QUARTERLY ASSESSMENT MONITORING REPORT (AMR) NOVEMBER 2001 PROGRAM GENERAL CHEMICAL CORPORATION 133-135 LELAND STREET FRAMINGHAM, MASSACHUSETTS

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3-19174

PREPARED FOR:
General Chemical Corporation
Framingham, Massachusetts

PREPARED BY:
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January 2002
File No. 15861.12

GZA
GeoEnvironmental, Inc.

Engineers and Scientists

January 29, 2002
GZA File No. 15861.12-C,PC

Mr. Jeffrey Chormann
Executive Office of Environmental Affairs
Department of Environmental Protection
One Winter Street
Boston, Massachusetts 02108

Re: November 2001 Quarterly Assessment Monitoring Report (AMR)
General Chemical Corporation, 133-135 Leland Street, Framingham, Massachusetts

Dear Mr. Chormann:

GZA GeoEnvironmental, Inc. (GZA) is pleased to present this report on behalf of General Chemical Corporation (GCC). This report presents the results of the November 2001 quarterly AMP groundwater sample collection and analysis. The focused risk evaluation for Facility workers at the Site, and the results of the recent Facility sump sampling event, which are also included herein. As you know, the November monitoring round was an abbreviated round, as an access agreement between Sithe and GCC had not been executed. The agreement has not been finalized, and although DEP verbally offered us an extension on the AMR deadline on December 3, 2001, we are transmitting this report to you now, in anticipation that the access agreement may not be executed before February 2002. At that time, the next AMP will be conducted.

This report contains information that addresses requirements contained in Attachment I to the Massachusetts Department of Environmental Protection (DEP) letter to GCC dated April 20, 1999, regarding the Comprehensive Assessment Report (CARP) prepared by CDW Consultants, Inc. (CDW) for the Site. Additionally, this report has been prepared to comply with the requirements set forth in DEP's November 2, 2000 Decision with Modifications. As such, this report includes historical data summaries and data quality evaluation for the current (November 2001) sampling round.

Please do not hesitate to call the undersigned at (781) 278-3700 with questions and/or comments.

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

Patricia A. Haederle, CPG
Project Manager

Albert J. Ricciardelli, PE
Consultant/Reviewer

Matthew J. Barvenik, LSP
Senior Principal

Attachment: November AMR

cc: Roy H. Swartz, GCC
Michael S. Persico, GCC (w/o attachment)
Matt Hoagland, EPA Region I (w/o attachment)
George P. King, Jr., City of Framingham (w/o attachment)
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1.00 INTRODUCTION AND SUMMARY

GZA GeoEnvironmental, Inc. (GZA) has prepared this Assessment Monitoring Report (AMR) on behalf of our client, General Chemical Corporation (GCC). This report is subject to the Limitations presented in Section 4.00. This report documents the results of the November 2001 Assessment Monitoring Program (AMP) at the 133-135 Leland Street site in Framingham, Massachusetts (the Site), which is shown on Figure 1.

The Assessment Monitoring Program is designed to monitor groundwater quality and elevation at representative locations at the Site and monitor the quality of water collected in the basement sump of the General Chemical Facility[1] (the Facility). The current (November 2001) Facility sump analytical data were also used to conduct a focused inhalation risk evaluation. Per the Massachusetts Department of Environmental Protection's (MADEP's) request in its July 31, 2001 letter to General Chemical Corporation (GCC), this focused risk evaluation includes an Imminent Hazard Evaluation (I.H.E.) for the exposure of workers in the warehouse basement[2].

Twelve groundwater, one sump and three surface water samples were collected during this AMP and analyzed for the presence of volatile organic compounds (VOCs) by EPA Method 8260B. Due to restricted access to Sithe Framingham LLC (Sithe) property during this round, only a subset of the samples originally scheduled for collection could be sampled. A synoptic groundwater and surface water elevation round was not performed due to this access limitation. These parameters were measured only in the wells that were sampled during this round. Laboratory analytical results from these samples are discussed in Section 3.00 of this report.

In general, the data from this AMP are consistent with that collected during the previous monitoring rounds. More specifically, the data indicate that the VOC groundwater plume originating from the GCC Facility continues to extend downgradient with the highest VOC levels detected along the centerline of the plume. Concentrations of VOCs in the Facility sump sample decreased significantly as compared to the previous sampling event. No VOCs were detected in any of the surface water samples collected during this round, or from wells GZ-2 and GZ-6 or Piezometer PZ-2D.

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[1] Per GZA's November 2, 2001 "Evaluation of Critical Exposure Pathways, 91 and 91A Leland Street, Framingham, Massachusetts" and as verbally approved by Ralph Fine of the DEP, air sampling is no longer required at the residences.

[2] As stated in GZA's August 21, 2001 letter to Jeffrey Chormann of the DEP, an imminent hazard evaluation is not required for Facility workers on the first floor, as the air flow is downward from the first floor to the basement.

2.00 GROUNDWATER QUALITY SAMPLING AND RESULTS

In accordance with MADEP requirements for quarterly AMP sampling, GZA completed the Fall 2001 groundwater sampling and analytical program[3]. In addition, GZA also sampled surface water locations SW-USA-1, SW-CBW-W and SW-DSA-1, located where the Sudbury Aqueduct crosses Course Brook. The total program consisted of the collection of groundwater samples from eleven monitoring wells, two piezometers, three surface water sampling locations, and the warehouse basement sump.

2.10 GROUNDWATER AND SURFACE WATER ELEVATION MEASUREMENTS

Between November 26 and 27, 2001, GZA personnel gauged and recorded depths to groundwater and NAPL thicknesses (if present) in thirteen Site wells and piezometers to the nearest 0.01-foot using an electronic interface probe. In addition, GZA gauged surface water elevations at three surface water sampling locations. Measurable quantities of separate phase hydrocarbons (SPH) were not detected in monitoring wells gauged during the current monitoring round.

Groundwater and surface water elevations were calculated using existing measuring point elevations minus the depth to water at each location. Groundwater and surface water elevation data are presented in Table 1. The elevations measured during this round are consistent with those observed during previous monitoring events. Also consistent with previous monitoring, the data for groundwater to the north of Leland Street (the former Trinity Oil Site) indicate flow to the northwest, with a groundwater divide proximate and parallel to Leland Street.

As all wells were not gauged during this round due to limited property access, there were insufficient data to generate groundwater elevation contours. A synoptic elevation round will be performed during the next AMP (currently scheduled for February 2002), and a groundwater contour plan will be included in the next AMR.

Data collected during this gauging event indicate downward vertical gradients in the CDW-18S/D, the GZ-7/7R and CDW-19S/19D well clusters. See Table 1 for groundwater elevations at locations gauged during this AMP. Water levels measured during this round are generally lower than those measured during the Fall 2000 AMP.

[3] As stated previously, due to access limitations GZA was not permitted to enter Sithe property, and as such wells and sampling locations on that property were not sampled.

2.20 GROUNDWATER SAMPLING PROCEDURES

On November 26 and 27, 2001, GZA personnel collected groundwater samples from ten monitoring wells[4] (CDW-18S, CDW-18D, CDW-19S, CDW-19D, GZ-6, GZ-1, GZ-2, GZ-3, GZ-7, and GZ-7R), two piezometers (PZ-2S/D), and the warehouse basement sump. Low flow sampling techniques were employed[5] in accordance with United States Environmental Protection Agency (EPA) guidelines[6]. Parameters (pH, temperature, specific conductivity, dissolved oxygen, ORP, and turbidity) were recorded every three minutes using a YSI 600 XL multimeter and LaMotte 2020 turbidity meter. The YSI multimeter was calibrated on a daily basis prior to sampling by GZA field technicians. The calibration was verified at the end of each day. Groundwater samples were collected from each well or piezometer upon parameter stabilization. Purge water was transferred to a 55-gallon drum and disposal services were arranged by GCC.

Groundwater samples were analyzed for VOCs via EPA Method 8260B, including 1,4-dioxane. Groundwater samples for the analyses were collected in hydrochloric acid-preserved 40-ml vials with Teflon™ septa. Samples were stored in an ice-packed cooler and transported to GZA's Environmental Chemistry Laboratory (ECL) in Hopkinton, Massachusetts following chain-of-custody protocol. The analytical results for these samples are summarized in Table 2. Copies of the laboratory data sheets for the groundwater samples are presented in Appendix A.

Samples for Quality Assurance/Quality Control (QA/QC) were also collected during the sampling program (see Table 2 and Appendix A). These samples included two trip blanks and one duplicate sample. The duplicate sample was collected from monitoring well CDW-18S and designated as CDW-180S[7]. The trip blanks, prepared from analyte-free water poured directly into hydrochloric acid-preserved vials, were handled and shipped in the same manner as the groundwater and surface water samples to identify possible contamination resulting from the handling and analytical processes.

2.30 GROUNDWATER ANALYTICAL TESTING RESULTS

Nineteen VOCs (vinyl chloride, 1,1-dichloroethene, dichloromethane, trans-1,2-dichloroethene, 1,1-dichloroethane, 2-butanone, cis-1,2-dichloroethene, 1,1,1-trichloroethane, benzene, trichloroethene, tetrachloroethene, o-xylene, styrene, isopropylbenzene, 1,2,4-trimethylbenzene, naphthalene, acetone, methyl-tertiary butyl ether , and 1,4-dioxane) were detected above method detection limits in groundwater samples. Of these compounds, total

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[4] At the time of sampling, monitoring well CDW-4 contained no water and was not sampled.

[5] All of the groundwater data shown in Appendix B were obtained by low flow sampling, except for the June 1999 and January 2000 rounds.

[6] Low Stress (low flow) Purging and Sampling Procedure for the Collection of Ground Water Samples From Monitoring Wells, EPA, Region I, July 30, 1996.

[7] Sample CDW-180S was accidentally destroyed prior to analysis.

VOC concentrations detected ranged from 7.9 micrograms per liter (µg/L) in the sample collected from GZ-3 to 78,040 µg/L in the sample collected from CDW-19D. VOCs were not present above method detection limits in the groundwater samples collected from GZ-2, GZ-6, and PZ-2D. A summary table of these analytical results is included as Table 2.

2.31 Historical Groundwater Data Trends

The total VOC concentrations in monitoring wells CDW-18S/D, and CDW-19S/D have historically fluctuated over several orders of magnitude. The concentrations observed in these wells during this sampling event are consistent with that trend. This behavior is typical of DNAPL sites and is likely due to the complex interrelationship between seasonal groundwater elevation variations and the DNAPL located upgradient of these wells. The decreasing VOC concentration trend in PZ-2S observed previously continues with the November 2001 results. Total VOC concentrations have decreased by greater than one thousand µg/L as compared to the July 2001 results. The VOC concentrations in GZ-1 and GZ-3 have decreased since the last semi-annual sampling event as well. No VOCs were detected in wells GZ-2, GZ-6, and PZ-2D, which have historically shown low to non-detectable concentrations.

Low levels of VOCs were detected in GZ-7 and GZ-7R, where they had not been observed previously. The compounds detected in GZ-7 were primarily petroleum-related compounds (methyl tertiary butyl ether, xylene, isopropylbenzene, naphthalene, and 1,2,4-trimethylbenzene) which are likely present as the result of surface spills upgradient of the well. Acetone was also detected in the GZ-7 sample, at a low concentration (47 µg/L). Low concentrations of Site constituents (cis-1, 2-dichloroethylene and 1,1,1-trichloroethane) and styrene were detected in GZ-7R at concentrations of 5.4, 2.9, and 1.9 µg/L, respectively, all of which are below GW-1 standards. As these constituents have never been detected in either well, their presence may be the result of cross-contamination, and will be confirmed when the well is sampled during future monitoring rounds.

Analysis of the monitoring well GZ-1 groundwater sample reveals Site constituents present at concentrations similar to those observed during the April 2001 AMP. 1,1-dichloroethene, cis-1,2-dichloroethene, 1,1,1-trichloroethane, trichloroethene, and tetrachloroethylene were detected in the November 2001 groundwater sample, at concentrations ranging from 2 µg/L (1,1-dichloroethene) to 180 µg/L (cis-1,2-dichloroethene). This monitoring well was installed in December 1999, using heavy-weight drilling mud, and is screened between 65 and 70 feet below ground surface. Photoionization detector headspace readings of soil samples collected from this zone during well installation indicated non-detectable concentrations. The PID readings were confirmed based on laboratory analyses, which also show that this zone was not contaminated at the time the boring was installed. Groundwater samples from this well were initially collected in January 2000, one month after installation, and no VOCs were detected at that time. The presence of VOCs in the last two groundwater samples, the first of which was obtained over a year after well installation, likely indicates that the borehole may be acting as a preferential flow

conduit for downward migration of contaminants into the till, from the impacted zones above.

