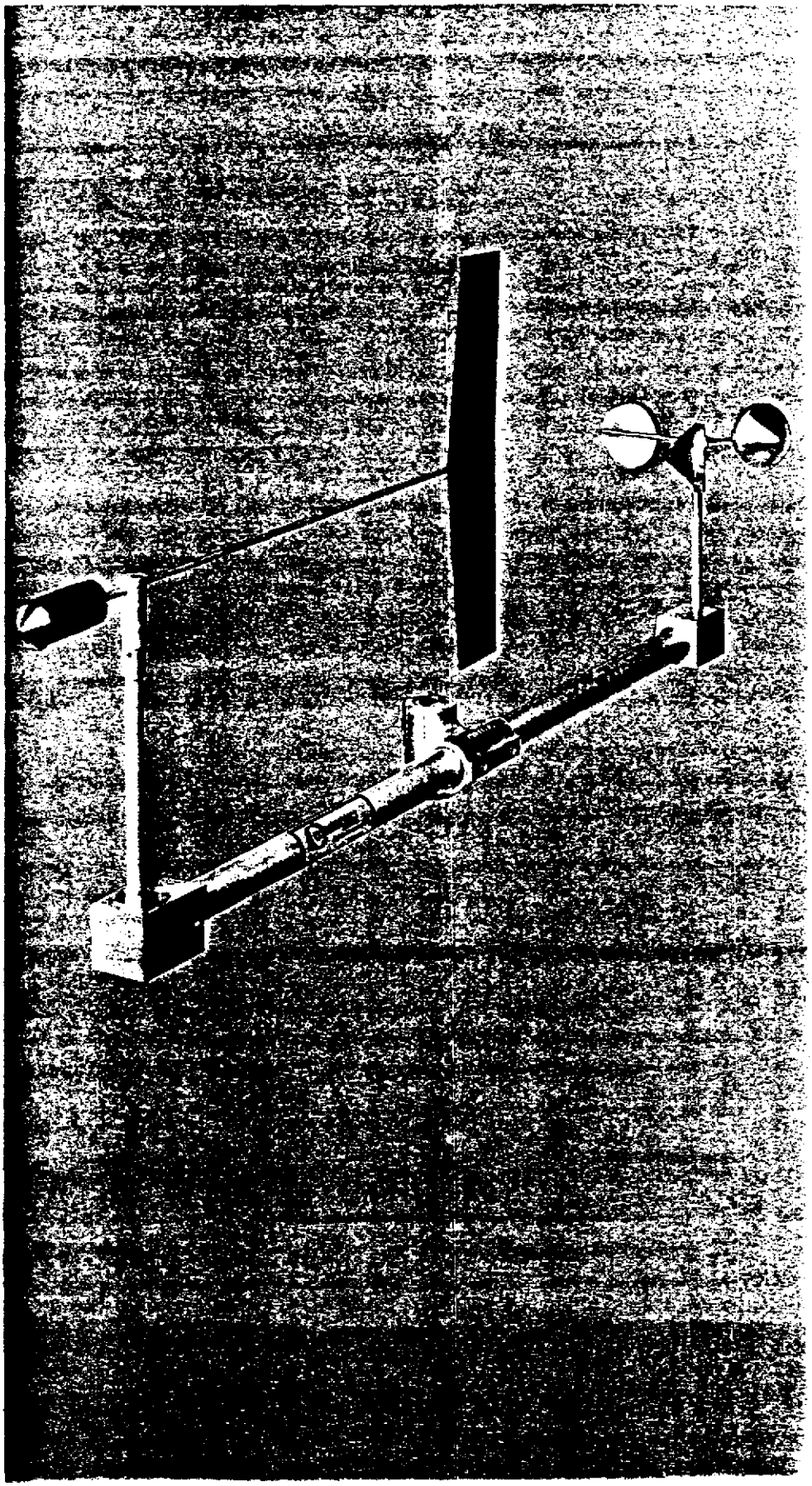
Wind speed is sensed by a three-cup anemometer and is converted to an electrical signal by a 20-hole photochopper, which uses a solid state light source for maximum reliability. Wind direction is sensed by a counterbalanced wind vane coupled to a precision, low-torque potentiometer. Both the wind speed and wind direction sensors use stainless steel precision ball bearings for maximum life and low threshold. Traceability to NBS is available as an option for each anemometer cup assembly by comparison testing against an NBS transfer standard in our wind tunnel test facility.

The sensors and their crossarm are an integral unit. The prewired crossarm mounts on a 3/4-inch IPS vertical pipe stub (1.05 inch O.D.). Orientation of the crossarm is along an East-West plane.

Optional external heaters for both sensors are available. These heaters consume approximately 40 watts of power and are thermostatically controlled.

The WM-III sensor is also available as a wind speed only (P/N 100108-1) or wind direction only (P/N 100108-2) instrument.

Recently, an improved, ruggedized aluminum cup (P/N 101286) and magnesium vane (P/N 101292) combination has been made part of the WM-III sensor package. The original stainless steel cups (P/N 100160) and vinylclad vane (P/N 100107) can still be provided as options. To safely transport the WM-III sensors with cups and vane, a transit case (P/N 100255) is available.



Signal conditioners for the WM-III sensors are available in modular form with a variety of full scale ranges, engineering units, outputs, and several other options. Please consult the Modular Meteorological System (MMS) and the Remote Meteorological System (RMS) bulletins for more details.

The WM-III sensors are standard equipment in the Utility Wind System and the Electronic Weather Station (EWS). Please consult these bulletins for additional information.

SENSOR SPECIFICATIONS

PERFORMANCE	WM-III WIND SPEED	WM-III WIND DIRECTION
Accuracy	±0.11 m/s (0.25 mph) or +1.5%	±3°
Threshold	< 0.45 m/s (< 1.00 mph)	< 0.45 m/s (< 1.00 mph)
Distance Constant	4.6m (15.0 ft.) of air max. 2.4m (8.0 ft.) of air max.-optional	4.6m (15.0 ft.) of air max. 2.4m (8.0 ft.) of air max.-optional
Damping Ratio		0.4 to 0.6 at 10° initial angle of attack
Operating Range	0-55 m/s (0-125 mph)	0° to 360° — mechanical 0° to 355° — electrical

ELECTRICAL SPECIFICATIONS

Signal Output	Nominal 2.0 Vpp into 4.7 K ohm, frequency proportional to wind speed, amplitude dependent on supply voltage	Variable DC voltage, magnitude proportional to wind direction.
Power Requirements*	6-12 Vdc at 1 mA nominal	Max. 5 mA through 2 K ohms

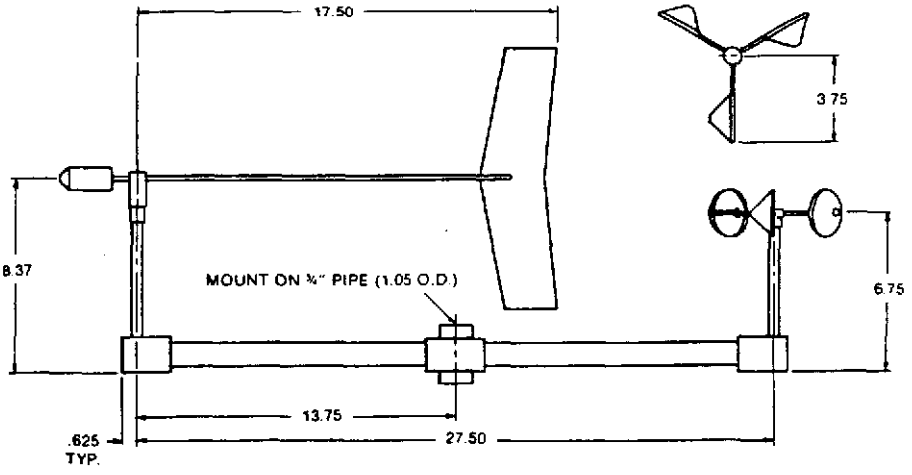
*Proper power provided by Climatronics' signal conditioner.

PHYSICAL SPECIFICATIONS

Weight	Less than 0.9 kg. (2 lbs.)	Less than 0.9 kg. (2 lbs.)
Turning Radius	9.5 cm (3.75 inch)	41.9 cm (17.5 inch)
Operating Temperature	-40° to 60° C (-40° to 140° F)	-40° to 60° C (-40° to 140° F)
Use with Signal Conditioner	P/N 100161 (MMS) P/N 100778 (RMS)	P/N 100161 (MMS) P/N 100779 (RMS)

SENSOR HEATER SPECIFICATIONS

Power Requirements	115 Vac; 60 Hz. 20 Watts per sensor	(P/N 101234)



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CLIMA CORPORATION

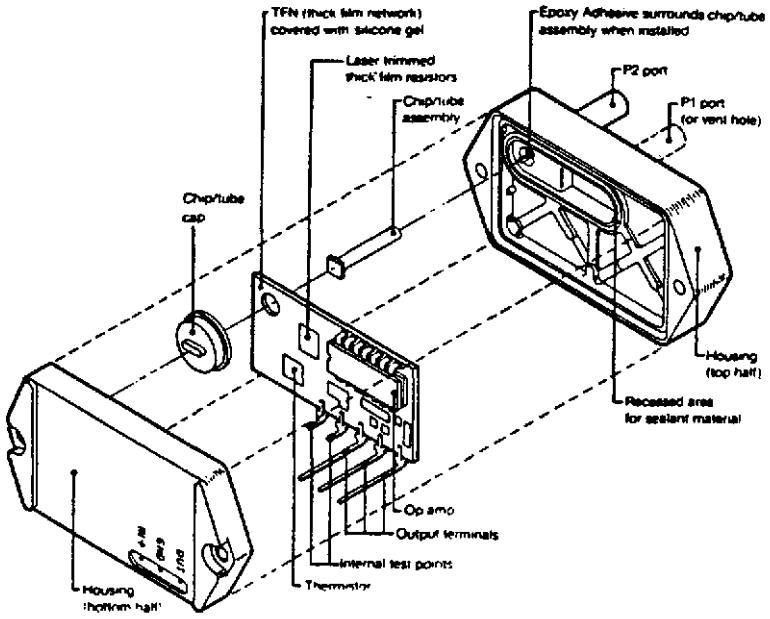
SOLID-STATE BAROMETRIC PRESSURE SENSOR

Climatronics' Solid-State Barometric Pressure Sensor (P/N 101448) uses a piezoresistive device to measure atmospheric pressure and is ideally suited to applications requiring exact measurement of pressure where the benefits of repeatability, low hysteresis and long-term stability are important. It offers state-of-the-art benefits of hybrid IC devices, including compactness, ruggedness, and reliability. Internal circuitry provides temperature compensation as an integral part of each device and is optimized on each unit as part of the calibration procedure.

The heart of the Solid-State Barometric Pressure Sensor is a small, square silicon chip with an integral sensing diaphragm and implanted piezoresistors. Pressure applied on the diaphragm causes it to flex, inducing a stress or strain in the buried resistors. The resistor values will change depending on the amount of pressure applied to the diaphragm. By providing a precisely-controlled reference voltage to the sensor's resistive network, an output voltage signal is produced which is proportional to the ambient pressure. Because of the unique construction, this output is very predictable, providing an ideal sensing element for barometric pressure sensors.

The range of this Solid-State Barometric Pressure Sensor is 600-1100mb. It can be used with Climatronics' modular signal conditioners or interfaced directly to a Remote Terminal Unit (RTU) for direct digital data acquisition.

EXPLODED VIEW



SPECIFICATIONS

Range	600mb to 1100mb (17.72" Hg. to 32.48" Hg.)
Accuracy (includes temperature, coefficient, hysteresis, and linearity)	±1.5mb
Resolution	Infinite
Temperature Range	
Compensated	-18°C to 63°C (0°F to 145°F)
Operating	-40°C to 85°C (-40°F to 185°F)
Elevation Range	Sea Level to 14,000 ft. Sea Level to 4265m
Input Voltage	+12 Vdc (nominal)
Output Voltage	1 to 5 Vdc
Power Required	0.18 Va
Size - Sensor	3"L x 2"W x 1½"H
Enclosure (Optional)	7 1/8"L x 4½" W x 5 1/8" H

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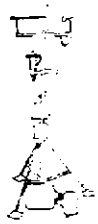


CLIMA CORPORATION

Temperature Sensors

- **Maintenance Free**
- **Versatile**
- **Highly Accurate**
- **Durable**

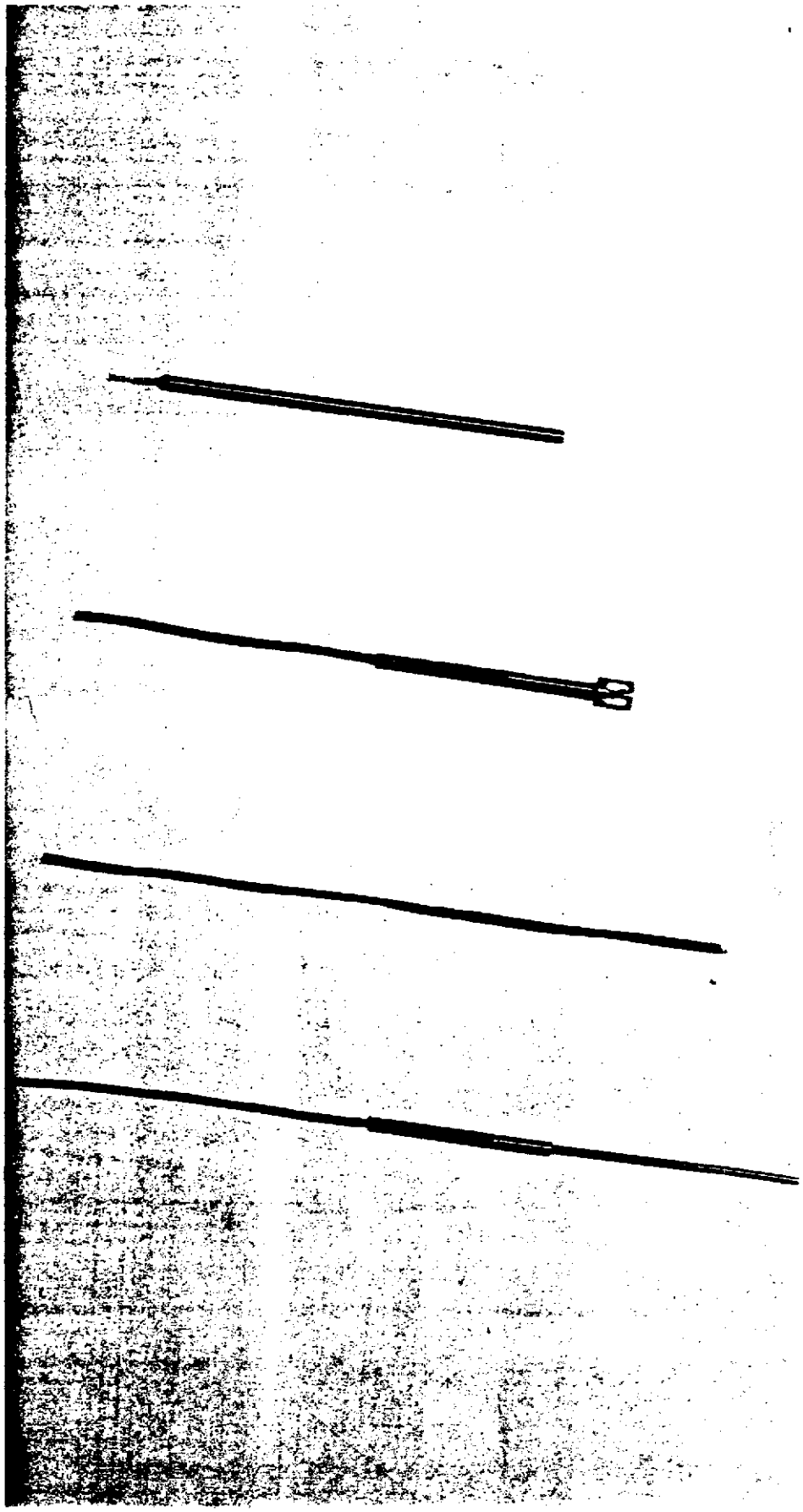
Capable of meeting virtually any ambient measurement need, Climatronics' temperature sensors are accurate, durable, linear over a wide range, can be provided with NBS traceable calibration, and are well-matched for high accuracy delta temperature applications.

The Air, Water/Soil, and Expanded Range Sensors encase a thermistor bead in a stainless steel or vinyl sheath. This casing, combined with Climatronics' temperature shield, gives the thermistor bead protection from solar radiation, precipitation, and corrosive, airborne particles. Such configurations transfer heat as rapidly as possible, yielding a typical time constant of 3.6 s. When direct exposure of the thermistor to the media being measured is permissible, our Fast Response Sensor reduces the time constant to a minimal 0.6 s.

A second type of sensor, Platinum 4-Wire, operates on the principle that electrical resistance of a pure metal increases with temperature. Platinum's superior linearity, stability, sensitivity and resistance to corrosion, make it an ideal practical choice. The unit's four-wire design automatically compensates for possible lead resistance errors, and it comes standardly supplied with certified NBS traceability.

Sensors install easily in Climatronics' temperature shields. The TS-10 Motor Aspirated Shield, P/N 100325, regulates air flow past the sensor (as discussed in the TS-10 data sheet) while the Naturally Aspirated Shield, P/N 100552, relies on ambient air flow or convection for sensor aspiration.

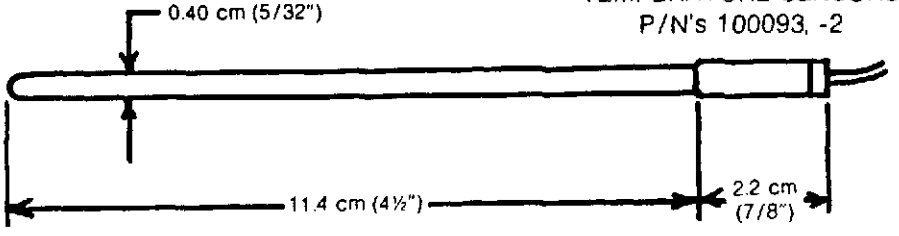
Please consult the Modular Meteorological System (MMS) or Remote Meteorological System (RMS) signal conditioner data sheets for the proper temperature sensor interface to use with the sensor of your selection.



