AQUIFER SCIENCES, INC.

All units should be converted in metrics ✓

/Use soil data from 15 - 20' bgs from W-A, W-1, B-1, B-F, B-G

Assume 1×10^{-5} Risk and calculate backwards to get SSTLs done, but use 95% UCL for soil samples

HUMAN HEALTH RISK ASSESSMENT
187 NORTH L STREET
LIVERMORE, CALIFORNIA

~~Can soil → leach → GW pathway be eliminated if pot deed restriction?~~

Why was 1998 GW data used and not most recent 4 qtrs? OK
Can recalc 95% UCL & compare w/ SSTLs W-1s WBs for GW
to indoor air

Prepared for

Don-Sul, Inc.
187 North L Street
Livermore, California 94550

by

Aquifer Sciences, Inc.
3680-A Mt. Diablo Blvd.
Lafayette, California 94549

August 30, 2000

AQUIFER SCIENCES, INC.

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971275

Ms. Rita Sullins
Don-Sul, Inc.
187 North L Street
Livermore, CA 94550

Subject: Human Health Risk Assessment
187 North L Street, Livermore, California

Dear Ms. Sullins:

Aquifer Sciences is pleased to present the results of the Human Health Risk Assessment performed for the Arrow Rentals site located at 187 North L Street in Livermore, California. Please call us if you have any questions concerning the report.

Respectfully yours,

Thomas E. Neely, REA
Hydrogeologist

Rebecca A. Sterbentz, RG, CHG, REA
President

Enclosure

cc: Eva Chu, Alameda County

TABLE OF CONTENTS

APPENDICES

HUMAN HEALTH RISK ASSESSMENT
187 North L Street, Livermore, California
August 2000

1.0 INTRODUCTION

This document presents the human health risk assessment for the Arrow Rentals site (hereinafter referred to as the "Site") located at 187 North L Street in Livermore, California. The objectives of the human health risk assessment are: 1) to quantify the baseline risk associated with chemicals of concern at the Site and 2) to establish risk-based remediation goals for soil and groundwater at the Site. This report also presents an evaluation of regional and local hydrogeology and a well survey.

2.0 DESCRIPTION OF THE SITE

The Site encompasses approximately 21,000 square feet of land and is located on the western side of North L Street in northern Livermore (Figure 1). Arrow Rentals, an equipment rental company, occupies the Site. One building covers approximately 1,400 square feet, and is located in the northern portion of the Site (Figure 2). The remainder of the Site is paved with asphalt or concrete. The Site is bounded on the north by railroad tracks, on the east by North L Street, and on the south and west by undeveloped land. Residential housing, commercial businesses, and light industry occupy the vicinity.

3.0 ENVIRONMENTAL HISTORY OF THE SITE

A Mobil service station operated at the Site between approximately 1951 and 1968 (WCC, 1991). Arrow Rentals purchased the Site in 1972. In 1972, three of five underground fuel storage tanks were removed after failing integrity tests. The two remaining tanks were used until 1984, when they were removed. In 1984, one 1,000-gallon underground fuel tank and a vapor monitoring well were installed.

In 1985, a delivery truck operator from Petcock Petroleum dispensed approximately 600 gallons of fuel into the vapor well. Water was poured into the well from a garden hose some time after the release.

Several soil and groundwater investigations have been conducted at the Site since 1988. The investigations have included drilling soil borings; collecting soil, soil vapor, and groundwater samples; installing groundwater monitoring wells, performing aquifer tests, and conducting periodic groundwater monitoring. The approximate lateral extent of contamination is shown on Figure 2. Based upon analytical data, the contamination at the Site extends less than 60 feet below grade and less than 100 feet offsite (WCC, 1991).

Alameda County has overseen the environmental case for the Site and has requested that a human health risk assessment be conducted to determine baseline risk and remediation goals.

4.0 TOPOGRAPHY AND HYDROGEOLOGY

The Site is located in the Livermore Valley. The following sections present a discussion of the regional and local topography and hydrogeology. Figure 3 illustrates the topography for the vicinity of the Site.

4.1 REGIONAL TOPOGRAPHY

The Site is located in an east-west trending valley (the Livermore Valley). The valley is bounded by hills on the north reaching elevations of more than 1,200 feet above mean sea level (MSL), and by hills on the south reaching to elevations of more than 900 feet MSL. The elevation of the valley floor ranges from more than 500 feet in the east to approximately 350 feet in the west.

Arroyo Mocho is located approximately 3,800 feet southwest of the Site. Arroyo Las Positas is located approximately 1.1 mile north of the Site. Both streams flow to the west toward the City of Pleasanton. Contamination at the Site likely does not impact either stream, based upon their distances from the Site.

4.2 LOCAL TOPOGRAPHY

The Site is approximately 480 feet MSL. The land surface in the vicinity of the Site slopes to the northwest at approximately 0.9 foot per 100 feet.

4.3 REGIONAL HYDROGEOLOGY

The Site resides on approximately 750 feet of valley-fill deposits, consisting of Quaternary alluvium and the Livermore Formation. The valley-fill deposits are underlain by the Pliocene-age Tassajara Formation (DWR, 1966).

The oldest relevant geologic unit is the Tassajara Formation, which consists of freshwater deposits of moderately indurated sandstone, siltstone, shale, conglomerate, and limestone (DWR, 1974). The Tassajara Formation probably underlies the valley-fill deposits near the Site at a depth of approximately 750 feet.

The Livermore Formation has been divided into two facies: one clay and one gravel (DWR, 1974). The clay facies is believed to underlie the gravel facies and represents a lacustrian phase of deposition. The gravel facies consists of unconsolidated beds of gravel, sand, silt, and clay

(DWR, 1966). The Livermore Formation occurs at a shallow depth in some areas and is difficult to distinguish from the valley-fill deposits.

Quaternary valley-fill alluvium forms the valley floor beneath the Site, thickening to the east. The alluvium consists of lenticular beds of gravel, sand, silt, and clay, representing reworked sediments of the Livermore Formation. The thickness of the alluvium ranges from approximately 20 to 350 feet.

4.4 LOCAL HYDROGEOLOGY

At the Site, silty and clayey gravel and sand extend between the ground surface to depths of approximately 35 to 40 feet below grade (WCC, 1991). The silty and clayey gravel and sand are underlain by silt and clay. In April 2000, the depth to groundwater in monitoring wells at the Site was approximately 25 feet below grade (Aquifer Sciences, 2000). In the early 1990s, the depth to groundwater was greater (approximately 40 feet below grade), due to an extended drought. Groundwater generally flows to the west, under a hydraulic gradient of approximately 0.019 ft/ft (Aquifer Sciences, 2000).

5.0 WELL SURVEY

We conduct a survey of wells in the vicinity of the Site to determine the locations of potential receptors of groundwater contamination. We researched well logs at the California Department of Water Resources (DWR) and Zone 7 of the Alameda County Flood Control and Water Conservation District (Zone 7). Table 1 lists information concerning wells located within approximately 1 mile of the Site.

The depths of monitoring wells located within 1 mile of the site are 85 feet or less. The depths of five cathodic protection wells are approximately 120 feet. The nearest cathodic protection well is 660 feet west-northwest of the Site. Domestic wells in the vicinity are at least 220 feet deep. The nearest domestic well is more than 3,000 feet south-southwest of the Site. Industrial wells in the vicinity are at least 95 feet deep. The nearest industrial well is more than 1,800 feet north-northeast of the Site. Municipal wells in the vicinity are at least 465 feet deep. The nearest municipal well is 2,200 feet north of the Site.

Well location maps were provided by Zone 7. These maps are included in Appendix A. Well 3S/2E8R15 is located approximately 400 feet north of the Site. The nearest downgradient well is 3S/2E8K4, located approximately 1,200 feet north of the Site. No information concerning the use or construction of either well was available.

Based upon information obtained during the well survey, monitoring wells are screened in water-bearing units within 85 feet of ground surface. Water supply wells (domestic, industrial, and municipal) in the vicinity are typically screened in water-bearing units deeper than 100 feet below

Can use 95% UCL if adequate # of samples, instead of using max.

grade. The nearest potential water supply well (3S/2E8R15) is approximately 400 feet north of the Site. The contamination at the Site extends less than 60 feet below grade and less than 100 feet offsite to the west (WCC, 1991). Consequently, based upon the distance to nearby wells, contamination at the Site is not impacting any known water supply wells.

6.0 HUMAN HEALTH RISK ASSESSMENT

An assessment of baseline human health risk is performed to evaluate current potential risk at the Site. Baseline human health risk is obtained from the evaluation of different exposure scenarios to representative concentrations of contaminants at the Site. The components needed to evaluate the baseline human health risk include: 1) identification of the chemicals of concern present in soil, 2) identification of potentially exposed receptor populations, 3) identification of relevant exposure pathways, 4) determination of toxicity criteria, 5) determination of physical, chemical, biological, and/or physiological parameters to calculate exposure-point concentrations and dose, and 6) calculation of risk. Remediation goals are then developed that correspond to acceptable risk levels. We utilized the "Risk-Based Corrective Action (RBCA) Tool Kit for Chemical Releases" computer software to assist in performing this assessment (GSI, 1998). The following sections present the known data, assumptions, and equations used to calculate the corresponding baseline risk and remediation goals.

6.1 CHEMICALS OF CONCERN

6.1.1 Identification of Chemicals

6.1.1.1 Chemicals of Concern in Soil

The chemicals that have been detected in soil are total petroleum hydrocarbons quantified as gasoline (TPH-gasoline); diesel (TPH-diesel); benzene, toluene, ethylbenzene, and xylenes (BTEX); naphthalene; 2-methylnaphthalene; and phenol. A summary of the analytical results for soil samples is presented in Table 2.

6.1.1.2 Chemicals of Concern in Groundwater

The chemicals that have been detected in groundwater are TPH-gasoline, TPH-diesel, BTEX, methyl tertiary butyl ether (MTBE), naphthalene, and 2-methylnaphthalene. A summary of the analytical results for groundwater samples is presented in Table 3.

6.1.2 Representative Chemical Concentrations

A representative concentration is used to perform risk calculations. For soil, the highest concentration of each chemical detected in samples collected from the vadose zone was selected as the representative concentration. For groundwater, the representative concentration of each

Any soil contamination from shallow soil samples collected from piping/dispenser areas? No
What has DTW been? Is 20' bgs below GWE?
Could include data from Boring B-G, (B-H)

Can evaluate for construction assuming exposure via dermal, inhalation, ingestion of soil &/or GW at ≤5' bgs, 8 hrs/day up to 6 months/yr.
No shallow contamination (≤3' bgs) noted.

chemical was calculated as the 95% upper confidence limit (UCL) of the mean. For buildings potentially located over the source area, the 95% UCL of the mean was calculated for samples collected from well W-1s, during the last four sampling events. For buildings potential located at the Site (but not over the source area), the 95% UCL of the mean was calculated for samples collected from wells W-Bs and W-3s during the last four sampling events. The method detection limit was used in calculating the mean for those groundwater samples that did not contain a chemical of concern. No toxicological information was available for 2-methyl-naphthalene; therefore, this chemical was not included in the risk assessment. The representative concentrations for each chemical in soil and groundwater are presented in Table 4.

6.1.2.1 Representative Chemical Concentrations in Soil

The highest concentrations of chemicals in the vadose zone were detected in samples collected at depths of 15 and 20 feet below grade. The concentrations of contaminants in soil at the 15-foot and 20-foot depths were selected to be representative of the maximum potential baseline exposure at the Site.

6.1.2.2 Representative Chemical Concentrations in Groundwater

The 95% UCLs of the mean for BTEX and MTBE in samples collected from well W-1s and the W-Bs/W-3s area over the four most recent sampling events are presented in Table 4. The maximum concentration of naphthalene was selected. The concentrations of contaminants in groundwater in Table 4 were selected to be representative of the potential baseline exposure at the Site.

6.2 POTENTIALLY EXPOSED RECEPTOR POPULATIONS

An equipment rental facility currently operates at the Site. Retail, light industrial, and residential properties are located in the vicinity of the Site. Railroad tracks pass adjacent to the Site to the north. Future land use could include retail, commercial, or industrial businesses, or residential housing.

Based upon these potential land use scenarios, the potentially exposed receptor populations are: 1) adult tenants, 2) child tenants, 3) adult and child visitors to the Site, 4) maintenance workers (e.g., groundskeepers), 5) office workers, and 6) construction workers during development of the Site. The baseline risks associated with these potentially-exposed populations are addressed in the residential or commercial scenarios. Since the potential exposure for tenants is higher than for visitors, the visitor exposure scenario was not considered in this risk assessment. We are not aware of a particular development plan for the Site. Consequently, we are unable to assess the potential health risk for construction workers. The potential exposure for construction workers depends upon the extent of excavation performed during redevelopment. However, if little soil is

Is dermal contact really an exposure pathway?
Could do deed restriction on water supply well on site

Were CA toxicity values for benzene used in risk assessment

excavated or disturbed, the potential health risk to construction workers would be less than to future tenants at the Site.

6.3 RELEVANT EXPOSURE PATHWAYS

Based upon the types of chemicals of concern (petroleum hydrocarbons) and affected media (soil and groundwater), the relevant exposure pathways are through: 1) inhalation of vapors from soil or groundwater, 2) ingestion of soil or groundwater, and 3) dermal contact with soil or groundwater.

Since the contamination is located 15 feet or more below grade, the potential exposure through some of these pathways is limited or insignificant. Ingestion of or dermal contact with contaminated soil is unlikely. Therefore, the relevant exposure pathways examined in this risk assessment are: 1) inhalation of vapors from soil or groundwater, 2) ingestion of groundwater, and 3) dermal contact with groundwater. The risk associated with dermal contact of groundwater is assumed to be the same as the risk associated with ingestion of groundwater. If future development of the site exposes contaminated soil, other exposure pathways would become relevant and the potential risk could change.

6.4 TOXICITY CRITERIA

The results of numerous toxicological studies have been compiled and evaluated by the United States Environmental Protection Agency (USEPA), California EPA, and other regulatory agencies. From these studies, carcinogenic risk slope factors (CSFs) and non-carcinogenic reference doses (RfDs) have been established for many chemicals. The magnitude of the CSF or RfD is an indicator of the toxicity of the chemical in question, and assist in the calculation of carcinogenic and non-carcinogenic risk. Sources of CSFs and RfDs include: 1) the USEPA Integrated Risk Information System (IRIS), 2) the USEPA Health Effects Summary Tables (HEAST), 3) the USEPA National Center for Environmental Assessment (NCEA) Risk Assessment Issue Papers, 4) the California EPA Office of Environmental Health Hazard Assessment (OEHHA) Technical Support Document for the Determination of Non-Cancer Chronic Reference Exposure Levels, and 5) the California EPA Memorandum Concerning Cancer Potency Factors.

6.4.1 Carcinogenic Toxicity Criteria

The toxicity of carcinogenic chemicals is expressed by CSFs, in terms of inverse exposure units $(mg/kg\text{-}day)^{-1}$. The CSF for a particular chemical of concern is multiplied by the corresponding dose to obtain a dimensionless value that represents the risk associated with that chemical and exposure pathway. Chemicals with low CSFs are less carcinogenic than those with high CSFs. CSFs corresponding to each exposure pathway and chemical are listed in Table 5.

6.4.2 Non-Carcinogenic Toxicity Criteria

The toxicity of non-carcinogenic chemicals is expressed by RfDs, in units of milligrams per kilogram of body weight per day. The RfD for a particular chemical of concern is the hypothetical dose that will cause no adverse health effects in human populations. Different RfDs are established for oral (ingestion) and inhalation pathways. RfDs generally represent the maximum safe dosage of a non-carcinogenic chemical. Highly toxic chemicals have low RfDs, indicating a low threshold dose. Less toxic chemicals have high RfDs, indicating a higher threshold dose. RfDs for each exposure pathway and chemical are listed in Table 5.

6.5 EXPOSURE POINT CONCENTRATIONS

An exposure point concentration (EPC) is the concentration of a chemical of concern that a potentially exposed receptor might encountered through a particular exposure pathway. For the cases of soil ingestion and dermal contact, the EPC is identical to the representative concentration.

The inhalation exposure scenario consists of two pathways, vapors migrating from contaminated soil and from contaminated groundwater. Indoor and outdoor inhalation exposure scenarios are considered. For vapors emanating from the subsurface, the EPC for an inhalation exposure scenario is dependent upon the chemical concentration in soil or groundwater, the vapor pressure of the chemical, properties of the soil, the depth of the contamination, and chemical dispersion properties in water and air. The EPC for each chemical in an inhalation exposure scenario was calculated using the equations that are presented in Appendix B.

6.6 CHRONIC DAILY INTAKES

A chronic daily intake is a dose expressed in units of milligrams of chemical per kilogram of body weight per day. The chronic daily intake for a potential receptor depends upon the EPC of a chemical, the characteristics of the receptor, and the exposure pathway. The equations used to calculate the chronic daily intakes and default parameters are provided in the manual "Risk Assessment Guidance for Superfund" (USEPA, 1989b).

7.0 EVALUATION OF BASELINE HUMAN HEALTH RISKS

The carcinogenic and non-carcinogenic risks for each exposure scenario were calculated. The carcinogenic risk was calculated by multiplying the carcinogenic chronic daily intake by the corresponding CSF. The non-carcinogenic risk was calculated by dividing the non-carcinogenic chronic daily intake by the corresponding RfD.

Total carcinogenic risk is expressed as the potential number of excess cancer cases for the exposed population. Under different scenarios, allowable risk ranges from less than one excess cancer case in one million ($1x10^{-6}$) to one in ten thousand ($1x10^{-4}$). For this assessment the

OK

allowable cumulative carcinogenic risk is $1x10^{-5}$. The total non-carcinogenic risk is compared to "1." Non-carcinogenic risk values of less than 1 are considered acceptable.

The following sections describe the potential baseline carcinogenic and non-carcinogenic risks.

7.1 TIER 1 BASELINE RISK ASSESSMENT - ONSITE COMMERCIAL SCENARIO

A "Tier 1" approach was utilized with site-specific data and many conservative (default) assumptions to estimate the baseline carcinogenic and non-carcinogenic risks at the Site. Table 6 presents a summary of the risks due to each chemical through each exposure pathway, under a commercial business scenario. Details concerning the risk assessment under this scenario are presented in Appendix C.

The outdoor air inhalation scenario yielded a carcinogenic risk of $3.4x10^{-7}$ (less than the allowable risk of $1x10^{-5}$ and a non-carcinogenic hazard quotient of 0.021 (less than the acceptable limit of 1). The indoor air inhalation scenario yielded a carcinogenic risk of $5.0x10^{-5}$ (higher than the allowable risk) and a hazard quotient of 2.9 (higher than the acceptable limit). The groundwater ingestion scenario yielded a carcinogenic risk of $9.4x10^{-4}$ (higher than the allowable risk) and hazard quotient of 32 (higher than the acceptable limit). The elevated carcinogenic risk was attributed to benzene. The elevated non-carcinogenic risk was primarily attributed to benzene.

7.2 TIER 1 BASELINE RISK ASSESSMENT - ONSITE RESIDENTIAL SCENARIO

A Tier 1 approach was repeated, using a residential scenario for the Site. Table 7 presents a summary of the risks due to each chemical through each exposure pathway. Details concerning the risk assessment under this scenario are presented in Appendix D.

The outdoor air inhalation scenario yielded a carcinogenic risk of $5.4x10^{-7}$ (less than the allowable risk of $1x10^{-5}$) and a non-carcinogenic hazard quotient of 0.027 (less than the acceptable limit of 1). The indoor air inhalation scenario yielded a carcinogenic risk of $1.0x10^{-4}$ (higher than the allowable risk) and a hazard quotient of 5.1 (higher than the acceptable limit). The groundwater ingestion scenario yielded a carcinogenic risk of $3.2x10^{-3}$ (higher than the allowable risk) and hazard quotient of 89 (higher than the acceptable limit). The elevated carcinogenic risk was attributed to benzene. The elevated non-carcinogenic risk associated with the groundwater ingestion scenario is attributed to benzene, toluene, and MTBE.

7.3 TIER 2 BASELINE RISK ASSESSMENT - ONSITE COMMERCIAL SCENARIO

A Tier 1 risk assessment incorporates many conservative assumptions, and may not represent actual health risks. A "Tier 2" assessment was also performed to evaluate potential risks that are more representative of conditions at the Site. The Tier 2 assessment considers potential offsite, as well as onsite, receptors. We considered a hypothetical case with commercial development

Why only data from Oct 1998 on were used? Why not use all data used to graph trend of degradation rate?

onsite and residential housing and commercial developments located within 100 feet offsite. These are conservative assumptions, since no residential or commercial developments are currently located within 100 feet of the Site.

Based upon trends in chemical concentrations in groundwater, we used first-order decay models (transient Domenico models) in the Tier 2 assessments. The measured and modeled chemical concentrations of BTEX and MTBE since October 1998 are illustrated in the graphs in Appendix E. The first-order decay model for each chemical is shown on each graph. The corresponding chemical half-lives are: 480 days for benzene, 271 days for toluene, 15.9 years for ethylbenzene, 2.7 years for xylenes, and 319 days for MTBE. Table 8 presents a summary of the risks due to each chemical through each exposure pathway. Details concerning the risk assessment under this scenario are presented in Appendix F.

The carcinogenic risk for onsite indoor air inhalation ($5.0x10^{-5}$) and onsite groundwater ingestion ($9.4x10^{-4}$) exceeded allowable risk. The non-carcinogenic hazard quotient for onsite indoor air inhalation (2.9) and onsite groundwater ingestion (32) also exceeded acceptable limits. The majority of the risk is attributed to benzene. The risks associated with onsite outdoor air inhalation exposures were within acceptable limits.

The carcinogenic and non-carcinogenic risks for all exposure pathways and potential offsite residential and commercial receptors were within acceptable limits (less than $1x10^{-6}$ for carcinogenic risk and less than 1.0 for non-carcinogenic risk). The highest total carcinogenic risk was $7.5x10^{-7}$, and the highest total non-carcinogenic risk was 0.035 for offsite receptors.

7.4 TIER 2 BASELINE RISK ASSESSMENT - ONSITE RESIDENTIAL SCENARIO

The Tier 2 assessment described in Section 7.3 was modified to reflect an onsite residential scenario. The remaining input parameters remained the same as in the Tier 2 assessment for the onsite commercial scenario. Table 9 presents a summary of the risks due to each chemical through each exposure pathway. Details concerning the risk assessment under this scenario are presented in Appendix G.

The carcinogenic risk for onsite indoor air inhalation ($1.0x10^{-4}$) and onsite groundwater ingestion ($3.2x10^{-3}$) exceeded allowable risk. The non-carcinogenic hazard quotient for onsite indoor air inhalation (5.1) and onsite groundwater ingestion (89) also exceeded acceptable limits. The majority of the risk is attributed to benzene. The risks associated with onsite outdoor air inhalation exposures were within acceptable limits.

The carcinogenic and non-carcinogenic risks for all exposure pathways and potential offsite residential and commercial receptors were within acceptable limits. The highest total carcinogenic risk was $7.5x10^{-7}$, and the highest total non-carcinogenic risk was 0.035 for offsite receptors.

Are the soil vapor samples really more reliable. Would it also depend on time, barometric pressure, ~~etc~~ location of sample, etc. Per R. Brewer, there is lotsa attenuation of benzene when it's in vapor phase, so he feels the SV samples are reliable

7.5 SUMMARY OF BASELINE RISK ASSESSMENT

7.5.1 Onsite Commercial and Residential Scenarios

The carcinogenic and non-carcinogenic risks associated with indoor air inhalation and groundwater ingestion exceeded allowable levels, according to the baseline assessment. The risks associated with outdoor air inhalation exposures were within acceptable limits.

In August 1998, Gribi Associates conducted soil vapor sampling at the Site (Gribi Associates, 1998). Soil vapor samples collected at a depth of 3 feet below grade near the former underground tanks contained benzene (up to 4.9 ppbv), toluene (up to 12 ppbv), ethylbenzene (up to 2.2 ppbv), and xylenes (up to 12.8 ppbv). Risk-Based Screening Levels (RBSLs) have been established by the Regional Water Quality Control Board (RWQCB) for BTEX in soil vapor at depths of 3 feet. The RBSLs correspond to a carcinogenic risk of $1x10^{-6}$ for benzene and a non-carcinogenic hazard quotient of 1.0 for toluene, ethylbenzene, and xylenes for residential receptors. The RBSLs are 11.6 ppbv for benzene, 27,000 ppbv for toluene, 69,000 ppbv for ethylbenzene, and 505,000 ppbv for xylenes. Consequently, the measured concentrations of BTEX in soil vapor at the Site are lower than the RBSLs, and the actual risks associated with indoor air inhalation are within acceptable limits.

The discrepancy between findings in the Gribi investigation and those in this risk assessment are likely due to the differences between measured and modeled contaminant concentrations. Conservation assumptions were used (such as maximum soil concentrations in the source area) to calculate vapor concentrations and to model transport and diffusion of contaminants through the subsurface and into the building area. The soil vapor data are more reliable indicators of subsurface conditions. Since the soil vapor concentrations are significantly less than the RBSLs for a residential scenario, no soil or groundwater remediation is necessary for the indoor air inhalation commercial or residential scenario.

7.5.2 Offsite Commercial and Residential Scenarios

The highest total carcinogenic risk for potential offsite residential and commercial receptors was $7.5x10^{-7}$, less than the acceptable limit of $1x10^{-5}$. The highest total non-carcinogenic hazard quotient was 0.035, less than the allowable limit of 1.0. Based upon these results, the existing levels of chemicals in soil and groundwater at the Site do not create an excessive human health risk to potential offsite receptors. Based upon existing conditions, no soil or groundwater remediation is necessary for offsite exposure scenarios.

8.0 RISK-BASED REMEDIATION GOALS

Risk-based remediation goals were calculated using the results of the baseline human health risk assessment and soil vapor data collected in 1998. Since the baseline risks due to indoor and

Wauldrit remediation goals be determined using an acceptable risk of 1×10^{-5} and working back to get SSTLs which are then compared with representative conc. of contaminants (ie benzene)

outdoor air inhalation are within acceptable limits, the remediation goals primarily address the risks associated with groundwater ingestion. Remediation goals were developed for existing and possible future redevelopment scenarios. The remediation goals for each scenario are discussed in the following subsection.