As in previous monitoring rounds, Site constituents with the highest groundwater concentrations were trichloroethene (TCE), tetrachloroethene (PCE) and cis-1,2-dichloroethene (cis-1,2-DCE). Concentration trends[8] for these compounds are illustrated in time/concentration graphs (Appendix B), for the following monitoring wells and piezometers: CDW-9, CDW-11, CDW-18S/D, CDW-19S/D, GZ-1, GZ-2, GZ-3, GZ-6, GZ-7, GZ-7R, PZ-2S/D, PZ-3D, and PZ-4D. In addition, vinyl chloride and acetone are plotted for monitoring points in which it has been detected above the respective method detection limit, in the current or previous AMPs. Constituents that were not detected at concentrations above the method detection limit are represented on the graphs as a concentration of zero.

2.32 Seasonal Groundwater Variation

In general, groundwater elevations across the Site rise during the winter and are the highest during the spring. GZA has observed no apparent correlation between seasonal fluctuation in water elevations and VOC concentrations. However, since the June 1999 and January 2000 rounds were not sampled using low flow methods, a full year of comparable data is not yet available to assess trends. Future reports will contain further analysis of potential seasonal trends.

2.40 SURFACE WATER SAMPLING PROCEDURES

On November 26, 2001, three surface water samples were collected from locations SW-USA-1, CBW-W, and SW-DSA-1. Two of the three surface water samples were taken as grab samples. The CBW-W sample was taken from the MWRA gatehouse, where the water was located twenty feet below the gatehouse floor. This sample was therefore collected using a peristaltic pump and dedicated tubing.

Surface water samples were collected in hydrochloric acid-preserved 40-ml vials with Teflon™ septa and analyzed for VOCs via EPA Method 8260B. Samples were stored in an ice-packed cooler and transported to GZA's Environmental Chemistry Laboratory (ECL) in Hopkinton, Massachusetts following chain-of-custody protocol. The VOC results for these samples are summarized in Table 3. Copies of the laboratory data sheets for the surface water samples are presented in Appendix A.

2.50 SURFACE WATER ANALYTICAL RESULTS

No volatile organic compounds were detected above the method detection limits in the surface water samples.

[8] The groundwater data shown in Appendix B were obtained by low flow sampling except for the June 1999 and January 2000 rounds, and are documented in their respective AMR.

2.51 Historical Surface Water Data Trends

A decrease in total VOCs was observed in a surface water sample taken from the aqueduct and the sample downstream of where the aqueduct crosses Course Brook. VOCs were not detected in surface water location USC-1 during any sampling event. Appendix C contains graphs of TCE, PCE, cis-1, 2-DCE and vinyl chloride concentrations over time for surface water locations SW-USA-1, SW-CBW-W and SW-DSA-1. At least four sampling rounds have been conducted by GZA at each of these surface water sampling locations. VOC concentrations at these locations are variable, but show a generally decreasing trend from December 2000 onward. This is likely due to the complex interrelationship between seasonal groundwater elevation variations, ice cover and temperature.

2.52 Seasonal Surface Water Variation

Surface water VOC concentrations tend to be highest in the winter due to low volatilization resulting from decreased ambient water/air temperatures. In addition, both the drainage ditch and Course Brook tend to be frozen over in the winter, and concentrations may be higher because volatile compounds are trapped under the ice. However, Course Brook was not frozen in November 2001, which may account for the continued decrease in VOC concentrations. In addition, as stated previously, the water table was lower in Fall 2001, as compared to the previous fall. This may also account for the decrease, as less groundwater is likely to be recharging the drainage ditch and Course Brook, and thus lower concentrations are observed in Course Brook (into which the drainage ditch discharges).

2.60 DATA USABILITY AND QA/QC DATA

Per MADEP's Decision with Modifications dated November 2, 2000, this report includes a discussion and evaluation of the quality and usability of the data. Included in this evaluation are a review of trip blanks[9], matrix spike and surrogate recoveries, and a discussion of elevated detection limits.

Neither of the trip blanks contained VOCs at concentrations above the method detection limits. All laboratory matrix spike recoveries, surrogate recoveries, and matrix spike duplicate results were within method acceptance limits. The matrix spike recoveries for the 8260 analyses (1,1-dichloroethene, trichloroethene, benzene, chlorobenzene, and toluene) and surrogate recoveries (1,2-dichloroethane-D4, toluene-D8, and 4-bromofluobenzene) were all within the limits for aqueous samples tested under this method. Acceptable limits are provided with the analytical data contained in Appendices A and C. No compounds were detected in the laboratory method blanks on the dates that

[9] The duplicate sample (taken at monitoring well CDW-18S) was not analyzed due to an error at the laboratory. Since relative percent differences for duplicate samples have ranged between 0 and 20% over the three prior sampling rounds, we do not feel this will affect the validity of our data.

the samples were analyzed. All sample coolers were received intact at the laboratory with interior temperatures below 5°C.

The method detection limits (MDLs) for the 8260B analyses were elevated for three of the fifteen samples. Elevated detection limits in a relatively concentrated sample are the result of the dilution required to quantify those compounds present at high concentrations. This is not unexpected for this Site given the high concentrations of Site constituents found within the core of the plume. The samples with elevated MDLs were collected from monitoring wells CDW-18D, and CDW-19D, both of which contain elevated levels of VOCs. The analysis for the PZ-2S sample exhibited a slightly elevated MDL, again due to the presence of elevated concentrations of VOCs, although these concentrations were lower than those detected in the CDW-18 and CDW-19 samples.

Dilution is commonly performed in the laboratory to reduce sample concentrations to levels within the calibration range of the instrument. Dilution can potentially result in a false negative result. Groundwater samples with elevated MDLs (CDW-18D and CDW-19D) were collected from within or proximate to the core of the plume. The sample with a slightly elevated MDL was taken from a point on the fringe of the plume. As discussed in GZA's Data Quality Evaluation Report (February 2001), groundwater quality data collected in the core of the plume is not utilized to assess adherence to ground water standards. Thus, the potential for false negatives for some low concentration compounds in this area of the plume would not have a significant impact on the conceptual site model.

3.00 SUMP SAMPLING RESULTS AND IMMINENT HAZARD EVALUATION

During previous evaluations conducted at the Site, GZA collected a groundwater sample from the sump located in the basement of the warehouse on the GCC property. The analytical results from the sump water sample were used to evaluate the potential for volatile constituents to migrate into indoor air at significant concentrations. To supplement the previous vapor intrusion evaluation, GZA collected an additional water sample from the sump during the November 2001 sampling event. This is the second sample collected under the requirements of the DEP Decision[10].

GZA evaluated the potential for Imminent Hazard conditions to exist at the Site according to MADEP risk characterization guidance. This evaluation relies on the assumptions and analytical results presented in the previous Imminent Hazard Evaluation (IHE) prepared for the Site (GZA, 2001) and analytical results collected during the November 2001 sampling event.

[10] MADEP requested the collection of four quarterly samples from the sump located in the basement of the warehouse on the GCC property in its "Imminent Hazard Evaluation - Decision with Modifications" communication. In response, GZA collected the first of four water samples during November 2000.

3.10 HAZARD IDENTIFICATION

On November 26, 2001 GZA personnel sampled water that accumulates in the sump located in the basement of the warehouse at the General Chemical Facility using a peristaltic pump and dedicated tubing. The sump water sample was analyzed for VOCs via EPA Method 8260, including 1,4-Dioxane. The sample was collected in hydrochloric acid preserved 40-ml vials with Teflon™ septa. The sample was stored in an ice-packed cooler and transported to GZA's ECL, following chain-of-custody protocol. Five constituents (dichloromethane [methylene chloride], cis-1, 2-Dichloroethene, 1,1,1-Trichloroethane, Trichloroethene, and Tetrachloroethene) were detected above laboratory sample quantitation limits in the sump water sample. The analytical results for the sump sample are presented in Table 4, along with the analytical results from the sump sample collected in November 2000. Table 4 presents constituents that were detected in at least one of the sump samples, a complete list of analytical parameters are presented in the laboratory data sheets for the sump water samples in Appendix A.

The sump sample analytical results indicate that less than thirty percent of the constituents detected in the previous sump sample, collected in November 2000, were detected in the more recent sump sample collected in November 2001. In addition, four of the five constituents (excluding dichloromethane) were detected in the November 2001 sump sample at concentrations at least an order of magnitude less than in the previous sample. This result may be attributed to differences in groundwater elevations between November 2000 and November 2001.

The imminent hazard evaluation focused on the analytical results from the more recent sampling event (November 2001). However, an additional assessment of the historical sump sample analytical results was also conducted to conservatively estimate the continuing effects. Even though only a subset of the constituents detected during the November 2000 sampling event were detected in the more recent sump water sample, all constituents detected at the Site were considered in the evaluation of the historical analytical results.

3.20 EXPOSURE ASSESSMENT

The MCP states that the focus of an IHE for human health is on the actual or likely exposures to human receptors under current site conditions, considering the current uses of the site and the surrounding environment, and considering an appropriate short period of time. The short period of time considered in this IHE is five years (310 CMR 40.0953(1)).

This imminent hazard evaluation focused on facility workers currently occupying the warehouse located on the GCC property. Facility Workers have the potential to inhale COCs detected in groundwater present in the sump that volatilize into the indoor air of the warehouse basement. The exposure assessment evaluated the presence of volatile constituents in the indoor air of the basement only, due to the pressure differential between the basement and the first floor that significantly decreases the potential for vapor

migration from the basement up to the first floor[11]. Further descriptions of the exposure assumptions used in this assessment are presented in Table 5 and are discussed below.

3.21 Receptor-Specific Exposure Assumptions

GZA relied on conservative exposure assumptions (i.e., those expected to err on the side of protecting human health) to evaluate potential exposures at the Site. Table 5 presents the exposure assumptions for the Facility Worker scenario. Sources and explanations for each of the exposure assumptions are provided on Table 5. These exposure assumptions were presented in the February 2001 Imminent Hazard Evaluation prepared by GZA and are considered by the MADEP to be "*sufficiently conservative*", as indicated in the ORS letter dated May 22, 2001.

3.22 Exposure Point Concentrations

Two exposure scenarios were evaluated for the volatilization of constituents from the sump water to the indoor air of the basement: current conditions and historical analytical results. Other than the exposure point concentrations (EPCs), the exposure assumptions were not changed between the cases. The current conditions exposure scenario only evaluated the sump water sample collected during the November 2001 sampling event, while the historic analytical result evaluation was based on the arithmetic mean concentration of constituents detected during the November 2000 and November 2001 sampling events[12]. The purpose of these two evaluations is to provide a conservative estimate of exposure (310 CMR 40.0953(7)) and to evaluate the historic analytical results, which indicated that more elevated concentrations were historically present in the sump water than under current conditions.

Confounding sources within the warehouse on the GCC property limited the potential for indoor air samples to accurately represent the migration of Site-related constituents from the subsurface into the indoor air of the building. Therefore, EPCs for inhalation of vapors in the indoor air (Facility Workers) were modeled from the concentrations detected in the sump water samples based on the current conditions and the historic analytical results. Table 6 and Table 7 present the inputs and results of the model used to estimate indoor air concentrations of VOCs volatilizing from the sump water for current conditions and the historic analytical results, respectively. The sump model is based on empirical data from measurements of both sump water and basement air in homes (Gas Research Institute, *Management of Manufactured Gas Plant Sites*, 1988).

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[11] Based on comments presented by the MADEP, GZA evaluated the potential for constituents detected in the sump water to volatilize into indoor air and migrate from the basement to the first floor of the building. In a letter sent to the MADEP on August 21, 2001, GZA discussed the impact of the basement venting fan on the indoor air circulation in the building and the limited potential for constituents present in the basement air to migrate to the first floor at significant concentrations.