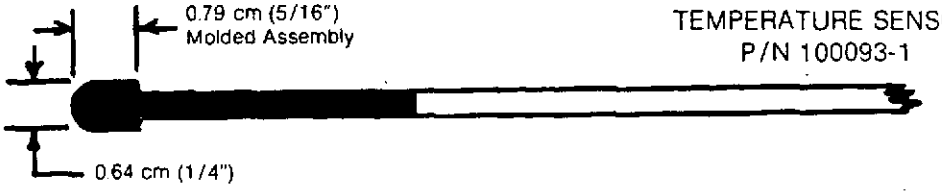
Specifications

	Air, Water/Soil P/N's 100093, 100093-1	Expanded Range P/N 100093-2	Fast Response P/N 100093-3	Platinum 4-Wire P/N 100826
Accuracy	±0.15°C (±0.27°F) over full range	±0.10°C (±0.18°F) over full range	±0.15°C (±0.27°F) over full range	±0.1°C (±0.18° F) over full range
Range	-30.0° to 50.0°C (-22.0° to 122.0°F)	-50.0° to 50.0°C (-58.0° to 122.0°F)	-30.0° to 50.0°C (-22.0° to 122.0°F)	-50.0° to 50.0°C (-58.0° to 122.0°F)
Time Constant	3.6 s	3.6 s	0.6 s	5.5 s
Interchangeability	±0.15°C (±0.27°F)	±0.10°C (±0.18°F)	±0.15°C (±0.27°F)	±0.25°C can be compensated
Linearity	±0.16°C (±0.29°F)	±0.16°C* (±0.25°F)	±0.16°C (±0.29°F)	±0.05°C included in accuracy
Leads	3	4	3	4
Size	0.64 cm dia x 11.4 cm long (¼" x 4½")	0.64 cm dia x 11.4 cm long (¼" x 4½")	0.64 cm dia x 4.8 cm long w/shield; otherwise 1.3 cm long (¼" x 1⅞" w/shield; otherwise ½")	0.64 cm dia x 15.2 cm long (¼" x 6")

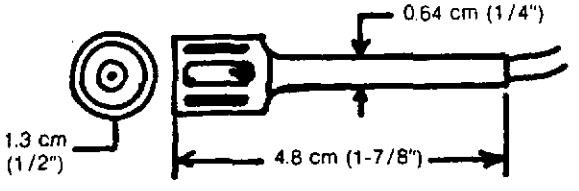
TEMPERATURE SENSORS
P/N's 100093, -2



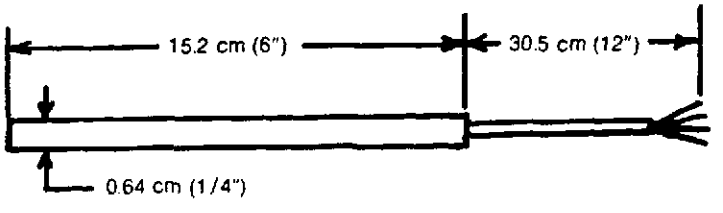
WATER/SOIL
TEMPERATURE SENSOR
P/N 100093-1



FAST RESPONSE SENSOR
P/N 100093-3



PLATINUM
4-WIRE SENSOR
P/N 100826



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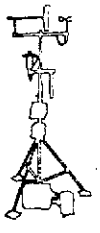


* Can be improved to ± 0.08°C using 0.02% accurate composite resistors.

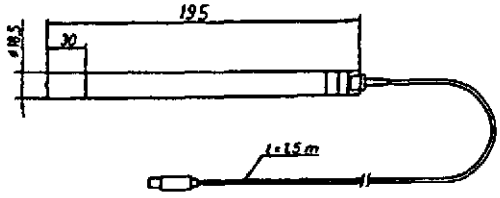
CLIMA CORPORATION

MOISTURE MEASUREMENT SENSORS

Climatronics' line of moisture measurement equipment includes Humidity Sensor P/N 101669 and Relative Humidity Transducer P/N 100098 for full relative humidity range responses with excellent linearity and negligible hysteresis. Our Dew Point Sensor P/N 101197 and Cooled Mirror Dew Point Sensor P/N 100880 complete the series. Both provide high accuracy consistent with reliability, wide operating ranges, and great sensitivity for continuous, unattended applications.

HUMIDITY SENSOR P/N 101669

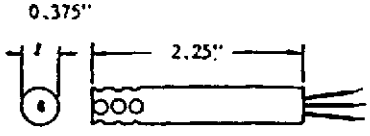
Extremely short response times with no need for temperature compensation characterize Climatronics' Humidity Sensor, P/N 101669, resulting from a unique design called the Humicap®. Capacitance change sensitive only to ambient humidity is induced in a one-micron thick dielectric polymer layer when it absorbs water molecules through a thin metal electrode. This change, proportional to relative humidity, is delivered in the form of dc voltage from the probe end to the signal conditioner by the electronics house in the probe. Its watertight outer construction is of corrosion-resistant aluminum and the Humicap®, in particular, is protected by a sintered filter.



RH Range	0 to 100 %RH
Ambient Temperature	-40°C to +80°C
Output to (0 to 100 %RH)	0 to 100 mV Differential into 1 kΩ
Operation Voltage	5.6 V ±0.01 V (provided by a Climatronics' signal conditioner)
Current Consumption	Approx. 1 mA
Response Time	1 s to 90 % of Humidity change at +20°C
Linearity	Approx. 1%
Hysteresis	Better than ± 1% for humidity excursion 0...80...0 %
Temperature Dependence	0.05 %RH per °C
Weight	115 g
Dimensions	Diameter 18.5 mm, length 195 mm

RELATIVE HUMIDITY TRANSDUCER P/N 100098

Relative Humidity Transducer P/N 100098, is a composite of organic and inorganic crystals which sense moisture by the hygromechanical stress of small, power, inert cellulose crystallite structures. These act upon a kovar beam, to which a pair of thermally-matched and electrically-isolated silicon strain gages are bonded, in a half Wheatstone bridge configuration.

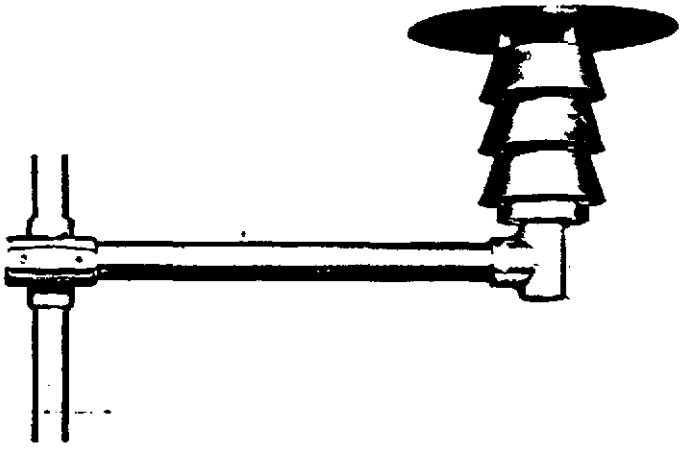


RH Range	0-100% RH
Operating Temperature	-40°C to 125°C, Normal temperature compensation for strain gages required
Output Signal	0.5 mV/V/% RH (nominal)
Operation Voltage	Maximum 0.5 Vdc or Vac
Total Resistance	Approx. 1000 Ω at 25°C Non-polarizing
Time Constant	Nominal 3 min.
Linearity	±2% Full scale
Hysteresis	±2%
Repeatability	±1%
Operating Pressure	Ambient (vacuum to over 3000 ps
Sensor Element Type	Inert cellulose crystallite, conditioned (Xeric element)
Hygromechanical Force of Element	200 mgs/% Decrease in relative humidity (nominal)
Electrical Type	Silicon, piezoresistive, thermally-matched strain gages
Dimensions	Diameter 9.7 mm, length 78.7 mm

CLIMA CORPORATION

NATURALLY ASPIRATED SHIELD

P/N 100552



Climatronics' P/N 100552 Naturally Aspirated Shield is constructed of sturdy anodized aluminum designed to house Climatronics' P/N 100093 Temperature Probes and/or Climatronics' P/N 100098 Relative Humidity Probes. These probes are held inside the shield via a mount made of Delrin. The mount may be modified to accept a single Climatronics' P/N 101669 Relative Humidity Sensor.

The Naturally Aspirated Shield comes complete with a Rain Hat. Hats are available that can mount almost all of the various Solar Radiation Sensors Climatronics offers. This enables a variety of seasors to be mounted in a cost effective and efficient manner.

The Naturally Aspirated Shield may be mounted on a tower or boom. There are 3/4", 1" and 1 1/4" I.D. pipe mounts available. Optionally, the Naturally Aspirated Shield can be mounted on the end of a Climatronics' P/N 101069 four foot universally mountable Tower Boom.

C.T. Main Audit Report
January 28, 1991 and April 3, 1991

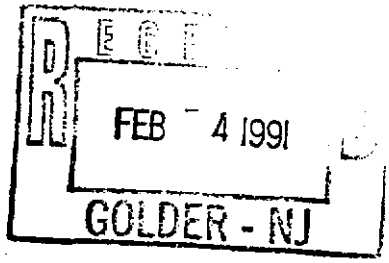
D73-6055/304.1

MAIN 1893

CHAS. T. MAIN, INC.

PRUDENTIAL CENTER, BOSTON, MASSACHUSETTS 02199 • TELEPHONE 617 262-3200 • TELEX 4430035 • FAX 617 859-2575

January 28, 1991
Reference No.: 4402-001-1000



Mr. Robert Glazier
Golder Associates
20000 Horizon Way
Suite 500
Mt. Laurel, NJ 08054

SUBJECT: Industri-Plex Hazardous Waste Remediation Site
Meteorological Monitoring System Audit Results

Dear Mr. Glazier:

On December 19, 1990 Chas. T. Main, Inc. (MAIN) conducted the second semi-annual independent QA performance audit on the Industri-Plex hazardous waste remediation site meteorological monitoring system. The audit was conducted according to the procedures described in the Quality Assurance Handbook for Air Pollution Measurement Systems - Volume IV - Meteorological Measurements: EPA 60014-82-60, August 1989, and the On-Site Meteorological Program Guidance for Regulatory Modeling Applications: EPA 450/4 -87-013, June 1987.

On December 4, 1990 Golder Associates notified MAIN of possible damage to the wind direction vane on the 10-meter meteorological tower and requested a site visit to inspect the vane. Shortly thereafter, a MAIN monitoring technician visited the site and climbed to the 10-meter level to inspect the Wind Mark III wind monitoring system. Upon inspection, the technician found a bent wind vane and damage to the wind direction sensor shaft. The wind vane and sensor shaft were bent back into place, and upon departure the technician verified that the wind direction sensory system was generating an output signal reasonably consistent with a normally operating system.

After discussing the results of the inspection with Golder Associates, a recommendation was made to purchase a new Climatronics Wind Mark III wind speed/wind direction monitoring system. Golder agreed and requested that upon procurement of the new Wind Mark III unit, a complete performance audit be conducted. This audit was to include an "end of period" check on the damaged wind system and a "beginning of period" check on the newly installed wind system. In this manner, installation of the new wind system and the second semi-annual performance audit could be completed simultaneously.

The audit procedures employed and the audit results are described and discussed in the following sections. For reference purposes, all audit check sheets used in the field are attached to this report.

Wind Speed Systems

The wind speed systems were tested by three different methods. First, a torque watch test was performed on the sensor in order to check the bearings and to determine the sensor starting threshold. Second, the sensor shaft was prevented from rotating, thereby simulating a zero wind speed; and third, a simulated upscale wind speed (29.3 mph) was introduced into the sensor via a synchronous motor. Results from these checks were compared to QA tolerance limits for wind speed systems.

End of Period Checks:

The torque watch test on the wind speed sensor in place indicated that the sensor bearings had an acceptable starting threshold of less than 0.12 gm-cm (1.0 mph).

The zero wind speed test result for this wind speed sensor as read from the system was 0.5 mph. A reading of 0.5 mph is the expected value because the system is offset to account for the 0.5 mph specified starting threshold of the sensor.

The 600 rpm (29.3 mph) synchronous motor test result was 29.3 mph for the wind speed sensor in place. This was the exact value expected for the wind speed sensory system.

Beginning of Period Checks:

The torque watch test on the newly installed wind speed sensor indicated that the sensor bearings had an acceptable starting threshold of less than 0.12 gm-cm (1.0 mph).

The zero wind speed test result for this wind speed sensor as read from the system was 0.5 mph. A reading of 0.5 mph is the expected value because the system is offset to account for the 0.5 mph specified starting threshold of the sensor.

The 600 rpm (29.3 mph) synchronous motor test result was 29.4 mph for the newly installed wind speed sensor. This value is well within the $\pm$1.6 mph quality assurance tolerance limits for the wind speed sensory system.

Wind Direction Systems

The wind direction systems were tested by two different methods. First, a torque watch test was performed on the sensor in order to check the bearings and to determine the sensor starting threshold. In the second method, the vane tip and vane tail were aimed at a point of known azimuth in order to check the vane alignment and sensor linearity. The results were compared to QA tolerance limits for wind direction systems.

End of Period Checks:

The torque watch test for the sensor in place indicated that the bearings had reached the upper tolerance limit of 18.0 gm-cm (1.0 mph). Normally, the bearings should not reach this limit for at least one year, and the observed reading is likely the result of the damage to the sensor.

The wind direction sensor vane was aligned to a tall stack to the west of the tower site. The azimuth from the tower to the stack was determined from a U.S. Geological Survey topographic map. This azimuth point is 274.5° for the vane tip and 94.5° for the vane tail.

The result of the vane tip and tail alignments were 280.0° and 100.0°, respectively. This equates to an average vane alignment difference of + 5.5°, which is 2.5° outside of the $\pm$3.0° quality assurance tolerance limits for wind direction measurement systems. Again, this is likely due to the previous damage to the sensor. The consistent +5.5° difference for the tip and tail alignments indicated that the sensor linearity was acceptable.

Beginning of Period Checks:

The torque watch test on the newly installed wind direction sensor indicated that the bearings had an acceptable starting threshold of approximately 10.0 gm-cm (<1.0 mph).

Finally, the new wind direction sensor vane was aligned to the azimuth point (the tall stack) with perfect results for both the tip and tail azimuth values. In addition to having an exact alignment, the linearity of the sensor from 0° to 360° was also exact.

Atmospheric Pressure

The monitoring system barometer was audited by comparing the system response to the response of a calibrated aneroid barometer.

The system response of 30.15 inches of mercury and the calibrated barometer response of 30.14 inches of mercury have a difference of -0.03 percent. This result is well within the ±1.0 percent quality assurance tolerance limits for atmospheric pressure measurement systems.

Temperature

The temperature system was audited by placing the sensor probe and an NBS traceable thermometer in an ambient water bath and an ice water bath, and comparing the results.

The ambient water bath thermometer test temperature was 55.2°F and the corresponding sensor response was 55.5°F. The ice water bath thermometer reading was 32.1°F and the corresponding sensor response was 32.0°F. The thermometer/sensor temperature differences for the ambient and ice water baths were -0.3°F and 0.1°F, respectively. These results are well within the ± 1.8°F quality assurance tolerance limits for temperature measurements.

Relative Humidity

The relative humidity sensor was audited by comparing the system response to the calculated relative humidity as determined by calibrated sling psychrometer readings.

The sling psychrometer relative humidity reading was calculated to be 52.0 percent and the corresponding system response was 50.0 percent resulting in a difference of -2.0 percent. This difference is within the ±5.0 percent quality assurance tolerance limits for relative humidity measurements.

Conclusion

All audit results, with the exception of those on the damaged wind direction sensor, were determined to be within QA tolerance limits. Therefore, upon installation of the new Wind Mark III wind speed/wind direction system on December 19, 1990 the Industri-Plex meteorological monitoring system is recording accurate data which meets or exceeds quality assurance guidelines.

With respect to the damaged Wind Mark III wind direction sensor, it appears the damage may have been caused by a large bird attempting to perch on the wind direction vane. This would not be the first time that this type of incident has occurred, as it has happened at other monitoring sites, however, it is very infrequent.

Please do not hesitate to call Tom Fritts or me if you have any questions.

Sincerely,

CHAS. T. MAIN, INC.

Dewey Gile
Project Meteorologist

DG/cmp/D#1

Response Requested __ Yes X No
Date Requested _____

cc: W/attachments

T. Fritts - MAIN
G. Pacheco - MAIN
S. Falzarano - MAIN

MAIN
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ENVIRONMENTAL AND RESOURCE
PLANNING DIVISION

AEROMETRIC MONITORING PROGRAM
SITE VISIT & OPERATING LOG

PROJECT: Golder Associates SITE: 10-m tower, Woburn, MA

DAY/DATE	COMMENTS	INITIALS/ TIME
Wed 12/19/90	Arrived at site at 0900 to conduct an audit on the Woburn, MA 10-Meter Met. tower. While Observing the tower from below, it was noticed that the 10-meter wind direction sensor was bent at the shaft. The audit showed a +5.5 degree alignment discrepency when aligned against the "Big Stack". Wind speed, temperature, dewpoint, and barometric pressure all passed the audit. A new WM II crossarm was replaced and the old one returned for re-furbishment	DG

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TELEPHONE 617-262-3200

AEROMETRIC MONITORING INSTRUMENTATION
GENERAL PURPOSE CALIBRATION CHECK FORM

CLIENT: Golder Asso. DATE: 12/19/90

PROJECT: 10 Meter Tower TIME:

SITE: Woburn, MA TECHNICIAN: Gile/Coughlin

PARAMETER	TEST INPUT	EXPECTED RESPONSE			OBSERVED RESPONSE		
		Voltage	Chart	DDAS	Voltage	Chart	DDAS
Parameter: 10 M WS	1. 0 RPM			0.50			0.50
Sensor M/N: 972	2. 600 RPM			29.30			29.30
S/N: ~~XXXX~~ (old)	3.						
Processor M/N: WM III	4.						
S/N:							
Range:							
Location:							

PARAMETER	TEST INPUT	EXPECTED RESPONSE			OBSERVED RESPONSE		
		Voltage	Chart	DDAS	Voltage	Chart	DDAS
Parameter: 10M WS	1. 0 RPM			0.50			0.50
Sensor M/N: 3210	2. 600 RPM			29.30			29.40
S/N: ~~XXXX~~ (new)	3.						
Processor M/N: WM III	4.						
S/N:							
Range:							
Location:							

PARAMETER	TEST INPUT	EXPECTED RESPONSE			OBSERVED RESPONSE		
		Voltage	Chart	DDAS	Voltage	Chart	DDAS
Parameter: 10 M	1.			3014		30.15	
Sensor M/N: Barometric	2.						
S/N: Pressure	3.						
Processor M/N:	4.						
S/N:							
Range:							
Location:							

COMMENTS:

Tourque watch test : end of black arrow (old)
Tourque watch test : start of black arrow (new)
both passed test. DG

PASS 158

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ENVIRONMENTAL AND RESOURCE
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FIELD ALIGNMENT / CALIBRATION DATA SHEET

CLIENT: Golder Associates DATE: ~~1/5~~ 12/19/90

PROJECT: 10 Meter Met. Tower TIME: _____

SITE: Woburn RCRA site TECHNICIAN: Gik/Coughlin

LEVEL: 10M SENSOR S/N OFF: 972 PROCESSOR S/N OFF: ____ VANE S/N OFF: ____

ON: ~~XXXXX~~ WM III 3210 ON: ____ ON: ____

REFERENCE POINTS				SENSOR RESPONSES		
LANDMARKS		AZIMUTH ANGLE (DEGREES)	AZIMUTH ANGLE (VOLTS)	DVM VOLTS / DEGREES	DDAS VOLTS / DEGREES	CHART / DEGREES
1. Big Stack	TIP:	274.5	—		280	
	TAIL:	94.5	—		100	
dd WM III. Sensor #972	540°					
2. _____	TIP:					
	TAIL:					
	540°					
3. Big Stack	TIP:	274.5	—		275	
	TAIL:	94.5	—		95	
New WM III Sensor #3210	540°					
4. _____	TIP:					
	TAIL:					
	540°					

COMMENTS: Old sensor was found to be + 5.5° out of alignment. DG

(old) Tourque watch test = 18 gm cm^{-1} = 1 mph threshold

(New) " " " = 10 gm cm^{-1}

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TEMPERATURE / DELTA-TEMPERATURE
FIELD CALIBRATION DATA SHEET

CLIENT: Golder Associates
DATE: 12/19/90
PROJECT: 10-meter Met. Tower
TIME:
SITE: Woburn, MA
TECHNICIAN: Gile / Coughlin

LEVEL	PROBE	REF. TEMP.	EXPECTED VOLTAGE
	TEMP		
	ΔTEMP		
	ΔTEMP		
10 m	Temp	32.10	
10 M	Temp	55.20	

DEGREE F. (OR C.) DVM	DAAS	CHART
	32.00	
	55.50	

TEMPERATURE / DELTA TEMPERATURE SENSOR EXCHANGE						
INSTRUMENT / SERIAL NO.	____ LEVEL		____ LEVEL		____ LEVEL	
	REMOVED	INSTALLED	REMOVED	INSTALLED	REMOVED	INSTALLED
TRANSLATOR						
ASPIRATOR SHIELD						
PROBE						

COMMENTS: Temperature results were excellent. DG

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ENVIRONMENTAL AND RESOURCE
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DEW POINT / RELATIVE HUMIDITY
FIELD CALIBRATION SHEET

CLIENT: Golder Associates DATE: 12/19/90

PROJECT: 10 Meter Met. Tower TIME:

SITE: Woburn, MA (RCRA) TECHNICIAN: Gile/Coughlin

TEST #	PARAMETER	SLING PSYCHROMETER	EXPECTED VOLTAGE	SENSOR S/N # 1002 Relative humidity ~~DEW POINT~~ DVM	DAAS	CHART
1	DRY BULB	48.5°F	—			
	WET BULB	41.3°F	—			
	W.B. DEP.	6.2°F	—			
	DEW POINT					
	REL. HUM.	52%	—		50%	
X						
2	DRY BULB	48.5°F				
	WET BULB	41.3°F				
	W.B. DEP.	6.2°F				
	DEW POINT					
	REL. HUM.	52%			50%	

DEW POINT SENSOR EXCHANGE

INSTRUMENT / SERIAL NO.	____ LEVEL		____ LEVEL		____ LEVEL	
	REMOVED	INSTALLED	REMOVED	INSTALLED	REMOVED	INSTALLED
ASPIRATOR						
DEW POINT TRANSLATOR						
DEW POINT PROBE						

COMMENTS: Relative humidity difference = + 2% - passed.
P.G.