8.1 COMMERCIAL DEVELOPMENT

As described in Section 7.0, the majority of carcinogenic and non-carcinogenic baseline risk is due to benzene. Reducing the concentrations of BTEX and MTBE would yield acceptable risk levels. The remediation goals and corresponding risk levels are presented in Table 10 and Appendix H. The remediation goal for benzene is 0.1 mg/kg in soil and 75 µg/L in groundwater. The remediation goal for toluene is 7 mg/kg in soil and 4,000 µg/L in groundwater. The remediation goal for ethylbenzene is 10 mg/kg in soil and 1,500 µg/L in groundwater. The remediation goal for xylenes is 100 mg/kg in soil and 9,000 µg/L in groundwater. The remediation goal for MTBE in groundwater is 200 µg/L. Naphthalene and phenol would not require remediation, and the remediation goals can equal the current representative concentrations.

8.2 RESIDENTIAL DEVELOPMENT

Reducing the concentrations of BTEX and MTBE would yield acceptable risk levels. The remediation goals and corresponding risk levels are presented in Table 11 and Appendix I. The remediation goal for benzene is 0.04 mg/kg in soil and 10 µg/L in groundwater. The remediation goal for toluene is 2.1 mg/kg in soil and 1,000 µg/L in groundwater. The remediation goal for ethylbenzene is 4 mg/kg in soil and 500 µg/L in groundwater. The remediation goal for xylenes is 26 mg/kg in soil and 7,000 µg/L in groundwater. The remediation goal for MTBE in groundwater is 100 µg/L. Naphthalene and phenol would not require remediation, and the remediation goals can equal the current representative concentrations.

8.3 DEED RESTRICTION FOR GROUNDWATER USE

Under this scenario, a restriction would be placed on the deed to the Site. The deed restriction would prevent the use of groundwater beneath the Site. The restriction would prevent the extraction of groundwater at the Site for agricultural, domestic, commercial, industrial, or municipal purposes. By implementing a deed restriction, groundwater ingestion would be eliminated as an exposure pathway. Since the risks associated with the inhalation of indoor and outdoor air are within acceptable limits, the remediation goals associated with commercial and residential developments under these conditions are equal to current representative concentrations. The remediation goals and corresponding risk levels for an onsite commercial scenario are presented in Table 12 and Appendix J. The remediation goals and corresponding risk levels for an onsite residential scenario are presented in Table 13 and Appendix K.

8.4 POST-REMEDIATION HUMAN HEALTH RISK

For each of the remediation scenarios presented in Section 8.0, the remaining levels of human health risk following remediation are within acceptable limits. In each case, the cumulative carcinogenic risk is no greater than $1.0x10^{-5}$. In each case, the cumulative non-carcinogenic risk does not exceed 1.0.

9.0 CONSERVATIVE ASSUMPTIONS IN PREPARING THE RISK ASSESSMENT

The baseline health risks and risk-based remediation goals presented in this document are upper-bound, conservative estimates for reasonable maximum exposure scenarios. Actual health risks may be lower. The main conservative assumptions include: 1) calculation of representative concentrations of chemicals in soil and groundwater, 2) estimation of exposure frequencies and duration for residents or tenants, and 3) calculation of indoor air concentrations from contaminant volatilization.

The representative concentrations for soil were assumed to be maximum concentrations detected in the source area. The representative concentrations for groundwater were assumed to be the 95% UCL of the mean. Consequently, the actual concentrations at the Site may be lower.

Given the conservative nature of the risk assessment, the actual carcinogenic and non-carcinogenic risks to the potentially exposed populations are likely to be significantly less than the values calculated in this assessment. The conservative assumptions also apply to the development of the remediation goals. The remediation goals are likely more protective of the potentially exposed population than calculated in this assessment.

10.0 SUMMARY AND CONCLUSIONS

We conducted this assessment to evaluate current and potential future human health risk due to contamination in soil and groundwater at the Site. Remediation goals were also calculated for various scenarios. We performed a well survey and reviewed local and regional hydrogeology to assist in the assessment and evaluate potential exposures by offsite receptors.

The well survey indicated that the nearest potential water supply well is located approximately 400 feet north of the Site. In addition, most of the water supply wells in the vicinity are screened at depths greater than 100 feet below grade. The contamination at the Site extends less than 60 feet below grade and less than 100 feet offsite to the west. Consequently, based upon the distance to nearby wells, contamination at the Site is not impacting any known water supply wells.

The baseline risk to potential offsite receptors is within acceptable limits (less than $1x10^{-5}$ for carcinogenic risk and less than 1.0 for non-carcinogenic risk). Therefore, the remediation goals and institutional controls specifically address potential risks at the Site.

The onsite risks due to indoor and outdoor air inhalation are within acceptable levels. Only the baseline risk associated with groundwater ingestion at the Site exceeded acceptable limits. The risk assessment, combined with previous soil vapor testing data, demonstrated that various remediation scenarios, combined with institutional controls, can yield acceptable limits of potential human health risk. Table 14 presents a summary of the remediation goals for each scenario. Each set of remediation goals yields a total carcinogenic risk of no more than $1x10^{-5}$ and a total non-carcinogenic risk of no more than 1.0 for onsite receptors.

With appropriate institutional controls in place (a deed restricting the use of groundwater and a deed notification for possible future development), no soil or groundwater remediation would be necessary. Other scenarios incorporate fewer or no institutional controls, but require more stringent remediation levels.

11.0 RECOMMENDATIONS

Base upon the results of this risk assessment and discussions with Tony and Rita Sullins, the current owners of the Site, we recommend the following.

- Place a restriction on the deed that prohibits the use of groundwater beneath the Site for agricultural, domestic, commercial, industrial, or municipal purposes.

- Place a notification on the deed and on file with the Livermore Building Department. The purpose of the notification is to alert City and County personnel if redevelopment of the Site is planned and to illustrate the location of residual contamination. This will enable Alameda County Environmental Health to evaluate a proposed project with respect to potential exposure to residual contamination.

- To ensure that contaminant concentrations stabilize or decrease, we recommend that groundwater samples be collected from monitoring wells W-1s, W-3s, W-Bs, and W-Es annually for laboratory analysis. Annual monitoring of the four wells should continue until plume stability has been verified.

12.0 REFERENCES

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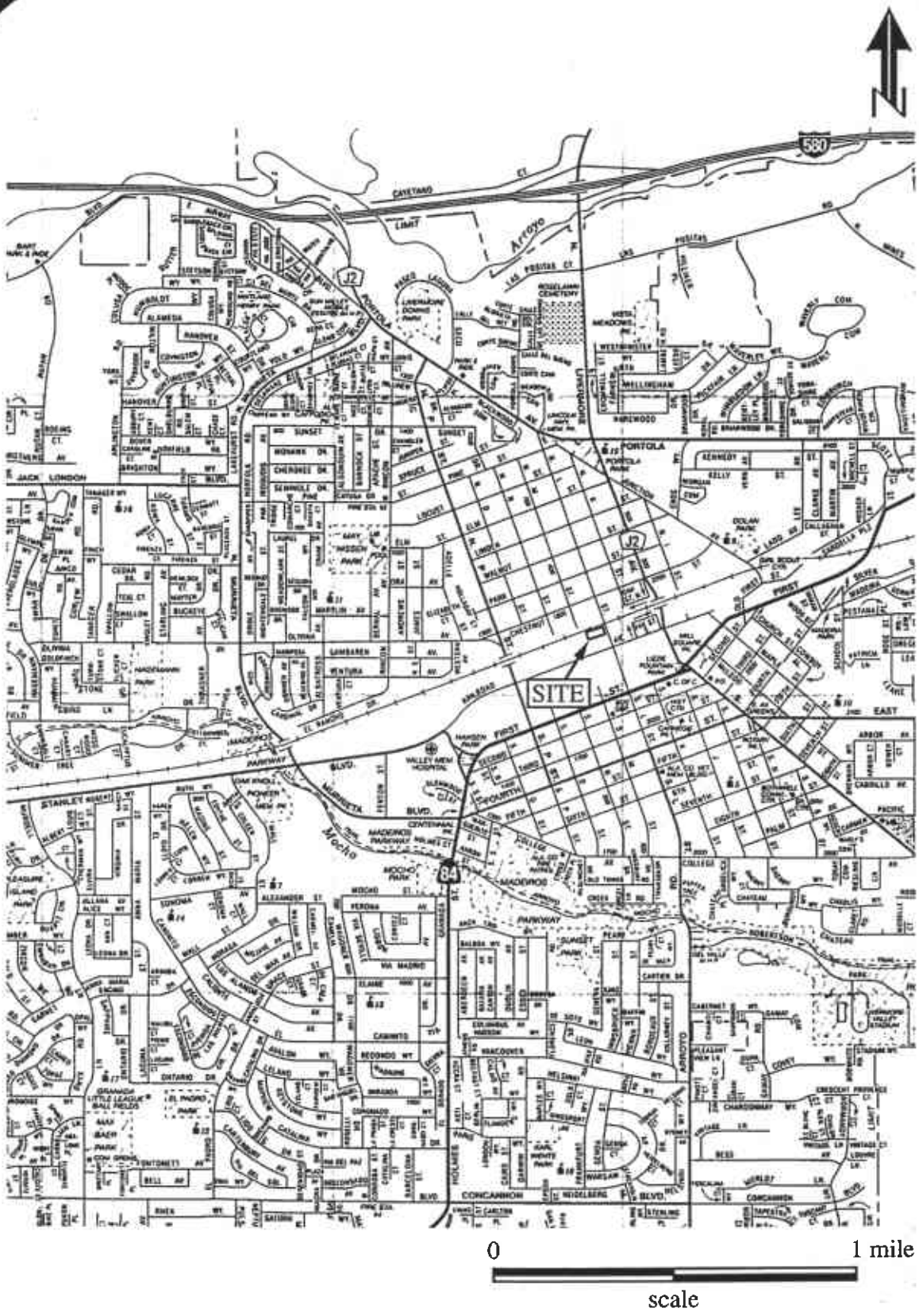


Figure 1. VICINITY MAP
187 North L Street, Livermore, California

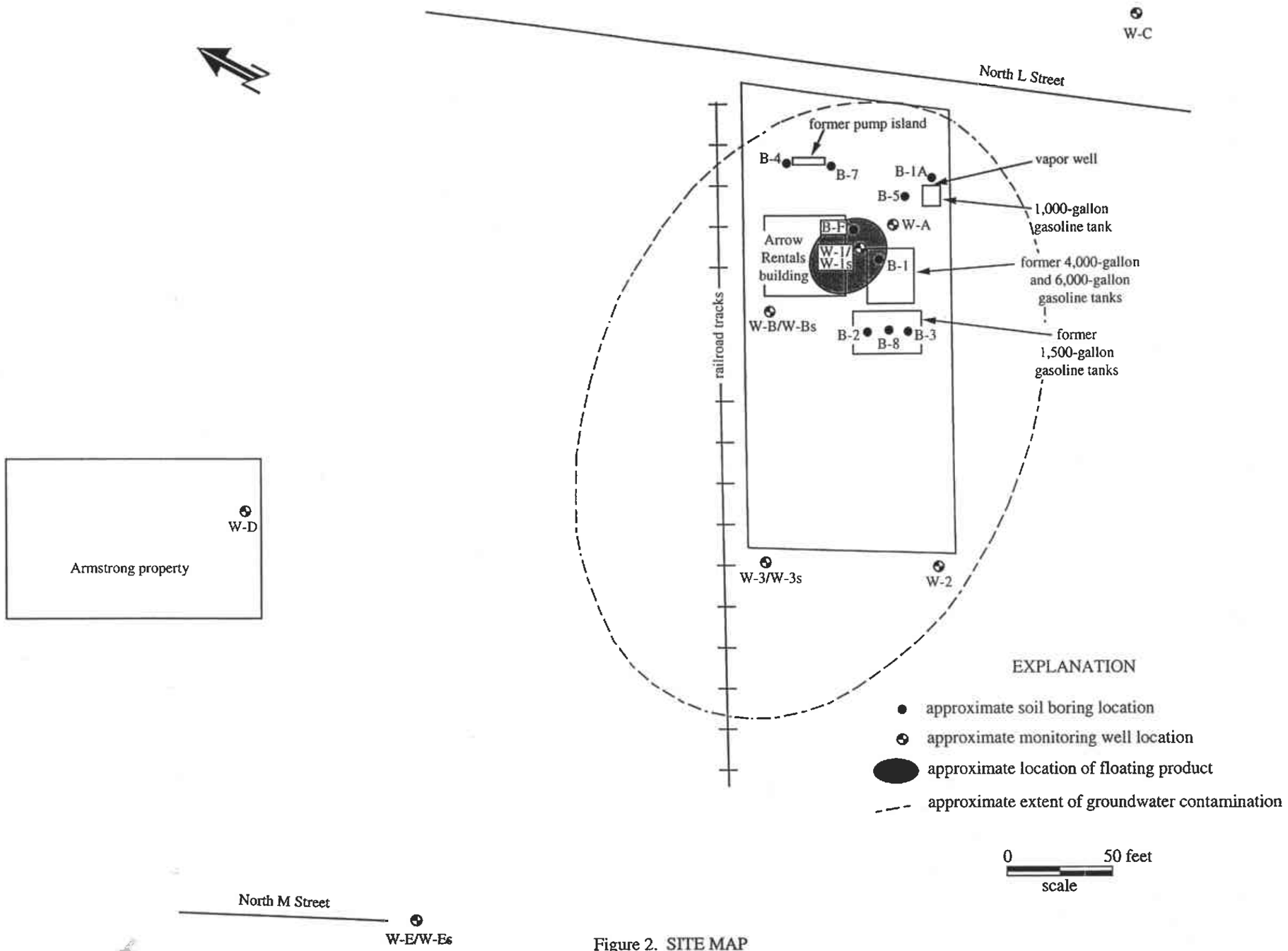


Figure 2. SITE MAP
187 North L Street, Livermore, California

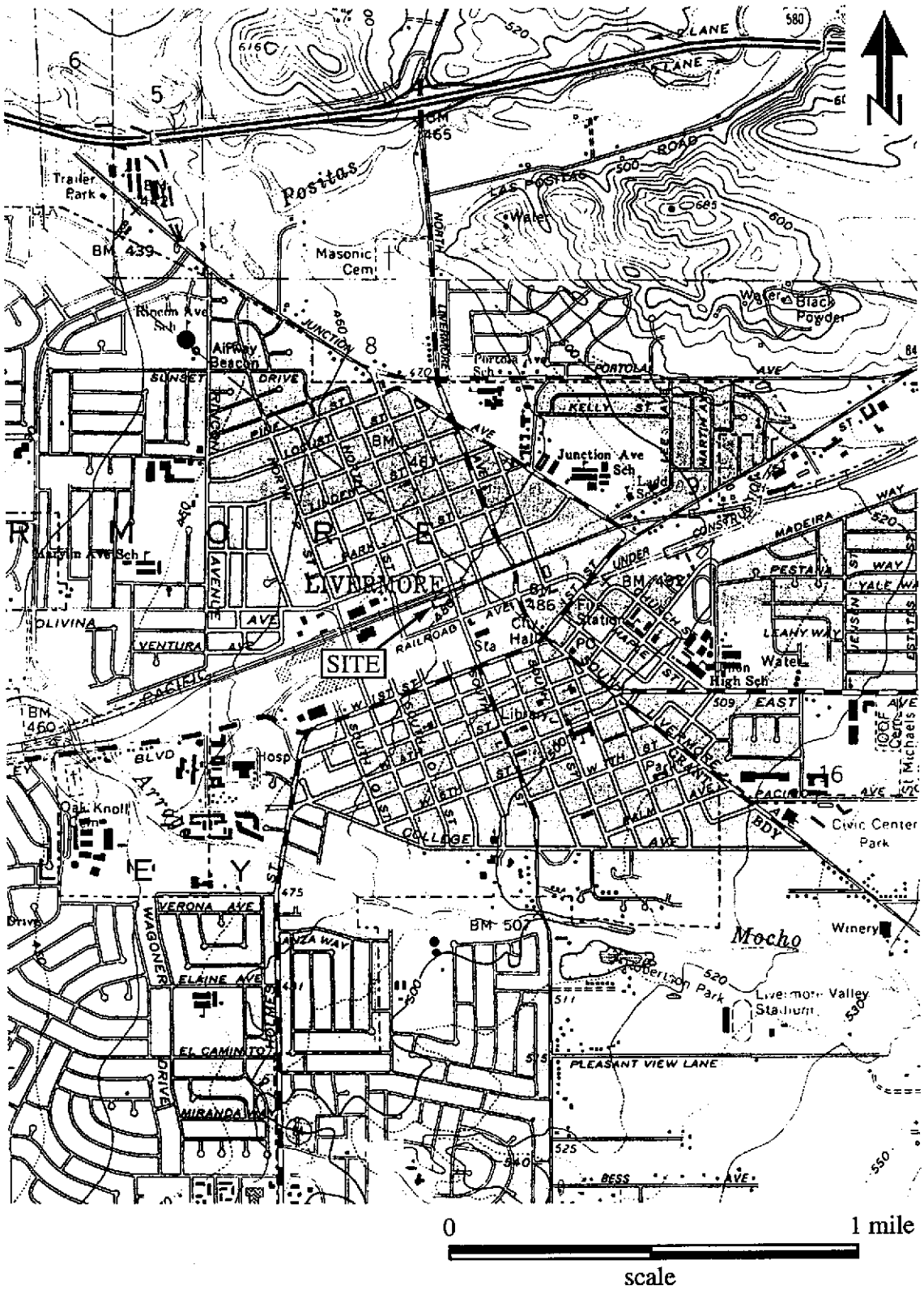


Figure 3. TOPOGRAPHIC MAP
187 North L Street, Livermore, California

Table 1. WELL SURVEY RESULTS
187 North L Street, Livermore, California

Location	Bearing to Site	Type	Status	Total Depth (feet)	Depth to Groundwater (feet)	Highest Screened Interval (feet)
3S/2E 8R1	805 feet, SSE	mon.	active	77	55.8	27-77
3S/2E 8R2	300 feet, S	mon.	active	61.5	42.74	30-60
3S/2E 8R3	on site	mon.	active	56.5	50	45.5-55.5
3S/2E 8R4	on site	mon.	active	51.5	49	39-49
3S/2E 8R5	on site	mon.	active	51.5	45	38-48
3S/2E 8R6	on site	mon.	active	63	50	42-52
3S/2E 8R7	on site	mon.	active	55	48	40-55
3S/2E 8R8	on site	mon.	active	55	47	45-55
3S/2E 8R9	on site	mon.	active	57.5	46	42-57.5
3S/2E 8R10	on site	mon.	active	61	47	40-60
3S/2E 8R11	795 feet, SSE	mon.	active	60	40	30-60
3S/2E 8R12	865 feet, SSE	mon.	active	60	40	30-60
3S/2E 8R13	895 feet, SSE	mon.	active	60	40	30-60
3S/2E 8P3	2,230 feet, W	mon.	decommissioned	55	53.5	25-55
3S/2E 8Q1	1,830 feet, W	mon.	decommissioned	53	45	25-53
3S/2E 8Q2	1,475 feet, W	mon.	decommissioned	59.5	50	29.5-59.5
3S/2E 8Q3	1,475 feet, SSW	mon.	decommissioned	40	NA	25-40
3S/2E 8K1	660 feet, WNW	cath.	active	120	NA	NA
3S/2E 8K2	1,255 feet, NNW	mon.	active	74	51	64-69
3S/2E 8K4	1,255 feet, NNW	NA	decommissioned	NA	NA	NA
3S/2E 8H1	2,210 feet, N	muni.	active	625	61.9	NA
3S/2E 8H2	2,655 feet, N	mon.	active	47	33	36-41
3S/2E 8G1	2,210 feet, NNW	muni.	active	465	NA	120-455
3S/2E 8G2	2,360 feet, NNW	cath.	active	120	NA	NA
3S/2E 9N1	1,325 feet, ESE	mon.	active	75	NA	55-75
3S/2E 9N2	1,325 feet, ESE	mon.	active	75	NA	55-75
3S/2E 9N3	1,325 feet, ESE	mon.	active	75	NA	55-75
3S/2E 9P1	2,950 feet, E	muni.	active	515	107	192-492
3S/2E 9P4	2,280 feet, ESE	mon.	active	54	45	37-52
3S/2E 9P5	2,340 feet, ESE	mon.	active	53	45	38-53
3S/2E 9P6	2,315 feet, ESE	mon.	active	51.5	45	35-50
3S/2E 9P7	2,210 feet, ESE	mon.	active	55	45	38-53
3S/2E 9P8	2,020 feet, E	cath.	active	120	NA	NA
3S/2E 9Q1	4,720 feet, ESE	muni.	active	576	NA	180-492
3S/2E 9Q3	3,685 feet, ESE	NA	decommissioned	28	8	NA
3S/2E 9Q4	3,540 feet, ESE	mon.	active	80	52	70-75
3S/2E 9Q8	(East Ave.) ESE	dom.	active	252	140	167-170
3S/2E 9M1M	1,845 feet, NNE	irr.	active	95	43	49-89
3S/2E 9M2	2,210 feet, ENE	mon.	active	54	40.3	38-53

Table 1 (continued). WELL SURVEY RESULTS
187 North L Street, Livermore, California

Location	Bearing to Site	Type	Status	Total Depth (feet)	Depth to Groundwater (feet)	Highest Screened Interval (feet)
3S/2E 9M3	2,200 feet, ENE	mon.	active	53	40	37-52
3S/2E 9M4	2,210 feet, ENE	mon.	active	53	40.4	37-52
3S/2E 9M5	2,210 feet, ENE	mon.	active	46	NA	20-46
3S/2E 9M6	2,210 feet, ENE	mon.	active	40	NA	10-40
3S/2E 9M7	2,210 feet, ENE	mon.	active	45	NA	10-45
3S/2E 9M8	2,210 feet, ENE	mon.	active	45	NA	10-45
3S/2E 9M9	2,210 feet, ENE	mon.	active	60	NA	40-60
3S/2E 9M10	2,210 feet, ENE	mon.	active	60	NA	40-60
3S/2E 9M11	2,210 feet, ENE	mon.	active	65	NA	45-65
3S/2E 9M12	1,475 feet, ENE	mon.	decommissioned	55	NA	NA
3S/2E 9M13	1,475 feet, ENE	mon.	decommissioned	55	NA	NA
3S/2E 9L1	3,095 feet, ENE	muni.	active	529	NA	136-496
3S/2E 9L2	3,095 feet, ENE	mon.	decommissioned	67	46	42-67
3S/2E 9L3	3,095 feet, ENE	mon.	active	61.5	55	46.5-61.5
3S/2E 9L10	3,095 feet, ENE	mon.	active	57	35.5	32-57
3S/2E 16C1	3,390 feet, ESE	muni.	active	584	69	288-298
3S/2E 16C3	3,690 feet, ESE	cath.	active	120	NA	NA
3S/2E 16E1	3,835 feet, SSE	irr.	active	394	NA	NA
3S/2E 16E2	4,130 feet, SSE	irr.	active	540	NA	125-136
3S/2E 16E3	3,690 feet, SSE	irr.	active	377	NA	112-131
3S/2E 16E4	3,540 feet, SSE	mon.	active	50	25	35-40
3S/2E 16E6	3,690 feet, SSE	irr.	active	360	57	300-360
3S/2E 17A	NA	NA	active	77	NA	NA
3S/2E 17B1	3,245 feet, SSW	NA	active	760	67	145-193
3S/2E 17B2	3,230 feet, SSW	dom.	active	442	67	221-224
3S/2E 17B3	2,580 feet, SSW	cath.	active	120	NA	NA
3S/2E 17B4	1,695 feet, SSW	mon.	active	65	40	44.6-59.6
3S/2E 17B5	1,990 feet, SSW	mon.	active	48.5	31.66	28.5-48.5
3S/2E 17B6	1,625 feet, SSW	mon.	active	65	54	44-51
3S/2E 17B7	1,620 feet, WSW	mon.	active	76	70.5	35-75
3S/2E 17B8	1,550 feet, WSW	mon.	active	85	71	35-84.5
3S/2E 17B19	2,210 feet, SSW	mon.	decommissioned	38	NA	23-38
3S/2E 17B72 & 3S/2E 17B73	1,695 feet, SSW	NA	active	65	NA	20-25
3S/2E 17G	3,170 feet, SSW	dom.	active	220	155	NA
3S/2E 17G2	3,170 feet, SSW	mon.	active	35	Dry	18-23
3S/2E 17G3	3,170 feet, SSW	mon.	active	70	31.3	45-70
3S/2E 17J1	NA	dom.	active	531	103	260-270

cath. = cathodic protection
dom. = domestic
irr. = irrigation
mon. = monitoring
muni. = municipal
NA = not available

Table 2. SUMMARY OF ANALYTICAL RESULTS FOR SOIL
187 North L Street, Livermore, California

Well/Boring/ Sample Number Number	Depth (feet)	TPH-gasoline (mg/kg)	TPH-diesel (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl-benzene (mg/kg)	Total Xylenes (mg/kg)	MTBE (mg/kg)	Naphthalene (mg/kg)	2-Methyl-naphthalene (mg/kg)	Phenol (mg/kg)
B-1A-10	10	< 10	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-1A-15	15	< 10	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-1A-20	20	< 10	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-1A-30	30	< 10	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-1A-35	35	< 10	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-1A-40	40	350	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-1A-45	45	54	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-1A-50	50	< 10	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-1	2	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
B-1	5	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
B-1	10	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
B-1	15	ND	2.3	ND	ND	ND	ND	NA	NA	NA	NA
B-1	20	170	NA	2.1	1.4	0.22	1.5	NA	NA	NA	NA
B-1	25	220	NA	0.38	7.1	6.4	52	NA	3.4	3.5	0.3
B-2	2	3.5	NA	ND	ND	ND	0.1	NA	NA	NA	NA
B-2	5	8.2	NA	ND	ND	ND	ND	NA	NA	NA	NA
B-2	10	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
B-2	15	ND	2.3	ND	ND	ND	ND	NA	NA	NA	NA
B-2	25	1.7	NA	ND	ND	ND	0.55	NA	NA	NA	NA
B-3	2	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
B-3	5	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
B-3	10	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
B-3	15	ND	2.6	ND	ND	ND	ND	NA	NA	NA	NA
B-3	20	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
B-3	25	1.3	NA	ND	ND	ND	ND	NA	NA	NA	NA
B-4	2	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
B-4	5	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA

Table 2 (continued). SUMMARY OF ANALYTICAL RESULTS FOR SOIL
187 North L Street, Livermore, California