[12] For constituents not detected above the laboratory sample quantitation limit (SQL), one half the SQL was included in the calculation of the arithmetic mean concentration.

Concentrations in basement air are calculated from the sump water concentrations using the following equation:

$$C_{air} = (0.15) * (H/RT) * C_{gw}$$

Where:

C_{air} = basement air concentration ($\mu g / m^3$)
C_{gw} = concentration in groundwater, measured in sample collected from sump ($\mu g/L$).

H/RT = 55 Vp M/S

Vp = Vapor pressure (mm Hg)
MW = Molecular Weight (--)
S = Solubility ($\mu g/L$)

The virtues of this model are that it is based on empirical data and provides a simple approach. The simplicity of the model, however, also contributes to a likely overestimate of basement air concentrations. The model does not account directly for removal mechanisms such as ventilation. Residential basements are not typically ventilated with direct outside air as is the case at the GCC warehouse basement, where a fan is operating to move air through the basement. Empirical relationships based on measured concentrations in air of homes likely overpredict concentrations in commercial buildings where ventilation rates are expected to be higher. The model provides a conservative estimate of basement air concentrations and is appropriate for use in this IHE[13].

3.30 CALCULATION OF EXPOSURE DOSES

The exposure dose represents the amount of a COC to which an individual receptor may come into contact. It is a function of receptor-specific exposure assumptions and constituent-specific exposure parameters. The material that reaches the receptor's absorption barrier (such as skin, lung, or gastrointestinal tract) is referred to as the applied dose (for ingestion and inhalation exposures), while the absorbed (or internal) dose (for dermal exposures) is defined as the amount of material that actually crosses the receptor's exchange boundary.

GZA calculated exposure doses for Facility Workers using the receptor-specific exposure assumptions presented on Table 5. For inhalation exposures, average daily exposures (ADEs) and Lifetime Average Daily Exposure (LADE) were calculated by normalizing indoor air EPCs with averaging times.

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[13] ORS reviewed GZA's Imminent Hazard Evaluation (IHE) prepared for GCC in February 2001. The MADEP's Office of Research and Standards (ORS) indicated in its May 22, 2001 letter that the "*simplicity and very conservative nature of the model most likely overestimates the concentrations*" and concurred with the conclusions of the human health IHE. Therefore GZA used similar methodology in the current evaluation.

ADE (or LADE) = EPC * Fraction of time exposed during exposure period

The specific equations used to calculate the ADEs and LADEs are presented on Table 5. These equations incorporate receptor-specific exposure variables and constituent-specific exposure point concentrations to estimate the constituent-specific exposures for each receptor and pathway.

3.40 DOSE-RESPONSE ASSESSMENT

GZA followed MADEP guidance (MADEP, ORS, July 1995) to select toxicity values for COCs at the Site. GZA used the sources of toxicity values presented in MADEP guidance, and hence, preferentially relied on US EPA sources such as:

1. Integrated Risk Information System (IRIS), a US EPA database; and

2. Health Effects Assessment Summary Tables (HEAST); prepared by US EPA's Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office.

The selected toxicity values are presented in Tables 8 and 9. As described in previous AMR reports, although GZA and most of the risk assessment community has concerns regarding MADEP's unit risk value for PCE, it was used as required by MADEP's January 24, 2000 letter.

To evaluate the potential for an imminent hazard (as defined in 310 CMR 40.0951), the five-year exposure scenario, typically considered to be a subchronic exposure, was used with the more conservative chronic RfCs (lower allowable levels). Consequently, we considered the five-year scenario a "chronic" risk evaluation. Unit risk values were used, as appropriate, to evaluate potential carcinogenic effects.

3.50 IMMINENT HAZARD RISK RESULTS

The calculated I.H.E. risks for current conditions are presented in Table 10, while the historic trend evaluation is presented in Table 11. The risk estimates for both the current conditions and the historic trend analysis are summarized in Table 12. The non-carcinogenic risk estimates calculated for facility workers, based on the current (HI = 0.00003) and historic (HI = 0.02) sump water sample results, are below the MADEP acceptable risk limits for an IHE, which is a total hazard index of ten. In addition, the Excess Lifetime Cancer Risk (ELCR) estimates calculated based on current conditions (7×10^{-9}) and the historic analytical results (3×10^{-6}) do not exceed the applicable MADEP cancer risk limit, which is an ELCR of 1×10^{-5}.

3.60 IMMINENT HAZARD EVALUATION CONCLUSIONS

Two exposure scenarios were evaluated as part of the human health IHE: (1) Facility workers inhaling indoor air based on current sump water samples and (2) Facility Workers inhaling indoor air based on historic sump water samples. The Facility workers may be exposed to VOCs that migrate from the sump into the indoor air of the warehouse basement on the GCC property. Conservative exposure assumptions were used to quantify potential exposures and associated health risks for these receptor groups. GZA concludes that Site conditions do not pose an Imminent Hazard to human health based on a comparison of the risk estimates to MADEP's risk limits for non-cancer and cancer risks, as specified in the MCP (310 CMR 40.0955(2)).

3.70 FUTURE IMMINENT HAZARD EVALUATIONS

Future sump sampling analytical results will be compared to the November 2000 sampling results (the sump sample containing highest total VOC concentration). If the concentrations are equal to or less than those in the November 2000 sample, then a human health IHE for Facility workers will not be performed. Should the concentrations exceed the 2000 concentrations, an IHE will be performed and included in the respective AMR.

4.00 LIMITATIONS

The observations described in this report were made under the conditions stated herein. The conclusions presented in this report were based solely upon the services described herein, and not on scientific tasks or procedures beyond the proposed services. The work described in this report was conducted in accordance with the Terms and Conditions contained in our proposal.

The results and conclusions provided in the report are based on the specified groundwater and air sampling conducted and were arrived at in accordance with generally accepted standards of environmental and/or industrial hygiene investigations. Where sample analyses were conducted by an outside laboratory, GZA has relied upon the data provided, and has not conducted an independent evaluation of the reliability of these data.

TABLES

TABLE 1

GROUNDWATER AND SURFACE WATER ELEVATIONS
General Chemical Corporation
Framingham, Massachusetts

Well ID	Measuring Point Elevation (feet)	Depth to Bottom (feet)	Depth to Water (feet)	Depth to SPH (feet)	Groundwater Elevation (feet)
CDW-1	159.59	12.3	NG	-	NG
CDW-2	157.21	12.5	NG	-	NG
CDW-3	157.65	11.1	NG	-	NG
CDW-4	158.21	6.7	>6.7		DRY
CDW-5	158.93	12.7	NG	-	NG
CDW-6	157.07	11.1	NG	-	NG
CDW-7	158.42	10.4	NG	-	NG
CDW-9	155.25	7.4	NG	-	NG
CDW-10	153.12	11.0	NG	-	NG
CDW-11	152.99	11.3	NG	-	NG
CDW-12	154.20	19.9	NG	-	NG
CDW-13	161.15	14.7	NG	-	NG
CDW-14	158.10	11.6	NG	-	NG
CDW-15	154.62	11.2	NG	-	NG
CDW-17	160.03	11.9	NG	-	NG
CDW-18S	153.57	5.5	2.74	-	150.8
CDW-18D	153.78	8.9	3.24	-	150.5
CDW-19S	152.63	1.9	1.50	-	151.1
CDW-19D	154.91	21.5	4.02	-	150.9
GZ-1	159.66	70.0	9.25	-	150.4
GZ-2	161.18	62.7	10.23	-	151.0
GZ-3	160.21	49.0	6.89	-	153.3
GZ-4	158.84	36.2	NG	-	NG
GZ-4R	158.65	62.7	NG	-	NG
GZ-5S	156.12	15.0	NG	-	NG
GZ-5D	156.07	40.1	NG	-	NG
GZ-6	165.42	19.3	11.98	-	153.4
GZ-7	161.40	43.2	8.75	-	152.7
GZ-7R	161.74	95.7	11.87	-	149.9
GZ-8	158.72	11.5	NG	-	NG
GZ-9	158.71	10.1	NG	-	NG
GZ-10	158.84	7.7	NG	-	NG
GZ-11	158.94	9.9	NG	-	NG
GZ-12	159.85	9.9	NG	-	NG
GZA 13	159.75	11.5	NG	-	NG
GZA 14S	155.35	25.3	NG	-	NG
GZA 14M	155.35	79.0	NG	-	NG
GZA 15S	156.47	14.0	NG	-	NG
GZA 15D	156.68	34.0	NG	-	NG
GZA 15R	156.51	53.0	NG	-	NG

TABLE 1

GROUNDWATER AND SURFACE WATER ELEVATIONS
General Chemical Corporation
Framingham, Massachusetts

Well ID	Measuring Point Elevation (feet)	Depth to Bottom (feet)	Depth to Water (feet)	Depth to SPH (feet)	Groundwater Elevation (feet)
GZA 16S	158.54	12.0	NG	-	NG
GZA 16M	158.77	50.0	NG	-	NG
GZA 17S	158.18	14.0	NG	-	NG
GZA 17M	158.06	50.0	NG	-	NG
GZA 18S	158.35	14.0	NG	-	NG
GZA 18M	158.31	45.5	NG	-	NG
GZA 19DD	154.15	48.0	2.72	-	151.4
EW-1	159.07	-	NG	-	NG
EW-PZ-1	156.85	45.0	NG	-	NG
EW-PZ-2S	158.52	18.0	6.77	-	151.8
EW-PZ-2D	158.37	43.0	9.00	-	149.4
PZ-1S	153.03	10.9	NG	-	NG
PZ-1D	154.34	20.9	NG	-	NG
PZ-2S	154.29	10.6	3.75	-	150.5
PZ-2D	154.72	15.3	4.19	-	150.5
PZ-3S	154.02	9.8	NG	-	NG
PZ-3D	154.06	20.1	NG	-	NG
SW-PZ3	153.88	-	NG	-	NG
PZ-4S	103.18	6.9	NG	-	NG
PZ-4D	103.37	11.3	NG	-	NG
FW-A	-	15.1	NG	-	NG
FW-17	-	15.8	NG	-	NG
SW-1	154.60	-	NG	-	NG
SW-2	-	-	NG	-	NG
SW-3	154.01	-	NG	-	NG
SW-10	152.60	13.0	NG	-	NG
ERM-4	159.53	12.8	NG	-	NG
ERM-11	161.17	41.4	NG	-	NG
ERM-12D	160.32	5.7	NG	-	NG
MW-1	159.88	9.2	NG	-	NG
MW-2	160.00	9.8	NG	-	NG
MW-4	160.90	-	NG	-	NG

Notes:

1. Groundwater and surface water locations were gauged by GZA personnel on November 26, 2001.
2. Note: Elevation data based on Massachusetts Coordinate System (NAD27).
3. NG = Not gauged. Access to property denied or well destroyed or inaccessible.
4. The casing for MW-1 was bent, and a water level reading was not obtained.
5. GZ-12 was completely obstructed at 0.1 feet below ground surface.
6. There was a roll off parked on ERM-4, therefore; water level readings were not obtained.