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APPENDIX B

Site Meteorological Data

APPENDIX B Meteorological Data

Meteorological Data Sampling

Fifteen minute average measurements were recorded for every day between 19 April 1990 except for the following data gaps:

20 June 1990 @ 16:00 - 23 June 1990 @ 13:45
19 July 1990 @ 02:15 - 27 July 1990 @ 09:30
13 Sep. 1990 @ 12:15 - 11 Oct. 1990 @ 11:00
6 Nov. 1990 @ 10:15 - 9 Nov. 1990 @ 13:15
18 Dec. 1990 @ 12:15 - 26 Dec. 1990 @ 17:15

The meteorological data gaps did not occur on days of air sampling except for missing data beginning at 10:15 a.m. on 6 November 1990, which was the second day of sampling for Sampling Period 3.

The performance of the meteorological system was audited by C.T. Main, Inc. on 24 April 1990 prior to Sampling Period 1 (May 15 to 16, 1990). The audit report is included in Appendix D of the Task A-1, Interim Report No. 1 Golder Associates Inc., 1990b). The results of the audit indicated that all instruments were performing within the EPA quality assurance guidelines except for the relative humidity probe which was recording relative humidity values 10 to 15 percent below actual values. The relative humidity probe was audited again on 2 May 1990 and 7 May 1990, and despite the installation of a new probe on the latter date, the readings were consistently 10 to 15 percent below actual relative humidities determined by the audit sensors. Logan Airport data for relative humidity over this period was used to calculate dust pump flow corrections. A new relative humidity sensor was installed on 19 July 1990 with a filter membrane to protect the sensor.

A second audit was performed by C.T. Main on 27 July 1990 and the auditing report is included in Appendix D of the Task A-1 Interim Report No. 2 (Golder Associates, 1990C). This audit determined that all monitoring equipment was operating within EPA quality assurance guidelines (USEPA, 1989b) including the newly installed relative humidity sensor. Because the wind direction vane was at the maximum allowable average alignment difference within the EPA quality assurance guideline (+3 degrees), the vane was realigned and the resulting average alignment difference was +1 degrees.

A third audit was performed by C.T. Main on 19 December 1990 and the auditing report is included in Appendix I of this report. All meteorological monitoring systems were determined to be operating within EPA quality assurance guidelines except for the wind direction system which had an average alignment difference of +5.5 degrees. A new wind direction vane was installed and the average alignment difference was 0 degrees.

The relative humidity sensor again became inoperative on 17 January 1991. C.T. Main was notified of the problem and performed an audit on 2 April 1991 to determine the nature of the problem. The audit report for this last audit to date is included in Appendix I of this report. With the exception of the relative humidity probe, all instruments were performing within the EPA quality assurance guidelines. Corrective action is currently taking place on the relative humidity probe.

Meteorology Results

Meteorological data taken at the Site for Sampling Periods 1 (May 15 to 16, 1990), 2 (August 6 to 7, 1990), 3 (November 5 to 6, 1990), and 4 (February 26 to 27, 1991) are reported in Tables B-1, B-2, B-3, and B-4, respectively. Each table shows average meteorological data for every hour between 10:00 of the first sampling day in the period to 15:00 of the second sampling day except for Table 27, which only reports until 10:00 on the second sampling day (6 November 1990) because of lost data. The hourly data are averages of the readings recorded by the data logger every fifteen minutes which, in turn, are arithmetic averages of results taken every second. Wind speed, temperature, relative humidity, and pressure are arithmetic averages over the four 15 minute intervals comprising the hour. Wind direction fluctuations are calculated as the geometric means of the recorded wind direction fluctuations over the four 15 minute interval recordings. Wind direction is based on vector addition of the four 15 minute interval recordings. Stability class is determined based on fluctuation in wind direction for estimating Pasquill stability categories (Turner, 1969a).

In addition to giving hourly data, Tables B-1, B-2, B-3, and B-4, show average conditions for each sampling period. Because Site relative humidity data for Sampling Periods 1 and 4 were determined to be in error by C.T. Main audits, relative humidity data for Logan Airport is given in addition to recorded data for the Site. Relative humidity data for both locations were within 1 percent during Sampling Periods 1 and 2. The Site relative humidity value for Sampling Period 3 was 8 percent higher than that for Logan Airport. Eight hourly values of greater than 100 percent were recorded on Site during Sampling Period 3 and are the cause of the elevated average relative humidity

value reported for the Site. Relative humidity values for the Site and Logan Airport are not comparable for Sampling Period 4 as the Site relative humidity probe had malfunctioned. The Logan Airport relative humidity value for Sampling Period 4 was 76 percent.

Based on frequency of reported wind directions for each hour, prevailing winds for Sampling Periods 1, 2, 3 and 4 were from the southwest, east-southeast, east-southeast and north and from the southwest, the southeast, the east, and the north-northeast, respectively. The two methods for determining prevailing wind direction over a period of time gave results within one 22.5 degree sector for each sampling period. Average wind speeds were in the range of 5.9 to 6.5 miles per hour (mph) for all four sampling periods. Average barometric pressure for all four sampling periods was in the range of 29.9 to 30.0 inches mercury. Average temperatures over each sampling period are representative of the respective seasons.

C:6255:MAY91RPT:A-1APPXB

Table B–1
Meteorological Data: Sampling Period 1

Year	Month	Day	Hour	Wind Speed (mph)	Wind Direction	Temperature (F)	Relative Humidity (%)		Average Pressure (inches Hg)	Stability Class
							Site Station	Logan Station		
1990	5	15	1000	4.5	W	66.9	53	48	30.05	A
1990	5	15	1100	6.2	W	70.9	47	41	30.01	A
1990	5	15	1200	8.3	SW	73.2	38	55	30.00	A
1990	5	15	1300	9.3	SW	74.1	34	40	29.98	A
1990	5	15	1400	10.6	SW	75.0	29	32	29.98	A
1990	5	15	1500	8.9	SW	75.4	26	31	29.96	B
1990	5	15	1600	10.2	WSW	76.2	24	31	29.93	B
1990	5	15	1700	10.6	WSW	75.2	25	33	29.94	B
1990	5	15	1800	11.2	WSW	74.6	25	35	29.95	C
1990	5	15	1900	9.9	SW	72.7	25	36	29.96	D
1990	5	15	2000	9.1	SW	70.3	26	35	30.00	D
1990	5	15	2100	7.1	SW	67.8	29	40	30.03	E
1990	5	15	2200	7.5	SW	65.6	30	52	30.04	E
1990	5	15	2300	6.8	SSW	65.1	34	56	30.04	E
1990	5	15	2400	6.1	SW	60.8	43	60	30.05	D
1990	5	16	100	6.5	SW	59.1	98	64	30.03	D
1990	5	16	200	6.2	SW	58.1	90	69	30.02	D
1990	5	16	300	5.5	SW	57.2	91	75	30.02	D
1990	5	16	400	4.3	SW	56.2	98	78	30.00	F
1990	5	16	500	3.5	WSW	55.8	99	80	29.99	F
1990	5	16	600	4.4	SW	55.7	99	83	30.00	B
1990	5	16	700	4.3	SW	56.0	100	87	30.00	C
1990	5	16	800	3.2	SW	57.0	99	81	30.00	B
1990	5	16	900	4.7	WSW	58.5	98	81	29.99	B
1990	5	16	1000	3.3	WSW	59.9	96	84	29.98	A
1990	5	16	1100	2.6	NNW	61.3	90	81	29.97	A
1990	5	16	1200	2.7	NNE	62.9	85	81	29.96	A
1990	5	16	1300	4.1	ESE	64.1	81	90	29.94	A
1990	5	16	1400	3.7	E	64.0	77	90	29.93	A
1990	5	16	1500	5.0	ESE	62.1	69	96	29.90	B

Prevailing Wind Direction	
Based on Frequency:	SW
Based on Vector Addition:	SW
Averge Wind Speed (mph):	6.3
Average Temperature (F):	65.1
Average Relative Humidity:	
Site Station:	62
Logan Station:	62
Average Pressure (inches Hg):	30.0
Stability Class Distribution	
A Stability:	33%
B Stability:	23%
C Stability:	7%
D Stability:	20%
E Stability:	10%
F Stability:	7%

Table B–2
Meteorological Data: Sampling Period 2

Year	Month	Day	Hour	Wind Speed (mph)	Wind Direction	Temperature (F)	Relative Humidity (%)		Average Pressure (inches Hg)	Stability Class
							Site Station	Logan Station		
1990	8	6	1000	11.3	S	75.1	74	62	30.03	C
1990	8	6	1100	11.6	S	76.5	68	60	30.01	C
1990	8	6	1200	11.3	S	77.4	62	58	30.01	C
1990	8	6	1300	10.1	S	77.7	57	67	30.00	C
1990	8	6	1400	5.7	ESE	75.8	58	69	29.98	A
1990	8	6	1500	5.5	ESE	72.8	67	71	29.99	B
1990	8	6	1600	3.8	ESE	72.5	74	74	30.00	B
1990	8	6	1700	4.3	SE	74.7	72	76	29.98	A
1990	8	6	1800	4.0	ESE	73.8	73	84	29.99	B
1990	8	6	1900	6.2	ESE	72.6	76	90	29.99	D
1990	8	6	2000	5.7	ESE	71.8	80	93	30.01	D
1990	8	6	2100	6.0	ESE	69.9	91	97	30.03	D
1990	8	6	2200	5.2	ESE	69.0	97	93	30.03	D
1990	8	6	2300	4.2	SE	68.9	98	97	30.03	F
1990	8	6	2400	3.7	SE	68.9	98	90	30.02	F
1990	8	7	100	5.1	SSE	69.0	98	93	30.03	F
1990	8	7	200	4.5	ESE	67.9	90	97	30.02	F
1990	8	7	300	3.1	ESE	66.3	91	97	30.02	F
1990	8	7	400	3.0	ESE	66.8	98	97	30.00	F
1990	8	7	500	4.4	ESE	69.2	99	97	29.99	F
1990	8	7	600	4.5	SE	69.2	99	97	30.00	A
1990	8	7	700	4.4	SE	69.2	100	97	30.00	A
1990	8	7	800	4.3	SE	69.8	99	97	30.00	A
1990	8	7	900	4.9	SE	70.2	98	90	29.99	A
1990	8	7	1000	5.5	SE	71.1	96	93	29.98	A
1990	8	7	1100	6.1	ESE	72.3	90	87	29.97	A
1990	8	7	1200	6.8	ESE	73.9	85	85	29.96	A
1990	8	7	1300	7.3	ESE	75.3	81	77	29.94	B
1990	8	7	1400	7.0	ESE	76.6	77	77	29.93	A
1990	8	7	1500	7.4	SE	78.9	69	79	29.90	A

Prevailing Wind Direction	
Based on Frequency:	ESE
Based on Vector Addition:	SE
Average Wind Speed (mph):	5.9
Average Temperature (F):	72.1
Average Relative Humidity:	
Site Station:	84
Logan Station:	85
Average Pressure (inches Hg):	30.0
Stability Class Distribution	
A Stability:	37%
B Stability:	13%
C Stability:	13%
D Stability:	13%
E Stability:	0%
F Stability:	23%

Table B-3
Meteorological Data: Sampling Period 3

Year	Month	Day	Hour	Wind Speed (mph)	Wind Direction	Temperature (F)	Relative Humidity (%)		Average Pressure (inches Hg)	Stability Class
							Site Station	Logan Station		
1990	11	5	1000	7.9	NNE	47.0	69	69	30.06	C
1990	11	5	1100	4.5	NNE	47.1	66	66	30.06	B
1990	11	5	1200	6.1	E	47.7	64	66	30.06	B
1990	11	5	1300	7.3	E	45.9	62	68	30.06	B
1990	11	5	1400	6.1	ENE	45.2	74	71	30.06	B
1990	11	5	1500	6.5	ESE	45.4	79	71	30.06	B
1990	11	5	1600	7.7	ESE	45.0	83	74	30.05	E
1990	11	5	1700	7.0	E	44.6	72	74	30.05	E
1990	11	5	1800	6.5	E	44.3	83	74	30.05	E
1990	11	5	1900	4.2	ENE	44.2	77	74	30.06	F
1990	11	5	2000	3.7	ENE	44.4	78	80	30.06	F
1990	11	5	2100	3.6	ENE	44.7	80	83	30.04	F
1990	11	5	2200	3.5	NE	45.0	82	96	30.02	F
1990	11	5	2300	3.8	ENE	44.8	92	93	30.00	F
1990	11	5	2400	8.0	ESE	46.5	109	90	29.97	E
1990	11	6	100	6.9	ESE	46.4	109	86	29.94	E
1990	11	6	200	8.1	ESE	46.6	108	90	29.89	D
1990	11	6	300	7.8	ESE	46.7	104	90	29.86	E
1990	11	6	400	7.8	ESE	46.4	107	96	29.79	E
1990	11	6	500	7.1	ESE	47.3	109	96	29.73	E
1990	11	6	600	8.1	ESE	49.0	108	96	29.65	D
1990	11	6	700	9.3	SE	51.3	109	96	29.56	D
1990	11	6	800	11.0	SE	53.0	113	94	29.48	D
1990	11	6	900	4.9	S	54.2	108	87	29.44	A
1990	11	6	1000	5.7	WNW	53.5	99	80	29.43	-

Prevailing Wind Direction	
Based on Frequency:	ESE
Based on Vector Addition:	E
Average Wind Speed (mph):	6.5
Average Temperature (F):	47.0
Average Relative Humidity:	
Site Station:	90
Logan Station:	82
Average Pressure (inches Hg):	29.9
Stability Class Distribution	
A Stability:	4%
B Stability:	21%
C Stability:	4%
D Stability:	17%
E Stability:	33%
F Stability:	21%

METEOROLOGY FILES

Disk	File	Start			End		
		Date	Day	Time	Date	Day	Time
Disk # 1	W042690.DAT	19-Apr-90	(109)	1430	26-Apr-90	(116)	1615
	W051790.DAT	26-Apr-90	(116)	1630	17-May-90	(137)	1615
	W060490.DAT	17-May-90	(137)	1630	04-Jun-90	(155)	1530
	W062090.DAT	04-Jun-90	(155)	1545	20-Jun-90	(171)	1545
	W082290.DAT	23-Jun-90	(174)	1400	19-Jul-90	(200)	1245
	W0822_2.DAT	27-Jul-90	(208)	0945	18-Aug-90	(230)	1300
Disk #2	W091390.DAT	18-Aug-90	(230)	1315	13-Sep-90	(256)	1200
	W101190.DAT	11-Oct-90	(284)	1115	06-Nov-90	(310)	1000
	W120590.DAT	09-Nov-90	(313)	1330	14-Nov-90	(318)	1300
	W121090.DAT	14-Nov-90	(318)	1315	22-Nov-90	(326)	1300
	W121890.DAT	22-Nov-90	(326)	1315	18-Dec-90	(352)	1200
Disk #3	W012991.DAT	26-Dec-90	(360)	1730	31-Dec-90	(365)	2345
	W0129_2.DAT	01-Jan-91	(1)	0000	15-Jan-91	(15)	2345
	W0129_3.DAT	16-Jan-91	(16)	0000	29-Jan-91	(29)	0915
	W020591.DAT	29-Jan-91	(29)	0930	05-Feb-91	(36)	0900
	W021191.DAT	05-Feb-91	(36)	0915	11-Feb-91	(42)	0945
Disk #4	W022291.DAT	11-Feb-91	(42)	1000	22-Feb-91	(53)	1745
	W030491.DAT	22-Feb-91	(53)	1800	04-Mar-91	(63)	0930

FILE FIELD DESCRIPTIONS

Field Position	Description
1	Day
2	Year
3	Time
4	Station I.D.
5	Wind Speed (mph)
6	Wind Direction (Degrees)
7	Sigma Wind Direction (Degrees)
8	Average Temperature (F)
9	Relative Humidity (%)
10	Average Pressure (inches Hg)

US EPA New England
Superfund Document Management System
Image Target Sheet

SDMS Document ID #: 230847

Site Name: INDUSTRI-PLEX

File Number: 6.4

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[ ] Oversized [ ] Color

[X] Non-Paper Media [ ] Other (Provide purpose below)

Document Type this Target Sheet Replaces:

[ ] Map [ ] Photograph [ ] Graph/Chart

[ ] Video [ ] Compact Disk [X] Other (Specify below)

FLOPPY DISK

Description or Comments:

DISKS #1 - 4

Retrieval:

[ ] Stored outside site file [ ] Available in PDF

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APPENDIX C

Pre-Design Work Plan Field Sampling Requirements

1.0 PURPOSE

This technical procedure is to be used to establish a uniform procedure for the collection of air samples for the remedial design project for the Industri-Plex Site in Woburn, MA.

2.0 APPLICABILITY

This technical procedure is applicable to all personnel involved with the collection of ambient air samples from the Industri-Plex Site in Woburn, MA.

3.0 DEFINITIONS

3.1 Summa Passivated Cylinder: A 15-liter stainless steel cylinder with an inlet valve where the surfaces which contact the sample have been conditioned to reduce reactivity of the sample.

3.2 Vacuum Flow Regulator: A flow regulator which attaches to the Summa Cylinder and allows the air sample to enter the cylinder at a controlled rate. A vacuum guage is attached to the flow regulator.

3.3 Air Sampling Pump: An air pump which has been calibrated to draw an air sample into a sample container at a controlled rate.

3.4 Filter Cassette: A device containing a filter used to collect dust samples. It is usually connected to an air sampling pump using tubing to draw air through the filter at a controlled rate.