Well/Boring/ Sample Number Number	Depth (feet)	TPH-gasoline (mg/kg)	TPH-diesel (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl-benzene (mg/kg)	Total Xylenes (mg/kg)	MTBE (mg/kg)	Naphthalene (mg/kg)	2-Methyl-naphthalene (mg/kg)	Phenol (mg/kg)
B-4	10	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
B-4	15	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
B-5	2	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
B-5	5	1.9	NA	ND	ND	ND	ND	NA	NA	NA	NA
B-5	10	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
B-5	15	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
B-5	20	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA
B-5	25	1.7	NA	ND	ND	ND	ND	NA	NA	NA	NA
B-6	5	1.8	NA	ND	ND	ND	ND	NA	NA	NA	NA
B-6	10	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
B-6	15	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
B-6	20	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA
B-6	25	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
B-7	5	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA
B-7	10	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
B-8	5	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
B-8	10	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA
W-A-20	20	< 1	NA	0.41	0.32	0.24	0.21	NA	NA	NA	NA
W-A-30	30	2	NA	0.39	0.13	0.035	1.2	NA	< 1	< 1	< 10
W-A-35	35	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
W-A-40	40	1,000	NA	12	37	7.5	27	NA	NA	NA	NA
W-B-25	25	< 1	NA	NA	NA	NA	NA	NA	NA	NA	NA
W-B-30	30	NA	NA	NA	NA	NA	NA	NA	< 1	< 1	< 1
W-B-35	35	< 1	NA	0.69	0.26	0.11	0.07	NA	NA	NA	NA

Table 2 (continued). SUMMARY OF ANALYTICAL RESULTS FOR SOIL
187 North L Street, Livermore, California

Well/Boring/ Sample Number	Depth (feet)	TPH-gasoline (mg/kg)	TPH-diesel (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl-benzene (mg/kg)	Total Xylenes (mg/kg)	MTBE (mg/kg)	Naphthalene (mg/kg)	2-Methyl-naphthalene (mg/kg)	Phenol (mg/kg)
W-1	5	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
W-1	10	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
W-1	15	1,200	NA	ND	21	20	130	NA	NA	NA	NA
W-1	20	350	380	2.5	14	6.3	30	NA	NA	NA	NA
W-1	25	490	NA	3.5	24	9.4	46	NA	NA	NA	NA
W-1	30	160	NA	1.0	7.9	3.6	18	NA	NA	NA	NA
W-1	35	370	NA	2.4	20	8.2	40	NA	NA	NA	NA
W-1	40	16,000	1,500	220	1,100	340	1,500	NA	NA	NA	NA
W-1	45	1,600	NA	30	120	34	160	NA	NA	NA	NA
W-1	50	2,500	NA	28	200	59	270	NA	NA	NA	NA
W-1	55	120	NA	3.2	10	2.7	13	NA	NA	NA	NA
W-2	5	1.2	NA	ND	0.14	ND	ND	NA	NA	NA	NA
W-2	10	ND	NA	ND	0.1	ND	ND	NA	NA	NA	NA
W-2	15	ND	NA	ND	0.1	ND	ND	NA	NA	NA	NA
W-2	20	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
W-2	25	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
W-2	30	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
W-2	35	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
W-2	40	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
W-2	45	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA
W-2	50	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
W-3	5	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
W-3	10	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
W-3	15	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
W-3	20	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
W-3	25	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
W-3	30	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
W-3	35	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA

Table 2 (continued). SUMMARY OF ANALYTICAL RESULTS FOR SOIL
187 North L Street, Livermore, California

Well/Boring/ Sample Number Number	Depth (feet)	TPH-gasoline (mg/kg)	TPH-diesel (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl-benzene (mg/kg)	Total Xylenes (mg/kg)	MTBE (mg/kg)	Naphthalene (mg/kg)	2-Methyl-naphthalene (mg/kg)	Phenol (mg/kg)
W-3	40	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA
W-3	45	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA
W-3	50	12	NA	0.06	ND	ND	ND	NA	NA	NA	NA

mg/kg = milligrams per kilograms [parts per million (ppm)]
NA = not analyzed
ND = not detected
MTBE = methyl tertiary butyl ether
TPH-gasoline = total petroleum hydrocarbons quantified as gasoline
TPH-diesel = total petroleum hydrocarbons quantified as diesel

Table 3. SUMMARY OF ANALYTICAL RESULTS FOR GROUNDWATER
187 North L Street, Livermore, California

Well Number	Date Sampled	TPH-gasoline (µg/L)	TPH-diesel (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	Naphthalene (µg/L)	2-Methyl-naphthalene (µg/L)
W-1	11/88	210,000	300,000	29,000	30,000	5,400	24,000	NA	NA	NA
W-1 product	11/88	NA	NA	64,000,000	47,000,000	13,000,000	51,000,000	NA	< 1,000,000	200,000
W-1 product (dup)	11/88	NA	NA	66,000,000	47,000,000	13,000,000	51,000,000	NA	< 1,000,000	200,000
W-2	11/88	360	< 50	6.7	2.1	0.47	1.3	NA	NA	NA
W-3	11/88	11,000	2,200	290	120	150	140	NA	NA	NA
W-1s	3/22/96	6,400	NA	580	470	85	1,100	< 500	NA	NA
W-1s	11/22/96	170,000	NA	13,000	18,000	3,500	18,000	< 10,000	NA	NA
W-1s	7/15/97	140,000	38,000	12,000	12,000	2,600	16,000	< 800	NA	NA
W-1s	10/29/97	650,000	180,000	14,000	19,000	7,800	35,000	< 3,000	NA	NA
W-1s	4/27/98	6,700	2,200	410	250	77	870	< 30	NA	NA
W-1s	10/23/98	99,000	18,000	9,800	9,400	1,800	11,000	< 600	NA	NA
W-1s	4/9/99	70,000	24,000	6,500	7,000	1,800	8,900	360	330	NA
W-1s	10/5/99	82,000	60,000	5,500	4,500	2,500	14,000	< 300	510	280
W-1s	4/5/00	47,000	15,000	4,300	2,300	1,500	6,100	170	330	110
W-3s	3/22/96	100	NA	13	6.9	5.3	14	< 5	NA	NA
W-3s	11/22/96	3,200	NA	270	29.0	63.0	100	< 100	NA	NA
W-3s	7/15/97	2,100	340	230	7	33	51	< 20	NA	NA
W-3s	10/29/97	2,800	750	630	31	71	69	< 30	NA	NA
W-3s	4/27/98	< 50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	< 3	NA	NA
W-3s	10/23/98	3,800	1,000	500	28	90	37	35	NA	NA
W-3s	4/9/99	980	430	240	4	37	3	< 12	NA	NA
W-3s	10/5/99	1,500	1,000	290	9.5	53	9.8	< 6	NA	NA
W-3s	4/5/00	810	320	150	3.0	9.0	5.7	< 3	< 5	< 5

AQUIFER SCIENCES, INC.

Table 3 (continued). SUMMARY OF ANALYTICAL RESULTS FOR GROUNDWATER
187 North L Street, Livermore, California

Well Number	Date Sampled	TPH-gasoline (µg/L)	TPH-diesel (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	Naphthalene (µg/L)	2-Methyl-naphthalene (µg/L)
W-Bs	3/22/96	61,000	NA	9,800	8,000	2,200	11,000	< 5,000	NA	NA
W-Bs	11/22/96	47,000	NA	5,100	3,100	1,400	7,800	< 2,500	NA	NA
W-Bs	7/15/97	66,000	17,000	7,800	4,900	1,900	10,000	< 600	NA	NA
W-Bs	10/29/97	44,000	27,000	6,000	500	1,500	6,400	380	NA	NA
W-Bs	4/27/98	63,000	17,000	6,100	5,400	1,900	9,100	< 600	NA	NA
W-Bs	10/23/98	48,000	9,600	6,700	1,200	1,500	6,200	< 300	NA	NA
W-Bs	4/9/99	39,000	12,000	4,100	1,900	1,400	5,600	< 300	NA	NA
W-Bs	10/5/99	38,000	7,300	3,800	390	1,600	5,900	< 60	NA	NA
W-Bs	4/5/00	34,000	9,600	3,500	1,200	1,400	4,700	< 150	280	68
W-Es	3/22/96	< 50	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 5	NA	NA
W-Es	11/22/96	280	NA	24	0.6	1.8	2.2	< 5	NA	NA
W-Es	10/23/98	82	69	< 0.5	0.8	< 0.5	0.8	4	NA	NA
W-Es	10/5/99	68	88	ND	ND	ND	ND	4	NA	NA
MCL		NE	NE	1	150	700	1,750	5	NE	NE

µg/L = micrograms per liter [parts per billion (ppb)]
NA = not analyzed
ND = not detected
NE = none established
MTBE = methyl tertiary butyl ether
TPH-gasoline = total petroleum hydrocarbons quantified as gasoline
TPH-diesel = total petroleum hydrocarbons quantified as diesel
MCL = Maximum Contaminant Level, January 1999

avg SS from
WLS, WBS?

consider 95% UCL of soil analytical results from
source area but 15-20' bgs (BF, WL, (WS), B1, W-A, BG)

Table 4. REPRESENTATIVE CONCENTRATIONS OF CHEMICALS IN SOIL AND GROUNDWATER
187 North L Street, Livermore, California

Chemical	Source Area Representative Concentration in Soil* (mg/kg)	Source Area Representative Concentration in Groundwater† (µg/L)	W-Bs/W-3s Area Representative Concentration in Groundwater‡ (µg/L)
Benzene	2.5	9,300	1,100
Toluene	21	9,400	88
Ethylbenzene	20	2,400	230
Total Xylenes	130	14,000	220
MTBE	NA	570	40
Naphthalene	3.4	510	38
Phenol	0.3	ND	ND

mg/kg = milligrams per kilogram (parts per million or ppm)
µg/L = micrograms per liter (parts per billion or ppb)
NA = not analyzed
ND = not detected
MTBE = methyl tertiary butyl ether
* Maximum concentrations in the vicinity of boring B-1 and well W-1.
† 95% upper confidence limit of the mean at well W-1s during four most recent sampling events.
‡ Geometric mean of the concentrations at wells W-Bs and W-3s during four most recent sampling events.

Table 5. REFERENCE DOSES AND CANCER SLOPE FACTORS
187 North L Street, Livermore, California

Parameter	Units	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	Naphthalene	Phenol
Dermal								
RfD	mg/kg-day	0.003	0.16	0.097	1.84	0.008	0.356	0.54
CSF	$(mg/kg\text{-}day)^{-1}$	0.0299	NA	NA	NA	NA	NA	NA
Ingestion								
RfD	mg/kg-day	0.003	0.2	0.1	2	0.01	0.4	0.6
CSF	$(mg/kg\text{-}day)^{-1}$	0.029	NA	NA	NA	NA	NA	NA
Inhalation								
RfD	mg/m^3	0.00595	0.40	1	7	3	1.4	2.1
CSF	$(\mu g/m^3)^{-1}$	8.29E-06	NA	NA	NA	NA	NA	NA

NA = not applicable
RfD = reference dose
CSF = cancer slope factor
Reference doses correspond to non-carcinogenic exposures.
Cancer slope factors apply to carcinogenic exposures.

Table 6. TIER 1 BASELINE RISK ASSESSMENT - ONSITE COMMERCIAL DEVELOPMENT
187 North L Street, Livermore, California

Onsite Receptors

Chemical	Carcinogenic Risk Due To Outdoor Air Exposure	Non-Carcinogenic Risk Due To Outdoor Air Exposure	Carcinogenic Risk Due To Indoor Air Exposure	Non-Carcinogenic Risk Due To Indoor Air Exposure	Carcinogenic Risk Due To Groundwater Exposure	Non-Carcinogenic Risk Due To Groundwater Exposure
Benzene	3.4E-07	1.9E-02	5.0E-05	2.8E+00	9.4E-04	3.0E+01
Toluene		1.0E-03		8.8E-02		4.6E-01
Ethylbenzene		1.8E-04		1.3E-02		2.3E-01
Total Xylenes		2.0E-04		1.3E-02		1.1E-01
MTBE		2.5E-07		3.6E-05		5.6E-01
Naphthalene		4.2E-07		4.0E-05		1.2E-02
Phenol		1.9E-09		1.3E-06		6.2E-03
Total Risk	3.4E-07	2.1E-02	5.0E-05	2.9E+00	9.4E-04	3.2E+01

Total Carcinogenic Risk	9.9E-04	Total Non-Carcinogenic Risk	35
Target Carcinogenic Risk	1.0E-05	Target Non-Carcinogenic Risk	1.0

MTBE = methyl tertiary butyl ether

Table 7. TIER 1 BASELINE RISK ASSESSMENT - ONSITE RESIDENTIAL DEVELOPMENT
187 North L Street, Livermore, California

Onsite Receptors

Chemical	Carcinogenic Risk Due To Outdoor Air Exposure	Non-Carcinogenic Risk Due To Outdoor Air Exposure	Carcinogenic Risk Due To Indoor Air Exposure	Non-Carcinogenic Risk Due To Indoor Air Exposure	Carcinogenic Risk Due To Groundwater Exposure	Non-Carcinogenic Risk Due To Groundwater Exposure
Benzene	5.4E-07	2.5E-02	1.0E-04	4.9E+00	3.2E-03	8.5E+01
Toluene		1.2E-03		1.5E-01		1.3E+00
Ethylbenzene		2.5E-04		2.2E-02		6.6E-01
Total Xylenes		2.9E-04		2.3E-02		3.1E-01
MTBE		3.5E-07		6.3E-05		1.6E+00
Naphthalene		5.9E-07		6.9E-05		3.5E-02
Phenol		2.6E-09		2.3E-06		1.7E-02
Total Risk	5.4E-07	2.7E-02	1.0E-04	5.1E+00	3.2E-03	8.9E+01

Total Carcinogenic Risk	3.3E-03	Total Non-Carcinogenic Risk	94
Target Carcinogenic Risk	1.0E-05	Target Non-Carcinogenic Risk	1.0

MTBE = methyl tertiary butyl ether

Table 8. TIER 2 BASELINE RISK ASSESSMENT - ONSITE COMMERCIAL DEVELOPMENT
187 North L Street, Livermore, California

Onsite Receptors

Chemical	Carcinogenic Risk Due To Outdoor Air Exposure	Non-Carcinogenic Risk Due To Outdoor Air Exposure	Carcinogenic Risk Due To Indoor Air Exposure	Non-Carcinogenic Risk Due To Indoor Air Exposure	Carcinogenic Risk Due To Groundwater Exposure	Non-Carcinogenic Risk Due To Groundwater Exposure
Benzene	3.4E-07	1.9E-02	5.0E-05	2.8E+00	9.4E-04	3.0E+01
Toluene		1.0E-03		8.8E-02		4.6E-01
Ethylbenzene		1.8E-04		1.3E-02		2.3E-01
Total Xylenes		2.0E-04		1.3E-02		1.1E-01
MTBE		2.5E-07		3.6E-05		5.6E-01
Naphthalene		4.2E-07		4.0E-05		1.2E-02
Phenol		1.9E-09		1.3E-06		6.2E-03
Total Risk	3.4E-07	2.1E-02	5.0E-05	2.9E+00	9.4E-04	3.2E+01

Total Carcinogenic Risk	9.9E-04	Total Non-Carcinogenic Risk	35
Target Carcinogenic Risk	1.0E-05	Target Non-Carcinogenic Risk	1.0

Table 8 (continued). TIER 2 BASELINE RISK ASSESSMENT - ONSITE COMMERCIAL DEVELOPMENT
187 North L Street, Livermore, California

Offsite Commercial Receptors

Chemical	Carcinogenic Risk Due To Outdoor Air Exposure	Non-Carcinogenic Risk Due To Outdoor Air Exposure	Carcinogenic Risk Due To Indoor Air Exposure	Non-Carcinogenic Risk Due To Indoor Air Exposure	Carcinogenic Risk Due To Groundwater Exposure	Non-Carcinogenic Risk Due To Groundwater Exposure
Benzene	1.6E-07	9.2E-03	NA	NA	1.5E-07	4.7E-03
Toluene		4.8E-04		NA		5.0E-09
Ethylbenzene		8.6E-05		NA		1.1E-03
Total Xylenes		9.8E-05		NA		6.5E-07
MTBE		1.2E-07		NA		1.1E-03
Naphthalene		2.0E-07		NA		5.7E-08
Phenol		9.0E-10		NA		8.8E-04
Total Risk	1.6E-07	9.8E-03	NA	NA	1.5E-07	7.8E-03

Total Carcinogenic Risk	3.1E-07	Total Non-Carcinogenic Risk	0.018
Target Carcinogenic Risk	1.0E-05	Target Non-Carcinogenic Risk	1.0

Table 8 (continued). TIER 2 BASELINE RISK ASSESSMENT - ONSITE COMMERCIAL DEVELOPMENT
187 North L Street, Livermore, California

Offsite Residential Receptors

Chemical	Carcinogenic Risk Due To Outdoor Air Exposure	Non-Carcinogenic Risk Due To Outdoor Air Exposure	Carcinogenic Risk Due To Indoor Air Exposure	Non-Carcinogenic Risk Due To Indoor Air Exposure	Carcinogenic Risk Due To Groundwater Exposure	Non-Carcinogenic Risk Due To Groundwater Exposure
Benzene	2.6E-07	1.2E-02	NA	NA	4.9E-07	1.3E-02
Toluene		5.9E-04		NA		1.4E-08
Ethylbenzene		1.2E-04		NA		3.2E-03
Total Xylenes		1.4E-04		NA		1.8E-06
MTBE		1.7E-07		NA		3.2E-03
Naphthalene		2.8E-07		NA		1.6E-07
Phenol		1.3E-09		NA		2.5E-03
Total Risk	2.6E-07	1.3E-02	NA	NA	4.9E-07	2.2E-02

Total Carcinogenic Risk	7.5E-07	Total Non-Carcinogenic Risk	0.035
Target Carcinogenic Risk	1.0E-05	Target Non-Carcinogenic Risk	1.0

NA = not applicable

MTBE = methyl tertiary butyl ether

Table 9. TIER 2 BASELINE RISK ASSESSMENT - ONSITE RESIDENTIAL DEVELOPMENT
187 North L Street, Livermore, California

Onsite Receptors

Chemical	Carcinogenic Risk Due To Outdoor Air Exposure	Non-Carcinogenic Risk Due To Outdoor Air Exposure	Carcinogenic Risk Due To Indoor Air Exposure	Non-Carcinogenic Risk Due To Indoor Air Exposure	Carcinogenic Risk Due To Groundwater Exposure	Non-Carcinogenic Risk Due To Groundwater Exposure
Benzene	5.4E-07	2.5E-02	1.0E-04	4.9E+00	3.2E-03	8.5E+01
Toluene		1.2E-03		1.5E-01		1.3E+00
Ethylbenzene		2.5E-04		2.2E-02		6.6E-01
Total Xylenes		2.9E-04		2.3E-02		3.1E-01
MTBE		3.5E-07		6.3E-05		1.6E+00
Naphthalene		5.9E-07		6.9E-05		3.5E-02
Phenol		2.6E-09		2.3E-06		1.7E-02
Total Risk	5.4E-07	2.7E-02	1.0E-04	5.1E+00	3.2E-03	8.9E+01

Total Carcinogenic Risk	3.3E-03	Total Non-Carcinogenic Risk	94
Target Carcinogenic Risk	1.0E-05	Target Non-Carcinogenic Risk	1.0

Table 9 (continued). TIER 2 BASELINE RISK ASSESSMENT - ONSITE RESIDENTIAL DEVELOPMENT
187 North L Street, Livermore, California

Offsite Commercial Receptors

Chemical	Carcinogenic Risk Due To Outdoor Air Exposure	Non-Carcinogenic Risk Due To Outdoor Air Exposure	Carcinogenic Risk Due To Indoor Air Exposure	Non-Carcinogenic Risk Due To Indoor Air Exposure	Carcinogenic Risk Due To Groundwater Exposure	Non-Carcinogenic Risk Due To Groundwater Exposure
Benzene	1.6E-07	9.2E-03	NA	NA	1.5E-07	4.7E-03
Toluene		4.8E-04		NA		5.0E-09
Ethylbenzene		8.6E-05		NA		1.1E-03
Total Xylenes		9.8E-05		NA		6.5E-07
MTBE		1.2E-07		NA		1.1E-03
Naphthalene		2.0E-07		NA		5.7E-08
Phenol		9.0E-10		NA		8.8E-04
Total Risk	1.6E-07	9.8E-03	NA	NA	1.5E-07	7.8E-03

Total Carcinogenic Risk	3.1E-07	Total Non-Carcinogenic Risk	0.018
Target Carcinogenic Risk	1.0E-05	Target Non-Carcinogenic Risk	1.0

Table 9 (continued). TIER 2 BASELINE RISK ASSESSMENT - ONSITE RESIDENTIAL DEVELOPMENT
187 North L Street, Livermore, California

Offsite Residential Receptors

Chemical	Carcinogenic Risk Due To Outdoor Air Exposure	Non-Carcinogenic Risk Due To Outdoor Air Exposure	Carcinogenic Risk Due To Indoor Air Exposure	Non-Carcinogenic Risk Due To Indoor Air Exposure	Carcinogenic Risk Due To Groundwater Exposure	Non-Carcinogenic Risk Due To Groundwater Exposure
Benzene	2.6E-07	1.2E-02	NA	NA	4.9E-07	1.3E-02
Toluene		5.9E-04		NA		1.4E-08
Ethylbenzene		1.2E-04		NA		3.2E-03
Total Xylenes		1.4E-04		NA		1.8E-06
MTBE		1.7E-07		NA		3.2E-03
Naphthalene		2.8E-07		NA		1.6E-07
Phenol		1.3E-09		NA		2.5E-03
Total Risk	2.6E-07	1.3E-02	NA	NA	4.9E-07	2.2E-02

Total Carcinogenic Risk	7.5E-07	Total Non-Carcinogenic Risk	0.035
Target Carcinogenic Risk	1.0E-05	Target Non-Carcinogenic Risk	1.0

NA = not applicable

MTBE = methyl tertiary butyl ether

Table 10. REMEDIATION GOALS - ONSITE COMMERCIAL DEVELOPMENT
187 North L Street, Livermore, California

Chemical	Remediation Goal for Soil (mg/kg)	Remediation Goal for Groundwater (µg/L)	Total Carcinogenic Risk (Onsite Receptor)	Total Non-Carcinogenic Risk (Onsite Receptor)
Benzene	0.1	75	8.5E-06	2.9E-01
Toluene	7	4,000		2.3E-01
Ethylbenzene	10	1,500		1.6E-01
Total Xylenes	100	9,000		9.4E-02
MTBE	NA	200		2.0E-01
Naphthalene	> 3.4	> 510		1.2E-02
Phenol	> 0.3	NA		6.2E-03
		Total Risk	8.5E-06	0.99
		Target Risk	1.0E-05	1.0

NA = not applicable

MTBE = methyl tertiary butyl ether

Table 11. REMEDIATION GOALS - ONSITE RESIDENTIAL DEVELOPMENT
187 North L Street, Livermore, California

Chemical	Remediation Goal for Soil (mg/kg)	Remediation Goal for Groundwater (µg/L)	Total Carcinogenic Risk (Onsite Receptor)	Total Non-Carcinogenic Risk (Onsite Receptor)
Benzene	0.04	10	9.5E-06	2.7E-01
Toluene	2.1	1,000		1.6E-01
Ethylbenzene	4	500		1.4E-01
Total Xylenes	26	7,000		1.0E-01
MTBE	NA	100		2.7E-01
Naphthalene	> 3.4	> 510		3.5E-02
Phenol	> 0.3	NA		1.7E-02
		Total Risk	9.5E-06	0.99
		Target Risk	1.0E-05	1.0

NA = not applicable

MTBE = methyl tertiary butyl ether

Table 12. REMEDIATION GOALS WITH DEED RESTRICTION ON GROUNDWATER
ONSITE COMMERCIAL DEVELOPMENT
187 North L Street, Livermore, California

Chemical	Remediation Goal for Soil (mg/kg)	Remediation Goal for Groundwater (µg/L)	Total Carcinogenic Risk (Onsite Receptor)	Total Non-Carcinogenic Risk (Onsite Receptor)
Benzene	2.5	9,300	1.3E-06*	< 1.0*
Toluene	21	9,400		< 1.0*
Ethylbenzene	20	2,400		< 1.0*
Total Xylenes	130	14,000		< 1.0*
MTBE	NA	570		3.6E-05
Naphthalene	3.4	510		4.0E-05
Phenol	0.3	NA		1.3E-06
		Total Risk	1.3E-06*	< 1.0*
		Target Risk	1.0E-05	1.0

NA = not applicable

MTBE = methyl tertiary butyl ether

* Based upon the results of soil vapor sampling as compared to Risk-Based Screening Levels (RBSLs).

Table 13. REMEDIATION GOALS WITH DEED RESTRICTION ON GROUNDWATER
ONSITE RESIDENTIAL DEVELOPMENT
187 North L Street, Livermore, California

Chemical	Remediation Goal for Soil (mg/kg)	Remediation Goal for Groundwater (µg/L)	Total Carcinogenic Risk (Onsite Receptor)	Total Non-Carcinogenic Risk (Onsite Receptor)
Benzene	2.5	9,300	1.5E-06*	< 1.0*
Toluene	21	9,400		< 1.0*
Ethylbenzene	20	2,400		< 1.0*
Total Xylenes	130	14,000		< 1.0*
MTBE	NA	570		6.3E-05
Naphthalene	3.4	510		7.0E-05
Phenol	0.3	NA		2.3E-06
		Total Risk	1.5E-06*	< 1.0*
		Target Risk	1.0E-05	1.0

NA = not applicable

MTBE = methyl tertiary butyl ether

* Based upon the results of soil vapor sampling as compared to Risk-Based Screening Levels (RBSLs).