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TABLE 2

GROUNDWATER ANALYTICAL RESULTS
General Chemical Corporation
Framingham, Massachusetts

	CDW-18S 11/26/01	CDW-18D 11/26/01	CDW-19S 11/26/01	CDW-19D 11/26/01	GZ-1 11/26/01	GZ-2 11/27/01	GZ-3 11/27/01	GZ-6 11/27/01	GZ-7 11/27/01	GZ-7R 11/27/01	PZ-2S 11/26/01	PZ-2D 11/26/02	GCC-SUMP 11/26/01	TB-1126 11/26/01	TB-1127 11/27/01
Vinyl Chloride	67	<200	4.5	<200	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<50	<2.0	<2.0	<2.0	<2.0
1,1-Dichloroethene	13	830	36	3,400	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	88	<1.0	<1.0	<1.0	<1.0
Dichloromethane	<1.0	270	<1.0	17,000	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<25	<1.0	64	<1.0	<1.0
trans-1,2-Dichloroethene	5.1	<100	1.5	<100	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<25	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	48	290	19	440	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	37	<1.0	<1.0	<1.0	<1.0
2-Butanone	850	<2,500	<25	<2,500	<25	<25	<25	<25	<25	<25	<630	<25	<25	<25	<25
cis-1,2-Dichloroethene	<1.0	20,000	1,100	30,000	180	<1.0	<1.0	<1.0	<1.0	5.4	220	<1.0	2.3	<1.0	<1.0
1,1,1-Trichloroethane	14	3,000	230	12,000	59	<1.0	1.4	<1.0	<1.0	2.9	28.0	<1.0	1.6	<1.0	<1.0
1,2-Dichloroethane	<1.0	<100	<1.0	<100	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<25	<1.0	<1.0	<1.0	<1.0
Benzene	1.2	<100	<1.0	<100	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<25	<1.0	<1.0	<1.0	<1.0
Trichloroethene	270	6,500	920	7,400	5.9	<1.0	5.1	<1.0	<1.0	<1.0	2,600	<1.0	3.3	<1.0	<1.0
Toluene	<1.0	<100	<1.0	<100	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<25	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	<1.0	<100	<1.0	<100	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<25	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	20	2,600	210	7,800	42	<1.0	1.4	<1.0	<1.0	<1.0	180	<1.0	1.0	<1.0	<1.0
Ethylbenzene	<1.0	<100	<1.0	<100	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<25	<1.0	<1.0	<1.0	<1.0
m&p-Xylene	<1.0	<100	<1.0	<100	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<25	<1.0	<1.0	<1.0	<1.0
o-Xylene	<1.0	<100	<1.0	<100	<1.0	<1.0	<1.0	<1.0	6.5	<1.0	<25	<1.0	<1.0	<1.0	<1.0
Styrene	<1.0	<100	<1.0	<100	<1.0	<1.0	<1.0	<1.0	<1.0	1.9	<25	<1.0	<1.0	<1.0	<1.0
Isopropylbenzene	<1.0	<100	<1.0	<100	<1.0	<1.0	<1.0	<1.0	1.9	<1.0	<25	<1.0	<1.0	<1.0	<1.0
1,2,4-trimethylbenzene	<1.0	<100	<1.0	<100	<1.0	<1.0	<1.0	<1.0	11	<1.0	<25	<1.0	<1.0	<1.0	<1.0
Naphthalene	<1.0	<100	<1.0	<100	<1.0	<1.0	<1.0	<1.0	2.6	<1.0	<25	<1.0	<1.0	<1.0	<1.0
Acetone	<25	<2,500	36	<2,500	<25	<25	<25	<25	47	<30	<630	<25	<25	<25	<25
Methyl-Tert-Butyl Ether	<2.0	<200	2.0	<200	<2.0	<2.0	<2.0	<2.0	45	<2.0	<50	<2.0	<2.0	<2.0	<2.0
1,4-Dioxane	<100	<10,000	<100	<10,000	<100	<50	<50	<100	<50	<100	<2500	<100	<100	<100	<100
Total VOCs	1,288	33,490	2,559	78,040	289	BMQL	7.9	BMQL	114	10	3,153	BMQL	72	BMQL	BMQL

Notes:

1. Samples were collected by GZA personnel on November 26 and 27, 2001.
2. Analyses performed by GZA's Environmental Chemistry Laboratory (ECL) in Hopkinton, Massachusetts via EPA Method 8260.
3. Concentrations are in ug/L (ppb). Only compounds detected during the last year of sampling are reported.
4. "BMQL" = Below Method Quantitation Limit (see laboratory data sheets for additional information).

TABLE 3

SURFACE WATER ANALYTICAL RESULTS
General Chemical Corporation
Framingham, Massachusetts

	SW-USA-1 11/26/2001	SW-CBW-W 11/26/2001	SW-DSA-1 11/26/2001
Vinyl Chloride	<2.0	<2.0	<2.0
1,1-Dichloroethene	<1.0	<1.0	<1.0
Dichloromethane	<1.0	<1.0	<1.0
trans-1,2-Dichloroethene	<1.0	<1.0	<1.0
1,1-Dichloroethane	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	<1.0	<1.0	<1.0
1,2-Dichloroethane	<1.0	<1.0	<1.0
Benzene	<1.0	<1.0	<1.0
Trichloroethene	<1.0	<1.0	<1.0
Toluene	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	<1.0	<1.0	<1.0
Tetrachloroethene	<1.0	<1.0	<1.0
Ethylbenzene	<1.0	<1.0	<1.0
m&p-Xylene	<1.0	<1.0	<1.0
o-Xylene	<1.0	<1.0	<1.0
Acetone	<25	<25	<25
Methyl-Tert-Butyl-Ether	<2.0	<2.0	<2.0
1,4-Dioxane	<100	<100	<100
Total VOCs	BMQL	BMQL	BMQL

Notes:

1. Samples were collected by GZA personnel on November 26 and 27, 2001.
2. Analyses performed by GZA's Environmental Chemistry Laboratory (ECL) in Hopkinton, Massachusetts via EPA Method 8260.
3. Concentrations are in ug/L (ppb). Only compounds detected during the last year of sampling are reported.
4. "BMQL" = Below Method Quantitation Limit (see laboratory data sheets for additional information).

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TABLE 4

SUMMARY OF ANALYTICAL DATA FOR SUMP SAMPLE[1]

Concentrations reported in micrograms per liter (µg/L)

General Chemical Corporation
Framingham, Massachusetts

Analytical Parameter[2]	Sump Sample 30-Nov-00	Sump Sample 26-Nov-01
Volatile Organic Compounds		
1,1,1-Trichloroethane	2400	1.6
1,1-Dichloroethane	140	<1.0
1,1-Dichloroethene	16	<1.0
1,2,4-Trimethylbenzene	3.4	<1.0
1,2-Dichlorobenzene	1.3	<1.0
1,3,5-Trimethylbenzene	1.5	<1.0
cis- 1,2-Dichloroethene	1000	2.3
Dichloromethane	57	64
Ethylbenzene	2.5	<1.0
m&p-Xylene	5.9	<1.0
Naphthalene	1.4	<1.0
o-Xylene	3.3	<1.0
Tetrachloroethene	600	1
Toluene	31	<1.0
trans- 1,2-Dichloroethene	4.5	<1.0
Trichloroethene	450	3.3
Vinyl Chloride	120	<2.0

Notes:

1. Analytical results based on water samples collected from the sump in the basement of the warehouse.
2. Only analytes detected during either of the sampling rounds are presented in this summary table. Refer to lab sheets in Attachment B for individual results and detection limits.
3. < indicates that the analyte was not detected above the listed sample quantitation limit.

TABLE 5

Exposure Assumptions for Facility Workers
General Chemical Corporation
Framingham, Massachusetts

Equations Used to Calculate Average Daily Exposure (ADE) and Lifetime Average Daily Exposure (LADE)

EXPOSURE PATHWAY: Inhalation of Vapors in Indoor Air

$$ADE_{inh\text{-}air} = \frac{EPC_{air} * EF * ED * EP * C1 * C2}{AP_{nc}} \quad \text{Equation 1}$$

$$LADE_{inh\text{-}air} = \frac{EPC_{air} * EF * ED * EP * C1}{AP_{c}} \quad \text{Equation 2}$$

Parameter	Definition	Units	Receptor-Specific Values Facility Worker (ages >18 years)	Rationale/Reference
$ADE_{inh\text{-}air}$	Average Daily Exposure	mg/m^3	Equation 1	Calculated
$LADE_{inh\text{-}air}$	Lifetime Average Daily Exposure	$\mu g/m^3$	Equation 2	Calculated
EPC_{air}	Exposure Point Concentration in Air	mg/m^3	Constituent-Specific	Modeled from concentrations detected in the sump sample
EF	Exposure Frequency	events/year	250	Five days per week for the entire year, excluding two weeks of vacation.
ED	Exposure Duration	hours/event	0.5	Length of time spent in the building basement (Note A).
EP	Exposure Period	years	5	Imminent Hazard Exposure Period (310 CMR 40.0953 (1))
C1	conversion factor for units	days/hr	0.0417	Constant
C2	conversion factor for units	$mg/\mu g$	0.001	Constant
AP_{nc}	Averaging Period, non-cancer	days	1,825	equals EP * 365 days/year
AP_{c}	Averaging Period, cancer	days	27,375	equals average lifetime, 75 years * 365 days/year

Notes:

A. For the inhalation of vapors in indoor air, the exposure duration was set at 0.5 hours per event. Workers who go into the basement on a regular basis, do so only to check on the sump pump operations. This task usually takes less than five minutes. The basement is used for storage and no personnel are assigned to the basement. The basement does not have offices or any work spaces established.

TABLE 6

ESTIMATION OF INDOOR AIR CONCENTRATIONS - WAREHOUSE BASEMENT
November 2001 Sump Data Evaluation - Current Conditions
General Chemical Corporation
Framingham, Massachusetts

COC	C_{gw} Groundwater Concentration ($\mu g/L$)	MW Molecular Weight (g/mole)	Vp Vapor Pressure (mmHg)	S Solubility ($\mu g/L$)	C_{air} Basement Air Concentration ($\mu g/m^3$)
Volatile Organic Compounds					
1,1,1-Trichloroethane	1.6	133	124	1,250,000	0.17
1,1-Dichloroethane	ND	99	227	5,060,000	NC
1,1-Dichloroethene	ND	97	591	2,232,000	NC
1,2,4-Trimethylbenzene	ND	120	2	3,470	NC
1,2-Dichlorobenzene	ND	147	1.5	137,000	NC
1,3,5-Trimethylbenzene	ND	120	2.4	97,700	NC
cis-1,2-Dichloroethene	2.3	97	202	800,000	0.46
Dichloromethane	64	85	455	13,000,000	1.6
Ethylbenzene	ND	106	9.6	172,000	NC
m&p-Xylene	ND	106	8.3	196,000	NC
Naphthalene	ND	128	17	32,900	NC
o-Xylene	ND	106	6.6	167,000	NC
Tetrachloroethene	1	166	20	240,000	0.11
Toluene	ND	92	28	538,000	NC
trans-1,2-Dichloroethene	ND	97	340	6,260,000	NC
Trichloroethene	3.3	131	69	1,400,000	0.18
Vinyl Chloride	ND	63	2660	1,100,000	NC

Where:

$$C_{air} = (0.15) * (55 * Vp * MW / S) * C_{gw}$$

Notes:

1. Management of Manufactured Gas Plant Sites Volume III Risk Assessment, Appendix C: Exposure Models. Gas Research Institute, 1988.
2. Groundwater concentrations are the concentrations of VOCs detected in the sample collected from the basement sump on November 26, 2001. Constituents not detected (ND) during the November 2001 sampling event were not further evaluated in this exposure scenario.
3. Molecular weight, solubility and vapor pressure were obtained from *Groundwater Chemicals: Desk Reference*. Montgomery, 1996.

Abbreviations:
COC = Constituent of Concern; NC = Not calculated; ND = Not detected.

TABLE 7

ESTIMATION OF INDOOR AIR CONCENTRATIONS - WAREHOUSE BASEMENT
November 2000 and November 2001 Analytical Results - Historical Sump Data Evaluation
General Chemical Corporation
Framingham, Massachusetts

COC	C_{gw} Groundwater Concentration ($\mu g/L$)	MW Molecular Weight (g/mole)	Vp Vapor Pressure (mmHg)	S Solubility ($\mu g/L$)	C_{air} Basement Air Concentration ($\mu g/m^3$)
Volatile Organic Compounds					
1,1,1-Trichloroethane	1201	133	124	1,250,000	131
1,1-Dichloroethane	70	99	227	5,060,000	2.6
1,1-Dichloroethene	8.3	97	591	2,232,000	1.7
1,2,4-Trimethylbenzene	2	120	2	3,470	1.1
1,2-Dichlorobenzene	0.9	147	1.5	137,000	0.012
1,3,5-Trimethylbenzene	1	120	2.4	97,700	0.025
cis-1,2-Dichloroethene	501	97	202	800,000	101
Dichloromethane	61	85	455	13,000,000	1.5
Ethylbenzene	1.5	106	9.6	172,000	0.073
m&p-Xylene	3.2	106	8.3	196,000	0.12
Naphthalene	0.95	128	17	32,900	0.52
o-Xylene	1.9	106	6.6	167,000	0.066
Tetrachloroethene	301	166	20	240,000	34
Toluene	16	92	28	538,000	0.63
trans-1,2-Dichloroethene	2.5	97	340	6,260,000	0.11
Trichloroethene	227	131	69	1,400,000	12
Vinyl Chloride	61	63	2660	1,100,000	75

Where:

$$C_{air} = (0.15) * (55 * Vp * MW / S) * C_{gw}$$

Notes:

1. Management of Manufactured Gas Plant Sites Volume III Risk Assessment, Appendix C: Exposure Models. Gas Research Institute, 1988.
2. Groundwater concentrations are the arithmetic mean concentrations of VOCs detected in the samples collected from the basement sump on November 30, 2000 and November 26, 2001. For constituents not detected above the laboratory sample quantitation limit (SQL), one-half the SQL was included in the derivation of the arithmetic mean concentration.
3. Molecular weight, solubility and vapor pressure were obtained from *Groundwater Chemicals: Desk Reference*. Montgomery, 1996.