3.5 Flowmeter: A device which measures the rate of air flow through a pipe or tube and is used to calibrate the air sampling pump.

3.6 Mercaptans: Organic compounds containing a reduced sulfur functional group. These compounds tend to have a strong odor.

3.7 Cryogenic Focusing: A method of pre-concentrating an air sample where a precise volume of the sample is pumped through a supercooled loop where the analytes are condensed and then liberated by heating into a precise volume of gas which is smaller than that of the original sample.

4.0 REFERENCES

4.1 Bernstein, D.M., and M. Lippmann. Calibration of Air Sampling Instruments.

4.2 California Air Resources Board, 1986. Testing Guidelines for Active Solid Waste Disposal Sites.

4.3 U.S. Environmental Protection Agency, 1984. Characterization of Hazardous Waste Sites - A Methods Manual: Volume II. Available Sampling Methods, Second Edition.

4.4 U.S. Environmental Protection Agency, 1987. A Compendium of Superfund Field Operations Methods.

5.0 DISCUSSION

This procedure has been prepared specifically for the air monitoring program at the Industri-Plex Site. It is based upon standard procedures for the collection and analysis of dust samples. The procedure for collection of samples for volatile organic compounds, hydrogen sulfide, and mercaptans are also based upon existing methodologies and have been chosen to provide the most representative samples possible for analysis by U.S. EPA Method TO-14 and California South Coast Air Quality Management District (SCAQMD) methods.

6.0 RESPONSIBILITY

6.1 Field Engineer: Field engineers are responsible for sample collection in compliance with this procedure.

6.2 Task Leader: The Task Leader is responsible for:

- Direct supervision of personnel collecting air samples;
- Ensuring that the proper equipment is available to accomplish the task;
- Review and approval of the work.

6.3 Project Manager: The Project Manager is responsible for:

- Assigning qualified staff to perform the sampling;
- Scheduling;

- Ensuring the completion of the task in accordance with this procedure and the Quality Assurance Project Plan.

7.0 EQUIPMENT AND MATERIALS

7.1 Fifteen-liter Summa passivated cylinders (Scientific Insturment Specialists, Inc. of Moscow, ID, see Figure 1) equipped with vacuum flow regulators and vacuum guages. The cylinders will have been cleaned and evacuated, and the flow regulator will have been calibrated before and after sampling, by the analytical laboratory.

7.2 Dust filter cassettes (37 mm diameter, 8-micron mixed cellulose ester, pre-loaded, #225-5, SKC Inc., Eight-Four, PA) prepared by the analytical laboratory.

7.3 Plastic tubing.

7.4 Air sampling pumps (SKC #224-PCXR7). The pumps will be programmable such that all pumps can be timed to turn on and off concurrently.

7.5 Air flowmeter (SKC #311-1000) to calibrate air sampling pumps. The flowmeter will be the bubble type with a soap film and stopwatch.

7.6 Manifold (SKC #224-26-02) for collecting duplicate samples.

7.7 Shipping containers and chain-of-custody documentation (Figure 2).

8.0 PROCEDURE

All samples should be collected at approximately the same time. Air sampling pumps used to collect dust samples can be programmed to turn on and off at the same time. Inlet valves on the Summa cylinders will have to be opened manually and will therefore vary in the exact start and stop time. However, they can be collected at approximately the same time within a window of $\pm$2 hour.

Upon arrival at the site, check that all necessary sampling equipment is available. All air sampling pumps should be calibrated with a bubble flowmeter according to the manufacturers instructions prior to the collection of samples. Pumps should be calibrated with a filter cassette connected to the pump to a flow rate of approximately 2 liters per minute. Mark the location of the metal ball on

the pump's rotameter for future checks during sample collection. It will be necessary to obtain data on temperature, barometric pressure, and relative humidity during pump calibration and sample collection from the site weather station in order to correct flow rates to standard conditions (see U.S. EPA, 1984, pp. 4-35 through 4-42).

Plan to deploy the samplers in early afternoon such that the shipping time to the laboratory can be minimized.

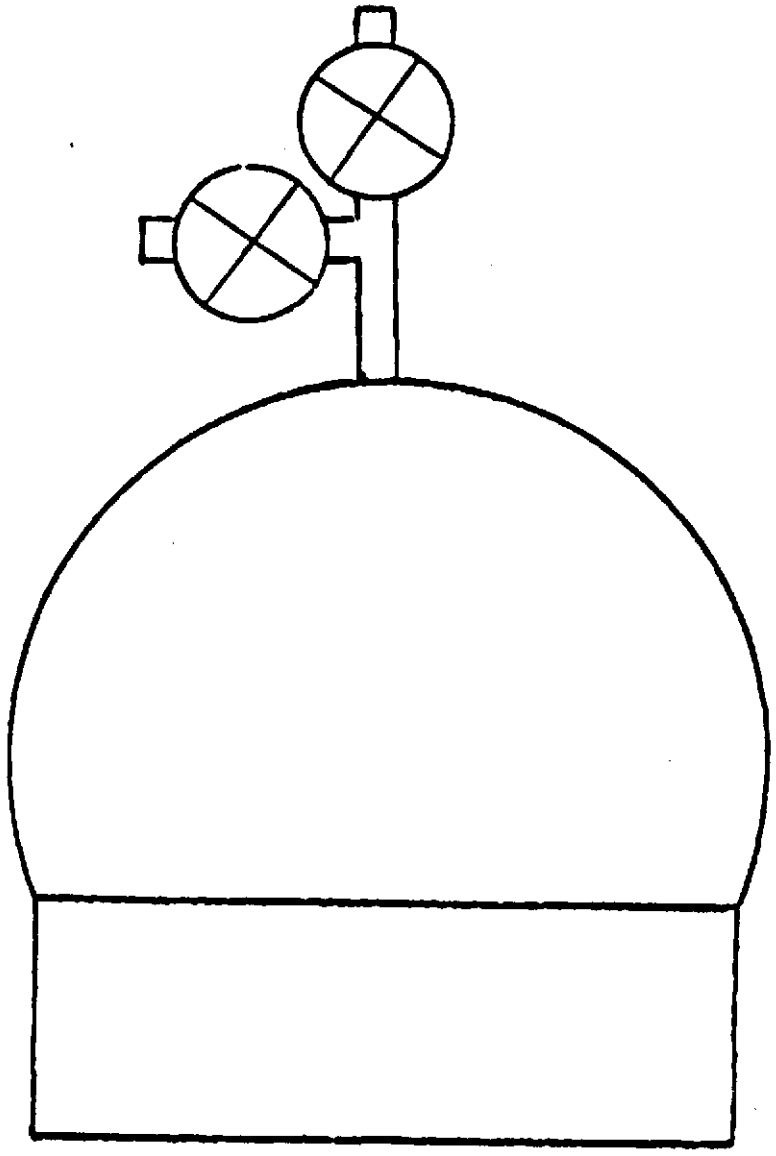
Deploy the pumps with filter cassettes attached at the sample locations given in the Field Sampling Plan. Program the pump to turn on and off at the pre-determined sampling interval. Duplicate cassettes should be set up at one station using a manifold to attach both cassettes to one pump. Make certain that the rotameter reads the same as that marked during calibration and record such checks on the sample collection data sheet. Serial numbers for pumps should also be recorded on sample collection data sheets. When the pumps begin to collect samples, start to deploy the Summa cylinders by opening the inlet valve and noting such time and the vacuum guage reading on the cylinder chain-of-custody form. Also note a description of the sample location, any noticeable odors, and approximate meteorological conditions such as temperature, wind speed and direction, cloud cover, and precipitation in the field book. Two cylinders should be deployed at the duplicate sample station.

Periodically check the samplers to ascertain that the rotameter reading has not changed and the samplers have not been tampered with. These checks should be recorded on the sample collection data sheets. If the rotameter reading has changed, adjust the flow rate to the approximate mark made during calibration and record such change on the sample collection data sheet.

Plan to arrive at the first cylinder which was deployed twenty four hours after the inlet valve was opened. Record the time and vacuum guage reading on the chain-of-custody form, close the valve, and note any changes in the site conditions in the field book. The air sampling pumps should also begin to shut down at this time. Return the cylinder and filter cassette to the shipping container and record the date and time of sampling on the chain-of-custody record. Collect cylinders and filters from all stations in the same order that the cylinders were deployed.

After all chain-of-custody documentation has been completed, seal the form in the shipping container with the samples and send them to the laboratory by overnight courier.

SUMMA Passivated Canister



15 l canister/24 hr.
composite flow at 7 ml/min

Scientific Instrument Specialists Inc.
Moscow, Idaho

JOB NO. 893-6255	SCALE N/A	SUMMA CYLINDER	
DRAWN LAS	DATE 12/04/89		
CHECKED RMG	DWG NO. MA01-078		
Golder Associates		INDUSTRI-PLEX SITE REMEDIAL TRUST	FIGURE 1

Enseco

FIGURE 2

Canister Chain of Custody and Field Data Record

Client _____ Page _____ of _____

Canister Serial #_____ Date Cleaned_____ VFR Serial#_____

1) Initial Calibration of VFR (vacuum flow regulator)	_____ ml/sec x 60 sec/1 min = _____ ml/min Date_____ Initials_____
2) Initial vacuum check of canister	_____ inches of Hg vacuum Date_____ Initials_____
3) Field vacuum check before sampling	_____ inches of Hg vacuum Date_____ Initials_____
4) Final vacuum/pressure after sampling	_____ inches of Hg vacuum Date_____ Initials_____
5) Final vacuum/pressure after receipt by lab	_____ inches of HG vacuum Date_____ Initials_____
6) Calibration check of VFR after receipt by lab	_____ ml/sec x 60 sec/1 min = _____ ml/min Date_____ Initials_____

Relinquished By:	Received by:	Date / Time

Note: Numbers 1,2,5,6 are completed by Ensoco Lab personnel
Numbers 1 & 6 only applies to time composite samples

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APPENDIX D

Canister Chain of Custody Forms for Sampling Period 4

Location #1

A9105903-001

RECEIVED Enseco MAR 29 1991 GOLDER - MT

Canister Chain of Custody and Field Data Record (Composite Samples)

Client Golder

Canister Serial # A-067 Date Cleaned 2/15/91 AM VFR Serial# HT-04

Leak Check OK M 2/22/91

24 Hour Composite

1) Initial Calibration of VFR (vacuum flow regulator)	/ ml/sec x 60 sec/1 min = 7.16 ml/min	2-21-91 = 7.18 Date 2/19/91 Initials da
2) Initial vacuum check of canister	30 inches of Hg vacuum	Date 2/22/91 Initials dB
3) Field vacuum check before sampling	30 inches of Hg vacuum	Date 2/26/91 Initials [illegible]
4) Final vacuum/pressure after sampling	13 inches of Hg vacuum	Date [illegible] Initials [illegible]
5) Final vacuum/pressure after receipt by lab	17.2 inches of Hg vacuum	Date 2/28/91 Initials da
6) Calibration check of VFR after receipt by lab	ml/sec x 60 sec/1 min = 6.53 ml/min	Date 2/28/91 Initials M

Relinquished By:	Received by:	Date / Time
Dan E Dale	Federal Express	2/22/91 4pm
Federal Express	Robert M Glazier	2/25/91 0900
Robert M Glazier	Federal Express	2/27/91 1400
Federal Express	Dan E Dale	2/28/91 9:45AM

Note: Numbers 1,2,5,6 are completed by Enseco Lab personnel

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A9105903-004 Enseco

Location #4

Canister Chain of Custody and Field Data Record (Composite Samples)

Client Golder Page 2 of 13

Canister Serial # A-068 Date Cleaned 2/13/91 pm VFR Serial# HT-05

Leak check OK 2/20/91 24 Hour Composite

1) Initial Calibration of VFR (vacuum flow regulator)	ml / sec x 60 sec / 1 min = 7.0 ml/min; 2·21·91 = 7.31; Date 2/19/91	Initials dh
2) Initial vacuum check of canister	30 inches of Hg vacuum; Date 2/22/91	Initials dh
3) Field vacuum check before sampling	20 inches of Hg vacuum; Date 2/26/91	Initials [illegible]
4) Final vacuum/pressure after sampling	10 inches of Hg vacuum; Date 2/27/91	Initials [illegible]
5) Final vacuum/pressure after receipt by lab	15.6 inches of Hg vacuum; Date 2/28/91	Initials dh
6) Calibration check of VFR after receipt by lab	ml / sec x 60 sec / 1 min = 7.12 ml/min; Date 2/28/91	Initials [illegible]

Relinquished By:	Received by:	Date / Time
Dan E. Dell	Federal Express	2/22/91 4pm
Federal Express	Robert M Glazier	2/25/91 0900
Robert M Glazier	Federal Express	2/27/91 1400
Fed. Ex.	Dan E Dell	2/28/91 9:45

Note: Numbers 1,2,5,6 are completed by Enseco Lab personnel

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A9105903-007

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Location #7

Canister Chain of Custody and Field Data Record (Composite Samples)

Client Golder

Canister Serial # A-069 Date Cleaned 2/14/91 & VFR Serial# HT-06

Leak Check OK 2/22/91

24 Hour Composite

1) Initial Calibration of VFR (vacuum flow regulator)	ml/sec x 60 sec/1 min = 7.28 ml/min 2-21-91 =	Date 2/19/91 Initials da
2) Initial vacuum check of canister	30 inches of Hg vacuum	Date 2/22/91 Initials da
3) Field vacuum check before sampling	30 inches of Hg vacuum	Date 2/26/91 Initials RMG
4) Final vacuum/pressure after sampling	17 inches of Hg vacuum	Date 2/27/91 Initials RMG
5) Final vacuum/pressure after receipt by lab	16 inches of Hg vacuum	Date 2/28/91 Initials da
6) Calibration check of VFR after receipt by lab	ml/sec x 60 sec/1 min = 7.14 ml/min	Date 2/28/91 Initials LA

Relinquished By:	Received by:	Date / Time
da E Del	Federal Express	2/22/91 4 pm
Federal Express	Robert M Hazen	2/25/91 0900
Robert M Hazen	Federal Express	2/27/91 1400
Federal Express	da E Del	2/28/91 9:45 am

Note: Numbers 1,2,5,6 are completed by Enseco Lab personnel

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A9105903-041

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Canister Chain of Custody and
Field Data Record
(Composite Samples)

Location #11

Client Golder

Page 4 of 13

Canister Serial # A-070 Date Cleaned 2/13/91 Am VFR Serial# HT-07

Leak check OK JH 2/22/91 24 Hour Composite

1) Initial Calibration of VFR (vacuum flow regulator)	ml/sec x 60 sec/1 min = 7.28 ml/min	Date 2-19-91 Initials dB
2) Initial vacuum check of canister	30 inches of Hg vacuum	Date 2/22/91 Initials dB
3) Field vacuum check before sampling	30 inches of Hg vacuum	Date 2/24/91 Initials RMG
4) Final vacuum/pressure after sampling	17 inches of Hg vacuum	Date 2/27/91 Initials RMG
5) Final vacuum/pressure after receipt by lab	16 inches of Hg vacuum	Date 2/28/91 Initials dB
6) Calibration check of VFR after receipt by lab	ml/sec x 60 sec/1 min = 7.45 ml/min	Date 2/28/91 Initials JH

Relinquished By:	Received by:	Date / Time
dan E Dell	Federal Express	2/22/91 4pm
Federal Express	Robert M Glazier	2/25/91 0900
Robert M Glazier	Federal Express	2/27/91 1400
Fed-Ex.	dan E Dell	2/28/91 9:45

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A905903-010

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Canister Chain of Custody and
Field Data Record
(Composite Samples)

Location #10

Client Golder

Canister Serial # A-071 Date Cleaned 2/14/91 AM VFR Serial# HT-08

Leak Check OK 1b 2/20/91 / 24 Hour Composite

1) Initial Calibration of VFR (vacuum flow regulator)	ml/sec x 60 sec/1 min = 6.98 ml/min	Date 2-19-91 Initials dd 2-21-91 = 7.11
2) Initial vacuum check of canister	30 inches of Hg vacuum	Date 2/22/91 Initials dd
3) Field vacuum check before sampling	30 inches of Hg vacuum	Date 2/24/91 Initials RMG
4) Final vacuum/pressure after sampling	18.5 inches of Hg vacuum	Date 2/27/91 Initials RMG
5) Final vacuum/pressure after receipt by lab	17.9 inches of Hg vacuum	Date 2/28/91 Initials dd
6) Calibration check of VFR after receipt by lab	ml/sec x 60 sec/1 min = 6.73 ml/min	Date 2/28/91 Initials dd

Relinquished By:	Received by:	Date / Time
Dan E. Dale	Federal Express	2/22/91 4pm
Federal Express	Robert M Hanzlik	2/25/91 0900
Robert M Hanzlik	Federal Express	2/27/91 1400
Fed-Ex.	Dan E. Dale	2/28/91 9:45 am

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A9105903-012

Location #13

Canister Chain of Custody and Field Data Record (Composite Samples)

Client Golder

Canister Serial # A-072 Date Cleaned 2/13/91 pm VFR Serial# HT-09

Leak Check OK JJ 2/22/91 24 Hour Composite

1) Initial Calibration of VFR (vacuum flow regulator)	ml/sec x 60 sec/1 min = 7.22 ml/min	Date 2-21-91 Initials dd. (2-21-91 7.00)
2) Initial vacuum check of canister	30 inches of Hg vacuum	Date 2/22/91 Initials dd
3) Field vacuum check before sampling	30 inches of Hg vacuum	Date 2/26/91 Initials RMG
4) Final vacuum/pressure after sampling	19 inches of Hg vacuum	Date 2/27/91 Initials RMG
5) Final vacuum/pressure after receipt by lab	18 inches of Hg vacuum	Date 2/28/91 Initials dd
6) Calibration check of VFR after receipt by lab	ml/sec x 60 sec/1 min = 7.0 ml/min	Date 2/28/91 Initials ll

Relinquished By:	Received by:	Date / Time
dan E. Dell	Federal Express	2/22/91 4pm
Federal Express	Robert M Hazen	2/25/91 0900
Robert M Hazen	Federal Express	2/27/91 1400
Fed. Ex.	dan E Dell	2/28/91 9:45 Am

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Not Used - Broken Canister

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Canister Chain of Custody and Field Data Record (Composite Samples)

Client Golder Page 7 of 13

Canister Serial # A-073 Date Cleaned 2/13/91 AM VFR Serial# HT-10

Leak Check OK JJ 2/22/91 24 Hour Composite

1) Initial Calibration of VFR (vacuum flow regulator)	ml / sec x 60 sec / 1 min = 7.29 ml/min	2-21-91 7.37 Date 2/19/91 Initials dd
2) Initial vacuum check of canister	* 30 + inches of Hg vacuum	Date 2/22/91 Initials dd
3) Field vacuum check before sampling	1 inches of Hg vacuum	Date 2/26/91 Initials RMG
4) Final vacuum/pressure after sampling	1 inches of Hg vacuum	Date 2/27/91 Initials RMG
5) Final vacuum/pressure after receipt by lab	____ inches of Hg vacuum	Date ____ Initials ____
6) Calibration check of VFR after receipt by lab	____ ml / sec x 60 sec / 1 min = ____ ml/min	Date ____ Initials ____

* 30+ inches of Hg vacuum = 30" Hg actually dd.