Table 14. SUMMARY OF REMEDIATION GOALS
187 North L Street, Livermore, California

Chemical	Representative Concentrations		Remediation Goals for Commercial Scenario		Remediation Goals for Residential Scenario		Remediation Goals for Commercial Scenario w/GW deed restriction		Remediation Goals for Residential Scenario w/GW deed restriction	
	Soil (mg/kg)	GW (µg/L)	Soil (mg/kg)	GW (µg/L)	Soil (mg/kg)	GW (µg/L)	Soil (mg/kg)	GW (µg/L)	Soil (mg/kg)	GW (µg/L)
Benzene	2.5	9,300	0.1	75	0.04	10	2.5	9,300	2.5	9,300
Toluene	21	9,400	7	4,000	2.1	1,000	21	9,400	21	9,400
Ethylbenzene	20	2,400	10	1,500	4	500	20	2,400	20	2,400
Total Xylenes	130	14,000	100	9,000	26	7,000	130	14,000	130	14,000
MTBE	NA	570	NA	200	NA	100	NA	570	NA	570
Naphthalene	3.4	510	> 3.4	> 510	> 3.4	> 510	3.4	510	3.4	510
Phenol	0.3	NA	> 0.3	NA	> 0.3	NA	0.3	NA	0.3	NA

NA = not applicable

MTBE = methyl tertiary butyl ether

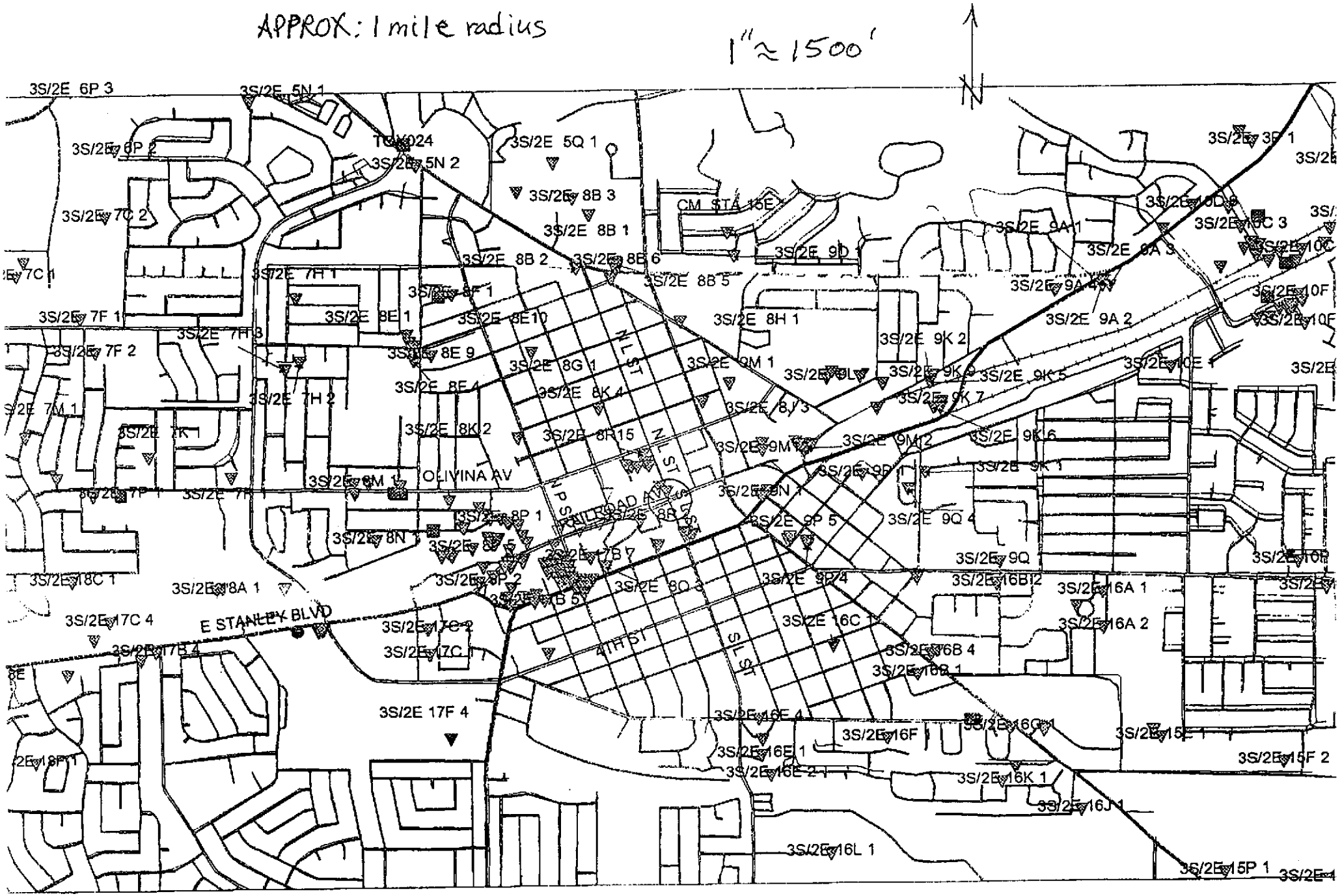
GW = groundwater

APPENDIX A

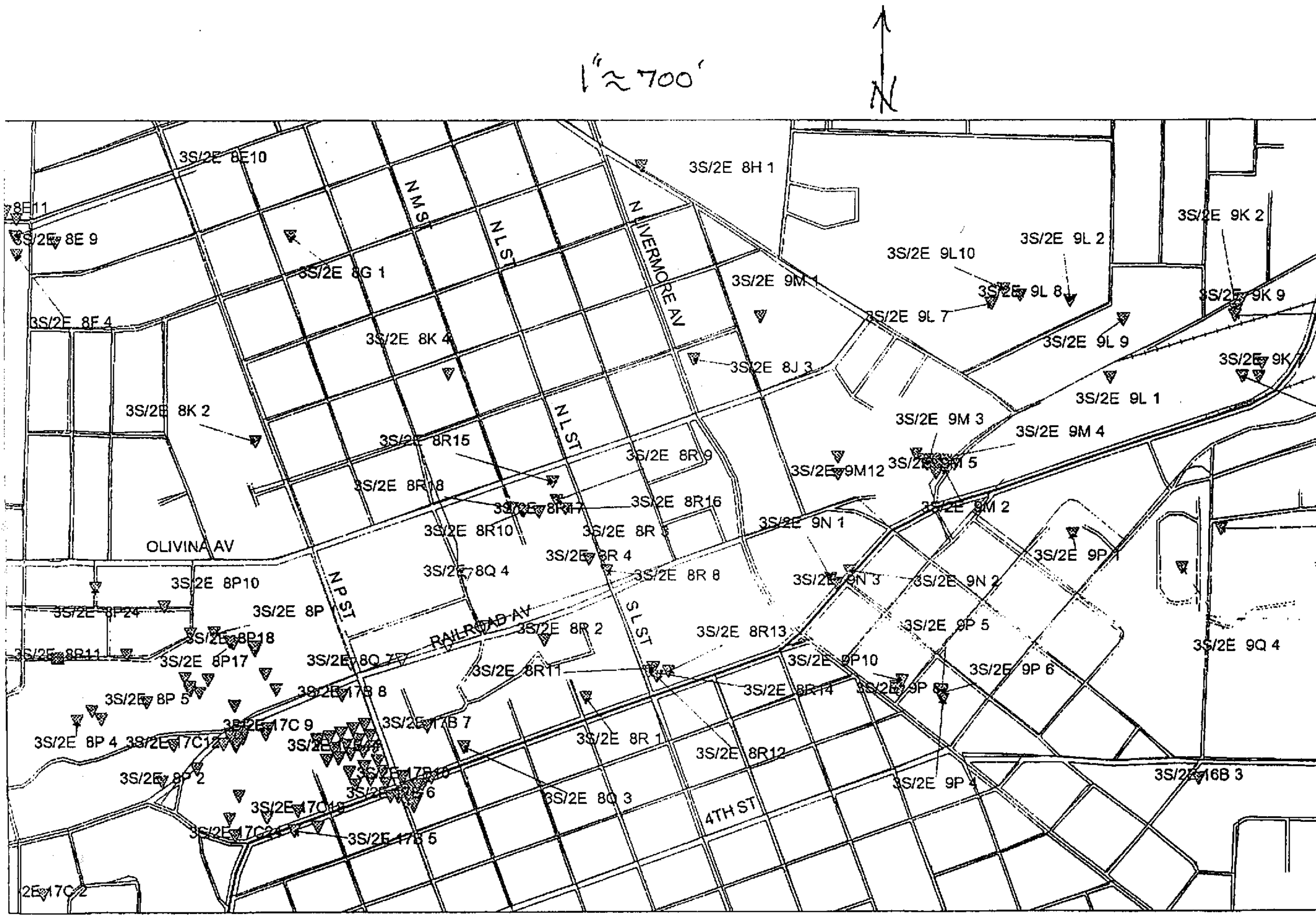
WELL LOCATION MAPS

APPROX: 1 mile radius

1" ≈ 1500'



1" ≈ 700'


N
3S/2E 8E10
3S/2E 8H 1
8E11
3S/2E 8E 9
3S/2E 8G 1
3S/2E 8F 4
N M ST
N L ST
N LIVERMORE AV
3S/2E 9M 1
3S/2E 9K 2
3S/2E 9L 2
3S/2E 9L10
3S/2E 9L 8
3S/2E 9L 7
3S/2E 9K 9
3S/2E 8K 4
3S/2E 8J 3
3S/2E 9L 9
3S/2E 9K 7
3S/2E 9L 1
3S/2E 8K 2
3S/2E 9M 3
3S/2E 9M 4
3S/2E 8R15
3S/2E 8R 9
3S/2E 9M12
3S/2E 9M 5
3S/2E 8R18
3S/2E 8R16
3S/2E 8R17
3S/2E 9M 2
3S/2E 8R10
3S/2E 8R 5
3S/2E 9N 1
OLIVINA AV
3S/2E 8R 4
3S/2E 9P 1
3S/2E 8Q 4
3S/2E 8R 8
3S/2E 9N 3
3S/2E 9N 2
3S/2E 8P10
N P ST
S L ST
3S/2E 8P24
3S/2E 8P 1
RAILROAD AV
3S/2E 8R 2
3S/2E 8R13
3S/2E 9P 5
3S/2E 8P18
3S/2E 9Q 4
3S/2E 8R11
3S/2E 8P17
3S/2E 8Q 7
3S/2E 9P10
3S/2E 8R11
3S/2E 9P 6
3S/2E 8R14
3S/2E 9P 8
3S/2E 17B 8
3S/2E 8P 5
3S/2E 17C 9
3S/2E 17B 7
3S/2E 8P 4
3S/2E 17C12
3S/2E 8R 1
3S/2E 8R12
3S/2E 17B10
3S/2E 8P 2
3S/2E 16B 3
3S/2E 9P 4
3S/2E 8Q 3
3S/2E 17C18
4TH ST
3S/2E 17C24
3S/2E 17B 5
2E 17C 2

APPENDIX B

EQUATIONS FOR INHALATION EXPOSURE SCENARIO

Media Cleanup Values: The RBCA Tool Kit has the ability to i) compare the site data to Tier 1 Risk-Based Screening Levels (RBSLs), computed using the default parameter values as listed in ASTM PS 104, or ii) calculate Tier 2 Site-Specific Target Levels (SSTLs) based on user-supplied site information. For each source medium (i.e., affected soil and groundwater), the software reports target concentrations for all complete pathways and identifies the applicable (i.e., minimum) value for source remediation. The equations used by the RBCA Tool Kit to calculate RBSLs and SSTLs are presented in Table A.2.

TABLE A.2 RBSL AND SSTL EQUATIONS USED IN THE RBCA TOOL KIT

GROUNDWATER EXPOSURE PATHWAY	
Groundwater Ingestion	
Carcinogens: $RBSL_{GW} = \frac{TR \cdot BW \cdot AT_C}{SFo \cdot EF \cdot ED \cdot IR_w}$ Non-Carcinogens: $RBSL_{GW} = \frac{THQ \cdot RfDo \cdot BW \cdot AT_n}{EF \cdot ED \cdot IR_w}$	$SSTL_{GW} = RBSL_{GW} \cdot DAF$
Soil Leaching to Groundwater → Groundwater Ingestion	
Carcinogens: $RBSL_S = \frac{TR \cdot BW \cdot AT_C}{SFo \cdot EF \cdot ED \cdot IR_w \cdot LF}$ Non-Carc.: $RBSL_S = \frac{THQ \cdot RfDo \cdot BW \cdot AT_n}{EF \cdot ED \cdot IR_w \cdot LF}$	$SSTL_s = RBSL_s \cdot DAF$
SOIL EXPOSURE PATHWAY	
Surface Soil Ingestion, Inhalation, and Dermal Contact	
Carcinogens: $RBSL_{SS} = \frac{TR \cdot BW \cdot AT_C}{EF \cdot ED \cdot \left[(SFo \cdot IR_s) + (URF \cdot 1000 \cdot BW \cdot (VF_{ss} + VF_p)) + (SFd \cdot SA \cdot M \cdot RAF_d)\right]}$ Non-Carc.: $RBSL_{SS} = \frac{THQ \cdot BW \cdot AT_n}{EF \cdot ED \cdot \left[\left(\frac{IR_s}{RfDo}\right) + \left(\frac{BW \cdot (VF_{ss} + VF_p)}{RfC}\right) + \left(\frac{SA \cdot M \cdot RAF_d}{RfDd}\right)\right]}$	$SSTL_{ss} = RBSL_{ss}$ *(No lateral transport; receptor at source.)*
OUTDOOR AIR EXPOSURE PATHWAY	
Subsurface Soil Volatilization to Ambient Air	
Carcinogens: $RBSL_S = \frac{TR \cdot AT_C}{EF \cdot ED \cdot URF \cdot 1000 \cdot VF_{samb}}$ Non-Carcinogens: $RBSL_S = \frac{THQ \cdot RfC \cdot AT_n}{EF \cdot ED \cdot VF_{samb}}$	$SSTL_s = RBSL_s \cdot ADF$
Groundwater Volatilization to Ambient Air	
Carcinogens: $RBSL_{GW} = \frac{TR \cdot AT_C}{EF \cdot ED \cdot URF \cdot 1000 \cdot VF_{wamb}}$ Non-Carcinogens: $RBSL_{GW} = \frac{THQ \cdot RfC \cdot AT_n}{EF \cdot ED \cdot VF_{wamb}}$	$SSTL_{GW} = RBSL_{GW} \cdot ADF$

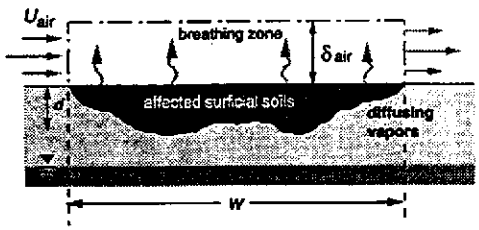
Continued

TABLE A.2 RBSL AND SSTL EQUATIONS USED IN THE RBCA TOOL KIT *Continued*

INDOOR AIR EXPOSURE PATHWAY	
Subsurface Soil Volatilization to Enclosed Space	
Carcinogens: $RBSL_S = \frac{TR \cdot AT_C}{EF \cdot ED \cdot URF \cdot 1000 \cdot VF_{sesp}}$ Non-Carcinogens: $RBSL_S = \frac{THQ \cdot RfC \cdot AT_n}{EF \cdot ED \cdot VF_{sesp}}$	$SSTL_{GW} = RBSL_{GW}$ *(No lateral transport; receptor at source.)*
Groundwater Volatilization to Enclosed Space	
Carcinogens: $RBSL_{GW} = \frac{TR \cdot AT_C}{EF \cdot ED \cdot URF \cdot 1000 \cdot VF_{wesp}}$ Non-Carcinogens: $RBSL_{GW} = \frac{THQ \cdot RfC \cdot AT_n}{EF \cdot ED \cdot VF_{wesp}}$	$SSTL_{GW} = RBSL_{GW}$ *(No lateral transport; receptor at source.)*
SURFACE WATER EXPOSURE PATHWAY	
Groundwater Discharge to Surface Water → Swimming and Fish Consumption	
RBSL not applicable. *(Receptor located away from source.)*	Carcinogens: $SSTL_{GW} = \frac{TR \cdot BW \cdot AT_C \cdot DAF \cdot DF_{gw-sw}}{ED \cdot \left[(SFo \cdot EV \cdot ET \cdot IR_{sw}) + (SFd \cdot EV \cdot SA_{sw} \cdot Z) + (SFo \cdot IR_{fish} \cdot FI_{fish} \cdot BCF)\right]}$ Non-Carc.: $SSTL_{GW} = \frac{THQ \cdot BW \cdot AT_n \cdot DAF \cdot DF_{gw-sw}}{ED \cdot \left[\left(\frac{EV \cdot ET \cdot IR_{sw}}{RfDo}\right) + \left(\frac{EV \cdot SA_{sw} \cdot Z}{RfDd}\right) + \left(\frac{IR_{fish} \cdot FI_{fish} \cdot BCF}{RfDo}\right)\right]}$
Soil Leaching to Groundwater → Groundwater Discharge to Surface Water → Swimming and Fish Consumption	
RBSL not applicable. *(Receptor located away from source.)*	Carcinogens: $SSTL_S = \frac{TR \cdot BW \cdot AT_C \cdot DAF \cdot DF_{gw-sw}}{ED \cdot \left[(SFo \cdot EV \cdot ET \cdot IR_{sw}) + (SFd \cdot EV \cdot SA_{sw} \cdot Z) + (SFo \cdot IR_{fish} \cdot FI_{fish} \cdot BCF)\right] \cdot LF}$ Non-Carc.: $SSTL_S = \frac{THQ \cdot BW \cdot AT_n \cdot DAF \cdot DF_{gw-sw}}{ED \cdot \left[\left(\frac{EV \cdot ET \cdot IR_{sw}}{RfDo}\right) + \left(\frac{EV \cdot SA_{sw} \cdot Z}{RfDd}\right) + \left(\frac{IR_{fish} \cdot FI_{fish} \cdot BCF}{RfDo}\right)\right] \cdot LF}$
Groundwater Discharge to Surface Water → Aquatic Life Protection	
RBSL not applicable. *(Receptor located away from source.)*	Carcinogens: $SSTL_{GW} = AQL \cdot DAF \cdot DF_{gw-sw}$ Non-Carcinogens: $SSTL_{GW} = AQL \cdot DAF \cdot DF_{gw-sw}$
Soil Leaching to Groundwater → Groundwater Discharge to Surface Water → Aquatic Life Protection	
RBSL not applicable. *(Receptor located away from source.)*	Carcinogens: $SSTL_S = \frac{AQL \cdot DAF \cdot DF_{gw-sw}}{LF}$ Non-Carcinogens: $SSTL_S = \frac{AQL \cdot DAF \cdot DF_{gw-sw}}{LF}$

Continued

Equation CM-1: Surface Soil Volatilization Factor (VFss)



CM-1a:

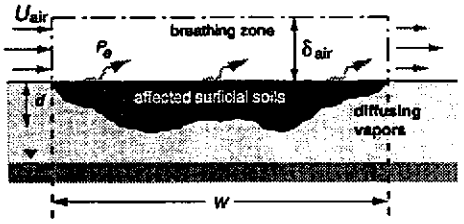
$$VF_{ss}\left[\frac{(mg/m^3-air)}{(mg/kg-soil)}\right]=\frac{2W\rho_s}{U_{air}\delta_{air}}\sqrt{\frac{D_s^{eff}H}{\pi\tau(\theta_{ws}+k_s\rho_s+H\theta_{as})}}\times10^3$$

or CM-1b:

$$VF_{ss}\left[\frac{(mg/m^3-air)}{(mg/kg-soil)}\right]=\frac{W\rho_s d}{U_{air}\delta_{air}\tau}\times10^3$$

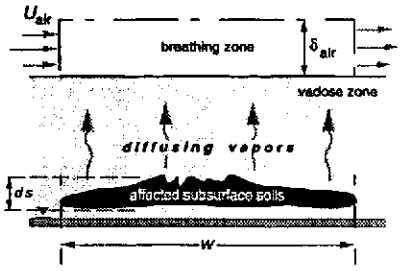
whichever is less

Equation CM-2: Soil Particulate Emission Factor (PEF)



$$PEF\left[\frac{(mg/m^3-air)}{(mg/kg-soil)}\right]=\frac{P_e W}{U_{air}\delta_{air}}\times10^3$$

Equation CM-3: Subsurface Soil Volatilization Factor (VFsamb)



CM-3a:

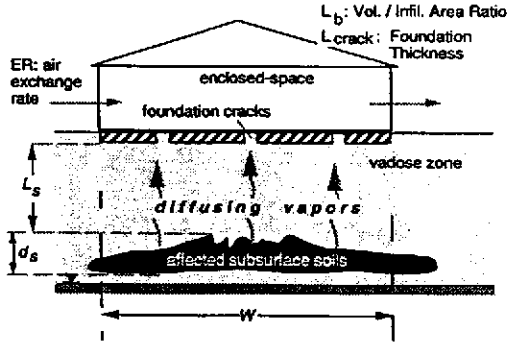
$$VF_{samb}\left[\frac{(mg/m^3-air)}{(mg/kg-soil)}\right]=\frac{H\rho_s}{[\theta_{ws}+k_s\rho_s+H\theta_{as}]\left[1+\frac{U_{air}\delta_{air}L_s}{D_s^{eff}W}\right]}\times10^3$$

or CM-3b:

$$VF_{samb}\left[\frac{(mg/m^3-air)}{(mg/kg-soil)}\right]=\frac{W\rho_s d_s}{U_{air}\delta_{air}\tau}\times10^3$$

whichever is less

Equation CM-4: Subsurface Soil to Enclosed Space Volatilization Factor (VFsesp)



CM-4a:

For $Q_s = 0$:

$$VF_{sesp}\left[\frac{(mg/m^3-air)}{(mg/kg-soil)}\right]=\frac{\frac{H\rho_s}{[\theta_{ws}+k_s\rho_s+H\theta_{as}]}\left[\frac{D_s^{eff}/L_s}{ER\,L_B}\right]}{1+\left[\frac{D_s^{eff}/L_s}{ER\,L_B}\right]+\left[\frac{D_s^{eff}/L_s}{(D_{crack}^{eff}/L_{crack})\cdot\eta}\right]}\times10^3$$

For $Q_s > 0$:

$$VF_{sesp}\left[\frac{(mg/m^3-air)}{(mg/kg-soil)}\right]=\frac{\frac{H\rho_s}{[\theta_{ws}+k_s\rho_s+H\theta_{as}]}\left[\frac{D_s^{eff}/L_s}{ER\,L_B}\right]e^{\xi}}{e^{\xi}+\left[\frac{D_s^{eff}/L_s}{ER\,L_B}\right]+\left[\frac{D_s^{eff}/L_s}{(Q_s/A_b)}\right](e^{\xi}-1)}\times10^3$$

or CM-4b:

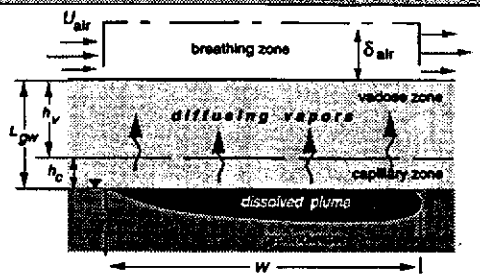
$$VF_{sesp}\left[\frac{(mg/m^3-air)}{(mg/kg-soil)}\right]=\frac{\rho_s d_s}{L_B ER\tau}\times\times10^3$$

whichever is less

FIGURE B.2. CROSS-MEDIA TRANSFER FACTORS IN THE RBCA TOOL KIT *Continued*

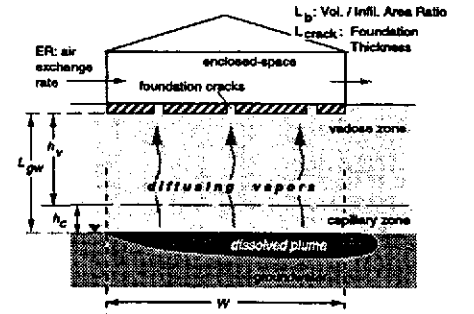
Continued

Equation CM-5: Groundwater Volatilization Factor (VFwamb)



$$VF_{wamb}\left[\frac{(mg/m^3-air)}{(mg/L-H_2O)}\right]=\frac{H}{1+\left[\frac{U_{air}\,\delta_{air}\,L_{GW}}{D_{ws}^{eff}\,W}\right]}\times 10^3$$

Equation CM-6: Groundwater to Enclosed Space Volatilization Factor (VFwesp)



For $Q_s = 0$:

$$VF_{wesp}\left[\frac{(mg/m^3-air)}{(mg/L-H_2O)}\right]=\frac{H\left[\frac{D_{ws}^{eff}/L_{GW}}{ER\,L_B}\right]}{1+\left[\frac{D_{ws}^{eff}/L_{GW}}{ER\,L_B}\right]+\left[\frac{D_{ws}^{eff}/L_{GW}}{(D_{crack}^{eff}/L_{crack})\cdot\eta}\right]}\times 10^3$$

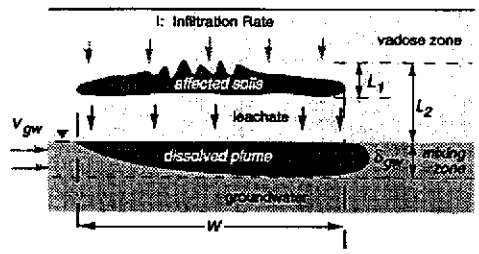
For $Q_s > 0$:

$$VF_{wesp}\left[\frac{(mg/m^3-air)}{(mg/L-H_20)}\right]=\frac{H\left[\frac{D_{ws}^{eff}/L_{GW}}{ER\,L_B}\right]e^{\xi}}{e^{\xi}+\left[\frac{D_{ws}^{eff}/L_{GW}}{ER\,L_B}\right]+\left[\frac{D_{ws}^{eff}/L_{GW}}{Q_s/A_b}\right]\left[e^{\xi}-1\right]}\times 10^3$$

Equation CM-7: Soil Leachate Partition Factor (Ksw)

Equation CM-8: Optional Soil Attenuation Model (SAM) Factor

Equation CM-9: Leachate-Groundwater Dilution Factor (LDF)



CM-7: $$K_{sw}\left[\frac{(mg/L-H_2O)}{(mg/kg-soil)}\right]=\frac{\rho_s}{\theta_{ws}+k_s\rho_s+H\theta_{as}}$$

CM-8: $$SAM\,[dimensionless]=\frac{L_1}{L_2}$$

CM-9: $$LDF\,[dimensionless]=1+\frac{V_{gw}\delta_{gw}}{I\cdot W}$$

Effective Diffusion Coefficients

Effective diffusivity in vadose zone soils:

$$D_s^{eff}\left[\frac{cm^2}{s}\right]=D^{air}\frac{\theta_{as}^{3.33}}{\theta_T^2}+\left[\frac{D^{wat}}{H}\right]\left[\frac{\theta_{ws}^{3.33}}{\theta_T^2}\right]$$

Effective diffusivity above the water table:

$$D_{ws}^{eff}\left[\frac{cm^2}{s}\right]=(h_c+h_v)\left[\frac{h_c}{D_{cap}^{eff}}+\frac{h_v}{D_s^{eff}}\right]^{-1}$$

Effective diffusivity through foundation cracks:

$$D_{crack}^{eff}\left[\frac{cm^2}{s}\right]=D^{air}\frac{\theta_{acrack}^{3.33}}{\theta_T^2}+\left[\frac{D^{wat}}{H}\right]\left[\frac{\theta_{wcrack}^{3.33}}{\theta_T^2}\right]$$

Effective diffusivity in the capillary zone:

$$D_{cap}^{eff}\left[\frac{cm^2}{s}\right]=D^{air}\frac{\theta_{acap}^{3.33}}{\theta_T^2}+\left[\frac{D^{wat}}{H}\right]\left[\frac{\theta_{wcap}^{3.33}}{\theta_T^2}\right]$$

Convective Air Flow Through Foundation Cracks

$$\xi=\frac{Q_s/A_b}{(D_{crack}^{eff}/L_{crack})\cdot\eta}$$

$$Q_s=\frac{2\pi\,\Delta p\,k_v\,X_{crack}}{\mu_{air}\ln\left[\frac{2\,Z_{crack}\,X_{crack}}{A_b\,\eta}\right]}$$

FIGURE B.2. CROSS-MEDIA TRANSFER FACTORS IN THE RBCA TOOL KIT *Continued*

APPENDIX C

TIER 1 BASELINE RISK ASSESSMENT - ONSITE COMMERCIAL SCENARIO

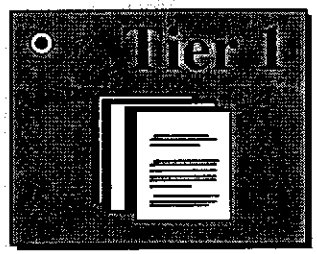
Main Screen

RBCA Tool Kit for Chemical Releases
Version 1.2 © 1999

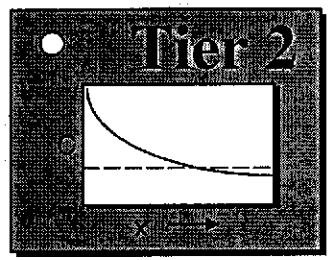
1. Project Information

Site Name:	Arrow Rentals		
Location:	187 North L Street, Livermore, California		
Compl. By:	Aquifer Sciences, Inc.		
Date:	17-Jul-00	Job ID:	971275

2. Which Type of RBCA Analysis? (?)



Generic Values
On-Site
Exposure



Site-Specific Values
On- or Off-Site Exposure

3. Calculation Options (?)

Affects which input data are required

- ☑ ***Baseline Risks (Forward mode)***
- ☑ ***RBCA Cleanup Standards (Backward mode)***

4. RBCA Evaluation Process

Prepare Input Data

Data Complete? (■= yes, ■= no)

- ■□ Exposure Pathways
- ■□ Constituents of Concern (COCs)
- ■□ Transport Models
- ■□ Soil Parameters
- ■□ GW Parameters
- ■□ Air Parameters

Review Output

- Exposure Flowchart
- COC Chem. Parameters
- Input Data Summary
- User-Spec. COC Data...
- Transient Domenico Analysis
- Baseline Risks...
- Cleanup Standards...