Abbreviations:
COC = Constituent of Concern; NC = Not calculated; ND = Not detected.

TABLE 8

SUMMARY OF DOSE-RESPONSE INFORMATION - NONCARCINOGENIC EFFECTS - INHALATION
General Chemical Corporation
Framingham, Massachusetts

COC	Inhalation Subchronic Reference Concentration (mg/m^3)		Inhalation Chronic Reference Concentration (mg/m^3)		Chronic Inhalation RfC UF x MF	Target Organ/System	Critical Effect	Study Animal	Study Method
Volatile Organic Compounds									
1,1,1-Trichloroethane	1.0E+01	h	5.2E+00	g					
1,1-Dichloroethane	5.0E+00	b	5.0E-01	b	1000 x 1	kidney	damage	cat	inhalation
1,1-Dichloroethene	5.0E-03	c	5.0E-03	g					
1,2,4-Trimethylbenzene	6.0E-03	d	6.0E-03	i					
1,2-Dichlorobenzene	2.0E+00	b	2.0E-01	b	1000 x 1	whole body	decreased weight gain	rat	inhalation
1,3,5-Trimethylbenzene	6.0E-03	d	6.0E-03	i					
cis-1,2-Dichloroethene	1.1E+00	c, f	1.1E+00	c, f					
Dichloromethance	3.0E+00	b	3.0E+00	b	100 x 1	liver	hepatotoxicity	rat	inhalation
Ethylbenzene	1.0E+00	d	1.0E+00	a	300 x 1	development	developmental toxicity	rat and rabbit	inhalation
m&p-Xylene	6.0E-02	d	6.0E-02	g					
Naphthalene	3.0E-03	d	3.0E-03	a	3000 x 1	nasal effects	hyperplasia and metaplasia in respiratory and olfactory epithelium, respectively	mouse	inhalation
o-Xylene	6.0E-02	d	6.0E-02	g					
Tetrachloroethene	4.6E+00	d	4.6E+00	g					
Toluene	4.0E-01	d	4.0E-01	a	300 x 1	CNS	neurological effects	humans	occupational inhalation
trans-1,2-Dichloroethene									
Trichloroethene	1.8E-01	c	1.8E-01	e					
Vinyl chloride	3.0E-01	h	1.0E-01	a					

Sources:

a. US EPA Integrated Risk Information System (IRIS), January 2002.
b. US EPA, Health Effects Summary Tables (HEAST), Office of Solid Waste and Emergency Response/Office of Emergency and Remedial Response, Annual FY 1997.
c. MA DEP derived values, "Documentation for the Risk Assessment ShortForm", MA DEP ORS, October 1992.
d. To be conservative, in the absence of an agency approved subchronic RfC, the chronic value was used.
e. MADEP, Bureau of Waste Site Cleanup and Office of Research and Standards, "Background Documentation for the Development of the MCP Numerical Standards," April 1994.
f. The dose response values for 1,2-dichloroethene (total) were used for cis 1,2-dichloroethene.
g. This value is an Allowable Threshold Concentration (analogous to an inhalation RfC) as listed in the ORS Guidance Document (1990).
h. Value withdrawn from HEAST but is used in lieu of additional information.
i. USEPA provisional value.

Notes:
1. A blank space indicates no data found.

2. CNS = Central Nervous System; COC = Constituent of Concern; MF= Modifying Factor; UF= Uncertainty Factor

TABLE 9

SUMMARY OF DOSE-RESPONSE INFORMATION - CARCINOGENIC EFFECTS
General Chemical Corporation
Framingham, Massachusetts

COC	Weight of Evidence Class	Inhalation Unit Risk $(\mu g/m^3)^{-1}$		Target Organ/System (Inhalation)	Study Animal	Study Method
Volatile Organic Compounds						
1,1,1-Trichloroethane	D a					
1,1-Dichloroethane	C a					
1,1-Dichloroethene	C a	5.0E-5	a	kidney	mouse	inhalation
1,2,4-Trimethylbenzene						
1,2-Dichlorobenzene	D a					
1,3,5-Trimethylbenzene						
cis-1,2-Dichloroethene	D a					
Dichloromethane	B2 a	4.7E-7	a	lung, liver	mouse	inhalation
Ethylbenzene	D a					
m&p-Xylene	D a					
Naphthalene	C a					
o-Xylene	D a					
Tetrachloroethene	C-B2 b	5.5E-5	c			
Toluene	D a					
trans-1,2-Dichloroethene						
Trichloroethene	C-B2 b	1.7E-6	b			
Vinyl chloride	A a	8.8E-6	a, d	liver	rat	inhalation

Sources:

a. US EPA, Integrated Risk Information System (IRIS), January 2002.

b. MADEP, Bureau of Waste Site Cleanup and Office of Research and Standards, "Background Documentation for the Development of the MCP Numerical Standards," April 1994.

c. This cancer unit risk value was derived by ORS as described in Chemical Health Effects Assessment Methodology and the Method to Derive Allowable Ambient Limits. See further discussion in text.

d. Inhalation unit risk values for vinyl chloride are based on continuous lifetime exposure from birth using the LMS Method (IRIS, 2001).

Notes:

1. Weight of evidence classification:
   - A: Human carcinogen
   - B: Probable human carcinogen
     - B1: Limited evidence of carcinogenicity in humans from epidemiological studies
     - B2: Sufficient evidence of carcinogenicity in animals, inadequate evidence in humans
   - C: Possible human carcinogen
   - D: Not classified
   - E: No evidence of carcinogenicity

2. Inhalation unit risk is defined as the risk per concentration unit in air, e.g. risk per $\mu g/m^3$.

Abbreviations:
COC = Constituent of Concern

TABLE 10

CALCULATION OF AVERAGE DAILY EXPOSURES AND RISK ESTIMATES
FOR INHALATION OF VAPORS IN INDOOR AIR

RECEPTOR: Facility Workers
EXPOSURE SCENARIO: November 2001 Data Only
CHRONIC NON-CANCER EFFECTS

See Table 5 for Exposure Variables and Rationale	**Inhalation of Indoor Air Vapors** $ADE_{inh\ air} = \frac{EPC_{air} * EF * ED * EP * C1 * C2}{AP_{nc}}$ $HQ_{inh\ air} = \frac{ADE_{inh\ air}}{RfC}$ $HI_{inh\ air} = \Sigma HQ_{inh\ air}$			
COC	EPC_{air} ($\mu g/m^3$)	$ADE_{inh\ air}$ (mg/m^3)	RfC Chronic (mg/m^3)	$HQ_{inh\ air}$ (unitless)
Volatile Organic Compounds				
1,1,1-Trichloroethane	0.17	2.5E-06	5.2E+00	4.8E-07
1,1-Dichloroethane	NC	NC	5.0E-01	NC
1,1-Dichloroethene	NC	NC	5.0E-03	NC
1,2,4-Trimethylbenzene	NC	NC	6.0E-03	NC
1,2-Dichlorobenzene	NC	NC	2.0E-01	NC
1,3,5-Trimethylbenzene	NC	NC	6.0E-03	NC
cis-1,2-Dichloroethene	0.46	6.6E-06	1.1E+00	6.0E-06
Dichloromethane	1.6	2.2E-05	3.0E+00	7.5E-06
Ethylbenzene	NC	NC	1.0E+00	NC
m&p-Xylene	NC	NC	6.0E-02	NC
Naphthalene	NC	NC	3.0E-03	NC
o-Xylene	NC	NC	6.0E-02	NC
Tetrachloroethene	0.11	1.6E-06	4.6E+00	3.5E-07
Toluene	NC	NC	4.0E-01	NC
trans-1,2-Dichloroethene	NC	NC	NA	NC
Trichloroethene	0.18	2.5E-06	1.8E-01	1.4E-05
Vinyl Chloride	NC	NC	1.0E-01	NC
			Total $HI_{inh\ air}$:	**2.8E-05**

Abbreviations:
NC = Not Calculated; NA = Not Applicable/Not Available

TABLE 10 (Continued)

CALCULATION OF LIFETIME AVERAGE DAILY EXPOSURES AND RISK ESTIMATES
FOR INHALATION OF VAPORS IN INDOOR AIR

RECEPTOR: Facility Workers
EXPOSURE SCENARIO: November 2001 Data Only
CANCER EFFECTS

See Table 5 for Exposure Variables and Rationale	**Inhalation of Indoor Air Vapors** $LADE_{inh\ air} = \frac{EPC_{air} * EF * ED * EP * CI}{AP_c}$ $ELCR_{inh\ air} = LADE_{inh\ air} * UR$ Total $ELCR_{inh\ air} = \Sigma\ ELCR_{inh\ air}$			
COC	EPC_{air} ($\mu g/m^3$)	$LADE_{inh\ air}$ ($\mu g/m^3$)	UR $(\mu g/m^3)^{-1}$	$ELCR_{inh\ air}$ (unitless)
Volatile Organic Compounds				
1,1,1-Trichloroethane	0.17	1.7E-04	NA	NC
1,1-Dichloroethane	NC	NC	NA	NC
1,1-Dichloroethene	NC	NC	5.0E-05	NC
1,2,4-Trimethylbenzene	NC	NC	NA	NC
1,2-Dichlorobenzene	NC	NC	NA	NC
1,3,5-Trimethylbenzene	NC	NC	NA	NC
cis-1,2-Dichloroethene	0.46	4.4E-04	NA	NC
Dichloromethane	1.6	1.5E-03	4.7E-07	7.0E-10
Ethylbenzene	NC	NC	NA	NC
m&p-Xylene	NC	NC	NA	NC
Naphthalene	NC	NC	NA	NC
o-Xylene	NC	NC	NA	NC
Tetrachloroethene	0.11	1.1E-04	5.5E-05	6.0E-09
Toluene	NC	NC	NA	NC
trans-1,2-Dichloroethene	NC	NC	NA	NC
Trichloroethene	0.18	1.7E-04	1.7E-06	2.9E-10
Vinyl Chloride	NC	NC	8.8E-06	NC
			Total $ELCR_{inh\ air}$:	**7.0E-09**

Abbreviations:
COC = Constituent of Concern; NC = Not Calculated; NA = Not Applicable/Not Available

TABLE 11

CALCULATION OF AVERAGE DAILY EXPOSURES AND RISK ESTIMATES FOR INHALATION OF VAPORS IN INDOOR AIR

RECEPTOR: Facility Workers
EXPOSURE SCENARIO: Average of November 2000 and November 2001
CHRONIC NON-CANCER EFFECTS