Relinquished By:	Received by:	Date / Time
dd E Dale	Federal Express	2/22/91 4pm
Federal Express	Robert M Glazier	2/25/91 0900
Robert M Glazier	Federal Express	2/27/91 1400
Federal Express	dd E Dale	2/28/91 9:45 AM

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A9105703-005

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Location #5

Canister Chain of Custody and Field Data Record (Composite Samples)

Client Golder

Canister Serial # A-074 Date Cleaned 2/14/91 pm VFR Serial# HT-12

Leak Check OK // 2/22/91 24 Hour Composite

1) Initial Calibration of VFR (vacuum flow regulator)	ml / sec x 60 sec / 1 min = 7.23 ml/min	2-21-91 = 7.42 Date 2/19/91 Initials dd
2) Initial vacuum check of canister	30 inches of Hg vacuum	Date 2/22/91 Initials dd
3) Field vacuum check before sampling	30 inches of Hg vacuum	Date 2/26/91 Initials RJG
4) Final vacuum/pressure after sampling	17 inches of Hg vacuum	Date ~~2/26~~ 2/27/91 Initials RJG
5) Final vacuum/pressure after receipt by lab	15.8 inches of Hg vacuum	Date 2/28/91 Initials dd
6) Calibration check of VFR after receipt by lab	ml / sec x 60 sec / 1 min = 7.70 ml/min	Date 2/28/91 Initials MH

Relinquished By:	Received by:	Date / Time
Dan E Dell	Federal Express	2/22/91 4pm
Federal Express	Robert M Hazen	2/25/91 0900
Robert M Hazen	Federal Express	2/27/91 1400
Fed. Ex.	Dan E Dell	2/28/91 9:45 Am

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Location # 9

A9105903-009

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Canister Chain of Custody and Field Data Record (Composite Samples)

Client Golder

Canister Serial # A-075 Date Cleaned 2/15/91 AM VFR Serial# HT-13

Leak check ok // 2/22/91 24 HOUR Composite

1) Initial Calibration of VFR (vacuum flow regulator)	ml/sec x 60 sec/1 min = 7.38 ml/min	Date 2-19-91 Initials dd. (2-28-91 = 7.39)
2) Initial vacuum check of canister	* 30+ inches of Hg vacuum	Date 2/22/91 Initials dd
3) Field vacuum check before sampling	30+ inches of Hg vacuum	Date 2/26/91 Initials RMG
4) Final vacuum/pressure after sampling	18 inches of Hg vacuum	Date 2/27/91 Initials RMG
5) Final vacuum/pressure after receipt by lab	17.7 inches of Hg vacuum	Date 3/28/91 Initials dd
6) Calibration check of VFR after receipt by lab	ml/sec x 60 sec/1 min = 7.89 ml/min	Date 3/28/91 Initials

* 30+ inches of Hg vacuum = 30" Hg vacuum actually. dd

Relinquished By:	Received by:	Date / Time
dan C. Dale	Federal Express	2/22/91 4pm
Federal Express	Robert M Glazier	2/25/91 0900
Robert M Glazier	Federal Express	2/27/91 1400
Fed. Ex.	dan C Dale	2/28/91 9:45 AM

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A9105903-003

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Canister Chain of Custody and
Field Data Record
(Composite Samples)

Client Golder

Canister Serial # A-076 Date Cleaned 2/13/91 AM VFR Serial# HT-16

Leak Check OK JD 2/22/91, 24 Hour Composite

1) Initial Calibration of VFR (vacuum flow regulator)	ml / sec x 60 sec / 1 min = 7.19 ml/min	2-21-91: 7.34 Date 2-21-91 Initials dd
2) Initial vacuum check of canister	* 30+ inches of Hg vacuum	Date 2/22/91 Initials dd
3) Field vacuum check before sampling	30+ inches of Hg vacuum	Date 2/26/91 Initials R.A.G.
4) Final vacuum/pressure after sampling	19 inches of Hg vacuum	Date 2/27/91 Initials R.A.G.
5) Final vacuum/pressure after receipt by lab	18 inches of Hg vacuum	Date 2/28/91 Initials dd
6) Calibration check of VFR after receipt by lab	ml / sec x 60 sec / 1 min = 6.9 ml/min	Date 3/04/91 Initials JD

* 30+ inches HG vacuum = 30" Hg vacuum actually. dd.

Relinquished By:	Received by:	Date / Time
dd E. Dal	Federal Express	2/22/91 4pm
Federal Express	Robert M Glazier	2/25/91 0900
Robert M Glazier	Federal Express	2/27/91 1400
Federal Express	dd E Dal	2/28/91 9:45 AM

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Location #2 dd AGS A9105903-002 Enseco

Canister Chain of Custody and Field Data Record (Composite Samples)

Client Golder Page 11 of 13

Canister Serial # A-078 Date Cleaned 2/14/91 AM VFR Serial# MT-19

Leak Check OK dd 2/22/91 24 HOUR Composite

1) Initial Calibration of VFR (vacuum flow regulator)	ml / sec x 60 sec / 1 min = 7.22 ml/min	Date 2/21/91 Initials dd (2-21-91 = 7.33)
2) Initial vacuum check of canister	★ 30+ inches of Hg vacuum	Date 2/22/91 Initials dd
3) Field vacuum check before sampling	30+ inches of Hg vacuum	Date 2/26/91 Initials JMF
4) Final vacuum/pressure after sampling	19 inches of Hg vacuum	Date 2/27/91 Initials JMG
5) Final vacuum/pressure after receipt by lab	18 inches of Hg vacuum	Date 2/28/91 Initials dd
6) Calibration check of VFR after receipt by lab	ml / sec x 60 sec / 1 min = 6.7 ml/min	Date 3/1/91 Initials MK

★ 30+ inches of Hg Vacuum = 30" Hg vacuum actually. dd.

Relinquished By:	Received by:	Date / Time
dd E. Orr	Federal Express	2/22/91 4pm
Federal Express	Robert M Hazlett	2/25/91 0900
Robert M Hazlett	Federal Express	2/27/91 1400
Federal Express	dd E. Orr	2/28/91 9:45 AM

Note: Numbers 1,2,5,6 are completed by Enseco Lab personnel

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A9105903-008

Enseco

Canister Chain of Custody and
Field Data Record
(Composite Samples)

Location #2

Client Calder

Canister Serial # A-079 Date Cleaned 2/14/91 pm VFR Serial# HT-20

Leak Check OK JK 2/22/91 24 Hour Composite

1) Initial Calibration of VFR (vacuum flow regulator)	ml / sec x 60 sec / 1 min = 7.29 ml/min	2-21-91 = 7.06 Date 2-21-91 Initials dg
2) Initial vacuum check of canister	* 30+ inches of Hg vacuum	Date 2/22/91 Initials dg
3) Field vacuum check before sampling	30+ inches of Hg vacuum	Date 2/26/91 Initials JMG
4) Final vacuum/pressure after sampling	20 inches of Hg vacuum	Date 2/27/91 Initials JMG
5) Final vacuum/pressure after receipt by lab	19.8 inches of Hg vacuum	Date 2/28/91 Initials dg
6) Calibration check of VFR after receipt by lab	ml / sec x 60 sec / 1 min = 6.75 ml/min	Date 3/6/91 Initials JM

30+ inches of Hg Vacuum = 30 inches Hg Vacuum actually. dg

Relinquished By:	Received by:	Date / Time
D. E. Oden	Federal Express	2/22/91 4pm
Federal Express	Robert M Hlozier	2/25/91 0900
Robert M Hlozier	Federal Express	2/27/91 1400
Federal Express	D. E. Oden	2/28/91 9:45

Note: Numbers 1,2,5,6 are completed by Enseco Lab personnel

FDR

Enseco, Inc. - Air Toxics Laboratory
9537 Telstar Avenue, Suite 118 • El Monte, CA 91731
(818) 442-8400 • FAX: (818) 442-3758

A9105903-006

Enseco

Canister Chain of Custody and Field Data Record (Composite Samples)

Location #6

Client Golder

Canister Serial # A-095 Date Cleaned 2/14/91 AM VFR Serial# HT-23

Leak Check OK ff 2/22/91 24 Hour Composite

1) Initial Calibration of VFR (vacuum flow regulator)	ml/sec x 60 sec/1 min = 7.38 ml/min	Date 2-21-91 Initials dd (2-21-91 = 7.35)
2) Initial vacuum check of canister	* 30 + inches of Hg vacuum	Date 2/22/91 Initials dd
3) Field vacuum check before sampling	30 + inches of Hg vacuum	Date 2/26/91 Initials [illegible]
4) Final vacuum/pressure after sampling	18 inches of Hg vacuum	Date 2/27/91 Initials [illegible]
5) Final vacuum/pressure after receipt by lab	18 inches of Hg vacuum	Date 2/28/91 Initials dd
6) Calibration check of VFR after receipt by lab	ml/sec x 60 sec/1 min = 6.97 ml/min	Date 2/28/91 Initials [illegible]

* 30 + Inches of Hg Vacuum = 30 inches of Hg Vacuum actually. dd

Relinquished By:	Received by:	Date / Time
[illegible]	Federal Express	2/22/91 4pm
Federal Express	Robert M Glazier	2/25/91 0900
Robert M Glazier	Federal Express	2/27/91 1400
Fed-Ex	[illegible]	2/28/91 9:45 Am

Note: Numbers 1,2,5,6 are completed by Enseco Lab personnel

CFDR

Enseco, Inc. - Air Toxics Laboratory
9537 Telstar Avenue, Suite 118 • El Monte, CA 91731
(818) 442-8400 • FAX: (818) 442-3758

A9105903-013

Enseco

Canister Chain of Custody and Field Data Record (Grab Samples)

Location # 8114 (Grab)

Client Golder

Page 1 of 1

Canister Serial # A-096

Date Cleaned 2/15/91

1) Initial vacuum check of canister	30 inches of Hg vacuum	Date 2/22/91 Initials dA
2) Field vacuum check before sampling	30 inches of Hg vacuum	Date 2/26/91 Initials RMG
3) Final vacuum/pressure after sampling	30 inches of Hg vacuum	Date 2/27/91 Initials RMG
4) Final vacuum/pressure after receipt by lab	0.3 ~~inches~~ psig of Hg vacuum	Date 2/1/91 Initials CC

Relinquished By:	Received by:	Date / Time
Jan E. Dale	Federal Express	2/22/91 4pm
Federal Express	Robert M Glazier	2/25/91 0900
Robert M Glazier	Federal Express	2/27/91 1400
Fed. Ex	Jan E. Dale	2/25/91 9:45 AM

Note: Numbers 1 & 4 are completed by Enseco Lab personnel

CDFR1

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9537 Telstar Avenue, Suite 118 • El Monte, CA 91731
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A9105903-014

Enseco

Canister Chain of Custody and Field Data Record (Grab Samples)

Client Golder

Canister Serial # A-077

Date Cleaned 2/13/91

Sulfur Spike

1) Initial vacuum check of canister	10 ~~inches of Hg vacuum~~ P.S.I.G	Date 2/26/91 Initials dd
2) Field vacuum check before sampling	+1.5 inches of Hg vacuum	Date 2/27/91 Initials RMG
3) Final vacuum/pressure after sampling	_____ inches of Hg vacuum	Date _____ Initials _____
4) Final vacuum/pressure after receipt by lab	— inches of Hg vacuum	Date — Initials lk

Relinquished By:	Received by:	Date / Time
dd E Del	dd E Del	dd 2/26/91 ~~2/25/91~~ 5 pm
Federal Express	Robert M Menzies	2/27/91 0900
Robert M Menzies	Federal Express	2/27/91 1400
Fed. Ex.	dd E Del	2/28/91 9:45 Am

Note: Numbers 1 & 4 are completed by Enseco Lab personnel

CDFR1

Enseco, Inc. - Air Toxics Laboratory
9537 Telstar Avenue, Suite 118 • El Monte, CA 91731
(818) 442-8400 • FAX: (818) 442-3758

APPENDIX E

Flow Pump Field Data Forms
for Sampling Period 4

PRE-DESIGN INVESTIGATION
INDUSTRI-PLEX SITE
WOBURN, MASSACHUSETTS

FLOW PUMP FIELD DATA FORM

PROJECT NO.: 893-6255

LOCATION NO.: 1 SAMPLER NAME: Bob Glazier

LOCATION DESCRIPTION [Address]: adjacent to old City of Woburn Dump

DATE STARTED: 2/26/91 TIME STARTED: 0854

DATE COMPLETED: 2/27/91 TIME COMPLETED: 0843

PUMP SERIAL NO.: 516376 RECORDED TARE OF FILTER: N/A

INITIAL ROTAMETER READING: 57

FINAL ROTAMETER READING: 55

REQUIRED FLOW RATE (ml/min): 2000

INTERMITTENT PUMPING REQUIRED: x YES _____ NO

PUMP PROGRAMMING:

1. DELAYED START [Time started - min.]: 0
2. SAMPLE PERIOD [Total time - min.]: 1440 (1430)
3. PUMP PERIOD [Total time - min.]: 480

WEATHER: initial: partly cloudy, ~30°F, light N-NE wind, light snow expected overnight
~3AM, 2/26/91: no pt, ~30°F, partly sunny, moderate E wind 8AM, 2/27/91 light NNE wind ~30°F cloudy only light snow showers overnight no accumulation

OBSERVATIONS: Final sample period = 1430 (at end of sampling)

C:FPFDFORM

PRE-DESIGN INVESTIGATION
INDUSTRI-PLEX SITE
WOBURN, MASSACHUSETTS

FLOW PUMP FIELD DATA FORM

PROJECT NO.: 893-6255

LOCATION NO.: 2 SAMPLER NAME: Bob Glazier

LOCATION DESCRIPTION [Address]: north of East Hide Pile

DATE STARTED: 2-26-91 TIME STARTED: 0825

DATE COMPLETED: 2-27-91 TIME COMPLETED: 0821

PUMP SERIAL NO.: 516542 RECORDED TARE OF FILTER: N/A

INITIAL ROTAMETER READING: 57

FINAL ROTAMETER READING: 57

REQUIRED FLOW RATE (ml/min): 2000

INTERMITTENT PUMPING REQUIRED: x YES _____ NO

PUMP PROGRAMMING:

1. DELAYED START [Time started - min.]: 0
2. SAMPLE PERIOD [Total time - min.]: 1440 (1436)
3. PUMP PERIOD [Total time - min.]: 480

WEATHER: initial: partly cloudy, ~30°F, light N-NE wind, light snow expected overnight
remainder: see location 1 description

OBSERVATIONS: final ~~sample~~ time period = 1436 at end of sampling

C:FPFDFORM

PRE-DESIGN INVESTIGATION
INDUSTRI-PLEX SITE
WOBURN, MASSACHUSETTS

FLOW PUMP FIELD DATA FORM

PROJECT NO.: 893-6255

LOCATION NO.: 3 SAMPLER NAME: Bob Glazier

LOCATION DESCRIPTION [Address]: NE of site in Reading

DATE STARTED: 2/26/91 TIME STARTED: 0943

DATE COMPLETED: 2/27/91 TIME COMPLETED: 0941

PUMP SERIAL NO.: 516524 RECORDED TARE OF FILTER: N/A

INITIAL ROTAMETER READING: 57

FINAL ROTAMETER READING: 56

REQUIRED FLOW RATE (ml/min): 2000

INTERMITTENT PUMPING REQUIRED: X YES _____ NO

PUMP PROGRAMMING:

1. DELAYED START [Time started - min.]: 0
2. SAMPLE PERIOD [Total time - min.]: 1440 (0039)
3. PUMP PERIOD [Total time - min.]: 480

WEATHER: initial: partly cloudy, ~30°F, light N-NE wind, light snow expected overnight
remainder: see location #1 description

OBSERVATIONS: pump reads flow fault, sample period = 0039 when retrieved

C:FPFDFORM

PRE-DESIGN INVESTIGATION
INDUSTRI-PLEX SITE
WOBURN, MASSACHUSETTS

FLOW PUMP FIELD DATA FORM

PROJECT NO.: 893-6255

LOCATION NO.: 4 SAMPLER NAME: Bob Glazier

LOCATION DESCRIPTION [Address]: NW corner of site

DATE STARTED: 2/26/91 TIME STARTED: 0909

DATE COMPLETED: 2/27/91 TIME COMPLETED: 0909

PUMP SERIAL NO.: 516551 RECORDED TARE OF FILTER: N/A

INITIAL ROTAMETER READING: 57

FINAL ROTAMETER READING: 57

REQUIRED FLOW RATE (ml/min): 2000

INTERMITTENT PUMPING REQUIRED: X YES ____ NO

PUMP PROGRAMMING:

1. DELAYED START [Time started - min.]: 0
2. SAMPLE PERIOD [Total time - min.]: 1440 (1440)
3. PUMP PERIOD [Total time - min.]: 480

WEATHER: initial: partly cloudy, ~30°F, light N-NE wind, light snow expected overnight
remainder: see location #1 description

OBSERVATIONS: ~~pump~~ sample period = 1440 at end of sampling

C:\FPFDFORM

PRE-DESIGN INVESTIGATION
INDUSTRI-PLEX SITE
WOBURN, MASSACHUSETTS

FLOW PUMP FIELD DATA FORM

PROJECT NO.: 893-6255

LOCATION NO.: 5 SAMPLER NAME: Bob Glazier

LOCATION DESCRIPTION [Address]: SE of East Hide Pile

DATE STARTED: 2/26/91 TIME STARTED: 1210

DATE COMPLETED: 2/27/91 TIME COMPLETED: 1210

PUMP SERIAL NO.: 516529 RECORDED TARE OF FILTER: N/A

INITIAL ROTAMETER READING: 57

FINAL ROTAMETER READING: 57

REQUIRED FLOW RATE (ml/min): 2000

INTERMITTENT PUMPING REQUIRED: X YES ____ NO

PUMP PROGRAMMING:

1. DELAYED START [Time started - min.]: 0
2. SAMPLE PERIOD [Total time - min.]: 1440 (1140)
3. PUMP PERIOD [Total time - min.]: 480

WEATHER: initial: see description for location #1
remainder: see location #1 description

OBSERVATIONS: slight H_2S odor, sample period = 1440 at end of sampling

C:FPFDFORM

PRE-DESIGN INVESTIGATION
INDUSTRI-PLEX SITE
WOBURN, MASSACHUSETTS

FLOW PUMP FIELD DATA FORM

PROJECT NO.: 893-6255

LOCATION NO.: 6 SAMPLER NAME: Bob Glazier

LOCATION DESCRIPTION [Address]: central part of site, just N of trailers

DATE STARTED: 2/26/91 TIME STARTED: 1130

DATE COMPLETED: 2/26/91 TIME COMPLETED: 1130

PUMP SERIAL NO.: 516385 RECORDED TARE OF FILTER: N/A

INITIAL ROTAMETER READING: 57

FINAL ROTAMETER READING: 53

REQUIRED FLOW RATE (ml/min): 2000

INTERMITTENT PUMPING REQUIRED: x YES _____ NO

PUMP PROGRAMMING:

1. DELAYED START [Time started - min.]: 0
2. SAMPLE PERIOD [Total time - min.]: 1440 (1440)
3. PUMP PERIOD [Total time - min.]: 480

WEATHER: initial: partly cloudy, ~30°F, light N/NE wind, light snow expected overnight
remainder: see location #1 description