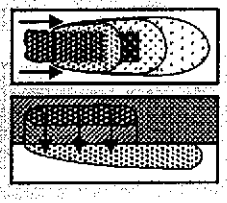
5. Commands and Options

New Site	Load Data...	Save Data As...	Quit
Print Sheet	Set Units	Custom Chem. Data...	*Help*

Exposure Pathway Identification

Site Name: Arrow Rentals
Location: 187 North L Street, Livermore, California
Compl. By: Aquifer Sciences, Inc.
Job ID: 971275 Date: 17-Jul-00

1. Groundwater Exposure



Groundwater Ingestion/ Surface Water Impact

Receptor Type:	Com.		
	On-site	Off-site1	Off-site2

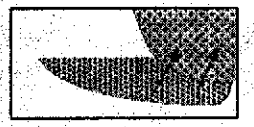
Source Media:

- [x] Affected Groundwater
- [x] Affected Soils Leaching to Groundwater

Distance to GW receptors (ft)

On-site	Off-site1	Off-site2
0		
0		

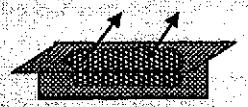
GW Discharge to Surface Water Exposure



- [ ] Swimming
- [ ] Fish Consumption
- [ ] Aquatic Life Protection

[Enter ALP Criteria]

2. Surface Soil Exposure

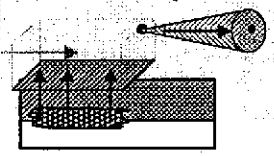


Direct Ingestion and Dermal Contact

Receptor Type:	None	
	On-site	No off-site receptors

Construction Worker [ ]

3. Air Exposure



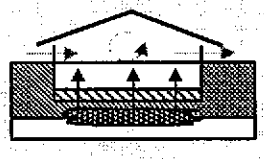
Volatilization and Particulates to Outdoor Air Inhalation

Receptor Type:	Com.		
	On-site	Off-site1	Off-site2
	0		

(ft)

Construction worker [ ]

- [x] Affected Soils--Volatilization to Ambient Outdoor Air
- [x] Affected Groundwater--Volatilization to Ambient Outdoor Air
- [ ] Affected Surface Soils--Particulates to Ambient Outdoor Air



Volatilization to Indoor Air Inhalation

Receptor Type:	Com.	
	On-site	No off-site receptors

- [x] Affected Soils--Volatilization to Enclosed Space
- [x] Affected Groundwater--Volatilization to Enclosed Space

4. Commands and Options

Main Screen | Print Sheet | Set Units | *Help*

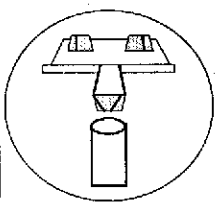
■□ Exposure Factors & Target Risks | Exposure Flowchart

Exposure Factors and Target Risk Limits

Site Name: Arrow Rentals
Location: 187 North L Street, Livermore, California
Compl. By: Aquifer Sciences, Inc.
Job ID: 971275 Date: 17-Jul-00

1. Exposure Parameters

		Residential			Commercial	
Age Adjustment?		Adult	(Age 0-6)	(Age 0-16)	Chronic	Construc.
Averaging time, carcinogens (yr)		70				
Averaging time, non-carcinogens (yr)		30			25	1
Body weight (kg)		70	15	35	70	
Exposure duration (yr)		30	6	16	25	1
Exposure frequency (days/yr)		350			250	180
Dermal exposure frequency (days/yr)		350			250	
Skin surface area, soil contact (cm^2)	☐	5800		2023	5800	5800
Soil dermal adherence factor ($mg/cm^2/day$)		1				
Water ingestion rate (L/day)		2			1	
Soil ingestion rate (mg/day)	☐	100	200		50	100
Swimming exposure time (hr/event)		3				
Swimming event frequency (events/yr)		12	12	12		
Swimming water ingestion rate (L/hr)	☐	0.05	0.5			
Skin surface area, swimming (cm^2)	☐	23000		8100		
Fish consumption rate (kg/day)		0.025				
Contaminated fish fraction (unitless)		1				



2. Risk Goal Calculation Options

- ○ Individual Constituent Risk Goals Only
- ◉ Individual and Cumulative Risk Goals

3. Target Health Risk Limits

	Individual	Cumulative
Target Risk (Class A/B carcins.)	1.0E-6	1.0E-5
Target Risk (Class C carcinogens)	1.0E-5	
Target Hazard Quotient	1.0E+0	
Target Hazard Index		1.0E+0

4. Commands and Options

Return to Exposure Pathways

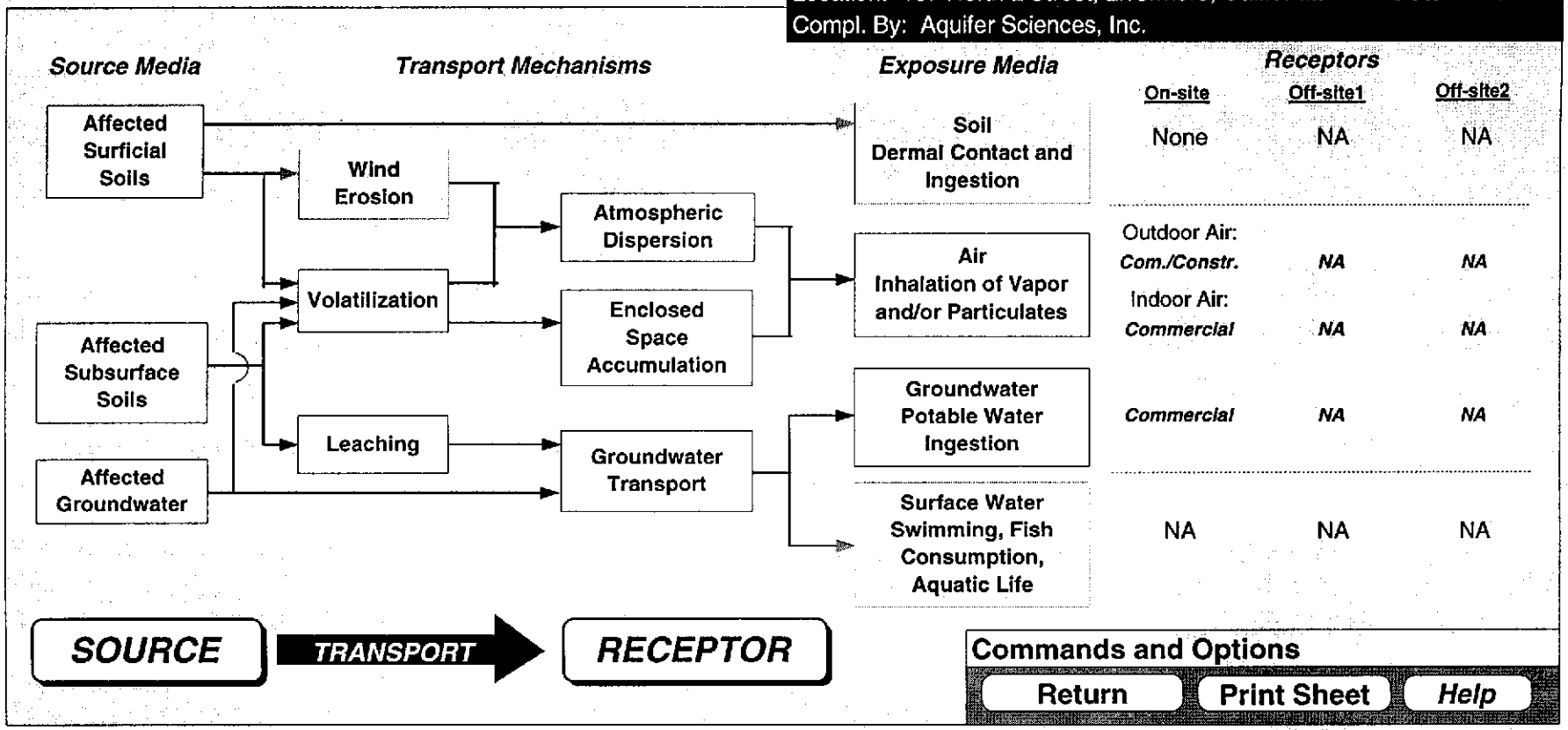
Use Default Values

Print Sheet

Help

Exposure Pathway Flowchart

Site Name: Arrow Rentals
Location: 187 North L Street, Livermore, California
Compl. By: Aquifer Sciences, Inc.
Job ID: 971275
Date: 17-Jul-00

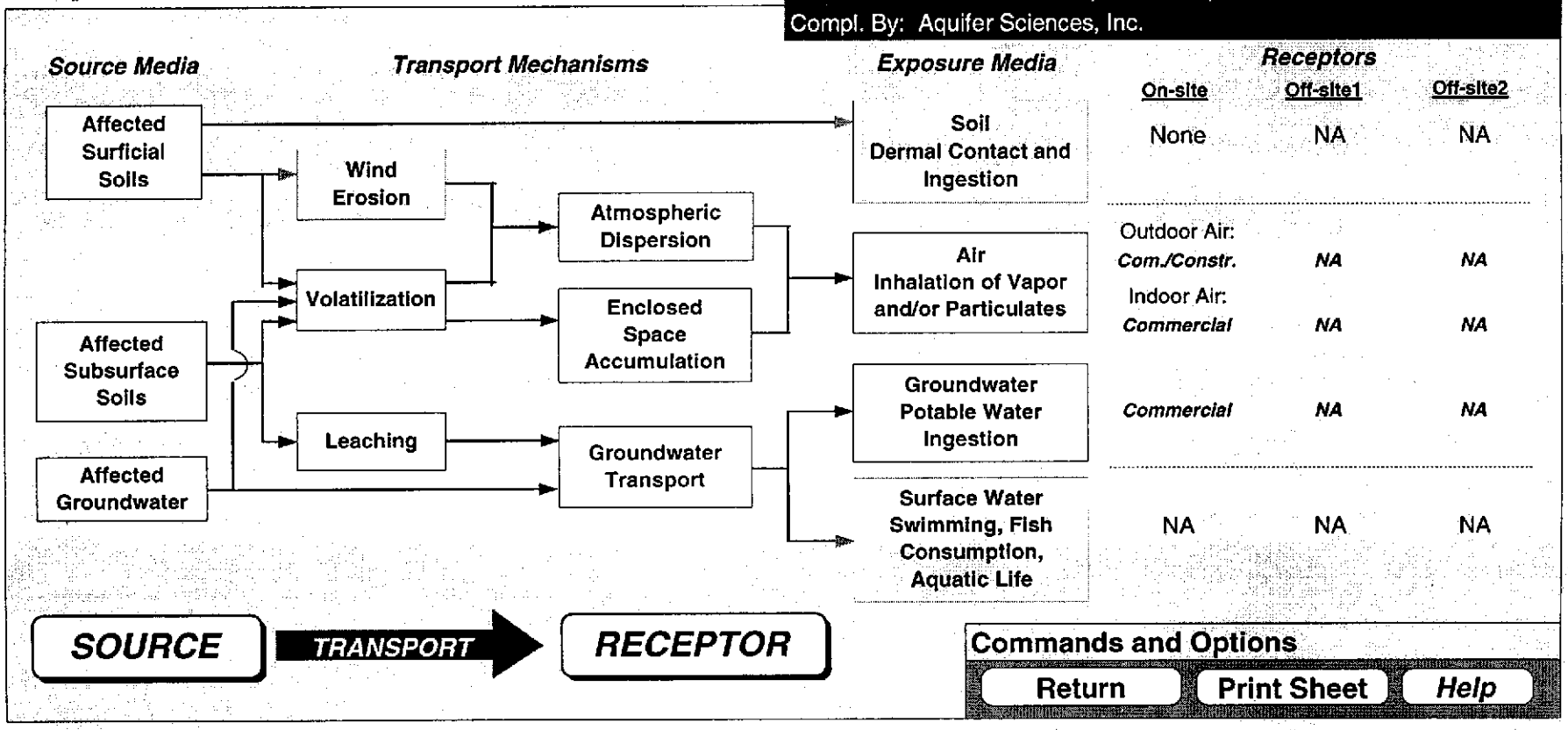


Commands and Options

Return | Print Sheet | Help

Exposure Pathway Flowchart

Site Name: Arrow Rentals
Location: 187 North L Street, Livermore, California
Compl. By: Aquifer Sciences, Inc.
Job ID: 971275
Date: 17-Jul-00



Site Name: Arrow Rentals
Location: 187 North L Street, Livermore, California
Compl. By: Aquifer Sciences, Inc.

Job ID: 971275
Date: 17-Jul-00

Commands and Options

Main Screen | Print Sheet | *Help*

Source Media Constituents of Concern (COCs)

☐ Apply Raoult's Law (?)

Selected COCs

COC Select: *Sort List:* (?)

Add/Insert | Top | MoveUp
Delete | Bottom | MoveDown

Representative COC Concentration (?)

Groundwater Source Zone

Calculate | Enter Site Data

Soil Source Zone

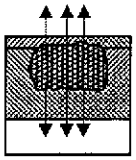
Enter Directly | ■ Enter Site Data

Selected COCs	Groundwater Source Zone (mg/L)	Groundwater Source Zone note	Soil Source Zone (mg/kg)	Soil Source Zone note	Mole Fraction in Source Material (-)
Benzene	9.3E+0	95% UCL at W-1s	2.5E+0	Max at 20 ft in W-1	
Toluene	9.4E+0	95% UCL at W-1s	2.1E+1	Max at 15 ft in W-1	
Ethylbenzene	2.4E+0	95% UCL at W-1s	2.0E+1	Max at 15 ft in W-1	
Xylene (mixed isomers)	1.4E+1	95% UCL at W-1s	1.3E+2	Max at 15 ft in W-1	
Methyl t-Butyl ether	5.7E-1	95% UCL at W-1s	0.0E+0		
Naphthalene	5.1E-1	Maximum at W-1s	3.4E+0	Max at 25 ft in B-1	
Phenol	0.0E+0		3.0E-1	Max at 25 ft in B-1	

Transport Modeling Options

Site Name: Arrow Rentals | Job ID: 971275
Location: 187 North L Street, Livermore, California | Date: 17-Jul-00
Compl. By: Aquifer Sciences, Inc.

1. Vertical Transport, Surface Soil Column



Outdoor Air Volatilization Factors (?)

- ○ Surface soil volatilization model only
- ◉ Combination surface soil/Johnson & Ettinger models
  Thickness of surface soil zone: 1 *(ft)*
- ○ User-specified VF from other model — Enter VF Values

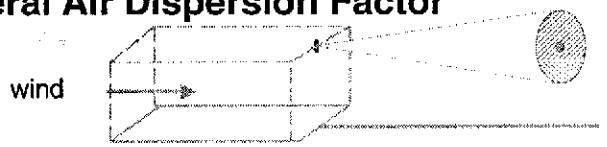
Indoor Air Volatilization Factors (?)

- ◉ Johnson & Ettinger model
- ○ User-specified VF from other model — Enter VF Values

Soil-to-Groundwater Leaching Factor (?)

- ◉ ASTM Model
  - ☐ Apply Soil Attenuation Model (SAM)
  - ☐ Allow first-order biodecay — Enter Decay Rates
- ○ User-specified LF from other model — Enter LF Values

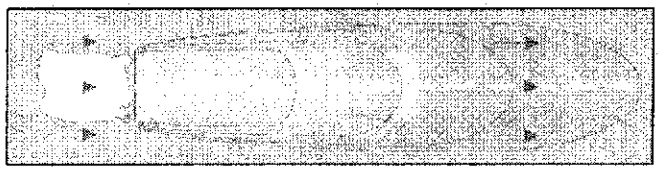
2. Lateral Air Dispersion Factor



(?)

	Off-site 1	Off-site 2	
○ 3-D Gaussian dispersion model			
○ User-Specified ADF	1.00E+0	1.00E+0	*(-)*

3. Groundwater Dilution Attenuation Factor



Calculate DAF using Domenico Model (?)

- ○ Domenico equation with dispersion only (no biodegradation)
- ○ Domenico equation first-order decay — Enter Decay Rates
- ○ Modified Domenico equation using electron acceptor superposition — Enter Site Data
  Enter Directly — Biodegradation Capacity: NC *(mg/L)*

— or —

User-Specified DAF Values

- ○ DAF values from other model or site data — Enter DAF Values

n o

4. Commands and Options

Main Screen | **Print Sheet** | ***Help***

Site-Specific Soil Parameters

Site Name: Arrow Rentals | Job ID: 971275
Location: 187 North L Street, Livermore, California | Date: 17-Jul-00
Compl. By: Aquifer Sciences, Inc.

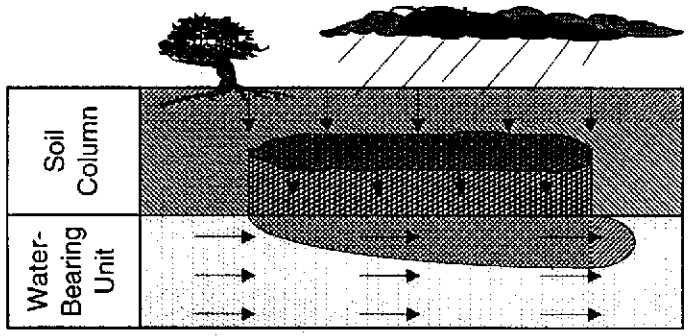
1. Soil Source Zone Characteristics

Hydrogeology

	General Case	Construction	
Depth to water-bearing unit		25	(ft)
Capillary zone thickness		0.16	(ft)
Soil column thickness		24.84	(ft)

Affected Soil Zone

Depth to top of affected soils		15	(ft)
Depth to base of affected soils		25	(ft)
Affected soil area	1280	1280	(ft^2)
Length of affected soil parallel to assumed wind direction	40	40	(ft)
Length of affected soil parallel to assumed GW flow direction		40	(ft)



2. Surface Soil Column

	Vadose Zone	Capillary Fringe	
Predominant USCS Soil Type			ults
or Calculate		or	
Total porosity		0.3	(-)
Volumetric water content	0.12	0.26	(-)
Volumetric air content	0.18	0.04	(-)
Dry bulk density		2.65	(kg/L)
Vertical hydraulic conductivity		3.3E+2	(ft/yr)
Vapor permeability		1.1E-11	(ft^2)
Capillary zone thickness		1.6E-1	(ft)

Net Rainfall Infiltration

Net infiltration estimate	11.81102362	(in/yr)
or Calculate	or	
Average annual precipitation	0	(in/yr)

Partitioning Parameters

Fraction organic carbon	0.01	(-)
Soil/water pH	6.8	(-)

3. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | | Help

Site-Specific Groundwater Parameters

Site Name: Arrow Rentals | Job ID: 971275
Location: 187 North L Street, Livermore, California | Date: 17-Jul-00
Compl. By: Aquifer Sciences, Inc.

1. Water-Bearing Unit

Hydrogeology

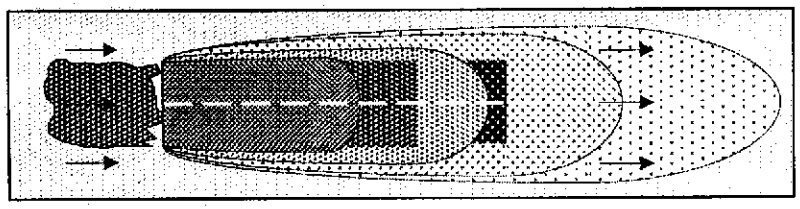
Groundwater Darcy velocity	8.2E+0	(ft/yr)
Groundwater seepage velocity	2.1E+1	(ft/yr)
or Enter Directly	or	
Hydraulic conductivity	4.1E+2	(ft/yr)
Hydraulic gradient	2.0E-2	(-)
Effective porosity	0.40	(-)

Sorption

Fraction organic carbon--saturated zone		(-)
Groundwater pH		(-)

2. Groundwater Source Zone

Groundwater plume width at source	32	(ft)
Plume (mixing zone) thickness at source	6.56167979	(ft)
or Calculate	or	
Saturated thickness	10	(ft)
Length of source zone		(ft)



3. Groundwater Dispersion

Model:

	GW Ingestion		Soil Leaching to GW		
	Off-site 1	Off-site 2	Off-site 1	Off-site 2	
Distance to GW receptors	0	0	0	0	(ft)
or NA	or		or		
Longitudinal dispersivity					(ft)
Transverse dispersivity					(ft)
Vertical dispersivity					(ft)

4. Groundwater Discharge to Surface Water

	Off-site 2	
Distance to GW/SW disharge point	NA	(ft)
Plume width at GW/SW discharge	0	(ft)
Plume thickness at GW/SW discharge	0	(ft)
Surface water flowrate at GW/SW discharge	0.0E+0	(ft^3/s)

5. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | | *Help*

Site-Specific Air Parameters

Site Name: Arrow Rentals | Job ID: 971275
Location: 187 North L Street, Livermore, California | Date: 17-Jul-00
Compl. By: Aquifer Sciences, Inc.