See Table 5 for Exposure Variables and Rationale	**Inhalation of Indoor Air Vapors** $ADE_{inh\,air} = \frac{EPC_{air} * EF * ED * EP * C1 * C2}{AP_{nc}}$		$HQ_{inh\,air} = \frac{ADE_{inh\,air}}{RfC}$	$HI_{inh\,air} = \Sigma HQ_{inh\,air}$
COC	EPC_{air} ($\mu g/m^3$)	$ADE_{inh\,air}$ (mg/m^3)	RfC Chronic (mg/m^3)	$HQ_{inh\,air}$ (unitless)
Volatile Organic Compounds				
1,1,1-Trichloroethane	131	1.9E-03	5.2E+00	3.6E-04
1,1-Dichloroethane	2.6	3.7E-05	5.0E-01	7.3E-05
1,1-Dichloroethene	1.7	2.5E-05	5.0E-03	5.0E-03
1,2,4-Trimethylbenzene	1.1	1.6E-05	6.0E-03	2.7E-03
1,2-Dichlorobenzene	0.012	1.7E-07	2.0E-01	8.5E-07
1,3,5-Trimethylbenzene	0.025	3.5E-07	6.0E-03	5.8E-05
cis-1,2-Dichloroethene	101	1.4E-03	1.1E+00	1.3E-03
Dichloromethane	1.5	2.1E-05	3.0E+00	7.1E-06
Ethylbenzene	0.073	1.0E-06	1.0E+00	1.0E-06
m&p-Xylene	0.12	1.7E-06	6.0E-02	2.8E-05
Naphthalene	0.52	7.4E-06	3.0E-03	2.5E-03
o-Xylene	0.066	9.4E-07	6.0E-02	1.6E-05
Tetrachloroethene	34	4.9E-04	4.6E+00	1.1E-04
Toluene	0.63	9.0E-06	4.0E-01	2.3E-05
trans-1,2-Dichloroethene	0.11	1.5E-06	NA	NC
Trichloroethene	12	1.7E-04	1.8E-01	9.6E-04
Vinyl Chloride	75	1.1E-03	1.0E-01	1.1E-02
			Total $HI_{inh\,air}$:	**2.4E-02**

Abbreviations:
COC = Constituent of Concern; NC = Not Calculated; NA = Not Applicable/Not Available

TABLE 11 (Continued)

CALCULATION OF LIFETIME AVERAGE DAILY EXPOSURES AND RISK ESTIMATES
FOR INHALATION OF VAPORS IN INDOOR AIR

RECEPTOR: Facility Workers
EXPOSURE SCENARIO: Average of November 2000 and November 2001
CANCER EFFECTS

See Table 5 for Exposure Variables and Rationale	**Inhalation of Indoor Air Vapors** $LADE_{inh\ air} = \frac{EPC_{air} * EF * ED * EP * CI}{AP_c}$ $ELCR_{inh\ air} = LADE_{inh\ air} * UR$ Total $ELCR_{inh\ air} = \Sigma\ ELCR_{inh\ air}$			
COC	EPC_{air} ($\mu g/m^3$)	$LADE_{inh\ air}$ ($\mu g/m^3$)	UR ($\mu g/m^3)^{-1}$	$ELCR_{inh\ air}$ (unitless)
Volatile Organic Compounds				
1,1,1-Trichloroethane	131	1.2E-01	NA	NC
1,1-Dichloroethane	2.6	2.4E-03	NA	NC
1,1-Dichloroethene	1.7	1.7E-03	5.0E-05	8.3E-08
1,2,4-Trimethylbenzene	1.1	1.1E-03	NA	NC
1,2-Dichlorobenzene	0.012	1.1E-05	NA	NC
1,3,5-Trimethylbenzene	0.025	2.3E-05	NA	NC
cis-1,2-Dichloroethene	101	9.6E-02	NA	NC
Dichloromethane	1.5	1.4E-03	4.7E-07	6.6E-10
Ethylbenzene	0.073	7.0E-05	NA	NC
m&p-Xylene	0.12	1.1E-04	NA	NC
Naphthalene	0.52	4.9E-04	NA	NC
o-Xylene	0.066	6.3E-05	NA	NC
Tetrachloroethene	34	3.3E-02	5.5E-05	1.8E-06
Toluene	0.63	6.0E-04	NA	NC
trans-1,2-Dichloroethene	0.11	1.0E-04	NA	NC
Trichloroethene	12	1.2E-02	1.7E-06	2.0E-08
Vinyl Chloride	75	7.2E-02	8.8E-06	6.3E-07
			Total $ELCR_{inh\ air}$:	**2.5E-06**

Abbreviations:
COC = Constituent of Concern; NC = Not Calculated; NA = Not Applicable/Not Available

TABLE 12

SUMMARY OF TOTAL HAZARD INDICES AND RISK ESTIMATES - Sump Sample Evaluation
General Chemical Corporation
Framingham, Massachusetts

Exposure Scenario	Exposure Media/Route	Noncarcinogenic Hazard Index Chronic	Excess Lifetime Cancer Risk Estimate[1]
Current Conditions*	Inhalation of Vapors in Indoor Air	Subtotal: 0.00003	7E-09
	Total for Current Conditions*:	**0.00003**	**7E-09**
	MADEP Risk Limits:	**10**	**1E-05**
	Exceed MADEP Acceptable Limits?	**NO**	**NO**
Historic Results*	Inhalation of Vapors in Indoor Air	Subtotal: 0.02	3E-06
	Total for Historic Results*:	**0.02**	**3E-06**
	MADEP Risk Limits:	**10**	**1E-05**
	Exceed MADEP Acceptable Limits?	**NO**	**NO**

Note:

1. As indicated in the MCP, 310 CMR 40.0993(6), and associated MADEP Risk Characterization Guidance (DEP ORS, July 1995), the MCP cancer risk limit is 1×10^{-5}, consisting of only one significant digit. Accordingly, one significant digit is presented for the cancer risk estimates compared to this risk limit.

* The current conditions evaluation focuses on analytical results from the November 2001 sampling event while the historic results evaluation estimates risk based on the analytical results from samples collected in November 2000 and November 2001.

Abbreviations:
MADEP = Massachusetts Department of Environmental Protection; MCP = Massachusetts Contingency Plan.

FIGURES

GENERAL CHEMICAL CORPORATION
133–135 LELAND STREET
FRAMINGHAM, MASSACHUSETTS

LOCUS PLAN

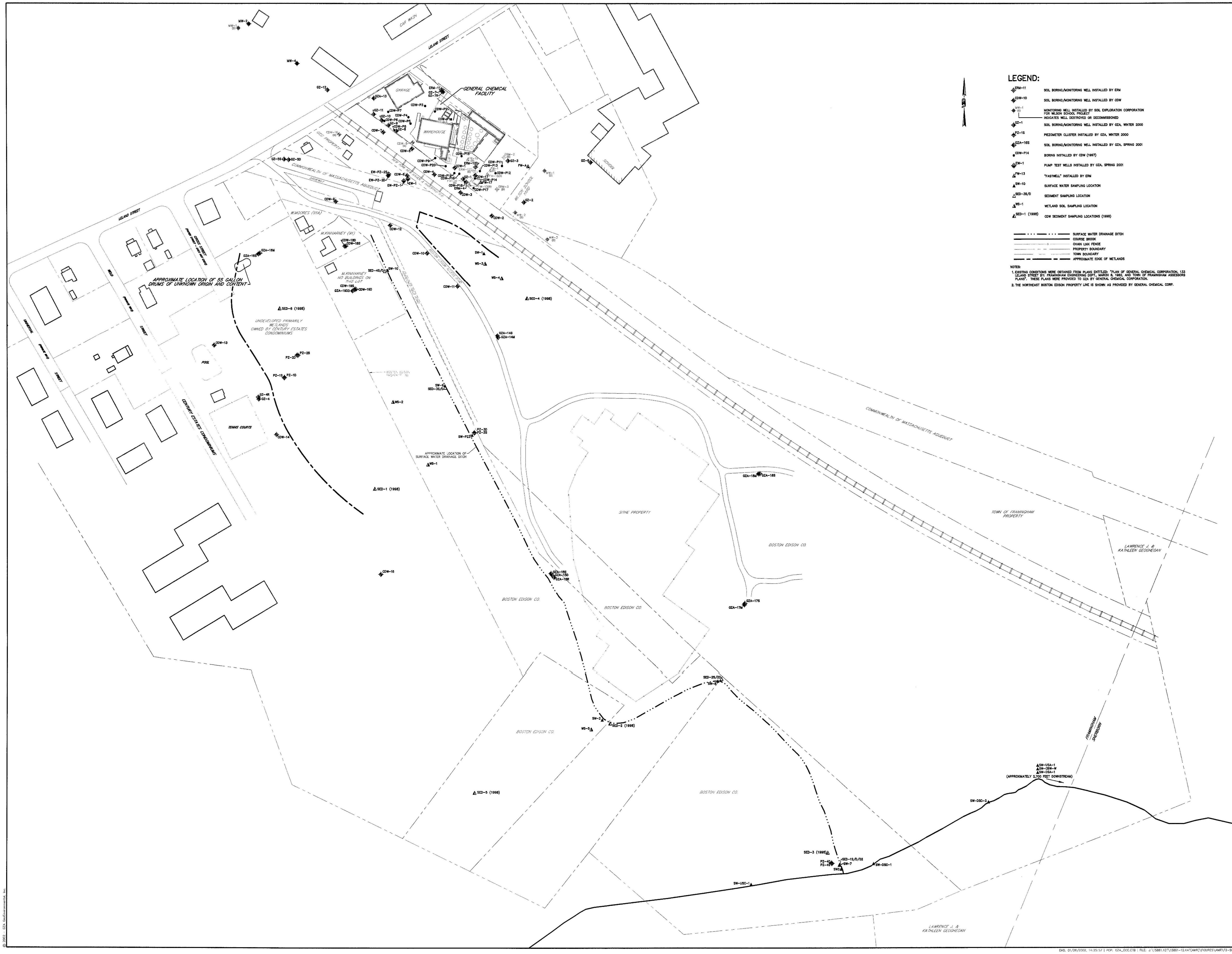
SOURCE
1987 USGS FRAMINGHAM, MA QUADRANGLE MAP
(NOT TO SCALE)

PROJ MGR: PAD
DESIGNED BY: WDD
REVIEWED BY: MJB
OPERATOR: MKH
DATE: 2/2/01

GZA
GeoEnvironmental, Inc.

JOB NO. 15861.12

FIGURE NO. 1



REV. NO.	DESCRIPTION / BY / DATE

SCALE: 1" = 80'
VERTICAL

GeoEnvironmental, Inc.
One Edgewater Drive
Norwood, MA 02062
P:781-278-3700 F:781-278-5701

PROJ MGR: PAH
DESIGNED BY: MHS
REVIEWED BY: MJB
OPERATOR: EMD
DATE: 01/28/02

SUPPLEMENTAL ASSESSMENT PLAN
GENERAL CHEMICAL CORPORATION
FRAMINGHAM, MASSACHUSETTS

SITE PLAN

JOB NO. 15861.12
FIGURE NO. 2

APPENDIX A

GROUNDWATER, SURFACE WATER AND SUMP LABORATORY ANALYTICAL REPORTS AND ASSOCIATED DOCUMENTATION

GZA GeoEnvironmental, Inc.
106 South Street
Hopkinton, MA 01748

ANALYTICAL REPORT

GZA GeoEnvironmental, Inc.
One Edgewater Drive
Norwood, MA 02062

Patricia Haederle

Project Name: General Chemical
Project No.: 15861.26

Date Received: 11/28/01
Date Reported: 12/10/01
Work Order No.: 0111-00244

Sample ID: GZ-2
Sample Date: 11/27/2001

Sample No.: 001

Test Performed	Method	Results	Units	Tech	Analysis Date
VOLATILE ORGANICS	EPA 8260			MQS	11/30/01
Dichlorodifluoromethane	EPA 8260	<2.0	ug/L	MQS	11/30/01
Chloromethane	EPA 8260	<4.0	ug/L	MQS	11/30/01
Vinyl Chloride	EPA 8260	<2.0	ug/L	MQS	11/30/01
Bromomethane	EPA 8260	<2.0	ug/L	MQS	11/30/01
Chloroethane	EPA 8260	<2.0	ug/L	MQS	11/30/01
Trichlorofluoromethane	EPA 8260	<4.0	ug/L	MQS	11/30/01
Diethylether	EPA 8260	<5.0	ug/L	MQS	11/30/01
Acetone	EPA 8260	<25	ug/L	MQS	11/30/01
1,1-Dichloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Dichloromethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Methyl-Tert-Butyl-Ether	EPA 8260	<2.0	ug/L	MQS	11/30/01
trans-1,2-Dichloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1-Dichloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
2-Butanone	EPA 8260	<25	ug/L	MQS	11/30/01
2,2-Dichloropropane	EPA 8260	<1.0	ug/L	MQS	11/30/01
cis-1,2-Dichloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Chloroform	EPA 8260	<1.0	ug/L	MQS	11/30/01
Bromochloromethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Tetrahydrofuran	EPA 8260	<10	ug/L	MQS	11/30/01
1,1,1-Trichloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1-Dichloropropene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Carbon Tetrachloride	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dichloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Benzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Trichloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dichloropropane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Bromodichloromethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,4-Dioxane	EPA 8260	<100	ug/L	MQS	11/30/01
Dibromomethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
4-Methyl-2-Pentanone	EPA 8260	<2.0	ug/L	MQS	11/30/01
cis-1,3-Dichloropropene	EPA 8260	<1.0	ug/L	MQS	11/30/01

GZA GeoEnvironmental, Inc.