OBSERVATIONS: Sample period = 1440 at end of sampling

C:FPFDFORM

PRE-DESIGN INVESTIGATION
INDUSTRI-PLEX SITE
WOBURN, MASSACHUSETTS

FLOW PUMP FIELD DATA FORM

PROJECT NO.: 893-6255

LOCATION NO.: 7 SAMPLER NAME: Bob Glazier

LOCATION DESCRIPTION [Address]: NE corner of site

DATE STARTED: 2/26/91 TIME STARTED: 1138

DATE COMPLETED: 2/27/91 TIME COMPLETED: 1138

PUMP SERIAL NO.: 516393 RECORDED TARE OF FILTER: N/A

INITIAL ROTAMETER READING: 57

FINAL ROTAMETER READING: 54

REQUIRED FLOW RATE (ml/min): 2000

INTERMITTENT PUMPING REQUIRED: X YES ____ NO

PUMP PROGRAMMING:

1. DELAYED START [Time started - min.]: 0
2. SAMPLE PERIOD [Total time - min.]: 1440 (1440)
3. PUMP PERIOD [Total time - min.]: 480

WEATHER: initial: partly cloudy, ~30°F, light N-NE wind, light snow expected overnight
remainder: see location #1 description

OBSERVATIONS: sample period = 1440 at end of sampling

C:FPFDFORM

PRE-DESIGN INVESTIGATION
INDUSTRI-PLEX SITE
WOBURN, MASSACHUSETTS

FLOW PUMP FIELD DATA FORM

PROJECT NO.: 893-6255

LOCATION NO.: 8 SAMPLER NAME: Bob Glazier

LOCATION DESCRIPTION [Address]: adjacent to CR lagoons

DATE STARTED: 2/26/91 TIME STARTED: 1110 ~~1100~~ EST

DATE COMPLETED: 2/27/91 TIME COMPLETED: 1053

PUMP SERIAL NO.: 516388 RECORDED TARE OF FILTER: N/A

INITIAL ROTAMETER READING: 57

FINAL ROTAMETER READING: 54

REQUIRED FLOW RATE (ml/min): 2000

INTERMITTENT PUMPING REQUIRED: X YES ____ NO

PUMP PROGRAMMING:

1. DELAYED START [Time started - min.]: 0
2. SAMPLE PERIOD [Total time - min.]: 1440 (1427)
3. PUMP PERIOD [Total time - min.]: 480

WEATHER: initial: partly cloudy, ~30°F, light N-NE wind, light snow expected overnight
~~sample period = 1427~~ remainder: see location #1 description

OBSERVATIONS: sample period = 1427 when sampling completed

C:FPFDFORM

PRE-DESIGN INVESTIGATION
INDUSTRI-PLEX SITE
WOBURN, MASSACHUSETTS

FLOW PUMP FIELD DATA FORM

PROJECT NO.: 893-6255

LOCATION NO.: 9 SAMPLER NAME: Bob Glazier

LOCATION DESCRIPTION [Address]: Barrow's School in Reading

DATE STARTED: 2/26/91 TIME STARTED: 1035

DATE COMPLETED: 2/27/91 TIME COMPLETED: 1020

PUMP SERIAL NO.: 516510 RECORDED TARE OF FILTER: N/A

INITIAL ROTAMETER READING: 57

FINAL ROTAMETER READING: 54

REQUIRED FLOW RATE (ml/min): 2000

INTERMITTENT PUMPING REQUIRED: X YES ____ NO

PUMP PROGRAMMING:

1. DELAYED START [Time started - min.]: 0
2. SAMPLE PERIOD [Total time - min.]: 1440 (1420)
3. PUMP PERIOD [Total time - min.]: 480

WEATHER: initial = partly cloudy, ~30°F, light N-NE wind, light snow expected overnight
remainder = see location #1 description

OBSERVATIONS: sample period = 1420 at end of sampling

C:FPFDFORM

PRE-DESIGN INVESTIGATION
INDUSTRI-PLEX SITE
WOBURN, MASSACHUSETTS

FLOW PUMP FIELD DATA FORM

PROJECT NO.: 893-6255

LOCATION NO.: 10 SAMPLER NAME: Bob Glover

LOCATION DESCRIPTION [Address]: Woburn Senior's Center SW of site

DATE STARTED: 2/26/91 TIME STARTED: 0925

DATE COMPLETED: 2/27/91 TIME COMPLETED: 0925

PUMP SERIAL NO.: 516628 RECORDED TARE OF FILTER: N/A

INITIAL ROTAMETER READING: 57

FINAL ROTAMETER READING: 56

REQUIRED FLOW RATE (ml/min): 2000

INTERMITTENT PUMPING REQUIRED: X YES _____ NO

PUMP PROGRAMMING:

1. DELAYED START [Time started - min.]: 0
2. SAMPLE PERIOD [Total time - min.]: 1440 (1440)
3. PUMP PERIOD [Total time - min.]: 480

WEATHER: initial: partly cloudy, ~30°F, light NNE wind, light snow expected overnight, remainder: see description for location #1

OBSERVATIONS: ~~sampling~~ sample period = 1440 at end of sampling

C:FPFDFORM

PRE-DESIGN INVESTIGATION
INDUSTRI-PLEX SITE
WOBURN, MASSACHUSETTS

FLOW PUMP FIELD DATA FORM

PROJECT NO.: 893-6255

LOCATION NO.: 11 SAMPLER NAME: Bob Glazier

LOCATION DESCRIPTION [Address]: Woburn Post office SE of site

DATE STARTED: 2/26/91 TIME STARTED: 0955

DATE COMPLETED: 2/27/91 TIME COMPLETED: 0955

PUMP SERIAL NO.: 516395 RECORDED TARE OF FILTER: N/A

INITIAL ROTAMETER READING: 57

FINAL ROTAMETER READING: 55

REQUIRED FLOW RATE (ml/min): 2000

INTERMITTENT PUMPING REQUIRED: X YES _____ NO

PUMP PROGRAMMING:

1. DELAYED START [Time started - min.]: 0
2. SAMPLE PERIOD [Total time - min.]: 1440 (1447)
3. PUMP PERIOD [Total time - min.]: 480

WEATHER: initial: partly cloudy, ~30°F, light N-NE wind, light snow expected overnight
remainder: see description for location #1

OBSERVATIONS: sample period = 1440 at end of sampling

C:FPFDFORM

PRE-DESIGN INVESTIGATION
INDUSTRI-PLEX SITE
WOBURN, MASSACHUSETTS

FLOW PUMP FIELD DATA FORM

PROJECT NO.: 893-6255

LOCATION NO.: 13 SAMPLER NAME: Bob Glazier

LOCATION DESCRIPTION [Address]: just SE of East Hide Pile

DATE STARTED: 2/26/91 TIME STARTED: 1210

DATE COMPLETED: 2/27/91 TIME COMPLETED: 1210

PUMP SERIAL NO.: 516369 RECORDED TARE OF FILTER: N/A

INITIAL ROTAMETER READING: 57

FINAL ROTAMETER READING: 54

REQUIRED FLOW RATE (ml/min): 2000

INTERMITTENT PUMPING REQUIRED: x YES _____ NO

PUMP PROGRAMMING:

1. DELAYED START [Time started - min.]: 0
2. SAMPLE PERIOD [Total time - min.]: 1440 (1440)
3. PUMP PERIOD [Total time - min.]: 480

WEATHER: initial: partly cloudy, ~30°F, light N-NE wind, light snow expected overnight, remainder: see description for location #1

OBSERVATIONS: sample period = 1440 at end of sampling, slight H_2S odor

C:FPFDFORM

APPENDIX F

Dust and Metals Laboratory Report for Sampling Period 4

Environmental Testing & Technologies Inc.
of South Jersey

Golder Associates, Inc.
20000 Horizon Way, Suite 500
Mt. Laurel, NJ 08054

Sample ID: Cassettes
Lab ID: #11726-#11739
Received: 02-28-91
Reported: 03-20-91
Reyised: 04-01-91

Attn.: Robert M. Glazier

Ref.: Industri-Plex Site, Woburn, MA

Lab ID	Filter #, Description	Dust*	Arsenic	Chromium	Lead
Units:		ug	ug	ug	ug
#11726	1, Adjacent Woburn landfill (closed)	390	230	<2.5	<5.0
#11727	2, N of East Hide Pile	480	73	<2.5	<5.0
#11728	3, NE of site in Reading	310	98	<2.5	<5.0
#11729	4, NW corner of site	400	<50	<2.5	<5.0
#11730	5, Just SE of East Hide Pile	430	<50	<2.5	<5.0
#11731	6, End of Commerce Way extension	350	<50	<2.5	<5.0
#11732	7, NE corner of site	390	58	<2.5	<5.0
#11733	8, Adjacent to Chromium Lagoons	300	<50	<2.5	<5.0
#11734	9, Barrow's School in Reading	330	<50	<2.5	<5.0
#11735	10, Senior Center SW of site	370	360	<2.5	<5.0
#11736	11, Post Office SE of site	460	<50	<2.5	<5.0
#11737	13, Adjacent East Hide Pile	460	<50	<2.5	<5.0
#11738	12, Blank	320	<50	<2.5	<5.0
#11739	14, Blank	330	<50	<2.5	<5.0
	15, Blank	20			
	16, Blank	50			
	17, Blank	40			
	18, Blank	40			
Matrix Spike Recovery, %			123	120	98
Matrix Spike Duplicate Recovery, %			102	126	100
RPD, %			18.6	4.9	2.0

*Note: The above weights are NOT blank corrected.

Reviewed and approved by

Sherree A. Baker

Sherree A. Baker
Laboratory Manager

APPENDIX G

VOC, Sulfur, and Methane Laboratory Report for Sampling Period 4

Enseco - Air Toxics Laboratory
9537 Telstar Avenue, Suite 118 • El Monte, CA 91731
(818) 442-8400 • FAX: (818) 442-3758

Enseco
A Corning Company

March 27, 1991

GOLDER ASSOCIATES
20000 Horizon Way, Ste. 500
Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

ANALYSIS NO.: A9105903-001/014
ANALYSES: Sulfur Compounds (CARB 16), Methane (SCAQMD Method 25.2), Volatile Organics by GCMS - EPA TO14
DATE SAMPLED: 24 hour composite samples taken on 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91

PROJECT: INDUSTRIPLEX

Enclosed with this letter is the report on the chemical and physical analyses on the samples from ANALYSIS NO: A9105903-001/014 as shown above.

The samples were received by Enseco - Air Toxics Laboratory, intact and and with the chain-of-custody record attached.

Please note that ND means not detected at the detection limit expressed.

Marita M. Lonergan
REVIEWED

Steve D Hsu
APPROVED

Enseco – Air Toxics Laboratory
9537 Telstar Avenue, Suite 118 • El Monte, CA 91731
(818) 442-8400 • FAX: (818) 442-3758

Enseco
A Corning Company

LABORATORY REPORT

GOLDER ASSOCIATES
20000 Horizon Way, Ste. 500
Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

ANALYSIS NO.: A9105903-001/013
ANALYSES: Sulfur Compounds (CARB 16)
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/04/91
SAMPLE TYPE: Air
QC BATCH NO.: GC401-9103041

Sulfur Compounds

	Results ppm (vol/vol)			
Sample Identification	Hydrogen Sulfide	Methyl Mercaptan	Dimethyl Sulfide	Dimethyl Disulfide
1P/A-1/001/000/3/4/6 A-067	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
1P/A-1/002/000/3/4/6 A-078	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
1P/A-1/003/000/3/4/6 A-076	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
1P/A-1/004/000/3/4/6 A-068	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
1P/A-1/005/000/3/4/6 A-074	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
1P/A-1/006/000/3/4/6 A-095	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
1P/A-1/007/000/3/4/6 A-069	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
1P/A-1/008/000/3/4/6 A-079	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
1P/A-1/009/000/3/4/6 A-075	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
1P/A-1/010/000/3/4/6 A-071	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
1P/A-1/011/000/3/4/6 A-070	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
1P/A-1/013/000/3/4/6 A-072	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
1P/A-1/014/000/3/4/6 A-096	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)

Enseco – Air Toxics Laboratory
9537 Telstar Avenue, Suite 118 • El Monte, CA 91731
(818) 442-8400 • FAX: (818) 442-3758

LABORATORY REPORT

GOLDER ASSOCIATES
20000 Horizon Way, Ste. 500
Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

ANALYSIS NO.: A9105903
ANALYSES: Sulfur Compounds (CARB 16)
DATE SAMPLED: 02/26/91-02/27/91
SAMPLE TYPE: Air
QC BATCH NO.: GC401-9103041

QC SUMMARY
Sulfur Compounds

Compounds	Laboratory Control Sample % Recovery	Duplicate Control Sample % Recovery	RPD
Hydrogen Sulfide	100	99	2
Methyl Mercaptan	88	88	0
Dimethyl Sulfide	95	93	2
Limit	80-115	80-115	20

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(818) 442-8400 • FAX: (818) 442-3758

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Sulfur Compound Stability Study

A 15L SUMMA passivated stainless steel canister was spiked with a measured volume of a standard gas mixture (Scott Specialty Gas) containing four sulfur compounds (H_2S, methyl mercaptan, dimethyl sulfide, and dimethyl disulfide). A known volume of hydrocarbon free air was added to the canister to simulate an ambient air matrix. The canister used for this study was identical to those used for the Industriplex project sampled 02/26/91 at 14 sample locations and identified by Enseco analysis #A9105903-001/014. (The canisters were manufactured by the same supplier, and were from the same lot).

The spiked canister was analyzed on 02/26/91. The canister was sent to the Industriplex site on 02/26/91. The canister was sent back to the laboratory on 02/27/91 and received by Enseco Air Toxics Laboratory on 02/28/91. The spiked canister was analyzed on 02/28/91. The results are summarized below:

	Concentration (ppmv)			
Date	Hydrogen Sulfide	Methyl Mercaptan	Dimethyl Sulfide	Dimethyl Disulfide
*02/26/91	1.1	1.2.	1.1	1.1
02/26/91	0.68	0.49	1.0	1.3
02/28/91	0.48	0.34	1.1	1.4

* Preparation date and theoretical concentration of spiked canister.

Enseco – Air Toxics Laboratory
9537 Telstar Avenue, Suite 118 • El Monte, CA 91731
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LABORATORY REPORT

GOLDER ASSOCIATES
20000 Horizon Way, Ste. 500
Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

ANALYSIS NO.: A9105903-001/006
ANALYSES: Methane (SCAQMD Method 25.2)
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/01/91
SAMPLE TYPE: Air
QC BATCH NO.: GC101-9103011

METHANE

SAMPLE IDENTIFICATION	SAMPLING TIME 02/26/91 (Composite)	RESULTS ppm (vol/vol)
1P/A-1/001/000/3/4/6 A-067	0843	ND(8)
1P/A-1/002/000/3/4/6 A-078	0821	ND(8)
1P/A-1/003/000/3/4/6 A-076	0941	ND(8)
1P/A-1/004/000/3/4/6 A-068	0909	ND(8)
1P/A-1/005/000/3/4/6 A-074	1210	ND(8)
1P/A-1/006/000/3/4/6 A-095	1130	ND(8)

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LABORATORY REPORT

GOLDER ASSOCIATES
20000 Horizon Way, Ste. 500
Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

ANALYSIS NO.: A9105903-007/012
ANALYSES: Methane (SCAQMD Method 25.2)
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/04/91
SAMPLE TYPE: Air
QC BATCH NO.: GC101-9103011

METHANE

SAMPLE IDENTIFICATION	SAMPLING TIME 02/26/91 (Composite)	RESULTS ppm (vol/vol)
1P/A-1/007/000/3/4/6 A-069	1138	ND(8)
1P/A-1/008/000/3/4/6 A-079	1055	ND(8)
1P/A-1/009/000/3/4/6 A-075	1020	ND(8)
1P/A-1/010/000/3/4/6 A-071	0925	ND(8)
1P/A-1/011/000/3/4/4 A-070	0955	ND(8)
1P/A-1/013/000/3/4/6 A-072	1210	ND(8)

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GOLDER ASSOCIATES
20000 Horizon Way, Ste. 500
Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

ANALYSIS NO.: A9105903-013
ANALYSES: Methane (SCAQMD Method 25.2)
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/05/91
SAMPLE TYPE: Air
QC BATCH NO.: GC101-9103051

METHANE

SAMPLE IDENTIFICATION	SAMPLING TIME 02/27/91 (Composite)	RESULTS ppm (vol/vol)
1P/A-1/014/000/3/4/6 A-096	1400	ND(2)

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LABORATORY REPORT

GOLDER ASSOCIATES
20000 Horizon Way., Ste. 500
Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

ANALYSIS NO.: A9105903
ANALYSES: Methane (SCADMD Method 25.2)
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
SAMPLE TYPE: Air
QC BATCH NO.: GC101-9103011

QC SUMMARY
Methane

Compound	Laboratory Control Sample % Recovery	Duplicate Control Sample % Recovery	RPD
Methane	100	94	6
Limit	80 - 120	80 - 120	20

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GOLDER ASSOCIATES
20000 Horizon Way., Ste. 500
Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

ANALYSIS NO.: A9105903
ANALYSES: Methane (SCAQMD Method 25.2)
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
SAMPLE TYPE: Air
QC BATCH NO.: GC101-9103051

QC SUMMARY
Methane

Compound	Laboratory Control Sample % Recovery	Duplicate Control Sample % Recovery	RPD
Methane	92	91	1
Limit	80 - 120	80 - 120	20

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LABORATORY REPORT

GOLDER ASSOCIATES
20000 Horizon Way, Ste. 500
Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

Sample ID:1P/A-1/001/000/3/4/6
A-067

ANALYSIS NO.: A9105903-001
ANAYLSES: Volatile Organics by GCMS - EPA TO14
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/01/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103011

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Dichlorodifluoromethane----------Freon 12----	ND	2
Chloromethane	ND	2.5
1,2,-Dichloro-1,1,2,2-Tetrafluoroethane--Freon 114---	ND	2
Vinyl Chloride	ND	2.5
Bromomethane----------	ND	3
Chloroethane	ND	5
Trichlorofluoromethane----------Freon 11----	10	1
cis-1,2-Dichloroethene	ND	2
Carbon Disulfide----------	ND	10
1,1,2-Trichloro-1,2,2-Trifluoroethane Freon 113	ND	2
Acetone----------	ND	10
Methylene Chloride	ND	4
trans-1,2-Dichloroethene----------	ND	4
1,1-Dichloroethane	ND	2.5
Vinyl Acetate----------	ND	2.5
1,1-Dichloroethene	ND	2
2-Butanone----------	ND	3
Chloroform	ND	2
1,1,1,-Trichloroethane----------	ND	2
Carbon Tetrachloride	ND	2
Benzene----------	ND	3
1,2-Dichloroethane	ND	2
Trichloroethene----------	ND	2.5
1,2-Dichloropropane	ND	8
Bromodichloromethane----------	ND	2
cis-1,3-Dichloropropene	ND	3
4-Methyl-2-Pentanone----------	ND	3

cont...