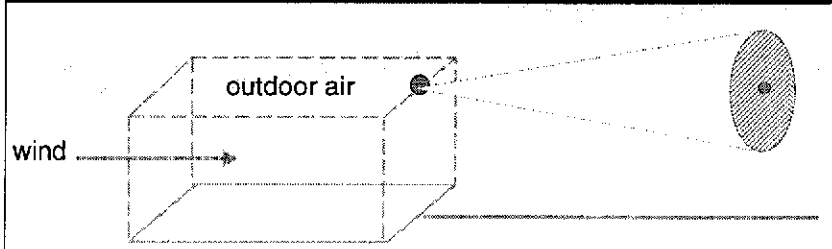
1. Outdoor Air Pathway

Dispersion in Air

	Off-site 1	Off-site 2	
Distance to offsite air receptor			(ft)
or	NA		
Horizontal dispersivity			(ft)
Vertical dispersivity			(ft)

Air Source Zone

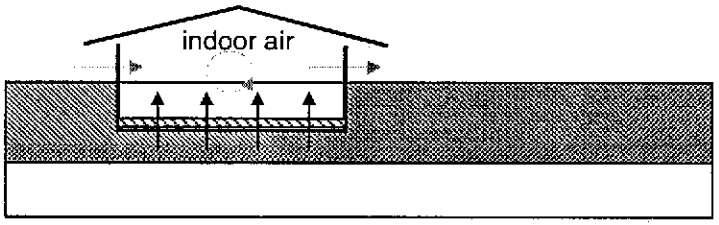
Air mixing zone height	6.56167979	(ft)
Ambient air velocity in mixing zone	7.381889764	(ft/s)
Areal particulate emission flux	6.9E-14	(g/cm^2/s)



2. Indoor Air Pathway

Building Parameters

	Residential	Commercial	
Building volume/area ratio	8	9.84252	(ft)
Foundation area	20000	20000	(ft^2)
Foundation perimeter	600	600	(ft)
Building air exchange rate	1.4E-4	1.4E-4	(1/s)
Depth to bottom of foundation slab	0.5	0.5	(ft)
Convective air flow through cracks	0.0E+0	0.0E+0	(ft^3/s)
Foundation thickness	0.5		(ft)
Foundation crack fraction	0.01		(-)
Volumetric water content of cracks	0.28		(-)
Volumetric air content of cracks	0.13		(-)
Indoor/Outdoor differential pressure	0		(Pa)



3. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | | *Help*

CHEMICAL DATA FOR SELECTED COCs

Physical Property Data

Constituent	CAS Number	type	Molecular Weight (g/mole) MW	ref	Diffusion Coefficients in air (cm2/s) Dair	ref	in water (cm2/s) Dwat	ref	log (Koc) or log(Kd) (@ 20 - 25 C) log(L/kg) partition		ref	Henry's Law Constant (@ 20 - 25 C) (atm-m3) mol	(unitless)	ref	Vapor Pressure (@ 20 - 25 C) (mm Hg)	ref	Solubility (@ 20 - 25 C) (mg/L)	ref	acid pKa	base pKb	ref
Benzene	71-43-2	A	78.1	PS	8.80E-02	PS	9.80E-06	PS	1.77	Koc	PS	5.55E-03	2.29E-01	PS	9.52E+01	PS	1.75E+03	PS	-	-	-
Toluene	108-88-3	A	92.4	5	8.50E-02	A	9.40E-06	A	2.13	Koc	A	6.30E-03	2.60E-01	A	3.00E+01	4	5.15E+02	29	-	-	-
Ethylbenzene	100-41-4	A	106.2	PS	7.50E-02	PS	7.80E-06	PS	2.56	Koc	PS	7.88E-03	3.25E-01	PS	1.00E+01	PS	1.69E+02	PS	-	-	-
Xylene (mixed isomers)	1330-20-7	A	106.2	5	7.20E-02	A	8.50E-06	A	2.38	Koc	A	7.03E-03	2.90E-01	A	7.00E+00	4	1.98E+02	5	-	-	-
Methyl t-Butyl ether	1634-04-4	O	88.146	5	7.92E-02	6	9.41E-05	7	1.08	Koc	A	5.77E-04	2.38E-02	-	2.49E+02	-	4.80E+04	A	-	-	-
Naphthalene	91-20-3	PAH	128.2	PS	5.90E-02	PS	7.50E-06	PS	3.30	Koc	PS	4.83E-04	1.99E-02	PS	2.30E-01	PS	3.10E+01	PS	-	-	-
Phenol	108-95-2	AP	94.1	PS	8.20E-02	PS	9.10E-06	PS	1.46	Koc	PS	3.97E-07	1.64E-05	PS	3.41E-01	PS	8.28E+04	PS	10	-	PS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 17-Jul-00

Job ID: 971275

CHEMICAL DATA FOR SELECTED COCs

Toxicity Data

	Reference Dose (mg/kg/day)				Reference Conc. (mg/m3)		Slope Factors 1/(mg/kg/day)				Unit Risk Factor 1/(µg/m3)			
Constituent	Oral RfD_oral	ref	Dermal RfD_dermal (mg/kg/day)	ref	Inhalation RfC_inhal	ref	Oral SF_oral	ref	Dermal SF_dermal 1/(mg/kg/day)	ref	Inhalation URF_inhal	ref	EPA Weight of Evidence	Is Constituent Carcinogenic ?
Benzene	3.00E-03	R	-	-	5.95E-03	R	2.90E-02	PS	2.99E-02	TX	8.29E-06	PS	A	TRUE
Toluene	2.00E-01	A,R	1.60E-01	TX	4.00E-01	A,R	-	-	-	-	-	-	D	FALSE
Ethylbenzene	1.00E-01	PS	9.70E-02	TX	1.00E+00	PS	-	-	-	-	-	-	D	FALSE
Xylene (mixed isomers)	2.00E+00	A,R	1.84E+00	TX	7.00E+00	A	-	-	-	-	-	-	D	FALSE
Methyl t-Butyl ether	1.00E-02	31	8.00E-03	TX	3.00E+00	R	-	-	-	-	-	-	-	FALSE
Naphthalene	4.00E-01	PS	3.56E-01	TX	1.40E+00	PS	-	-	-	-	-	-	D	FALSE
Phenol	6.00E-01	PS	5.40E-01	TX	2.10E+00	PS	-	-	-	-	-	-	D	FALSE

Site Name: Arrow Rentals

Site Location: 187 North L St

Miscellaneous Chemical Data

Constituent	Maximum Contaminant Level MCL (mg/L)	ref	Time-Weighted Average Workplace Criteria TWA (mg/m3)	ref	Aquatic Life Prot. Criteria AQL (mg/L)	ref	Bioconcentration Factor (L-wat/kg-fish)
Benzene	5.00E-03	52 FR 25690	3.25E+00	PS	-	-	12.6
Toluene	1.00E+00	56 FR 3526 (30 Jan 91)	1.47E+02	ACGIH	-	-	70
Ethylbenzene	7.00E-01	56 FR 3526 (30 Jan 91)	4.35E+02	PS	-	-	1
Xylene (mixed isomers)	1.00E+01	56 FR 3526 (30 Jan 91)	4.34E+02	ACGIH	-	-	1
Methyl t-Butyl ether	-	-	6.00E+01	NIOSH	-	-	1
Naphthalene	-	-	5.00E+01	PS	-	-	430
Phenol	-	-	1.90E+01	PS	-	-	1

Site Name: Arrow Rentals

Site Location: 187 North L St

CHEMICAL DATA FOR SELECTED COCs

Miscellaneous Chemical Data

Constituent	Dermal Relative Absorp. Factor (unitless)	Water Dermal Permeability Data: Dermal Permeability Coeff. (cm/hr)	Lag time for Dermal Exposure (hr)	Critical Exposure Time (hr)	Relative Contr of Derm Perm Coeff (unitless)	Water/Skin Derm Adsorp Factor (cm/event)	ref	Detection Limits: Groundwater (mg/L)	ref	Soil (mg/kg)	ref	Half Life (First-Order Decay) (days): Saturated	Unsaturated	ref
Benzene	0.5	0.021	0.26	0.63	0.013	7.3E-2	D	0.002	S	0.005	S	720	720	H
Toluene	0.5	0.045	0.32	0.77	0.054	1.6E-1	D	0.002	S	0.005	S	28	28	H
Ethylbenzene	0.5	0.074	0.39	1.3	0.14	2.7E-1	D	0.002	S	0.005	S	228	228	H
Xylene (mixed isomers)	0.5	0.08	0.39	1.4	0.16	2.9E-1	D	0.005	S	0.005	S	360	360	H
Methyl t-Butyl ether	0.5	-	-	-	-	-	-	-	-	-	-	360	180	H
Naphthalene	0.05	0.069	0.53	2.2	0.2	2.7E-1	D	0.01	32	0.01	32	258	258	H
Phenol	0.5	0.0055	0.33	0.79	0.0029	2.0E-2	D	0.01	32	0.66	32	10	10	H

Site Name: Arrow Rentals

Site Location: 187 North L St

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 17-Jul-00

Job ID: 971275

Exposure Parameters		Residential			Commercial/Industrial	
		Adult	(1-6yrs)	(1-16 yrs)	Chronic	Construc.
AT_c	Averaging time for carcinogens (yr)	70				
AT_n	Averaging time for non-carcinogens (yr)	30			25	1
BW	Body weight (kg)	70	15	35	70	
ED	Exposure duration (yr)	30	6	16	25	1
τ	Averaging time for vapor flux (yr)	30			25	1
EF	Exposure frequency (days/yr)	350			250	180
EF_D	Exposure frequency for dermal exposure	350			250	
IR_w	Ingestion rate of water (L/day)	2			1	
IR_s	Ingestion rate of soil (mg/day)	100	200		50	100
SA	Skin surface area (dermal) (cm^2)	5800		2023	5800	5800
M	Soil to skin adherence factor	1				
ET_{swim}	Swimming exposure time (hr/event)	3				
EV_{swim}	Swimming event frequency (events/yr)	12	12	12		
IR_{swim}	Water ingestion while swimming (L/hr)	0.05	0.5			
SA_{swim}	Skin surface area for swimming (cm^2)	23000		8100		
IR_{fish}	Ingestion rate of fish (kg/yr)	0.025				
F_{fish}	Contaminated fish fraction (unitless)	1				

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	Commercial	NA	NA
Soil Leaching to Groundwater Ingestion	Commercial	NA	NA
Applicable Surface Water Exposure Routes:			
Swimming			NA
Fish Consumption			NA
Aquatic Life Protection			NA
Soil:			
Direct Ingestion and Dermal Contact	None		
Outdoor Air:			
Particulates from Surface Soils	None	NA	NA
Volatilization from Soils	Commercial	NA	NA
Volatilization from Groundwater	Commercial	NA	NA
Indoor Air:			
Volatilization from Subsurface Soils	Commercial	NA	NA
Volatilization from Groundwater	Commercial	NA	NA

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	0	NA	NA	(ft)
Soil leaching to groundwater receptor	0	NA	NA	(ft)
Outdoor air inhalation receptor	0	NA	NA	(ft)

Target Health Risk Values		Individual	Cumulative
TR_{ab}	Target Risk (class A&B carcinogens)	1.0E-6	1.0E-5
TR_c	Target Risk (class C carcinogens)	1.0E-5	
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 1
Outdoor air volatilization model	Surface & subsurface models
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable

Surface Parameters		General	Construction	(Units)
A	Source zone area	1.3E+3	NA	(ft^2)
W	Length of source-zone area parallel to wind	4.0E+1	NA	(ft)
W_{gw}	Length of source-zone area parallel to GW flow	4.0E+1		(ft)
U_{air}	Ambient air velocity in mixing zone	7.4E+0		(ft/s)
δ_{air}	Air mixing zone height	6.6E+0		(ft)
P_a	Areal particulate emission rate	NA		(g/cm^2/s)
L_{ss}	Thickness of affected surface soils	1.0E+0		(ft)

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	1.6E-1			(ft)
h_v	Vadose zone thickness	2.5E+1			(ft)
ρ_s	Soil bulk density	2.7E+0			(g/cm^3)
f_{oc}	Fraction organic carbon	1.0E-2			(-)
θ_T	Soil total porosity	3.0E-1			(-)
K_{vs}	Vertical hydraulic conductivity	3.3E+2			(ft/yr)
k_v	Vapor permeability	1.1E-11			(ft^2)
L_{gw}	Depth to groundwater	2.5E+1			(ft)
L_s	Depth to top of affected soils	1.5E+1			(ft)
L_{base}	Depth to base of affected soils	2.5E+1			(ft)
L_{subs}	Thickness of affected soils	1.0E+1			(ft)
pH	Soil/groundwater pH	6.8E+0			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.26	0.12	0.28	(-)
θ_a	Volumetric air content	0.04	0.18	0.13	(-)

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	9.84E+0	(ft)
A_b	Foundation area	NA	2.00E+4	(cm^2)
X_{crk}	Foundation perimeter	NA	6.00E+2	(ft)
ER	Building air exchange rate	NA	1.40E-4	(1/s)
L_{crk}	Foundation thickness	NA	5.00E-1	(ft)
Z_{crk}	Depth to bottom of foundation slab	NA	5.00E-1	(ft)
η	Foundation crack fraction	NA	1.00E-2	(-)
dP	Indoor/outdoor differential pressure	NA	0.00E+0	(Pa)
Q_s	Convective air flow through slab	NA	0.00E+0	(ft^3/s)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	6.6E+0	(ft)
I	Net groundwater infiltration rate	1.2E+1	(in/yr)
U_{gw}	Groundwater Darcy velocity	8.2E+0	(ft/yr)
V_{gw}	Groundwater seepage velocity	2.1E+1	(ft/yr)
K_s	Saturated hydraulic conductivity	NA	(ft/yr)
i	Groundwater gradient	NA	(-)
S_w	Width of groundwater source zone	NA	(ft)
S_d	Depth of groundwater source zone	NA	(ft)
θ_{eff}	Effective porosity in water-bearing unit	NA	(-)
f_{oc-sat}	Fraction organic carbon in water-bearing unit	NA	(-)
pH_{sat}	Groundwater pH	NA	(-)
	Biodegradation considered?	NA	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Soil Leaching to GW		
α_x	Longitudinal dispersivity	NA	NA	NA	NA	(ft)
α_y	Transverse dispersivity	NA	NA	NA	NA	(ft)
α_z	Vertical dispersivity	NA	NA	NA	NA	(ft)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(ft)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(ft)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(ft^3/s)
W_{pl}	Width of GW plume at SW discharge	NA	(ft)
δ_{pl}	Thickness of GW plume at SW discharge	NA	(ft)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ☐ (CHECKED IF PATHWAY IS ACTIVE)

SURFACE SOILS:
VAPOR INHALATION

Constituents of Concern	1) Source Medium: Soil Conc. (mg/kg)	2) NAF Value (m^3/kg) Receptor: On-site (0 ft) Commercial	On-site (0 ft) Construction Worker	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA	3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2): On-site (0 ft) Commercial	On-site (0 ft) Construction Worker	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA
Benzene	2.5E+0								
Toluene	2.1E+1								
Ethylbenzene	2.0E+1								
Xylene (mixed isomers)	1.3E+2								
Methyl t-Butyl ether	0.0E+0								
Naphthalene	3.4E+0								
Phenol	3.0E-1								

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 17-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

SURFACE SOILS:

VAPOR INHALATION (cont'd)

Constituents of Concern	4) Exposure Multiplier (EFxED)/(ATx365) (unitless)				5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4)			
	On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)	On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)
	Commercial	Construction Worker	NA	NA	Commercial	Construction Worker	NA	NA
Benzene								
Toluene								
Ethylbenzene								
Xylene (mixed isomers)								
Methyl t-Butyl ether								
Naphthalene								
Phenol								

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr)

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
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RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SUBSURFACE SOILS (15 - 25 ft):

VAPOR INHALATION

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/kg) Receptor			3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)		
	Soil Conc. (mg/kg)	On-site (0 ft) Commercial	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA	On-site (0 ft) Commercial	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA
Benzene	2.5E+0	4.5E+4			5.6E-5		
Toluene	2.1E+1	4.5E+4			4.7E-4		
Ethylbenzene	2.0E+1	8.7E+4			2.3E-4		
Xylene (mixed isomers)	1.3E+2	6.8E+4			1.9E-3		
Methyl t-Butyl ether	0.0E+0	5.0E+4			0.0E+0		
Naphthalene	3.4E+0	9.7E+6			3.5E-7		
Phenol	3.0E-1	5.2E+7			5.8E-9		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 17-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

SUBSURFACE SOILS (15 - 25 ft):
VAPOR INHALATION (cont'd)

Constituents of Concern	4) Exposure Multiplier (EFxED)/(ATx365) (unitless)			5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4)		
	On-site (0 ft) Commercial	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA	On-site (0 ft) Commercial	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA
Benzene	2.4E-1			1.4E-5		
Toluene	6.8E-1			3.2E-4		
Ethylbenzene	6.8E-1			1.6E-4		
Xylene (mixed isomers)	6.8E-1			1.3E-3		
Methyl t-Butyl ether	6.8E-1			0.0E+0		
Naphthalene	6.8E-1			2.4E-7		
Phenol	6.8E-1			4.0E-9		

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr)

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 17-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAY IS ACTIVE)**

GROUNDWATER: VAPOR INHALATION

Exposure Concentration

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/L) Receptor			3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)		
	Groundwater Conc. (mg/L)	On-site (0 ft) Commercial	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA	On-site (0 ft) Commercial	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA
Benzene	9.3E+0	8.4E+4			1.1E-4		
Toluene	9.4E+0	7.7E+4			1.2E-4		
Ethylbenzene	2.4E+0	7.1E+4			3.4E-5		
Xylene (mixed isomers)	1.4E+1	8.2E+4			1.7E-4		
Methyl t-Butyl ether	5.7E-1	5.2E+5			1.1E-6		
Naphthalene	5.1E-1	9.9E+5			5.2E-7		
Phenol	0.0E+0	2.6E+8			0.0E+0		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 17-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

GROUNDWATER: VAPOR

INHALATION (cont'd)

Constituents of Concern	4) Exposure Multiplier (EFxED)/(ATx365) (unitless)			5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4)		
	On-site (0 ft)	Off-site 1 (0 ft)	Off-site 2 (0 ft)	On-site (0 ft)	Off-site 1 (0 ft)	Off-site 2 (0 ft)
	Commercial	NA	NA	Commercial	NA	NA
Benzene	2.4E-1			2.7E-5		
Toluene	6.8E-1			8.4E-5		
Ethylbenzene	6.8E-1			2.3E-5		
Xylene (mixed isomers)	6.8E-1			1.2E-4		
Methyl t-Butyl ether	6.8E-1			7.6E-7		
Naphthalene	6.8E-1			3.5E-7		
Phenol	6.8E-1			0.0E+0		

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr)

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 17-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

TOTAL PATHWAY EXPOSURE (mg/m^3)

(Sum average expsosure concentrations from soil and groundwater routes.)

Constituents of Concern	On-site (0 ft) Commercial	On-site (0 ft) Construction Worker	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA
Benzene	4.1E-5			
Toluene	4.0E-4			
Ethylbenzene	1.8E-4			
Xylene (mixed isomers)	1.4E-3			
Methyl t-Butyl ether	7.6E-7			
Naphthalene	5.9E-7			
Phenol	4.0E-9			

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 17-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 PATHWAY RISK CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

CARCINOGENIC RISK

Constituents of Concern	(1) EPA Carcinogenic Classification	(2) Total Carcinogenic Exposure (mg/m^3)				(3) Inhalation Unit Risk Factor (µg/m^3)^-1	(4) Individual COC Risk (2) x (3) x 1000			
		On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)		On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)
		Commercial	Construction Worker	NA	NA		Commercial	Construction Worker	NA	NA
Benzene	A	4.1E-5				8.3E-6	3.4E-7			
Toluene	D									
Ethylbenzene	D									
Xylene (mixed isomers)	D									
Methyl t-Butyl ether	-									
Naphthalene	D									
Phenol	D									
Total Pathway Carcinogenic Risk =							**3.4E-7**			

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 17-Jul-00

Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 PATHWAY RISK CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

TOXIC EFFECTS

Constituents of Concern	(5) Total Toxicant Exposure (mg/m^3)				(6) Inhalation Reference Conc. (mg/m^3)	(7) Individual COC Hazard Quotient (5) / (6)			
	On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)		On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)
	Commercial	Construction Worker	NA	NA		Commercial	Construction Worker	NA	NA
Benzene	1.1E-4				6.0E-3	1.9E-2			
Toluene	4.0E-4				4.0E-1	1.0E-3			
Ethylbenzene	1.8E-4				1.0E+0	1.8E-4			
Xylene (mixed isomers)	1.4E-3				7.0E+0	2.0E-4			
Methyl t-Butyl ether	7.6E-7				3.0E+0	2.5E-7			
Naphthalene	5.9E-7				1.4E+0	4.2E-7			
Phenol	4.0E-9				2.1E+0	1.9E-9			
Total Pathway Hazard Index =						**2.1E-2**			

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 17-Jul-00

Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SOILS (15 - 25 ft): VAPOR INTRUSION INTO ON-SITE BUILDINGS

Constituents of Concern	1) Source Medium Soil Conc. (mg/kg)	2) NAF Value (m^3/kg) Receptor Commercial	3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2) Commercial	4) Exposure Multiplier (EFxED)/(ATx365) (unitless) Commercial	5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4) Commercial
Benzene	2.5E+0	3.2E+2	7.7E-3	2.4E-1	1.9E-3
Toluene	2.1E+1	6.4E+2	3.3E-2	6.8E-1	2.2E-2
Ethylbenzene	2.0E+1	1.5E+3	1.3E-2	6.8E-1	9.0E-3
Xylene (mixed isomers)	1.3E+2	1.2E+3	1.1E-1	6.8E-1	7.5E-2
Methyl t-Butyl ether	0.0E+0	5.6E+2	0.0E+0	6.8E-1	0.0E+0
Naphthalene	3.4E+0	1.6E+5	2.1E-5	6.8E-1	1.5E-5
Phenol	3.0E-1	7.4E+4	4.0E-6	6.8E-1	2.8E-6

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 17-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER: VAPOR INTRUSION INTO ON-SITE BUILDINGS

Constituents of Concern	Exposure Concentration 1) Source Medium Groundwater Conc. (mg/L)	2) NAF Value (m^3/L) Receptor Commercial	3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2) Commercial	4) Exposure Multiplier (EFxED)/(ATx365) (unitless) Commercial	5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4) Commercial
Benzene	9.3E+0	5.5E+2	1.7E-2	2.4E-1	4.1E-3
Toluene	9.4E+0	5.0E+2	1.9E-2	6.8E-1	1.3E-2
Ethylbenzene	2.4E+0	4.6E+2	5.2E-3	6.8E-1	3.6E-3
Xylene (mixed isomers)	1.4E+1	5.3E+2	2.6E-2	6.8E-1	1.8E-2
Methyl t-Butyl ether	5.7E-1	3.6E+3	1.6E-4	6.8E-1	1.1E-4
Naphthalene	5.1E-1	8.5E+3	6.0E-5	6.8E-1	4.1E-5
Phenol	0.0E+0	3.1E+5	0.0E+0	6.8E-1	0.0E+0

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 17-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS

Constituents of Concern	TOTAL PATHWAY EXPOSURE (mg/m^3) *(Sum average expsosure concentrations from soil and groundwater routes.)* Commercial
Benzene	6.0E-3
Toluene	3.5E-2
Ethylbenzene	1.3E-2
Xylene (mixed isomers)	9.3E-2
Methyl t-Butyl ether	1.1E-4
Naphthalene	5.6E-5
Phenol	2.8E-6

Site Name: Arrow Rentals Date Completed: 17-Jul-00
Site Location: 187 North L Street, Livermore, Calif Job ID: 971275
Completed By: Aquifer Sciences, Inc.

RBCA SITE ASSESSMENT

TIER 1 PATHWAY RISK CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

Constituents of Concern	(1) EPA Carcinogenic Classification	(2) Total Carcinogenic Exposure (mg/m^3) Commercial	(3) Inhalation Unit Risk Factor (µg/m^3)^-1	(4) Individual COC Risk (2) x (3) x 1000 Commercial
		CARCINOGENIC RISK		
Benzene	A	6.0E-3	8.3E-6	5.0E-5
Toluene	D			
Ethylbenzene	D			
Xylene (mixed isomers)	D			
Methyl t-Butyl ether	-			
Naphthalene	D			
Phenol	D			

Total Pathway Carcinogenic Risk = **5.0E-5**

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 17-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 PATHWAY RISK CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

	TOXIC EFFECTS		
	(5) Total Toxicant Exposure (mg/m^3)	(6) Inhalation Reference Concentration (mg/m^3)	(7) Individual COC Hazard Quotient (5) / (6)
Constituents of Concern	Commercial		Commercial
Benzene	1.7E-2	6.0E-3	2.8E+0
Toluene	3.5E-2	4.0E-1	8.8E-2
Ethylbenzene	1.3E-2	1.0E+0	1.3E-2
Xylene (mixed isomers)	9.3E-2	7.0E+0	1.3E-2
Methyl t-Butyl ether	1.1E-4	3.0E+0	3.6E-5
Naphthalene	5.6E-5	1.4E+0	4.0E-5
Phenol	2.8E-6	2.1E+0	1.3E-6

Total Pathway Hazard Index = **2.9E+0**

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 17-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SOILS (15 - 25 ft): LEACHING TO GROUNDWATER INGESTION

Constituents of Concern	1) Source Medium	2) NAF Value (L/kg) Receptor			3) Exposure Medium Groundwater: POE Conc. (mg/L) (1)/(2)		
	Soil Conc. (mg/kg)	On-site (0 ft) Commercial	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA	On-site (0 ft) Commercial	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA
Benzene	2.5E+0	1.5E+0			1.6E+0		
Toluene	2.1E+1	3.3E+0			6.3E+0		
Ethylbenzene	2.0E+1	8.8E+0			2.3E+0		
Xylene (mixed isomers)	1.3E+2	5.8E+0			2.2E+1		
Methyl t-Butyl ether	0.0E+0	4.0E-1			0.0E+0		
Naphthalene	3.4E+0	4.7E+1			7.2E-2		
Phenol	3.0E-1	7.9E-1			3.8E-1		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 17-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

SOILS (15 - 25 ft): LEACHING TO GROUNDWATER INGESTION (cont'd)

Constituents of Concern	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg-day)			5) Average Daily Intake Rate (mg/kg/day) (3) x (4)		
	On-site (0 ft) Commercial	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA	On-site (0 ft) Commercial	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA
Benzene	3.5E-3			5.7E-3		
Toluene	9.8E-3			6.1E-2		
Ethylbenzene	9.8E-3			2.2E-2		
Xylene (mixed isomers)	9.8E-3			2.2E-1		
Methyl t-Butyl ether	9.8E-3			0.0E+0		
Naphthalene	9.8E-3			7.0E-4		
Phenol	9.8E-3			3.7E-3		

NOTE: AT = Averaging time (days) ED = Exposure duration (yr) IR = Ingestion rate (mg/day)
BW = Body weight (kg) EF = Exposure frequency (days/yr)

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 17-Jul-00

Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER: INGESTION

	1) Source Medium	2) NAF Value (unitless) Receptor			3) Exposure Medium Groundwater: POE Conc. (mg/L) (1)/(2)		
Constituents of Concern	Groundwater Conc. (mg/L)	On-site (0 ft) Commercial	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA	On-site (0 ft) Commercial	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA
Benzene	9.3E+0	1.0E+0			9.3E+0		
Toluene	9.4E+0	1.0E+0			9.4E+0		
Ethylbenzene	2.4E+0	1.0E+0			2.4E+0		
Xylene (mixed isomers)	1.4E+1	1.0E+0			1.4E+1		
Methyl t-Butyl ether	5.7E-1	1.0E+0			5.7E-1		
Naphthalene	5.1E-1	1.0E+0			5.1E-1		
Phenol	0.0E+0	1.0E+0			0.0E+0		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 17-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

GROUNDWATER INGESTION (cont'd)

Constituents of Concern	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg/day)			5) Average Daily Intake Rate (mg/kg/day) (3) x (4)		
	On-site (0 ft) Commercial	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA	On-site (0 ft) Commercial	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA
Benzene	3.5E-3			3.2E-2		
Toluene	9.8E-3			9.2E-2		
Ethylbenzene	9.8E-3			2.3E-2		
Xylene (mixed isomers)	9.8E-3			1.4E-1		
Methyl t-Butyl ether	9.8E-3			5.6E-3		
Naphthalene	9.8E-3			5.0E-3		
Phenol	9.8E-3			0.0E+0		

NOTE: AT = Averaging time (days) ED = Exposure duration (yr) IR = Ingestion rate (mg/day)
BW = Body weight (kg) EF = Exposure frequency (days/yr)

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 17-Jul-00

Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

MAXIMUM PATHWAY INTAKE (mg/kg/day)
(Maximum intake of active pathways soil leaching & groundwater routes.)