ANALYTICAL REPORT

Project Name: General Chemical
Project No.: 15861.26

Work Order No.: 0111-00244

Sample ID: GZ-2
Sample Date: 11/27/2001

Sample No.: 001

Test Performed	Method	Results	Units	Tech	Analysis Date
Toluene	EPA 8260	<1.0	ug/L	MQS	11/30/01
trans-1,3-Dichloropropene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1,2-Trichloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
2-Hexanone	EPA 8260	<2.0	ug/L	MQS	11/30/01
1,3-Dichloropropane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Tetrachloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Dibromochloromethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dibromoethane (EDB)	EPA 8260	<2.0	ug/L	MQS	11/30/01
Chlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1,1,2-Tetrachloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Ethylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
m&p-Xylene	EPA 8260	<1.0	ug/L	MQS	11/30/01
o-Xylene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Styrene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Bromoform	EPA 8260	<2.0	ug/L	MQS	11/30/01
Isopropylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1,2,2-Tetrachloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2,3-Trichloropropane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Bromobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
N-Propylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
2-Chlorotoluene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,3,5-Trimethylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
4-Chlorotoluene	EPA 8260	<1.0	ug/L	MQS	11/30/01
tert-Butylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2,4-Trimethylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
sec-Butylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
p-Isopropyltoluene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,3-Dichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,4-Dichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
n-Butylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dibromo-3-Chloropropane	EPA 8260	<5.0	ug/L	MQS	11/30/01
1,2,4-Trichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Hexachlorobutadiene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Naphthalene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2,3-Trichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Surrogates:	EPA 8260				
***1,2-Dichloroethane-D4	EPA 8260	112	% R	MQS	11/30/01
***Toluene-D8	EPA 8260	104	% R	MQS	11/30/01
***4-Bromofluorobenzene	EPA 8260	93.9	% R	MQS	11/30/01
Preparation		1.0	DF	MQS	11/30/01

GZA GeoEnvironmental, Inc.

ANALYTICAL REPORT

Project Name: General Chemical
Project No.: 15861.26

Work Order No.: 0111-00244

Sample ID: GZ-6
Sample Date: 11/27/2001

Sample No.: 002

Test Performed	Method	Results	Units	Tech	Analysis Date
VOLATILE ORGANICS	EPA 8260			MQS	11/30/01
Dichlorodifluoromethane	EPA 8260	<2.0	ug/L	MQS	11/30/01
Chloromethane	EPA 8260	<4.0	ug/L	MQS	11/30/01
Vinyl Chloride	EPA 8260	<2.0	ug/L	MQS	11/30/01
Bromomethane	EPA 8260	<2.0	ug/L	MQS	11/30/01
Chloroethane	EPA 8260	<2.0	ug/L	MQS	11/30/01
Trichlorofluoromethane	EPA 8260	<4.0	ug/L	MQS	11/30/01
Diethylether	EPA 8260	<5.0	ug/L	MQS	11/30/01
Acetone	EPA 8260	<25	ug/L	MQS	11/30/01
1,1-Dichloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Dichloromethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Methyl-Tert-Butyl-Ether	EPA 8260	<2.0	ug/L	MQS	11/30/01
trans-1,2-Dichloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1-Dichloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
2-Butanone	EPA 8260	<25	ug/L	MQS	11/30/01
2,2-Dichloropropane	EPA 8260	<1.0	ug/L	MQS	11/30/01
cis-1,2-Dichloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Chloroform	EPA 8260	<1.0	ug/L	MQS	11/30/01
Bromochloromethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Tetrahydrofuran	EPA 8260	<10	ug/L	MQS	11/30/01
1,1,1-Trichloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1-Dichloropropene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Carbon Tetrachloride	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dichloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Benzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Trichloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dichloropropane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Bromodichloromethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,4-Dioxane	EPA 8260	<100	ug/L	MQS	11/30/01
Dibromomethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
4-Methyl-2-Pentanone	EPA 8260	<2.0	ug/L	MQS	11/30/01
cis-1,3-Dichloropropene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Toluene	EPA 8260	<1.0	ug/L	MQS	11/30/01
trans-1,3-Dichloropropene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1,2-Trichloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
2-Hexanone	EPA 8260	<2.0	ug/L	MQS	11/30/01
1,3-Dichloropropane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Tetrachloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Dibromochloromethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dibromoethane (EDB)	EPA 8260	<2.0	ug/L	MQS	11/30/01

GZA GeoEnvironmental, Inc.

ANALYTICAL REPORT

Project Name: General Chemical
Project No.: 15861.26

Work Order No.: 0111-00244

Sample ID: GZ-6
Sample Date: 11/27/2001

Sample No.: 002

Test Performed	Method	Results	Units	Tech	Analysis Date
Chlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1,1,2-Tetrachloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Ethylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
m&p-Xylene	EPA 8260	<1.0	ug/L	MQS	11/30/01
o-Xylene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Styrene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Bromoform	EPA 8260	<2.0	ug/L	MQS	11/30/01
Isopropylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1,2,2-Tetrachloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2,3-Trichloropropane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Bromobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
N-Propylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
2-Chlorotoluene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,3,5-Trimethylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
4-Chlorotoluene	EPA 8260	<1.0	ug/L	MQS	11/30/01
tert-Butylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2,4-Trimethylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
sec-Butylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
p-Isopropyltoluene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,3-Dichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,4-Dichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
n-Butylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dibromo-3-Chloropropane	EPA 8260	<5.0	ug/L	MQS	11/30/01
1,2,4-Trichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Hexachlorobutadiene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Naphthalene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2,3-Trichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Surrogates:	EPA 8260				
***1,2-Dichloroethane-D4	EPA 8260	108	% R	MQS	11/30/01
***Toluene-D8	EPA 8260	104	% R	MQS	11/30/01
***4-Bromofluorobenzene	EPA 8260	92.9	% R	MQS	11/30/01
Preparation		1.0	DF	MQS	11/30/01

GZA GeoEnvironmental, Inc.

ANALYTICAL REPORT

Project Name: General Chemical
Project No.: 15861.26

Work Order No.: 0111-00244

Sample ID: GZ-3
Sample Date: 11/27/2001

Sample No.: 003

Test Performed	Method	Results	Units	Tech	Analysis Date
VOLATILE ORGANICS	EPA 8260			MQS	11/30/01
Dichlorodifluoromethane	EPA 8260	<2.0	ug/L	MQS	11/30/01
Chloromethane	EPA 8260	<4.0	ug/L	MQS	11/30/01
Vinyl Chloride	EPA 8260	<2.0	ug/L	MQS	11/30/01
Bromomethane	EPA 8260	<2.0	ug/L	MQS	11/30/01
Chloroethane	EPA 8260	<2.0	ug/L	MQS	11/30/01
Trichlorofluoromethane	EPA 8260	<4.0	ug/L	MQS	11/30/01
Diethylether	EPA 8260	<5.0	ug/L	MQS	11/30/01
Acetone	EPA 8260	<25	ug/L	MQS	11/30/01
1,1-Dichloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Dichloromethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Methyl-Tert-Butyl-Ether	EPA 8260	<2.0	ug/L	MQS	11/30/01
trans-1,2-Dichloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1-Dichloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
2-Butanone	EPA 8260	<25	ug/L	MQS	11/30/01
2,2-Dichloropropane	EPA 8260	<1.0	ug/L	MQS	11/30/01
cis-1,2-Dichloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Chloroform	EPA 8260	<1.0	ug/L	MQS	11/30/01
Bromochloromethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Tetrahydrofuran	EPA 8260	<10	ug/L	MQS	11/30/01
1,1,1-Trichloroethane	EPA 8260	1.4	ug/L	MQS	11/30/01
1,1-Dichloropropene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Carbon Tetrachloride	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dichloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Benzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Trichloroethene	EPA 8260	5.1	ug/L	MQS	11/30/01
1,2-Dichloropropane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Bromodichloromethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,4-Dioxane	EPA 8260	<100	ug/L	MQS	11/30/01
Dibromomethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
4-Methyl-2-Pentanone	EPA 8260	<2.0	ug/L	MQS	11/30/01
cis-1,3-Dichloropropene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Toluene	EPA 8260	<1.0	ug/L	MQS	11/30/01
trans-1,3-Dichloropropene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1,2-Trichloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
2-Hexanone	EPA 8260	<2.0	ug/L	MQS	11/30/01
1,3-Dichloropropane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Tetrachloroethene	EPA 8260	1.4	ug/L	MQS	11/30/01
Dibromochloromethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dibromoethane (EDB)	EPA 8260	<2.0	ug/L	MQS	11/30/01

GZA GeoEnvironmental, Inc.

ANALYTICAL REPORT

Project Name: General Chemical
Project No.: 15861.26

Work Order No.: 0111-00244

Sample ID: GZ-3
Sample Date: 11/27/2001

Sample No.: 003

Test Performed	Method	Results	Units	Tech	Analysis Date
Chlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1,1,2-Tetrachloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Ethylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
m&p-Xylene	EPA 8260	<1.0	ug/L	MQS	11/30/01
o-Xylene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Styrene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Bromoform	EPA 8260	<2.0	ug/L	MQS	11/30/01
Isopropylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1,2,2-Tetrachloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2,3-Trichloropropane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Bromobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
N-Propylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
2-Chlorotoluene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,3,5-Trimethylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
4-Chlorotoluene	EPA 8260	<1.0	ug/L	MQS	11/30/01
tert-Butylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2,4-Trimethylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
sec-Butylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
p-Isopropyltoluene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,3-Dichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,4-Dichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
n-Butylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dibromo-3-Chloropropane	EPA 8260	<5.0	ug/L	MQS	11/30/01
1,2,4-Trichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Hexachlorobutadiene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Naphthalene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2,3-Trichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Surrogates:	EPA 8260				
***1,2-Dichloroethane-D4	EPA 8260	107	% R	MQS	11/30/01
***Toluene-D8	EPA 8260	105	% R	MQS	11/30/01
***4-Bromofluorobenzene	EPA 8260	94.1	% R	MQS	11/30/01
Preparation		1.0	DF	MQS	11/30/01

GZA GeoEnvironmental, Inc.

ANALYTICAL REPORT

Project Name: General Chemical
Project No.: 15861.26

Work Order No.: 0111-00244

Sample ID: GZ-7
Sample Date: 11/27/2001

Sample No.: 004

Test Performed	Method	Results	Units	Tech	Analysis Date
VOLATILE ORGANICS	EPA 8260			MQS	11/30/01
Dichlorodifluoromethane	EPA 8260	<2.0	ug/L	MQS	11/30/01
Chloromethane	EPA 8260	<4.0	ug/L	MQS	11/30/01
Vinyl Chloride	EPA 8260	<2.0	ug/L	MQS	11/30/01
Bromomethane	EPA 8260	<2.0	ug/L	MQS	11/30/01
Chloroethane	EPA 8260	<2.0	ug/L	MQS	11/30/01
Trichlorofluoromethane	EPA 8260	<4.0	ug/L	MQS	11/30/01
Diethylether	EPA 8260	<5.0	ug/L	MQS	11/30/01
Acetone	EPA 8260	47	ug/L	MQS	11/30/01
1,1-Dichloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Dichloromethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Methyl-Tert-Butyl-Ether	EPA 8260	45	ug/L	MQS	11/30/01
trans-1,2-Dichloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1-Dichloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
2-Butanone	EPA 8260	<25	ug/L	MQS	11/30/01
2,2-Dichloropropane	EPA 8260	<1.0	ug/L	MQS	11/30/01
cis-1,2-Dichloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Chloroform	EPA 8260	<1.0	ug/L	MQS	11/30/01
Bromochloromethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Tetrahydrofuran	EPA 8260	<10	ug/L	MQS	11/30/01
1,1,1-Trichloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1-Dichloropropene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Carbon Tetrachloride	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dichloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Benzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Trichloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dichloropropane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Bromodichloromethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,4-Dioxane	EPA 8260	<100	ug/L	MQS	11/30/01
Dibromomethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
4-Methyl-2-Pentanone	EPA 8260	<2.0	ug/L	MQS	11/30/01
cis-1,3-Dichloropropene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Toluene	EPA 8260	<1.0	ug/L	MQS	11/30/01
trans-1,3-Dichloropropene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1,2-Trichloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
2-Hexanone	EPA 8260	<2.0	ug/L	MQS	11/30/01
1,3-Dichloropropane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Tetrachloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Dibromochloromethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dibromoethane (EDB)	EPA 8260	<2.0	ug/L	MQS	11/30/01

GZA GeoEnvironmental, Inc.