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Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

Sample ID: 1P/A-1/001/000/3/4/6
A-067

ANALYSIS NO.: A9105903-001
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/01/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103011

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Toluene	ND	3
trans-1,3-Dichloropropene	ND	3
1,1,2-Trichloroethane	ND	3
Tetrachloroethene	ND	3
2-Hexanone	ND	5
Dibromochloromethane	ND	3
1,2-Dibromoethane	ND	2
Chlorobenzene	ND	2.5
Ethylbenzene	ND	2.5
Total Xylenes	ND	5
Styrene	ND	7
Bromoform	ND	2
1,1,2,2-Tetrachloroethane	ND	4
Benzyl Chloride	ND	2
4-Ethyl Toluene	ND	4
1,3,5-Trimethylbenzene	ND	2.5
1,2,4-Trimethylbenzene	ND	3
1,3-Dichlorobenzene	ND	3
1,4-Dichlorobenzene	ND	4
1,2-Dichlorobenzene	ND	5
1,2,4-Trichlorobenzene	ND	7
Hexachlorobutadiene	ND	5

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LABORATORY REPORT

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Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

Sample ID: 1P/A-1/002/000/3/4/6
A-078

ANALYSIS NO.: A9105903-002
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/01/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103011

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Dichlorodifluoromethane----------Freon 12----	ND	2
Chloromethane	ND	2.5
1,2,-Dichloro-1,1,2,2-Tetrafluoroethane--Freon 114---	ND	2
Vinyl Chloride	ND	2.5
Bromomethane----------	ND	3
Chloroethane	ND	5
Trichlorofluoromethane----------Freon 11----	ND	1
cis-1,2-Dichloroethene	ND	2
Carbon Disulfide----------	ND	10
1,1,2-Trichloro-1,2,2-Trifluoroethane Freon 113	ND	2
Acetone----------	ND	10
Methylene Chloride	ND	4
trans-1,2-Dichloroethene----------	ND	4
1,1-Dichloroethane	ND	2.5
Vinyl Acetate----------	ND	2.5
1,1-Dichloroethene	ND	2
2-Butanone----------	ND	3
Chloroform	ND	2
1,1,1,-Trichloroethane----------	ND	2
Carbon Tetrachloride	ND	2
Benzene----------	ND	3
1,2-Dichloroethane	ND	2
Trichloroethene----------	ND	2.5
1,2-Dichloropropane	ND	8
Bromodichloromethane----------	ND	2
cis-1,3-Dichloropropene	ND	3
4-Methyl-2-Pentanone----------	ND	3

cont...

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LABORATORY REPORT

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ATTN: MR. BOB GLAZIER

Sample ID: 1P/A-1/002/000/3/4/6
A-078

ANALYSIS NO.: A9105903-002
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/01/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103011

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Toluene	ND	3
trans-1,3-Dichloropropene	ND	3
1,1,2-Trichloroethane	ND	3
Tetrachloroethene	ND	3
2-Hexanone	ND	5
Dibromochloromethane	ND	3
1,2-Dibromoethane	ND	2
Chlorobenzene	ND	2.5
Ethylbenzene	ND	2.5
Total Xylenes	ND	5
Styrene	ND	7
Bromoform	ND	2
1,1,2,2-Tetrachloroethane	ND	4
Benzyl Chloride	ND	2
4-Ethyl Toluene	ND	4
1,3,5-Trimethylbenzene	ND	2.5
1,2,4-Trimethylbenzene	ND	3
1,3-Dichlorobenzene	ND	3
1,4-Dichlorobenzene	ND	4
1,2-Dichlorobenzene	ND	5
1,2,4-Trichlorobenzene	ND	7
Hexachlorobutadiene	ND	5

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ATTN: MR. BOB GLAZIER

Sample ID: 1P/A-1/003/000/3/4/6
A-076

ANALYSIS NO.: A9105903-003
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/01/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103011

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Dichlorodifluoromethane----------Freon 12----	ND	2
Chloromethane	ND	2.5
1,2,-Dichloro-1,1,2,2-Tetrafluoroethane--Freon 114---	ND	2
Vinyl Chloride	ND	2.5
Bromomethane----------	ND	3
Chloroethane	ND	5
Trichlorofluoromethane----------Freon 11----	ND	1
cis-1,2-Dichloroethene	ND	2
Carbon Disulfide----------	ND	10
1,1,2-Trichloro-1,2,2-Trifluoroethane Freon 113	ND	2
Acetone----------	ND	10
Methylene Chloride	ND	4
trans-1,2-Dichloroethene----------	ND	4
1,1-Dichloroethane	ND	2.5
Vinyl Acetate----------	ND	2.5
1,1-Dichloroethene	ND	2
2-Butanone----------	ND	3
Chloroform	ND	2
1,1,1,-Trichloroethane----------	ND	2
Carbon Tetrachloride	ND	2
Benzene----------	ND	3
1,2-Dichloroethane	ND	2
Trichloroethene----------	ND	2.5
1,2-Dichloropropane	ND	8
Bromodichloromethane----------	ND	2
cis-1,3-Dichloropropene	ND	3
4-Methyl-2-Pentanone----------	ND	3

cont...

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LABORATORY REPORT

GOLDER ASSOCIATES
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Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

ANALYSIS NO.: A9105903-003
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/01/91

Sample ID: 1P/A-1/003/000/3/4/6
A-076

SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103011

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Toluene	ND	3
trans-1,3-Dichloropropene	ND	3
1,1,2-Trichloroethane	ND	3
Tetrachloroethene	ND	3
2-Hexanone	ND	5
Dibromochloromethane	ND	3
1,2-Dibromoethane	ND	2
Chlorobenzene	ND	2.5
Ethylbenzene	ND	2.5
Total Xylenes	ND	5
Styrene	ND	7
Bromoform	ND	2
1,1,2,2-Tetrachloroethane	ND	4
Benzyl Chloride	ND	2
4-Ethyl Toluene	ND	4
1,3,5-Trimethylbenzene	ND	2.5
1,2,4-Trimethylbenzene	ND	3
1,3-Dichlorobenzene	ND	3
1,4-Dichlorobenzene	ND	4
1,2-Dichlorobenzene	ND	5
1,2,4-Trichlorobenzene	ND	7
Hexachlorobutadiene	ND	5

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GOLDER ASSOCIATES
20000 Horizon Way, Ste. 500
Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

Sample ID: 1P/A-1/004/000/3/4/6
A-068

ANALYSIS NO.: A9105903-004
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/01/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103011

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Dichlorodifluoromethane----------Freon 12----	ND	2
Chloromethane	ND	2.5
1,2,-Dichloro-1,1,2,2-Tetrafluoroethane--Freon 114---	ND	2
Vinyl Chloride	ND	2.5
Bromomethane----------	ND	3
Chloroethane	ND	5
Trichlorofluoromethane----------Freon 11----	ND	1
cis-1,2-Dichloroethene	ND	2
Carbon Disulfide----------	ND	10
1,1,2-Trichloro-1,2,2-Trifluoroethane Freon 113	ND	2
Acetone----------	ND	10
Methylene Chloride	ND	4
trans-1,2-Dichloroethene----------	ND	4
1,1-Dichloroethane	ND	2.5
Vinyl Acetate----------	ND	2.5
1,1-Dichloroethene	ND	2
2-Butanone----------	ND	3
Chloroform	ND	2
1,1,1,-Trichloroethane----------	ND	2
Carbon Tetrachloride	ND	2
Benzene----------	ND	3
1,2-Dichloroethane	ND	2
Trichloroethene----------	ND	2.5
1,2-Dichloropropane	ND	8
Bromodichloromethane----------	ND	2
cis-1,3-Dichloropropene	ND	3
4-Methyl-2-Pentanone----------	ND	3

cont...

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LABORATORY REPORT

GOLDER ASSOCIATES
20000 Horizon Way, Ste. 500
Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

Sample ID: 1P/A-1/004/000/3/4/6
A-068

ANALYSIS NO.: A9105903-004
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/01/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103011

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Toluene	ND	3
trans-1,3-Dichloropropene	ND	3
1,1,2-Trichloroethane	ND	3
Tetrachloroethene	ND	3
2-Hexanone	ND	5
Dibromochloromethane	ND	3
1,2-Dibromoethane	ND	2
Chlorobenzene	ND	2.5
Ethylbenzene	ND	2.5
Total Xylenes	ND	5
Styrene	ND	7
Bromoform	ND	2
1,1,2,2-Tetrachloroethane	ND	4
Benzyl Chloride	ND	2
4-Ethyl Toluene	ND	4
1,3,5-Trimethylbenzene	ND	2.5
1,2,4-Trimethylbenzene	ND	3
1,3-Dichlorobenzene	ND	3
1,4-Dichlorobenzene	ND	4
1,2-Dichlorobenzene	ND	5
1,2,4-Trichlorobenzene	ND	7
Hexachlorobutadiene	ND	5

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Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

Sample ID: 1P/A-1/005/000/3/4/6
A-074

ANALYSIS NO.: A9105903-005
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/01/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103011

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Dichlorodifluoromethane----------Freon 12----	ND	2
Chloromethane	ND	2.5
1,2,-Dichloro-1,1,2,2-Tetrafluoroethane--Freon 114---	ND	2
Vinyl Chloride	ND	2.5
Bromomethane----------	ND	3
Chloroethane	ND	5
Trichlorofluoromethane----------Freon 11----	ND	1
cis-1,2-Dichloroethene	ND	2
Carbon Disulfide----------	ND	10
1,1,2-Trichloro-1,2,2-Trifluoroethane Freon 113	ND	2
Acetone----------	ND	10
Methylene Chloride	ND	4
trans-1,2-Dichloroethene----------	ND	4
1,1-Dichloroethane	ND	2.5
Vinyl Acetate----------	ND	2.5
1,1-Dichloroethene	ND	2
2-Butanone----------	ND	3
Chloroform	ND	2
1,1,1,-Trichloroethane----------	ND	2
Carbon Tetrachloride	ND	2
Benzene----------	ND	3
1,2-Dichloroethane	ND	2
Trichloroethene----------	ND	2.5
1,2-Dichloropropane	ND	8
Bromodichloromethane----------	ND	2
cis-1,3-Dichloropropene	ND	3
4-Methyl-2-Pentanone----------	ND	3

cont...

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LABORATORY REPORT

GOLDER ASSOCIATES
20000 Horizon Way, Ste. 500
Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

Sample ID: 1P/A-1/005/000/3/4/6
A-074

ANALYSIS NO.: A9105903-005
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/01/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103011

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Toluene	ND	3
trans-1,3-Dichloropropene	ND	3
1,1,2-Trichloroethane	ND	3
Tetrachloroethene	ND	3
2-Hexanone	ND	5
Dibromochloromethane	ND	3
1,2-Dibromoethane	ND	2
Chlorobenzene	ND	2.5
Ethylbenzene	ND	2.5
Total Xylenes	ND	5
Styrene	ND	7
Bromoform	ND	2
1,1,2,2-Tetrachloroethane	ND	4
Benzyl Chloride	ND	2
4-Ethyl Toluene	ND	4
1,3,5-Trimethylbenzene	ND	2.5
1,2,4-Trimethylbenzene	ND	3
1,3-Dichlorobenzene	ND	3
1,4-Dichlorobenzene	ND	4
1,2-Dichlorobenzene	ND	5
1,2,4-Trichlorobenzene	ND	7
Hexachlorobutadiene	ND	5

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LABORATORY REPORT

GOLDER ASSOCIATES
20000 Horizon Way, Ste. 500
Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

Sample ID: 1P/A-1/006/000/3/4/6
A-095

ANALYSIS NO.: A9105903-006
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/01/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103011

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Dichlorodifluoromethane----------Freon 12----	ND	2
Chloromethane	ND	2.5
1,2,-Dichloro-1,1,2,2-Tetrafluoroethane--Freon 114---	ND	2
Vinyl Chloride	ND	2.5
Bromomethane----------	ND	3
Chloroethane	ND	5
Trichlorofluoromethane----------Freon 11----	42	1
cis-1,2-Dichloroethene	ND	2
Carbon Disulfide----------	ND	10
1,1,2-Trichloro-1,2,2-Trifluoroethane Freon 113	ND	2
Acetone----------	ND	10
Methylene Chloride	51	4
trans-1,2-Dichloroethene----------	ND	4
1,1-Dichloroethane	ND	2.5
Vinyl Acetate----------	ND	2.5
1,1-Dichloroethene	ND	2
2-Butanone----------	ND	3
Chloroform	ND	2
1,1,1,-Trichloroethane----------	ND	2
Carbon Tetrachloride	ND	2
Benzene----------	ND	3
1,2-Dichloroethane	ND	2
Trichloroethene----------	ND	2.5
1,2-Dichloropropane	ND	8
Bromodichloromethane----------	ND	2
cis-1,3-Dichloropropene	ND	3
4-Methyl-2-Pentanone----------	ND	3

cont...

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LABORATORY REPORT

GOLDER ASSOCIATES
20000 Horizon Way, Ste. 500
Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

Sample ID: 1P/A-1/006/000/3/4/6
A-095

ANALYSIS NO.: A9105903-006
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/01/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103011

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Toluene	ND	3
trans-1,3-Dichloropropene	ND	3
1,1,2-Trichloroethane	ND	3
Tetrachloroethene	ND	3
2-Hexanone	ND	5
Dibromochloromethane	ND	3
1,2-Dibromoethane	ND	2
Chlorobenzene	ND	2.5
Ethylbenzene	ND	2.5
Total Xylenes	ND	5
Styrene	ND	7
Bromoform	ND	2
1,1,2,2-Tetrachloroethane	ND	4
Benzyl Chloride	ND	2
4-Ethyl Toluene	ND	4
1,3,5-Trimethylbenzene	ND	2.5
1,2,4-Trimethylbenzene	ND	3
1,3-Dichlorobenzene	ND	3
1,4-Dichlorobenzene	ND	4
1,2-Dichlorobenzene	ND	5
1,2,4-Trichlorobenzene	ND	7
Hexachlorobutadiene	ND	5

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GOLDER ASSOCIATES
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Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

Sample ID: 1P/A-1/007/000/3/4/6
A-069

ANALYSIS NO.: A9105903-007
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/01/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103011

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Dichlorodifluoromethane----------Freon 12----	ND	2
Chloromethane	ND	2.5
1,2,-Dichloro-1,1,2,2-Tetrafluoroethane--Freon 114---	ND	2
Vinyl Chloride	ND	2.5
Bromomethane----------	ND	3
Chloroethane	ND	5
Trichlorofluoromethane----------Freon 11----	14	1
cis-1,2-Dichloroethene	ND	2
Carbon Disulfide----------	ND	10
1,1,2-Trichloro-1,2,2-Trifluoroethane Freon 113	ND	2
Acetone----------	ND	10
Methylene Chloride	ND	4
trans-1,2-Dichloroethene----------	ND	4
1,1-Dichloroethane	ND	2.5
Vinyl Acetate----------	ND	2.5
1,1-Dichloroethene	ND	2
2-Butanone----------	ND	3
Chloroform	ND	2
1,1,1,-Trichloroethane----------	ND	2
Carbon Tetrachloride	ND	2
Benzene----------	ND	3
1,2-Dichloroethane	ND	2
Trichloroethene----------	ND	2.5
1,2-Dichloropropane	ND	8
Bromodichloromethane----------	ND	2
cis-1,3-Dichloropropene	ND	3
4-Methyl-2-Pentanone----------	ND	3

cont...

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ATTN: MR. BOB GLAZIER

Sample ID: 1P/A-1/007/000/3/4/6
A-069

ANALYSIS NO.: A9105903-007
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/01/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103011

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Toluene	ND	3
trans-1,3-Dichloropropene	ND	3
1,1,2-Trichloroethane	ND	3
Tetrachloroethene	ND	3
2-Hexanone	ND	5
Dibromochloromethane	ND	3
1,2-Dibromoethane	ND	2
Chlorobenzene	ND	2.5
Ethylbenzene	ND	2.5
Total Xylenes	ND	5
Styrene	ND	7
Bromoform	ND	2
1,1,2,2-Tetrachloroethane	ND	4
Benzyl Chloride	ND	2
4-Ethyl Toluene	ND	4
1,3,5-Trimethylbenzene	ND	2.5
1,2,4-Trimethylbenzene	ND	3
1,3-Dichlorobenzene	ND	3
1,4-Dichlorobenzene	ND	4
1,2-Dichlorobenzene	ND	5
1,2,4-Trichlorobenzene	ND	7
Hexachlorobutadiene	ND	5

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ATTN: MR. BOB GLAZIER

Sample ID: 1P/A-1/008/000/3/4/6
A-079

ANALYSIS NO.: A9105903-008
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/01/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103011

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Dichlorodifluoromethane----------Freon 12----	ND	2
Chloromethane	ND	2.5
1,2,-Dichloro-1,1,2,2-Tetrafluoroethane--Freon 114---	ND	2
Vinyl Chloride	ND	2.5
Bromomethane----------	ND	3
Chloroethane	ND	5
Trichlorofluoromethane----------Freon 11----	4.4	1
cis-1,2-Dichloroethene	ND	2
Carbon Disulfide----------	ND	10
1,1,2-Trichloro-1,2,2-Trifluoroethane Freon 113	ND	2
Acetone----------	ND	10
Methylene Chloride	ND	4
trans-1,2-Dichloroethene----------	ND	4
1,1-Dichloroethane	ND	2.5
Vinyl Acetate----------	ND	2.5
1,1-Dichloroethene	ND	2
2-Butanone----------	ND	3
Chloroform	ND	2
1,1,1,-Trichloroethane----------	ND	2
Carbon Tetrachloride	ND	2
Benzene----------	ND	3
1,2-Dichloroethane	ND	2
Trichloroethene----------	ND	2.5
1,2-Dichloropropane	ND	8
Bromodichloromethane----------	ND	2
cis-1,3-Dichloropropene	ND	3
4-Methyl-2-Pentanone----------	ND	3

cont...

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ATTN: MR. BOB GLAZIER

Sample ID: 1P/A-1/008/000/3/4/6
A-079

ANALYSIS NO.: A9105903-008
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/01/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103011

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Toluene	8.2	3
trans-1,3-Dichloropropene	ND	3
1,1,2-Trichloroethane	ND	3
Tetrachloroethene	ND	3
2-Hexanone	ND	5
Dibromochloromethane	ND	3
1,2-Dibromoethane	ND	2
Chlorobenzene	ND	2.5
Ethylbenzene	ND	2.5
Total Xylenes	ND	5
Styrene	ND	7
Bromoform	ND	2
1,1,2,2-Tetrachloroethane	ND	4
Benzyl Chloride	ND	2
4-Ethyl Toluene	ND	4
1,3,5-Trimethylbenzene	ND	2.5
1,2,4-Trimethylbenzene	ND	3
1,3-Dichlorobenzene	ND	3
1,4-Dichlorobenzene	ND	4
1,2-Dichlorobenzene	ND	5
1,2,4-Trichlorobenzene	ND	7
Hexachlorobutadiene	ND	5

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ATTN: MR. BOB GLAZIER

Sample ID: 1P/A-1/009/000/3/4/6
A-075

ANALYSIS NO.: A9105903-009
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/01/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103011

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Dichlorodifluoromethane----------Freon 12----	ND	2
Chloromethane	ND	2.5
1,2,-Dichloro-1,1,2,2-Tetrafluoroethane--Freon 114---	ND	2
Vinyl Chloride	ND	2.5
Bromomethane----------	ND	3
Chloroethane	ND	5
Trichlorofluoromethane----------Freon 11----	5.7	1
cis-1,2-Dichloroethene	ND	2
Carbon Disulfide----------	ND	10
1,1,2-Trichloro-1,2,2-Trifluoroethane Freon 113	ND	2
Acetone----------	ND	10
Methylene Chloride	ND	4
trans-1,2-Dichloroethene----------	ND	4
1,1-Dichloroethane	ND	2.5
Vinyl Acetate----------	ND	2.5
1,1-Dichloroethene	ND	2
2-Butanone----------	ND	3
Chloroform	ND	2
1,1,1,-Trichloroethane----------	ND	2
Carbon Tetrachloride	ND	2
Benzene----------	ND	3
1,2-Dichloroethane	ND	2
Trichloroethene----------	ND	2.5
1,2-Dichloropropane	ND	8
Bromodichloromethane----------	ND	2
cis-1,3-Dichloropropene	ND	3
4-Methyl-2-Pentanone----------	ND	3

cont...