ANALYTICAL REPORT

Project Name: General Chemical
Project No.: 15861.26

Work Order No.: 0111-00244

Sample ID: GZ-7
Sample Date: 11/27/2001

Sample No.: 004

Test Performed	Method	Results	Units	Tech	Analysis Date
Chlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1,1,2-Tetrachloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Ethylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
m&p-Xylene	EPA 8260	<1.0	ug/L	MQS	11/30/01
o-Xylene	EPA 8260	6.5	ug/L	MQS	11/30/01
Styrene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Bromoform	EPA 8260	<2.0	ug/L	MQS	11/30/01
Isopropylbenzene	EPA 8260	1.9	ug/L	MQS	11/30/01
1,1,2,2-Tetrachloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2,3-Trichloropropane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Bromobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
N-Propylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
2-Chlorotoluene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,3,5-Trimethylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
4-Chlorotoluene	EPA 8260	<1.0	ug/L	MQS	11/30/01
tert-Butylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2,4-Trimethylbenzene	EPA 8260	11	ug/L	MQS	11/30/01
sec-Butylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
p-Isopropyltoluene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,3-Dichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,4-Dichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
n-Butylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dibromo-3-Chloropropane	EPA 8260	<5.0	ug/L	MQS	11/30/01
1,2,4-Trichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Hexachlorobutadiene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Naphthalene	EPA 8260	2.6	ug/L	MQS	11/30/01
1,2,3-Trichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Surrogates:	EPA 8260				
***1,2-Dichloroethane-D4	EPA 8260	109	% R	MQS	11/30/01
***Toluene-D8	EPA 8260	106	% R	MQS	11/30/01
***4-Bromofluorobenzene	EPA 8260	92.6	% R	MQS	11/30/01
Preparation		1.0	DF	MQS	11/30/01

GZA GeoEnvironmental, Inc.

ANALYTICAL REPORT

Project Name: General Chemical
Project No.: 15861.26

Work Order No.: 0111-00244

Sample ID: GZ-7R
Sample Date: 11/27/2001

Sample No.: 005

Test Performed	Method	Results	Units	Tech	Analysis Date
VOLATILE ORGANICS	EPA 8260			MQS	11/30/01
Dichlorodifluoromethane	EPA 8260	<2.0	ug/L	MQS	11/30/01
Chloromethane	EPA 8260	<4.0	ug/L	MQS	11/30/01
Vinyl Chloride	EPA 8260	<2.0	ug/L	MQS	11/30/01
Bromomethane	EPA 8260	<2.0	ug/L	MQS	11/30/01
Chloroethane	EPA 8260	<2.0	ug/L	MQS	11/30/01
Trichlorofluoromethane	EPA 8260	<4.0	ug/L	MQS	11/30/01
Diethylether	EPA 8260	<5.0	ug/L	MQS	11/30/01
Acetone	EPA 8260	<30	ug/L	MQS	11/30/01
1,1-Dichloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Dichloromethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Methyl-Tert-Butyl-Ether	EPA 8260	<2.0	ug/L	MQS	11/30/01
trans-1,2-Dichloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1-Dichloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
2-Butanone	EPA 8260	<25	ug/L	MQS	11/30/01
2,2-Dichloropropane	EPA 8260	<1.0	ug/L	MQS	11/30/01
cis-1,2-Dichloroethene	EPA 8260	5.4	ug/L	MQS	11/30/01
Chloroform	EPA 8260	<1.0	ug/L	MQS	11/30/01
Bromochloromethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Tetrahydrofuran	EPA 8260	<10	ug/L	MQS	11/30/01
1,1,1-Trichloroethane	EPA 8260	2.9	ug/L	MQS	11/30/01
1,1-Dichloropropene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Carbon Tetrachloride	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dichloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Benzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Trichloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dichloropropane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Bromodichloromethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,4-Dioxane	EPA 8260	<100	ug/L	MQS	11/30/01
Dibromomethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
4-Methyl-2-Pentanone	EPA 8260	<2.0	ug/L	MQS	11/30/01
cis-1,3-Dichloropropene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Toluene	EPA 8260	<1.0	ug/L	MQS	11/30/01
trans-1,3-Dichloropropene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1,2-Trichloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
2-Hexanone	EPA 8260	<2.0	ug/L	MQS	11/30/01
1,3-Dichloropropane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Tetrachloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Dibromochloromethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dibromoethane (EDB)	EPA 8260	<2.0	ug/L	MQS	11/30/01

GZA GeoEnvironmental, Inc.

ANALYTICAL REPORT

Project Name: General Chemical
Project No.: 15861.26

Work Order No.: 0111-00244

Sample ID: GZ-7R
Sample Date: 11/27/2001

Sample No.: 005

Test Performed	Method	Results	Units	Tech	Analysis Date
Chlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1,1,2-Tetrachloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Ethylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
m&p-Xylene	EPA 8260	<1.0	ug/L	MQS	11/30/01
o-Xylene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Styrene	EPA 8260	1.9	ug/L	MQS	11/30/01
Bromoform	EPA 8260	<2.0	ug/L	MQS	11/30/01
Isopropylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1,2,2-Tetrachloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2,3-Trichloropropane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Bromobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
N-Propylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
2-Chlorotoluene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,3,5-Trimethylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
4-Chlorotoluene	EPA 8260	<1.0	ug/L	MQS	11/30/01
tert-Butylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2,4-Trimethylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
sec-Butylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
p-Isopropyltoluene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,3-Dichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,4-Dichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
n-Butylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dibromo-3-Chloropropane	EPA 8260	<5.0	ug/L	MQS	11/30/01
1,2,4-Trichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Hexachlorobutadiene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Naphthalene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2,3-Trichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Surrogates:	EPA 8260				
***1,2-Dichloroethane-D4	EPA 8260	109	% R	MQS	11/30/01
***Toluene-D8	EPA 8260	104	% R	MQS	11/30/01
***4-Bromofluorobenzene	EPA 8260	92.5	% R	MQS	11/30/01
Preparation		1.0	DF	MQS	11/30/01

GZA GeoEnvironmental, Inc.

ANALYTICAL REPORT

Project Name: General Chemical
Project No.: 15861.26

Work Order No.: 0111-00244

Sample ID: TRIP BLANK
Sample Date: 11/27/2001

Sample No.: 006

Test Performed	Method	Results	Units	Tech	Analysis Date
VOLATILE ORGANICS	EPA 8260			MQS	11/30/01
Dichlorodifluoromethane	EPA 8260	<2.0	ug/L	MQS	11/30/01
Chloromethane	EPA 8260	<4.0	ug/L	MQS	11/30/01
Vinyl Chloride	EPA 8260	<2.0	ug/L	MQS	11/30/01
Bromomethane	EPA 8260	<2.0	ug/L	MQS	11/30/01
Chloroethane	EPA 8260	<2.0	ug/L	MQS	11/30/01
Trichlorofluoromethane	EPA 8260	<4.0	ug/L	MQS	11/30/01
Diethylether	EPA 8260	<5.0	ug/L	MQS	11/30/01
Acetone	EPA 8260	<25	ug/L	MQS	11/30/01
1,1-Dichloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Dichloromethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Methyl-Tert-Butyl-Ether	EPA 8260	<2.0	ug/L	MQS	11/30/01
trans-1,2-Dichloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1-Dichloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
2-Butanone	EPA 8260	<25	ug/L	MQS	11/30/01
2,2-Dichloropropane	EPA 8260	<1.0	ug/L	MQS	11/30/01
cis-1,2-Dichloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Chloroform	EPA 8260	<1.0	ug/L	MQS	11/30/01
Bromochloromethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Tetrahydrofuran	EPA 8260	<10	ug/L	MQS	11/30/01
1,1,1-Trichloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1-Dichloropropene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Carbon Tetrachloride	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dichloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Benzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Trichloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dichloropropane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Bromodichloromethane	EPA 8260	<0.50	ug/L	MQS	11/30/01
1,4-Dioxane	EPA 8260	<100	ug/L	MQS	11/30/01
Dibromomethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
4-Methyl-2-Pentanone	EPA 8260	<2.0	ug/L	MQS	11/30/01
cis-1,3-Dichloropropene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Toluene	EPA 8260	<1.0	ug/L	MQS	11/30/01
trans-1,3-Dichloropropene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1,2-Trichloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
2-Hexanone	EPA 8260	<2.0	ug/L	MQS	11/30/01
1,3-Dichloropropane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Tetrachloroethene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Dibromochloromethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dibromoethane (EDB)	EPA 8260	<2.0	ug/L	MQS	11/30/01

GZA GeoEnvironmental, Inc.

ANALYTICAL REPORT

Project Name: General Chemical
Project No.: 15861.26

Work Order No.: 0111-00244

Sample ID: TRIP BLANK
Sample Date: 11/27/2001

Sample No.: 006

Test Performed	Method	Results	Units	Tech	Analysis Date
Chlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1,1,2-Tetrachloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Ethylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
m&p-Xylene	EPA 8260	<1.0	ug/L	MQS	11/30/01
o-Xylene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Styrene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Bromoform	EPA 8260	<2.0	ug/L	MQS	11/30/01
Isopropylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,1,2,2-Tetrachloroethane	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2,3-Trichloropropane	EPA 8260	<1.0	ug/L	MQS	11/30/01
Bromobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
N-Propylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
2-Chlorotoluene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,3,5-Trimethylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
4-Chlorotoluene	EPA 8260	<1.0	ug/L	MQS	11/30/01
tert-Butylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2,4-Trimethylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
sec-Butylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
p-Isopropyltoluene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,3-Dichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,4-Dichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
n-Butylbenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2-Dibromo-3-Chloropropane	EPA 8260	<5.0	ug/L	MQS	11/30/01
1,2,4-Trichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Hexachlorobutadiene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Naphthalene	EPA 8260	<1.0	ug/L	MQS	11/30/01
1,2,3-Trichlorobenzene	EPA 8260	<1.0	ug/L	MQS	11/30/01
Surrogates:	EPA 8260				
***1,2-Dichloroethane-D4	EPA 8260	105	% R	MQS	11/30/01
***Toluene-D8	EPA 8260	103	% R	MQS	11/30/01
***4-Bromofluorobenzene	EPA 8260	92.7	% R	MQS	11/30/01
Preparation		1.0	DF	MQS	11/30/01

GZA GeoEnvironmental, Inc.

ANALYTICAL REPORT

Project Name: General Chemical
Project No.: 15861.26

Work Order No.: 0111-00244

PROJECT NARRATIVE:

1. Sample Receipt

The samples were received on 11/28/01 via _x_GZA courier, __EC, __FEDEX, or ___hand delivered.
The temperature of the __temperature blank, _x_cooler air was 4.0 degrees C. The samples were received intact for all requested analyses.

The samples were appropriately preserved in accordance with the method they reference, including methanol preservation of soil samples for volatile analyses (preparation method 5035).

2. EPA Method 8260

Non-target volatile compounds were detected in sample GZ-7 (approximately 120ug/L by TIC Analysis).

Attach QC 8260 11/30/01 - S