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ATTN: MR. BOB GLAZIER

Sample ID: 1P/A-1/009/000/3/4/6
A-075

ANALYSIS NO.: A9105903-009
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/01/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103011

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Toluene	ND	3
trans-1,3-Dichloropropene	ND	3
1,1,2-Trichloroethane	ND	3
Tetrachloroethene	ND	3
2-Hexanone	ND	5
Dibromochloromethane	ND	3
1,2-Dibromoethane	ND	2
Chlorobenzene	ND	2.5
Ethylbenzene	ND	2.5
Total Xylenes	ND	5
Styrene	ND	7
Bromoform	ND	2
1,1,2,2-Tetrachloroethane	ND	4
Benzyl Chloride	ND	2
4-Ethyl Toluene	ND	4
1,3,5-Trimethylbenzene	ND	2.5
1,2,4-Trimethylbenzene	ND	3
1,3-Dichlorobenzene	ND	3
1,4-Dichlorobenzene	ND	4
1,2-Dichlorobenzene	ND	5
1,2,4-Trichlorobenzene	ND	7
Hexachlorobutadiene	ND	5

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ANALYSIS NO.: A9105903-010
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/04/91

Sample ID: 1P/A-1/010/000/3/4/6
A-071

SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103041

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Dichlorodifluoromethane----------Freon 12----	ND	2
Chloromethane	ND	2.5
1,2,-Dichloro-1,1,2,2-Tetrafluoroethane--Freon 114---	ND	2
Vinyl Chloride	ND	2.5
Bromomethane----------	ND	3
Chloroethane	ND	5
Trichlorofluoromethane----------Freon 11----	ND	1
cis-1,2-Dichloroethene	ND	2
Carbon Disulfide----------	ND	10
1,1,2-Trichloro-1,2,2-Trifluoroethane Freon 113	ND	2
Acetone----------	ND	10
Methylene Chloride	ND	4
trans-1,2-Dichloroethene----------	ND	4
1,1-Dichloroethane	ND	2.5
Vinyl Acetate----------	ND	2.5
1,1-Dichloroethene	ND	2
2-Butanone----------	ND	3
Chloroform	ND	2
1,1,1,-Trichloroethane----------	ND	2
Carbon Tetrachloride	ND	2
Benzene----------	ND	3
1,2-Dichloroethane	ND	2
Trichloroethene----------	ND	2.5
1,2-Dichloropropane	ND	8
Bromodichloromethane----------	ND	2
cis-1,3-Dichloropropene	ND	3
4-Methyl-2-Pentanone----------	ND	3

cont...

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Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

Sample ID: 1P/A-1/010/000/3/4/6
A-071

ANALYSIS NO.: A9105903-010
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/04/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103041

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Toluene	ND	3
trans-1,3-Dichloropropene	ND	3
1,1,2-Trichloroethane	ND	3
Tetrachloroethene	ND	3
2-Hexanone	ND	5
Dibromochloromethane	ND	3
1,2-Dibromoethane	ND	2
Chlorobenzene	ND	2.5
Ethylbenzene	ND	2.5
Total Xylenes	ND	5
Styrene	ND	7
Bromoform	ND	2
1,1,2,2-Tetrachloroethane	ND	4
Benzyl Chloride	ND	2
4-Ethyl Toluene	ND	4
1,3,5-Trimethylbenzene	ND	2.5
1,2,4-Trimethylbenzene	ND	3
1,3-Dichlorobenzene	ND	3
1,4-Dichlorobenzene	ND	4
1,2-Dichlorobenzene	ND	5
1,2,4-Trichlorobenzene	ND	7
Hexachlorobutadiene	ND	5

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Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

Sample ID: 1P/A-1/011/000/3/4/6
A-070

ANALYSIS NO.: A9105903-011
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/04/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103041

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Dichlorodifluoromethane----------Freon 12----	ND	2
Chloromethane	ND	2.5
1,2,-Dichloro-1,1,2,2-Tetrafluoroethane--Freon 114---	ND	2
Vinyl Chloride	ND	2.5
Bromomethane----------	ND	3
Chloroethane	ND	5
Trichlorofluoromethane----------Freon 11----	2.4	1
cis-1,2-Dichloroethene	ND	2
Carbon Disulfide----------	ND	10
1,1,2-Trichloro-1,2,2-Trifluoroethane Freon 113	ND	2
Acetone----------	ND	10
Methylene Chloride	ND	4
trans-1,2-Dichloroethene----------	ND	4
1,1-Dichloroethane	ND	2.5
Vinyl Acetate----------	ND	2.5
1,1-Dichloroethene	ND	2
2-Butanone----------	ND	3
Chloroform	ND	2
1,1,1,-Trichloroethane----------	ND	2
Carbon Tetrachloride	ND	2
Benzene----------	ND	3
1,2-Dichloroethane	ND	2
Trichloroethene----------	ND	2.5
1,2-Dichloropropane	ND	8
Bromodichloromethane----------	ND	2
cis-1,3-Dichloropropene	ND	3
4-Methyl-2-Pentanone----------	ND	3

cont...

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ATTN: MR. BOB GLAZIER

Sample ID: 1P/A-1/011/000/3/4/6
A-070

ANALYSIS NO.: A9105903-011
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/04/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103041

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Toluene	ND	3
trans-1,3-Dichloropropene	ND	3
1,1,2-Trichloroethane	ND	3
Tetrachloroethene	ND	3
2-Hexanone	ND	5
Dibromochloromethane	ND	3
1,2-Dibromoethane	ND	2
Chlorobenzene	ND	2.5
Ethylbenzene	ND	2.5
Total Xylenes	ND	5
Styrene	ND	7
Bromoform	ND	2
1,1,2,2-Tetrachloroethane	ND	4
Benzyl Chloride	ND	2
4-Ethyl Toluene	ND	4
1,3,5-Trimethylbenzene	ND	2.5
1,2,4-Trimethylbenzene	ND	3
1,3-Dichlorobenzene	ND	3
1,4-Dichlorobenzene	ND	4
1,2-Dichlorobenzene	ND	5
1,2,4-Trichlorobenzene	ND	7
Hexachlorobutadiene	ND	5

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ATTN: MR. BOB GLAZIER

Sample ID: 1P/A-1/013/000/3/4/6
A-072

ANALYSIS NO.: A9105903-012
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/04/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103041

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Dichlorodifluoromethane----------Freon 12----	ND	2
Chloromethane	ND	2.5
1,2,-Dichloro-1,1,2,2-Tetrafluoroethane--Freon 114---	ND	2
Vinyl Chloride	ND	2.5
Bromomethane----------	ND	3
Chloroethane	ND	5
Trichlorofluoromethane----------Freon 11----	3.3	1
cis-1,2-Dichloroethene	ND	2
Carbon Disulfide----------	ND	10
1,1,2-Trichloro-1,2,2-Trifluoroethane Freon 113	ND	2
Acetone----------	ND	10
Methylene Chloride	ND	4
trans-1,2-Dichloroethene----------	ND	4
1,1-Dichloroethane	ND	2.5
Vinyl Acetate----------	ND	2.5
1,1-Dichloroethene	ND	2
2-Butanone----------	ND	3
Chloroform	ND	2
1,1,1,-Trichloroethane----------	ND	2
Carbon Tetrachloride	ND	2
Benzene----------	ND	3
1,2-Dichloroethane	ND	2
Trichloroethene----------	ND	2.5
1,2-Dichloropropane	ND	8
Bromodichloromethane----------	ND	2
cis-1,3-Dichloropropene	ND	3
4-Methyl-2-Pentanone----------	ND	3

cont...

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Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

ANALYSIS NO.: A9105903-012
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/04/91

Sample ID: 1P/A-1/013/000/3/4/6
A-072

SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103041

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Toluene	ND	3
trans-1,3-Dichloropropene	ND	3
1,1,2-Trichloroethane	ND	3
Tetrachloroethene	ND	3
2-Hexanone	ND	5
Dibromochloromethane	ND	3
1,2-Dibromoethane	ND	2
Chlorobenzene	ND	2.5
Ethylbenzene	ND	2.5
Total Xylenes	ND	5
Styrene	ND	7
Bromoform	ND	2
1,1,2,2-Tetrachloroethane	ND	4
Benzyl Chloride	ND	2
4-Ethyl Toluene	ND	4
1,3,5-Trimethylbenzene	ND	2.5
1,2,4-Trimethylbenzene	ND	3
1,3-Dichlorobenzene	ND	3
1,4-Dichlorobenzene	ND	4
1,2-Dichlorobenzene	ND	5
1,2,4-Trichlorobenzene	ND	7
Hexachlorobutadiene	ND	5

Enseco - Air Toxics Laboratory
9537 Telstar Avenue, Suite 118 • El Monte, CA 91731
(818) 442-8400 • FAX: (818) 442-3758

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LABORATORY REPORT

GOLDER ASSOCIATES
20000 Horizon Way, Ste. 500
Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

Sample ID: 1P/A-1/014/000/3/4/6
A-096

ANALYSIS NO.: A9105903-013
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/04/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103041

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Dichlorodifluoromethane----------Freon 12----	ND	2
Chloromethane	ND	2.5
1,2,-Dichloro-1,1,2,2-Tetrafluoroethane--Freon 114---	ND	2
Vinyl Chloride	ND	2.5
Bromomethane----------	ND	3
Chloroethane	ND	5
Trichlorofluoromethane----------Freon 11----	ND	1
cis-1,2-Dichloroethene	ND	2
Carbon Disulfide----------	ND	10
1,1,2-Trichloro-1,2,2-Trifluoroethane Freon 113	ND	2
Acetone----------	ND	10
Methylene Chloride	ND	4
trans-1,2-Dichloroethene----------	ND	4
1,1-Dichloroethane	ND	2.5
Vinyl Acetate----------	ND	2.5
1,1-Dichloroethene	ND	2
2-Butanone----------	ND	3
Chloroform	ND	2
1,1,1,-Trichloroethane----------	ND	2
Carbon Tetrachloride	ND	2
Benzene----------	ND	3
1,2-Dichloroethane	ND	2
Trichloroethene----------	ND	2.5
1,2-Dichloropropane	ND	8
Bromodichloromethane----------	ND	2
cis-1,3-Dichloropropene	ND	3
4-Methyl-2-Pentanone----------	ND	3

cont...

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LABORATORY REPORT

GOLDER ASSOCIATES
20000 Horizon Way, Ste. 500
Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

Sample ID: 1P/A-1/014/000/3/4/6
A-096

ANALYSIS NO.: A9105903-013
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
DATE ANALYZED: 03/04/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103041

Volatile Organics by GCMS - EPA T014

Parameter	Results ppb(v/v)	Detection Limit
Toluene	ND	3
trans-1,3-Dichloropropene	ND	3
1,1,2-Trichloroethane	ND	3
Tetrachloroethene	ND	3
2-Hexanone	ND	5
Dibromochloromethane	ND	3
1,2-Dibromoethane	ND	2
Chlorobenzene	ND	2.5
Ethylbenzene	ND	2.5
Total Xylenes	ND	5
Styrene	ND	7
Bromoform	ND	2
1,1,2,2-Tetrachloroethane	ND	4
Benzyl Chloride	ND	2
4-Ethyl Toluene	ND	4
1,3,5-Trimethylbenzene	ND	2.5
1,2,4-Trimethylbenzene	ND	3
1,3-Dichlorobenzene	ND	3
1,4-Dichlorobenzene	ND	4
1,2-Dichlorobenzene	ND	5
1,2,4-Trichlorobenzene	ND	7
Hexachlorobutadiene	ND	5

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LABORATORY REPORT

GOLDER ASSOCIATES
20000 Horizon Way, Ste. 500
Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

ANALYSIS NO.: A9105903
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103011

QC SUMMARY
Volatile Organics by GCMS
EPA TO14

Compounds	Laboratory Control Sample % Recovery	Duplicate Control Sample % Recovery	RPD
Methylene Chloride	111	110	1
1,1 Dichloroethene	107	104	2
Trichloroethene	112	106	3
Toluene	103	99	4
1,1,2,2-Tetrachlorethane	115	114	1
Limits	80 - 115	80 - 115	20

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LABORATORY REPORT

GOLDER ASSOCIATES
20000 Horizon Way, Ste. 500
Mt. Laurel, NJ 08054
ATTN: MR. BOB GLAZIER

ANALYSIS NO.: A9105903
ANALYSES: Volatile Organics by GCMS - EPA T014
DATE SAMPLED: 02/26/91-02/27/91
DATE SAMPLE REC'D: 02/28/91
SAMPLE TYPE: Air
QC BATCH NO.: MS201-9103041

QC SUMMARY
Volatile Organics by GCMS
EPA TO14

Compounds	Laboratory Control Sample % Recovery	Duplicate Control Sample % Recovery	RPD
Methylene Chloride	114	115	2
1,1 Dichloroethene	106	106	1
Trichloroethene	105	112	6
Toluene	96	95	1
1,1,2,2-Tetrachlorethane	103	106	9
Limits	80 - 115	80 - 115	20

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☐ 7440 Lincoln Way, Garden Grove, CA 92641, (714) 895-6
☐ 2810 Bunsen Ave., Unit A Ventura, CA 93003, (805) 650-0546
☐ 2325 Skyway Dr., Unit K, Santa Maria, CA 93455, (805) 922-2776
☒ 9537 Telstar Ave., Unit 118, El Monte, CA 91731, (818) 442-8400
☐ Mobile Labs, (800) ENSECO-8

CHAIN OF CUSTODY RECORD

Date 2-27-91 Page 1 of 2

Lab Number A9105903-001/014

CLIENT: Golder Associates Inc.
ADDRESS: 20000 Horizon Way, #500 Mt. Laurel, NJ 08054
PROJECT NAME: Industri-Plex
CONTRACT / PURCHASE ORDER / QUOTE #: Contract
PROJECT MANAGER: Bob Glazier
PHONE NUMBER: 609-273-1110
SITE CONTACT: Bob Glazier 617-938-1553

ANALYSES: TCL Volatiles; Methane; H_2S /reduced Scmpds

Sample No. / Identification	Date	Time	Lab Sample Number	SAMPLE TYPE LIQ.	AIR	SOLID	No. of Containers	Sample Condition/ REMARKS
IP/A-1/001/000/3/4/6	2-27-91	0843	A-067		X		1	Location 1 -001
IP/A-1/002/000/3/4/6	2-27-91	0821	A-078		X		1	Location 2 -002
IP/A-1/003/000/3/4/6	2-27-91	0941	A-076		X		1	Location 3 -003
IP/A-1/004/000/3/4/6	2-27-91	0909	A-068		X		1	Location 4 -004
IP/A-1/005/000/3/4/6	2-27-91	1210	A-074		X		1	Location 5 -005
IP/A-1/006/000/3/4/6	2-27-91	1130	A-095		X		1	Location 6 -006
IP/A-1/007/000/3/4/6	2-27-91	1138	A-069		X		1	Location 7 -007
IP/A-1/008/000/3/4/6	2-27-91	1055	A-079		X		1	Location 8 -008
IP/A-1/009/000/3/4/6	2-27-91	1020	A-075		X		1	Location 9 -009
IP/A-1/010/000/3/4/6	2-27-91	0925	A-071		X		1	Location 10 -010

SAMPLERS: (Signature) Robert M Glazier

Received by: (Signature) — Date 2-27-91 — Time 1400

Relinquished by: (Signature) — Received by: (Signature) — Date — Time

The delivery of samples and the signature on this chain of custody form constitutes authorization to perform the analyses specified above under the Enseco Terms and Conditions, unless a contract or purchase order has been executed and is cited above.

Relinquished by: (Signature) Federal Express — Date — Time — Received for Laboratory by: Jan E Del — Date RECEIVED 2/28/91 — Time 9:45 AM — Date ACCEPTED — Time

Method of Shipment: Federal Express Airbill No: 515873965, 515873964 (spike)

Special Instructions:
Please record canister vacuum guage reading on canister COC form.
Please try to run within 72 hrs of receipt.

SAMPLE DISPOSITION:
1. Storage time requested: 30 days
(Samples will be stored for 30 days without additional charges; thereafter storage charges will be billed at the published rates.)
2. Sample to be returned to client: Y (N)
(Enseco will dispose of unreturned samples at no extra charge. Disposal will be by incineration wherever possible; otherwise, as appropriate, according to legal requirements.)

Enseco
A Corning Company

☐ 7440 L... ...ay, G... ...ove, CA ..., (714) 70
☐ 2810 Bunsen Ave., Unit A Ventura, CA 93003, (805) (... 18
☐ 2325 Skyway Dr., Unit K, Santa Maria, CA 93455, (805) ...-2778
☐ 9537 Telstar Ave., Unit 118, El Monte, CA 91731, (818) 442-8400
☐ Mobile Labs, (800) ENSECO-8

CHAIN OF CUSTODY RECORD

Date 2-27-91 Page 2 of 2

Lab Number A9105903-001/01 (Con't)

CLIENT: Golder Associates Inc	PROJECT MANAGER: Bob Glazier
ADDRESS: 20,000 Horizon Way, #500, Mt Laurel, NJ 08054	PHONE NUMBER: 609-273-1110
PROJECT NAME: Industri-Plex Contract	SITE CONTACT: Bob Glazier 617-938-1553
CONTRACT / PURCHASE ORDER / QUOTE #	

ANALYSES: TCL Volatiles; Methane; H2S/reduced S compds.

Sample No. / Identification	Date	Time	Lab Sample Number	SAMPLE TYPE LIQ.	AIR	SOLID	No. of Containers	TCL Volatiles	Methane	H2S/reduced S compds.				Sample Condition/ REMARKS	
IP/A-1/011/000/3/4/6	2-27-91	0955	A-070		X		1	X	X	X				Location 11	-011
IP/A-1/013/000/3/4/6	2-27-91	1210	A-072		X		1	X	X	X				Location 13	-012
IP/A-1/014/000/3/4/6	2-27-91	1400	A-096		X		1	X	X	X				Trip Blank	-013
IP/A-1/015/000/3/4/6	2-27-91	1400	A-077		X		1	X	X	X				Lab Spike	-014
N/A			A-073											Not Used	—

SAMPLERS: (Signature) Robert M Glazier	Received by: (Signature)	Date 2-27-91	Time 1400
Relinquished by: (Signature)	Received by: (Signature)	Date	Time

The delivery of samples and the signature on this chain of custody form constitutes authorization to perform the analyses specified above under the Enseco Terms and Conditions, unless a contract or purchase order has been executed and is cited above.

Relinquished by: (Signature)	Date	Time	Received for Laboratory by:	RECEIVED Date	RECEIVED Time	ACCEPTED Date	ACCEPTED Time
Federal Express →			[signature]	2/28/91	9:45 AM		

Method of Shipment: Federal Express Airbill No.: 5158739655, 5158739644 (spike)

Special Instructions: Please record canister vacuum guage reading on canister COC form. Please try to run within 72 hrs of receipt.

SAMPLE DISPOSITION:
1. Storage time requested: 30 days
(Samples will be stored for 30 days without additional charges; thereafter storage charges will be billed at the published rates.)
2. Sample to be returned to client: Y (N)
(Enseco will dispose of unreturned samples at no extra charge. Disposal will be by incineration wherever possible; otherwise, as appropriate, according to legal requirements.)

ENS—1145

DISTRIBUTION: White with report, Yellow to Enseco, Pink to Courier, Gold to Sample Control