Constituents of Concern	On-site (0 ft) Commercial	Off-site 1 NA	Off-site 2 NA
Benzene	3.2E-2		
Toluene	9.2E-2		
Ethylbenzene	2.3E-2		
Xylene (mixed isomers)	2.2E-1		
Methyl t-Butyl ether	5.6E-3		
Naphthalene	5.0E-3		
Phenol	3.7E-3		

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 17-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 PATHWAY RISK CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

CARCINOGENIC RISK

Constituents of Concern	(1) EPA Carcinogenic Classification	(2) Maximum Carcinogenic Intake Rate (mg/kg/day)			(3) Oral Slope Factor (mg/kg-day)^-1	(4) Individual COC Risk (2) x (3)		
		On-site (0 ft) Commercial	Off-site 1 NA	Off-site 2 NA		On-site (0 ft) Commercial	Off-site 1 NA	Off-site 2 NA
Benzene	A	3.2E-2			2.9E-2	9.4E-4		
Toluene	D							
Ethylbenzene	D							
Xylene (mixed isomers)	D							
Methyl t-Butyl ether	-							
Naphthalene	D							
Phenol	D							
Total Pathway Carcinogenic Risk =						**9.4E-4**		

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 17-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 PATHWAY RISK CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

TOXIC EFFECTS

Constituents of Concern	(5) Maximum Toxicant Intake Rate (mg/kg/day)			(6) Oral Reference Dose (mg/kg/day)	(7) Individual COC Hazard Quotient (5) / (6)		
	On-site (0 ft) Commercial	Off-site 1 NA	Off-site 2 NA		On-site (0 ft) Commercial	Off-site 1 NA	Off-site 2 NA
Benzene	9.1E-2			3.0E-3	3.0E+1		
Toluene	9.2E-2			2.0E-1	4.6E-1		
Ethylbenzene	2.3E-2			1.0E-1	2.3E-1		
Xylene (mixed isomers)	2.2E-1			2.0E+0	1.1E-1		
Methyl t-Butyl ether	5.6E-3			1.0E-2	5.6E-1		
Naphthalene	5.0E-3			4.0E-1	1.2E-2		
Phenol	3.7E-3			6.0E-1	6.2E-3		
Total Pathway Hazard Index =					**3.2E+1**		

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 17-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT | **Baseline Risk Summary-All Pathways**

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 17-Jul-00

TIER 1 BASELINE RISK SUMMARY TABLE

EXPOSURE PATHWAY	BASELINE CARCINOGENIC RISK: Individual COC Risk – Maximum Value	Individual COC Risk – Target Risk	Cumulative COC Risk – Total Value	Cumulative COC Risk – Target Risk	Risk Limit(s) Exceeded?	BASELINE TOXIC EFFECTS: Hazard Quotient – Maximum Value	Hazard Quotient – Applicable Limit	Hazard Index – Total Value	Hazard Index – Applicable Limit	Toxicity Limit(s) Exceeded?
OUTDOOR AIR EXPOSURE PATHWAYS										
Complete:	3.4E-7	1.0E-6	3.4E-7	1.0E-5	☐	1.9E-2	1.0E+0	2.1E-2	1.0E+0	☐
INDOOR AIR EXPOSURE PATHWAYS										
Complete:	5.0E-5	1.0E-6	5.0E-5	1.0E-5	■	2.8E+0	1.0E+0	2.9E+0	1.0E+0	■
SOIL EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	☐	NA	NA	NA	NA	☐
GROUNDWATER EXPOSURE PATHWAYS										
Complete:	9.4E-4	1.0E-6	9.4E-4	1.0E-5	■	3.0E+1	1.0E+0	3.2E+1	1.0E+0	■
SURFACE WATER EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	☐	NA	NA	NA	NA	☐
CRITICAL EXPOSURE PATHWAY (Maximum Values From Complete Pathways)										
	9.4E-4	*1.0E-6*	*9.4E-4*	*1.0E-5*	■	*3.0E+1*	*1.0E+0*	*3.2E+1*	*1.0E+0*	■
	Groundwater		*Groundwater*			*Groundwater*		*Groundwater*		

RBCA SITE ASSESSMENT

Chemical-Specific Tier 1 Cleanup Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 17-Jul-00
Job ID: 971275

Constituent: Benzene **CAS No.: 71-43-2**

Risk-Based Screening Level (RBSL) Concentrations

		On-site
Groundwater Ingestion		
Receptor Type / Distance (ft)		Commercial / 0
RBSLgw (mg/L)	THQ = 1e+0	3.1E-1
	TR = 1e-6	9.9E-3
Soil Leaching to Groundwater Ingestion		
Receptor Type / Distance (ft)		Commercial / 0
RBSLs (mg/kg)	THQ = 1e+0	4.7E-1
	TR = 1e-6	1.5E-2
Surface Soil Ingestion and Dermal Contact		
Receptor Type / Distance (ft)		None
RBSLss (mg/kg)	THQ = 1e+0	NA
	TR = 1e-6	NA
Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBELair (µg/m3)	THQ = 1e+0	8.7E+0
	TR = 1e-6	4.9E-1
Soil Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Com./Constr. / 0
RBSLs (mg/kg)	THQ = 1e+0	#DIV/0!
	TR = 1e-6	#DIV/0!
Groundwater Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBSLgw (mg/L)	THQ = 1e+0	7.3E+2
	TR = 1e-6	4.1E+1
Indoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBELair (µg/m3)	THQ = 1e+0	8.7E+0
	TR = 1e-6	4.9E-1
Soil Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBSLs (mg/kg)	THQ = 1e+0	2.8E+0
	TR = 1e-6	1.6E-1
Groundwater Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBSLgw (mg/L)	THQ = 1e+0	4.8E+0
	TR = 1e-6	2.7E-1

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	7.8E+1	PS
Sol	(mg/L)	1.8E+3	PS
P_{vap}	(mmHg)	9.5E+1	PS
H_{atm}	(atm-m^3/mol)	5.6E-3	PS
pK_a	(log[mol/mol])	-	-
pK_b	(log[mol/mol])	-	-
log(K_{oc})	(log[L/kg])	1.8E+0	PS
D_{air}	(cm^2/sec)	8.8E-2	PS
D_{wat}	(cm^2/sec)	9.8E-6	PS
Toxicity Data			
Wt of Evd.		A	
SF_o	(1/[mg/kg/day])	2.9E-2	PS
SF_d	(1/[mg/kg/day])	3.0E-2	TX
URF_i	(1/[µg/m^3])	8.3E-6	PS
RfD_o	(mg/kg/day)	3.0E-3	R
RfD_d	(mg/kg/day)	-	-
RfC_i	(mg/m^3)	6.0E-3	R
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-1	D
K_p	(cm/hr)	2.1E-2	
tau_d	(hr/event)	2.6E-1	
t_{crit}	(hr)	6.3E-1	
B	(-)	1.3E-2	
Regulatory Standards			
MCL	(mg/L)	5.0E-3	*
TWA	(mg/m^3)	3.3E+0	PS
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	2.0E-3	S
ADL_s	(mg/kg)	5.0E-3	S
$t_{1/2,sat}$	(d)		H
$t_{1/2,unsat}$	(d)		H

* MCL ref = 52 FR 25690

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VFss	(kg-soil/L-air)	NA	NC	NC
VFsamb	(kg-soil/L-air)	NA	2.2E-5	5.4E-5
VFwamb	(L-wat/L-air)	NA	1.2E-5	1.2E-5
VFsesp	(kg-soil/L-air)	NA	3.1E-3	NA
VFwesp	(L-wat/L-air)	NA	1.8E-3	NA
LF	(kg-soil/L-wat)	All exposures: 6.5E-1		NA

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	2.3E-1
K_{sw}	(L-wat/kg-soil)	1.5E+0
C_{sat}	(mg/kg-soil)	1.1E+3
$C_{sat,vap}$	(µg/m^3-air)	4.0E+5
$D_{eff,s}$	(cm^2/sec)	3.2E-3
$D_{eff,crk}$	(cm^2/sec)	5.9E-4
$D_{eff,cap}$	(cm^2/sec)	2.7E-5
$D_{eff,ws}$	(cm^2/sec)	1.8E-3
R_{sat}	(-)	
R_{unsat}	(-)	1.4E+1
Z	(cm/event)	7.3E-2

NA = Not applicable; NC = Not calculated.

Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT

Chemical-Specific Tier 1 Cleanup Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 17-Jul-00
Job ID: 971275

Constituent: Toluene **CAS No.: 108-88-3**

Risk-Based Screening Level (RBSL) Concentrations

		On-site
Groundwater Ingestion		
Receptor Type / Distance (ft)		Commercial / 0
RBSLgw (mg/L)	THQ = 1e+0	2.0E+1
	TR = 1e-6	NC
Soil Leaching to Groundwater Ingestion		
Receptor Type / Distance (ft)		Commercial / 0
RBSLs (mg/kg)	THQ = 1e+0	6.8E+1
	TR = 1e-6	NC
Surface Soil Ingestion and Dermal Contact		
Receptor Type / Distance (ft)		None
RBSLss (mg/kg)	THQ = 1e+0	NA
	TR = 1e-6	NA
Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBELair (µg/m3)	THQ = 1e+0	5.8E+2
	TR = 1e-6	NC
Soil Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Com./Constr. / 0
RBSLs (mg/kg)	THQ = 1e+0	#DIV/0!
	TR = 1e-6	NC
Groundwater Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBSLgw (mg/L)	THQ = 1e+0	>5.2E+2
	TR = 1e-6	NC
Indoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBELair (µg/m3)	THQ = 1e+0	5.8E+2
	TR = 1e-6	NC
Soil Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBSLs (mg/kg)	THQ = 1e+0	3.8E+2
	TR = 1e-6	NC
Groundwater Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBSLgw (mg/L)	THQ = 1e+0	2.9E+2
	TR = 1e-6	NC

Chemical Parameters

		Units	Value	Reference
Physical Properties				
MW		(g/mol)	9.2E+1	5
Sol		(mg/L)	5.2E+2	29
P_{vap}		(mmHg)	3.0E+1	4
H_{atm}		(atm-m^3/mol)	6.3E-3	A
pK_a		(log[mol/mol])	-	-
pK_b		(log[mol/mol])	-	-
$\log(K_{oc})$		(log[L/kg])	2.1E+0	A
D_{air}		(cm^2/sec)	8.5E-2	A
D_{wat}		(cm^2/sec)	9.4E-6	A
Toxicity Data				
Wt of Evd.			D	
SF_o		(1/[mg/kg/day])	-	-
SF_d		(1/[mg/kg/day])	-	-
URF_i		(1/[µg/m^3])	-	-
RfD_o		(mg/kg/day)	2.0E-1	A,R
RfD_d		(mg/kg/day)	1.6E-1	TX
RfC_i		(mg/m^3)	4.0E-1	A,R
Dermal Exposure Parameters				
RAF_d		(mg/mg)	5.0E-1	D
K_p		(cm/hr)	4.5E-2	
tau_d		(hr/event)	3.2E-1	
t_{crit}		(hr)	7.7E-1	
B		(-)	5.4E-2	
Regulatory Standards				
MCL		(mg/L)	1.0E+0	*
TWA		(mg/m^3)	1.5E+2	ACGIH
AQL		(mg/L)	-	-
Miscellaneous Parameters				
ADL_{gw}		(mg/L)	2.0E-3	S
ADL_s		(mg/kg)	5.0E-3	S
$t_{1/2,sat}$		(d)		H
$t_{1/2,unsat}$		(d)		H

* MCL ref = 56 FR 3526 (30 Jan 91)

		Units	Residential	Commercial	Construction
Cross-Media Transfer Factors					
VFss		(kg-soil/L-air)	NA	NC	NC
VFsamb		(kg-soil/L-air)	NA	2.2E-5	2.7E-5
VFwamb		(L-wat/L-air)	NA	1.3E-5	1.3E-5
VFsesp		(kg-soil/L-air)	NA	1.6E-3	NA
VFwesp		(L-wat/L-air)	NA	2.0E-3	NA
LF		(kg-soil/L-wat)	All exposures: 3.0E-1		NA

		Units	Value
Derived Parameters			
H		(L-wat/L-air)	2.6E-1
K_{sw}		(L-wat/kg-soil)	7.1E-1
C_{sat}		(mg/kg-soil)	7.3E+2
$C_{sat,vap}$		(µg/m^3-air)	1.5E+5
$D_{eff,a}$		(cm^2/sec)	3.1E-3
$D_{eff,crk}$		(cm^2/sec)	5.7E-4
$D_{eff,cap}$		(cm^2/sec)	2.5E-5
$D_{eff,ws}$		(cm^2/sec)	1.8E-3
R_{sat}		(-)	
R_{unsat}		(-)	3.1E+1
Z		(cm/event)	1.6E-1

NA = Not applicable; NC = Not calculated.

Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT | **Chemical-Specific Tier 1 Cleanup Summary**

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 17-Jul-00
Job ID: 971275

Constituent: Ethylbenzene **CAS No.: 100-41-4**

Risk-Based Screening Level (RBSL) Concentrations

		On-site
Groundwater Ingestion		
Receptor Type / Distance (ft)		Commercial / 0
RBSLgw (mg/L)	THQ = 1e+0	1.0E+1
	TR = 1e-6	NC
Soil Leaching to Groundwater Ingestion		
Receptor Type / Distance (ft)		Commercial / 0
RBSLs (mg/kg)	THQ = 1e+0	8.9E+1
	TR = 1e-6	NC
Surface Soil Ingestion and Dermal Contact		
Receptor Type / Distance (ft)		None
RBSLss (mg/kg)	THQ = 1e+0	NA
	TR = 1e-6	NA
Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBELair (µg/m3)	THQ = 1e+0	1.5E+3
	TR = 1e-6	NC
Soil Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Com./Constr. / 0
RBSLs (mg/kg)	THQ = 1e+0	#DIV/0!
	TR = 1e-6	NC
Groundwater Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBSLgw (mg/L)	THQ = 1e+0	>1.7E+2
	TR = 1e-6	NC
Indoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBELair (µg/m3)	THQ = 1e+0	1.5E+3
	TR = 1e-6	NC
Soil Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBSLs (mg/kg)	THQ = 1e+0	>6.2E+2
	TR = 1e-6	NC
Groundwater Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBSLgw (mg/L)	THQ = 1e+0	>1.7E+2
	TR = 1e-6	NC

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VFss	(kg-soil/L-air)	NA	NC	NC
VFsamb	(kg-soil/L-air)	NA	1.1E-5	1.1E-5
VFwamb	(L-wat/L-air)	NA	1.4E-5	1.4E-5
VFsesp	(kg-soil/L-air)	NA	6.5E-4	NA
VFwesp	(L-wat/L-air)	NA	2.2E-3	NA
LF	(kg-soil/L-wat)	All exposures: 1.1E-1		NA

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	1.1E+2	PS
Sol	(mg/L)	1.7E+2	PS
P_{vap}	(mmHg)	1.0E+1	PS
H_{atm}	(atm-m^3/mol)	7.9E-3	PS
pK_a	(log[mol/mol])	-	-
pK_b	(log[mol/mol])	-	-
log(K_{oc})	(log[L/kg])	2.6E+0	PS
D_{air}	(cm^2/sec)	7.5E-2	PS
D_{wat}	(cm^2/sec)	7.8E-6	PS
Toxicity Data			
Wt of Evd.		D	
SF_o	(1/[mg/kg/day])	-	-
SF_d	(1/[mg/kg/day])	-	-
URF_i	(1/[µg/m^3])	-	-
RfD_o	(mg/kg/day)	1.0E-1	PS
RfD_d	(mg/kg/day)	9.7E-2	TX
RfC_i	(mg/m^3)	1.0E+0	PS
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-1	D
K_p	(cm/hr)	7.4E-2	
tau_d	(hr/event)	3.9E-1	
t_{crit}	(hr)	1.3E+0	
B	(-)	1.4E-1	
Regulatory Standards			
MCL	(mg/L)	7.0E-1	*
TWA	(mg/m^3)	4.4E+2	PS
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	2.0E-3	S
ADL_s	(mg/kg)	5.0E-3	S
$t_{1/2,sat}$	(d)		H
$t_{1/2,unsat}$	(d)		H

* MCL ref = 56 FR 3526 (30 Jan 91)

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	3.2E-1
K_{sw}	(L-wat/kg-soil)	2.7E-1
C_{sat}	(mg/kg-soil)	6.2E+2
$C_{sat,vap}$	(µg/m^3-air)	5.8E+4
$D_{eff,a}$	(cm^2/sec)	2.8E-3
$D_{eff,crk}$	(cm^2/sec)	5.0E-4
$D_{eff,cap}$	(cm^2/sec)	2.1E-5
$D_{eff,ws}$	(cm^2/sec)	1.5E-3
R_{sat}	(-)	
R_{unsat}	(-)	8.1E+1
Z	(cm/event)	2.7E-1

NA = Not applicable; NC = Not calculated.

Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT

Chemical-Specific Tier 1 Cleanup Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 17-Jul-00
Job ID: 971275

Constituent: Xylene (mixed isomers) **CAS No.: 1330-20-7**

Risk-Based Screening Level (RBSL) Concentrations

		On-site
Groundwater Ingestion		
Receptor Type / Distance (ft)		Commercial / 0
RBSLgw (mg/L)	THQ = 1e+0	>2.0E+2
	TR = 1e-6	NC
Soil Leaching to Groundwater Ingestion		
Receptor Type / Distance (ft)		Commercial / 0
RBSLs (mg/kg)	THQ = 1e+0	>4.9E+2
	TR = 1e-6	NC
Surface Soil Ingestion and Dermal Contact		
Receptor Type / Distance (ft)		None
RBSLss (mg/kg)	THQ = 1e+0	NA
	TR = 1e-6	NA
Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBELair (µg/m3)	THQ = 1e+0	1.0E+4
	TR = 1e-6	NC
Soil Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Com./Constr. / 0
RBSLs (mg/kg)	THQ = 1e+0	#DIV/0!
	TR = 1e-6	NC
Groundwater Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBSLgw (mg/L)	THQ = 1e+0	>2.0E+2
	TR = 1e-6	NC
Indoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBELair (µg/m3)	THQ = 1e+0	1.0E+4
	TR = 1e-6	NC
Soil Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBSLs (mg/kg)	THQ = 1e+0	>4.9E+2
	TR = 1e-6	NC
Groundwater Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBSLgw (mg/L)	THQ = 1e+0	>2.0E+2
	TR = 1e-6	NC

Chemical Parameters

		Units	Value	Reference
Physical Properties				
MW		(g/mol)	1.1E+2	5
Sol		(mg/L)	2.0E+2	5
P_{vap}		(mmHg)	7.0E+0	4
H_{atm}		(atm-m^3/mol)	7.0E-3	A
pK_a		(log[mol/mol])	-	-
pK_b		(log[mol/mol])	-	-
log(K_{oc})		(log[L/kg])	2.4E+0	A
D_{air}		(cm^2/sec)	7.2E-2	A
D_{wat}		(cm^2/sec)	8.5E-6	A
Toxicity Data				
Wt of Evd.			D	
SF_o		(1/[mg/kg/day])	-	-
SF_d		(1/[mg/kg/day])	-	-
URF_i		(1/[µg/m^3])	-	-
RfD_o		(mg/kg/day)	2.0E+0	A,R
RfD_d		(mg/kg/day)	1.8E+0	TX
RfC_i		(mg/m^3)	7.0E+0	A
Dermal Exposure Parameters				
RAF_d		(mg/mg)	5.0E-1	D
K_p		(cm/hr)	8.0E-2	
tau_d		(hr/event)	3.9E-1	
t_{crit}		(hr)	1.4E+0	
B		(-)	1.6E-1	
Regulatory Standards				
MCL		(mg/L)	1.0E+1	*
TWA		(mg/m^3)	4.3E+2	ACGIH
AQL		(mg/L)	-	-
Miscellaneous Parameters				
ADL_{gw}		(mg/L)	5.0E-3	S
ADL_s		(mg/kg)	5.0E-3	S
$t_{1/2,sat}$		(d)		H
$t_{1/2,unsat}$		(d)		H

* MCL ref = 56 FR 3526 (30 Jan 91)

		Units	Residential	Commercial	Construction
Cross-Media Transfer Factors					
VFss		(kg-soil/L-air)	NA	NC	NC
VFsamb		(kg-soil/L-air)	NA	1.5E-5	1.5E-5
VFwamb		(L-wat/L-air)	NA	1.2E-5	1.2E-5
VFsesp		(kg-soil/L-air)	NA	8.4E-4	NA
VFwesp		(L-wat/L-air)	NA	1.9E-3	NA
LF		(kg-soil/L-wat)	All exposures: 1.7E-1		NA

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	2.9E-1
K_{sw}	(L-wat/kg-soil)	4.1E-1
C_{sat}	(mg/kg-soil)	4.9E+2
$C_{sat,vap}$	(µg/m^3-air)	4.0E+4
$D_{eff,s}$	(cm^2/sec)	2.6E-3
$D_{eff,crk}$	(cm^2/sec)	4.8E-4
$D_{eff,cap}$	(cm^2/sec)	2.1E-5
$D_{eff,ws}$	(cm^2/sec)	1.5E-3
R_{sat}	(-)	
R_{unsat}	(-)	5.4E+1
Z	(cm/event)	2.9E-1

NA = Not applicable; NC = Not calculated.

Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT

Chemical-Specific Tier 1 Cleanup Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 17-Jul-00
Job ID: 971275

Constituent: Methyl t-Butyl ether **CAS No.: 1634-04-4**

Risk-Based Screening Level (RBSL) Concentrations

		On-site
Groundwater Ingestion		
Receptor Type / Distance (ft)		Commercial / 0
RBSLgw (mg/L)	THQ = 1e+0	1.0E+0
	TR = 1e-6	NC
Soil Leaching to Groundwater Ingestion		
Receptor Type / Distance (ft)		Commercial / 0
RBSLs (mg/kg)	THQ = 1e+0	4.0E-1
	TR = 1e-6	NC
Surface Soil Ingestion and Dermal Contact		
Receptor Type / Distance (ft)		None
RBSLss (mg/kg)	THQ = 1e+0	NA
	TR = 1e-6	NA
Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBELair (µg/m3)	THQ = 1e+0	4.4E+3
	TR = 1e-6	NC
Soil Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Com./Constr. / 0
RBSLs (mg/kg)	THQ = 1e+0	#DIV/0!
	TR = 1e-6	NC
Groundwater Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBSLgw (mg/L)	THQ = 1e+0	>4.8E+4
	TR = 1e-6	NC
Indoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBELair (µg/m3)	THQ = 1e+0	4.4E+3
	TR = 1e-6	NC
Soil Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBSLs (mg/kg)	THQ = 1e+0	2.5E+3
	TR = 1e-6	NC
Groundwater Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBSLgw (mg/L)	THQ = 1e+0	1.6E+4
	TR = 1e-6	NC

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	8.8E+1	5
Sol	(mg/L)	4.8E+4	A
P_{vap}	(mmHg)	2.5E+2	-
H_{atm}	(atm-m^3/mol)	5.8E-4	-
pK_a	(log[mol/mol])	-	-
pK_b	(log[mol/mol])	-	-
log(K_{oc})	(log[L/kg])	1.1E+0	A
D_{air}	(cm^2/sec)	7.9E-2	6
D_{wat}	(cm^2/sec)	9.4E-5	7
Toxicity Data			
Wt of Evd.		-	
SF_o	(1/[mg/kg/day])	-	-
SF_d	(1/[mg/kg/day])	-	-
URF_i	(1/[µg/m^3])	-	-
RfD_o	(mg/kg/day)	1.0E-2	31
RfD_d	(mg/kg/day)	8.0E-3	TX
RfC_i	(mg/m^3)	3.0E+0	R
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-1	-
K_p	(cm/hr)	-	
tau_d	(hr/event)	-	
t_{crit}	(hr)	-	
B	(-)	-	
Regulatory Standards			
MCL	(mg/L)	-	*
TWA	(mg/m^3)	6.0E+1	NIOSH
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	-	-
ADL_s	(mg/kg)	-	-
$t_{1/2,sat}$	(d)		H
$t_{1/2,unsat}$	(d)		H

* MCL ref = -

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VFss	(kg-soil/L-air)	NA	NC	NC
VFsamb	(kg-soil/L-air)	NA	2.0E-5	2.0E-5
VFwamb	(L-wat/L-air)	NA	1.9E-6	1.9E-6
VFsesp	(kg-soil/L-air)	NA	1.8E-3	NA
VFwesp	(L-wat/L-air)	NA	2.8E-4	NA
LF	(kg-soil/L-wat)	All exposures: 2.5E+0		NA

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	2.4E-2
K_{sw}	(L-wat/kg-soil)	6.0E+0
C_{sat}	(mg/kg-soil)	8.0E+3
$C_{sat,vap}$	(µg/m^3-air)	1.2E+6
$D_{eff,s}$	(cm^2/sec)	3.0E-3
$D_{eff,crk}$	(cm^2/sec)	8.7E-4
$D_{eff,cap}$	(cm^2/sec)	5.1E-4
$D_{eff,ws}$	(cm^2/sec)	2.9E-3
R_{sat}	(-)	
R_{unsat}	(-)	3.7E+0
Z	(cm/event)	-

NA = Not applicable; NC = Not calculated.

Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT

Chemical-Specific Tier 1 Cleanup Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 17-Jul-00
Job ID: 971275

Constituent: Naphthalene **CAS No.: 91-20-3**

Risk-Based Screening Level (RBSL) Concentrations

		On-site
Groundwater Ingestion		
Receptor Type / Distance (ft)		Commercial / 0
RBSLgw (mg/L)	THQ = 1e+0	>3.1E+1
	TR = 1e-6	NC
Soil Leaching to Groundwater Ingestion		
Receptor Type / Distance (ft)		Commercial / 0
RBSLs (mg/kg)	THQ = 1e+0	>6.2E+2
	TR = 1e-6	NC
Surface Soil Ingestion and Dermal Contact		
Receptor Type / Distance (ft)		None
RBSLss (mg/kg)	THQ = 1e+0	NA
	TR = 1e-6	NA
Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBELair (µg/m3)	THQ = 1e+0	>1.6E+3
	TR = 1e-6	NC
Soil Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Com./Constr. / 0
RBSLs (mg/kg)	THQ = 1e+0	#DIV/0!
	TR = 1e-6	NC
Groundwater Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBSLgw (mg/L)	THQ = 1e+0	>3.1E+1
	TR = 1e-6	NC
Indoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBELair (µg/m3)	THQ = 1e+0	>1.6E+3
	TR = 1e-6	NC
Soil Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBSLs (mg/kg)	THQ = 1e+0	>6.2E+2
	TR = 1e-6	NC
Groundwater Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBSLgw (mg/L)	THQ = 1e+0	>3.1E+1
	TR = 1e-6	NC

Chemical Parameters

		Units	Value	Reference
Physical Properties				
MW		(g/mol)	1.3E+2	PS
Sol		(mg/L)	3.1E+1	PS
P_{vap}		(mmHg)	2.3E-1	PS
H_{atm}		(atm-m^3/mol)	4.8E-4	PS
pK_a		(log[mol/mol])	-	-
pK_b		(log[mol/mol])	-	-
$\log(K_{oc})$		(log[L/kg])	3.3E+0	PS
D_{air}		(cm^2/sec)	5.9E-2	PS
D_{wat}		(cm^2/sec)	7.5E-6	PS
Toxicity Data				
Wt of Evd.			D	
SF_o		(1/[mg/kg/day])	-	-
SF_d		(1/[mg/kg/day])	-	-
URF_i		(1/[µg/m^3])	-	-
RfD_o		(mg/kg/day)	4.0E-1	PS
RfD_d		(mg/kg/day)	3.6E-1	TX
RfC_i		(mg/m^3)	1.4E+0	PS
Dermal Exposure Parameters				
RAF_d		(mg/mg)	5.0E-2	D
K_p		(cm/hr)	6.9E-2	
tau_d		(hr/event)	5.3E-1	
t_{crit}		(hr)	2.2E+0	
B		(-)	2.0E-1	
Regulatory Standards				
MCL		(mg/L)	-	*
TWA		(mg/m^3)	5.0E+1	PS
AQL		(mg/L)	-	-
Miscellaneous Parameters				
ADL_{gw}		(mg/L)	1.0E-2	32
ADL_s		(mg/kg)	1.0E-2	32
$t_{1/2,sat}$		(d)		H
$t_{1/2,unsat}$		(d)		H

* MCL ref = -

		Units	Residential	Commercial	Construction
Cross-Media Transfer Factors					
VFss		(kg-soil/L-air)	NA	NC	NC
VFsamb		(kg-soil/L-air)	NA	1.0E-7	1.0E-7
VFwamb		(L-wat/L-air)	NA	1.0E-6	1.0E-6
VFsesp		(kg-soil/L-air)	NA	6.3E-6	NA
VFwesp		(L-wat/L-air)	NA	1.2E-4	NA
LF		(kg-soil/L-wat)	All exposures: 2.1E-2		NA

		Units	Value
Derived Parameters			
H		(L-wat/L-air)	2.0E-2
K_{sw}		(L-wat/kg-soil)	5.0E-2
C_{sat}		(mg/kg-soil)	6.2E+2
$C_{sat,vap}$		(µg/m^3-air)	1.6E+3
$D_{eff,s}$		(cm^2/sec)	2.2E-3
$D_{eff,crk}$		(cm^2/sec)	4.3E-4
$D_{eff,cap}$		(cm^2/sec)	6.2E-5
$D_{eff,ws}$		(cm^2/sec)	1.8E-3
R_{sat}		(-)	
R_{unsat}		(-)	4.4E+2
Z		(cm/event)	2.7E-1

NA = Not applicable; NC = Not calculated.

Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT

Chemical-Specific Tier 1 Cleanup Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 17-Jul-00
Job ID: 971275

Constituent: Phenol **CAS No.: 108-95-2**

Risk-Based Screening Level (RBSL) Concentrations

		On-site
Groundwater Ingestion		
Receptor Type / Distance (ft)		Commercial / 0
RBSLgw (mg/L)	THQ = 1e+0	6.1E+1
	TR = 1e-6	NC
Soil Leaching to Groundwater Ingestion		
Receptor Type / Distance (ft)		Commercial / 0
RBSLs (mg/kg)	THQ = 1e+0	4.8E+1
	TR = 1e-6	NC
Surface Soil Ingestion and Dermal Contact		
Receptor Type / Distance (ft)		None
RBSLss (mg/kg)	THQ = 1e+0	NA
	TR = 1e-6	NA
Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBELair (µg/m3)	THQ = 1e+0	>1.7E+3
	TR = 1e-6	NC
Soil Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Com./Constr. / 0
RBSLs (mg/kg)	THQ = 1e+0	#DIV/0!
	TR = 1e-6	NC
Groundwater Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBSLgw (mg/L)	THQ = 1e+0	>8.3E+4
	TR = 1e-6	NC
Indoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBELair (µg/m3)	THQ = 1e+0	>1.7E+3
	TR = 1e-6	NC
Soil Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBSLs (mg/kg)	THQ = 1e+0	>2.8E+4
	TR = 1e-6	NC
Groundwater Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Commercial / 0
RBSLgw (mg/L)	THQ = 1e+0	>8.3E+4
	TR = 1e-6	NC

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	9.4E+1	PS
Sol	(mg/L)	8.3E+4	PS
P_{vap}	(mmHg)	3.4E-1	PS
H_{atm}	(atm-m^3/mol)	4.0E-7	PS
pK_a	(log[mol/mol])	1.0E+1	PS
pK_b	(log[mol/mol])	-	PS
$\log(K_{oc})$	(log[L/kg])	1.5E+0	PS
D_{air}	(cm^2/sec)	8.2E-2	PS
D_{wat}	(cm^2/sec)	9.1E-6	PS
Toxicity Data			
Wt of Evd.		D	
SF_o	(1/[mg/kg/day])	-	-
SF_d	(1/[mg/kg/day])	-	-
URF_i	(1/[µg/m^3])	-	-
RfD_o	(mg/kg/day)	6.0E-1	PS
RfD_d	(mg/kg/day)	5.4E-1	TX
RfC_i	(mg/m^3)	2.1E+0	PS
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-1	D
K_p	(cm/hr)	5.5E-3	
tau_d	(hr/event)	3.3E-1	
t_{crit}	(hr)	7.9E-1	
B	(-)	2.9E-3	
Regulatory Standards			
MCL	(mg/L)	-	*
TWA	(mg/m^3)	1.9E+1	PS
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	1.0E-2	32
ADL_s	(mg/kg)	6.6E-1	32
$t_{1/2,sat}$	(d)		H
$t_{1/2,unsat}$	(d)		H

* MCL ref = -

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VFss	(kg-soil/L-air)	NA	NC	NC
VFsamb	(kg-soil/L-air)	NA	1.9E-8	1.9E-8
VFwamb	(L-wat/L-air)	NA	3.9E-9	3.9E-9
VFsesp	(kg-soil/L-air)	NA	1.3E-5	NA
VFwesp	(L-wat/L-air)	NA	3.2E-6	NA
LF	(kg-soil/L-wat)	All exposures: 1.3E+0		NA

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	1.6E-5
K_{sw}	(L-wat/kg-soil)	3.0E+0
C_{sat}	(mg/kg-soil)	2.8E+4
$C_{sat,vap}$	(µg/m^3-air)	1.7E+3
$D_{eff,s}$	(cm^2/sec)	8.3E-3
$D_{eff,crk}$	(cm^2/sec)	4.8E-2
$D_{eff,cap}$	(cm^2/sec)	7.0E-2
$D_{eff,ws}$	(cm^2/sec)	8.4E-3
R_{sat}	(-)	
R_{unsat}	(-)	7.4E+0
Z	(cm/event)	2.0E-2

NA = Not applicable; NC = Not calculated.

Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT

Chemical-Specific Tier 1 Cleanup Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 17-Jul-00

Definitions

Risk-Based Screening Level Concentrations	
RBSLgw	Risk-based screening level for groundwater (mg/L)
RBSLs	Risk-based screening level for soil (mg/kg)
RBELair	Risk-based exposure limit for air (µg/m3)
THQ	Target hazard quotient
TR	Target risk

Cross-Media Transfer Factors	
VF_{ss}	Volatilization factor, surface soil to outdoor air (kg-soil/L-air)
VF_{samb}	Volatilization factor, subsurface soil to outdoor air (kg-soil/L-air)
VF_{wamb}	Volatilization factor, groundwater to outdoor air (L-wat/L-air)
VF_{wesp}	Volatilization factor, subsurface soil to indoor air (kg-soil/L-air)
VF_{wesp}	Volatilization factor, groundwater to indoor air (L-wat/L-air)
LF	Leaching factor, soil to groundwater (kg-soil/L-wat)

Cross-Media Transfer Factors	
DAF_{gw}	Dilution-attenuation factor, groundwater (-)
DAF_{sigw}	Dilution-attenuation factor, soil leaching to groundwater (-)

Physical Properties	
MW	Molecular weight (g/mol)
Sol	Aqueous solubility limit (mg/L)
P_{vap}	Vapor pressure (mmHg)
H_{atm}	Henry's Law constant (atm-m^3/mol)
pK_a	Acid ionization constant (log[mol/mol])
pK_b	Base ionization constant (log[mol/mol])
K_{oc}	Organic carbon/Water partition coefficient (L/kg)
K_d	Soil/Water distribution coeffient (L/kg)
D_{air}	Molecular diffusion coeffient in air (cm^2/sec)
D_{wat}	Molecular diffusion coeffient in water (cm^2/sec)

Toxicity Data	
Wt of Evd.	Weight of evidence
SF_o	Oral slope factor for carcinogens (1/[mg/kg/day])
SF_d	Dermal slope factor for carcinogens (1/[mg/kg/day])
URF_i	Inhalation unit risk facor for carcinogens (1/[µg/m^3])
RfD_o	Oral reference dose (mg/kg/day)
RfD_d	Dermal reference dose (mg/kg/day)
RfC_i	Inhalation reference concentration (mg/m^3)

Dermal Exposure Parameters	
RAF_d	Dermal relative absorption factor (mg/mg)
K_p	Dermal permeability coeff. (cm/hr)
tau_d	Lag time for dermal exposure (hr/event)
t_{crit}	Critical exposure time (hr)
B	Relative contribution of permeability coeff. (-)

Regulatory Standards	
MCL	Maximum contaminant level for drinking water protection (mg/L)
TWA	Time-weighted average workplace air criterion (mg/m^3)
AQL	Aquatic life protection criterion (mg/L)

Miscellaneous Parameters	
ADL_{gw}	Analytical detection limit in groundwater (mg/L)
ADL_s	Analytical detection limit in soil (mg/kg)
$t_{1/2,sat}$	Half life, saturated zone (d)
$t_{1/2,unsat}$	Half life, unsaturated zone (d)

Derived Parameters	
H	Dimensionless Henry's Law contant (L-wat/L-air)
K_{sw}	Soil to pore-water partitioning factor (L-wat/kg-soil)
C_{sat}	Saturated residual conc. in vadose zone soils (mg/kg-soil)
$C_{sat,vap}$	Saturated concentration in vapors (mg/m3-air)
$D_{eff,a}$	Effective diffusion coeff. in vadose zone soils (cm^2/sec)
$D_{eff,crk}$	Effective diffusion coeff. in foundation cracks (cm^2/sec)
$D_{eff,cap}$	Effective diffusion coeff. in capillary zone (cm^2/sec)
$D_{eff,ws}$	Effective diffusion coeff., water table to ground surface (cm^2/sec)
R_{sat}	Retardation factor, saturated zone (-)
R_{unsat}	Retardation factor, unsaturated zone (-)
Z	Water to skin dermal absorption factor (cm/event)

Chemical Parameter References

PS	Standard Provisional Guide for Risk-Based Corrective Action, ASTM PS 104-98.
A	Emergency Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites,
D	USEPA, Dermal Exposure Assessment: Principles and Applications, ORD, EPA/600/8-91/011B.
H	Howard, Handbook of Environmental Degradation Rates, Lewis Publishers, Chelsea, MI, 1989
R	EPA Region III Risk Based Concentration Table, EPA Region 3, March 7, 1995.
S	USEPA, Test Methods for Evaluating Solid Waste, SW-846, Third Edition, OSWER, November 1986.
T	TPH Criteria Working Group, 1996.
TX	TNRCC Risk-Based Corrective Action for Leaking Storage Tank Sites, January 1994.
3	based on Kow from (2) and DiToro, D. M., 1985:"A Particle Interaction Model of Reversible Organic Chemical Sorption", Chemosphere, 14(10), 1505-1538. log(Koc) = 0.00028 + 0.983 log(Kow)
4	USEPA, 1989: Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF) - USEPA, OAQPS, Air Emission Models, (EPA-450/3-87-026).
5	Verschueren, Karel, 1983: Handbook of Environmental data on organic Chemicals, Second Ed., (Van nostrand Reinhold Company Inc., New York), ISBN: 0-442-28802-6.
6	Calculated diffusivity using the method of Fuller, Schettler, and Giddings from (9).
7	Calculated diffusivity using the method of Hayduk and Laudie and the reference from (9).
8	Calculated using Kenaga ang Goring Kow/solubility regression equation reference (9) and Kow data from (2). log(S, mg/l) = -0.922 log(Kow) + 4.184
9	Handbook of Chemical Property Estimation Methods, 1982, W.J. Lyman, (McGraw-Hill, New York). ISBN -0-07-039175-0.
10	Calculated from (Pv/Patm)/(solubility/mol wt).
11	Back calculated from solubility, Note (8) and (3).
12	Aldrich Chemical Catalog, 1991.
13	Calculated using Modified Watson Correlation from (9) and normal boiling point.
14	USEPA, 1979: Water Related Environmental Fate of 129 Priority Pollutants, Vol.1, USEPA, OWQPS,(EPA-4404-79-029a).
15	The Agrochemicals Handbook, (The Royal Society of Chemistry, The University, Nottingham, England), ISBN 0-85186-406-6.
16	Vapor pressure specified at elevated temperature, adjustments to 25C using methods presented by (9).
17	Wauchope, R. D., T. M. Butler, A. G. Hornsby, P. W. M. Augustijn-Beckers, and J.P. Burt, 1992: "The SCS/ARS/CES Pesticide Properties Database for Environmental Decision Making", Reviews of Environmental Contamination and Toxicology, vol 123, 1-155.
18	Farm Chemicals Handbook 91, C. Sine, ed., (Meister Publishing Company, Willoughby, Ohio).
19	Structure and Nomenclature Search System, (Version 7.00/7.03) December, 1992.
20	From Syracuse Research Corporation Calculated Value from pochem-pcgems, 1988, ref no. 255435 in Enirofate database, Accession no. 105543.
23	NIOSH, 1990: Pocket Guide to Chemical Hazards, (U. S. Dept. of Health & Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health).
24	Buchter, B. et al., 1989: Correlation of Freundlich Kd and N retention Parameters with Soils and Elements, Soil Science, 148, 370-379.
25	USEPA, 1993: Air/Superfund National Technical Guidance Study series: Estimation of Air Impacts for Thermal Desorption Units Used at Superfund Sites, US Environmental Protection Agency, Office of Air Quality Planning and Standards, EPA-451/R-93-005.
26	NTIS Accession No. PB93-215630, April 1993.
27	Based on salt solubilities in Table 3-120, R. H. Perry and D. W. Green, " Perry's Chemical Engineering Handbook" Sixth Edition, (McGraw-Hill, New York), 1973.
28	Based on salt solubilities in Table of Physical Constants for Inorganic Compounds, Weast, R. C., CRC Handbook of Chemistry and Physics, 67th edition, (CRC Press, Inc., Boca Raton), 1987.
29	Montgomery and Welkom, "Groundwater Chemicals Desk Reference", Lewis Publishers, Chelsea, MI, 1990.
30	USEPA, 1996: Soil Screening Guidance: Technical Background Doc., (EPA/540/R-95/128)
31	TNRCC Risk Reduction Rule Implementation, July 23, 1998. (update to Reference "TX")
32	USEPA, Method 8270C, Revision 3, "Semivolatile Organic Compounds by GC/MS", December 1996.
33	40 CFR 131.36, July 1, 1997
34	40 CFR 141.23, July 1, 1997
35	USEPA, Manual for the Certification of Laboratories Analyzing Drinking Water, EPA 815-B-97-001, March 1997
36	Calculated using Chiou et al. equation reported in (9); S (µmol/L) from (15).
37	Calculated using Chiou et al. equation reported in (9); S (µmol/L) from (23).
38	Calculated using Chiou et al. equation reported in (9); S (µmol/L) from (4).

RBCA SITE ASSESSMENT

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 17-Jul-00
Job ID: 971275

SOIL (15 - 25 ft) RBSL VALUES

Target Risk (Class A & B) 1.0E-6
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 1.0E+0

RBSL Results For Complete Exposure Pathways ("X" If Complete)

			X	Soil Leaching to Groundwater Ingestion			X	Soil Vol. to Indoor Air	X	Soil Volatilization to Outdoor Air				Surface Soil Inhalation, Ingestion,Dermal Contact		Applicable RBSL	RBSL Exceeded ?	Required CRF
CONSTITUENTS OF CONCERN		Representative Concentration		On-site (0 ft)	NA	NA		On-site (0 ft)		On-site (0 ft)		NA	NA	On-site (0 ft)				Only if "yes" left
CAS No.	Name	(mg/kg)		Commercial	NA	NA		Commercial		Commercial	Construction Worker	NA	NA	None	Construction Worker	(mg/kg)	"■" if yes	
71-43-2	Benzene	2.5E+0		1.5E-2	NA	NA		1.6E-1		2.2E+1	NA	NA	NA	NA	NA	1.5E-2	■	1.6E+2
108-88-3	Toluene	2.1E+1		6.8E+1	NA	NA		3.8E+2		>7.3E+2	NA	NA	NA	NA	NA	6.8E+1	☐	<1
100-41-4	Ethylbenzene	2.0E+1		8.9E+1	NA	NA		>6.2E+2		>6.2E+2	NA	NA	NA	NA	NA	8.9E+1	☐	<1
1330-20-7	Xylene (mixed isomers)	1.3E+2		>4.9E+2	NA	NA		>4.9E+2		>4.9E+2	NA	NA	NA	NA	NA	>4.9E+2	☐	NA
1634-04-4	Methyl t-Butyl ether	0.0E+0		4.0E-1	NA	NA		2.5E+3		>8.0E+3	NA	NA	NA	NA	NA	4.0E-1	☐	<1
91-20-3	Naphthalene	3.4E+0		>6.2E+2	NA	NA		>6.2E+2		>6.2E+2	NA	NA	NA	NA	NA	>6.2E+2	☐	NA
108-95-2	Phenol	3.0E-1		4.8E+1	NA	NA		>2.8E+4		>2.8E+4	NA	NA	NA	NA	NA	4.8E+1	☐	<1

">" Indicates risk-based target concentration greater than constituent residual saturation value. NA = Not applicable. NC = Not calculated.

RBCA SITE ASSESSMENT

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 17-Jul-00

Job ID: 971275

GROUNDWATER RBSL VALUES

Target Risk (Class A & B) 1.0E-6
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 1.0E+0

RBSL Results For Complete Exposure Pathways ("X" if Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	X Groundwater Ingestion			X GW Vol. to Indoor Air	X Groundwater Volatilization to Outdoor Air			Applicable RBSL	RBSL Exceeded ?	Required CRF
			On-site (0 ft)	NA	NA	On-site (0 ft)	On-site (0 ft)	NA	NA			Only if "yes" left
CAS No.	Name	(mg/L)	Commercial	NA	NA	Commercial	Commercial	NA	NA	(mg/L)	"■" if yes	
71-43-2	Benzene	9.3E+0	9.9E-3	NA	NA	2.7E-1	4.1E+1	NA	NA	9.9E-3	■	9.4E+2
108-88-3	Toluene	9.4E+0	2.0E+1	NA	NA	2.9E+2	>5.2E+2	NA	NA	2.0E+1	☐	<1
100-41-4	Ethylbenzene	2.4E+0	1.0E+1	NA	NA	>1.7E+2	>1.7E+2	NA	NA	1.0E+1	☐	<1
1330-20-7	Xylene (mixed isomers)	1.4E+1	>2.0E+2	NA	NA	>2.0E+2	>2.0E+2	NA	NA	>2.0E+2	☐	NA
1634-04-4	Methyl t-Butyl ether	5.7E-1	1.0E+0	NA	NA	1.6E+4	>4.8E+4	NA	NA	1.0E+0	☐	<1
91-20-3	Naphthalene	5.1E-1	>3.1E+1	NA	NA	>3.1E+1	>3.1E+1	NA	NA	>3.1E+1	☐	NA
108-95-2	Phenol	0.0E+0	6.1E+1	NA	NA	>8.3E+4	>8.3E+4	NA	NA	6.1E+1	☐	<1

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

RBCA SITE ASSESSMENT | **Cumulative Risk Worksheet**

Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, California | Date Completed: 17-Jul-00

CUMULATIVE RISK WORKSHEET

CONSTITUENTS OF CONCERN		Representative Concentration		Proposed CRF		Resultant Target Concentration	
CAS No.	Name	Soil (mg/kg)	Groundwater (mg/L)	Soil	GW	Soil (mg/kg)	Groundwater (mg/L)
71-43-2	Benzene	2.5E+0	9.3E+0	1.0E+0	1.0E+0	2.5E+0	9.3E+0
108-88-3	Toluene	2.1E+1	9.4E+0	1.0E+0	1.0E+0	2.1E+1	9.4E+0
100-41-4	Ethylbenzene	2.0E+1	2.4E+0	1.0E+0	1.0E+0	2.0E+1	2.4E+0
1330-20-7	Xylene (mixed isomers)	1.3E+2	1.4E+1	1.0E+0	1.0E+0	1.3E+2	1.4E+1
1634-04-4	Methyl t-Butyl ether	0.0E+0	5.7E-1	1.0E+0	1.0E+0	0.0E+0	5.7E-1
91-20-3	Naphthalene	3.4E+0	5.1E-1	1.0E+0	1.0E+0	3.4E+0	5.1E-1
108-95-2	Phenol	3.0E-1	0.0E+0	1.0E+0	1.0E+0	3.0E-1	0.0E+0

Cumulative Values:

RBCA SITE ASSESSMENT | **Cumulative Risk Worksheet**

Site Name: Arrow Rentals | Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, Californi | Site Location: 187 North L Street, Livermore, Californi | Date Completed: 17-Jul-00

CUMULATIVE RISK WORKSHEET

Cumulative Target Risk: 1.0E-5 Target Hazard Index: 1.0E+0

ON-SITE RECEPTORS

CONSTITUENTS OF CONCERN		Outdoor Air Exposure: Commercial Target Risk: 1.0E-6 / 1.0E-5		Indoor Air Exposure: Commercial Target Risk: 1.0E-6 / 1.0E-5		Soil Exposure: None Target Risk: 1.0E-6 / 1.0E-5		Groundwater Exposure: Commercial Target Risk: 1.0E-6 / 1.0E-5	
			Target HQ: 1.0E+0		Target HQ: 1.0E+0		Target HQ: 1.0E+0		Target HQ: 1.0E+0
CAS No.	Name	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient
71-43-2	Benzene	3.4E-7	1.9E-2	5.0E-5	2.8E+0			9.4E-4	3.0E+1
108-88-3	Toluene		1.0E-3		8.8E-2				4.6E-1
100-41-4	Ethylbenzene		1.8E-4		1.3E-2				2.3E-1
1330-20-7	Xylene (mixed isomers)		2.0E-4		1.3E-2				1.1E-1
1634-04-4	Methyl t-Butyl ether		2.5E-7		3.6E-5				5.6E-1
91-20-3	Naphthalene		4.2E-7		4.0E-5				1.2E-2
108-95-2	Phenol		1.9E-9		1.3E-6				6.2E-3
Cumulative Values:		**3.4E-7**	**2.1E-2**	**5.0E-5** ■	**2.9E+0** ■	**0.0E+0**	**0.0E+0**	**9.4E-4** ■	**3.2E+1** ■

■ indicates risk level exceeding target risk

RBCA SITE ASSESSMENT | **Cumulative Risk Worksheet**

Site Name: Arrow Rentals | Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, Californ | Site Location: 187 North L Street, Livermore, California | Date Completed: 17-Jul-00

CUMULATIVE RISK WORKSHEET

Cumulative Target Risk: 1.0E-5 | Target Hazard Index: 1.0E+0

Groundwater DAF Option: FALSE

OFF-SITE RECEPTORS

CONSTITUENTS OF CONCERN		Outdoor Air Exposure:				Groundwater Exposure:			
		None		None		None		None	
		Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0
CAS No.	Name	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient
71-43-2	Benzene								
108-88-3	Toluene								
100-41-4	Ethylbenzene								
1330-20-7	Xylene (mixed isomers)								
1634-04-4	Methyl t-Butyl ether								
91-20-3	Naphthalene								
108-95-2	Phenol								
Cumulative Values:		0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0

■ indicates risk level exceeding target risk

APPENDIX D

TIER 1 BASELINE RISK ASSESSMENT - ONSITE RESIDENTIAL SCENARIO

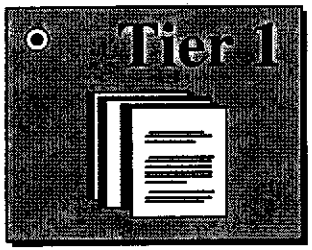
Main Screen

RBCA Tool Kit for Chemical Releases
Version 1.2 © 1999

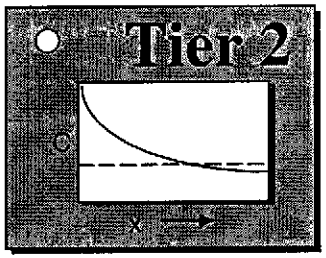
1. Project Information

Site Name:	Arrow Rentals		
Location:	187 North L Street, Livermore, California		
Compl. By:	Aquifer Sciences, Inc.		
Date:	18-Jul-00	Job ID:	971275

2. Which Type of RBCA Analysis? (?)



Generic Values
On-Site
Exposure



Site-Specific Values

On- or Off-Site Exposure

3. Calculation Options (?)

Affects which input data are required

☑ ***Baseline Risks (Forward mode)***

☑ ***RBCA Cleanup Standards (Backward mode)***

4. RBCA Evaluation Process

Prepare Input Data

Data Complete? (■= yes, ■= no)

- ■□ Exposure Pathways
- ■□ Constituents of Concern (COCs)
- ■□ Transport Models
- ■□ Soil Parameters
- ■□ GW Parameters
- ■□ Air Parameters

Review Output

- Exposure Flowchart
- COC Chem. Parameters
- Input Data Summary
- User-Spec. COC Data...
- Transient Domenico Analysis...
- Baseline Risks...
- Cleanup Standards...

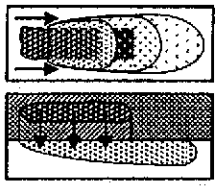
5. Commands and Options

New Site	Load Data...	Save Data As...	Quit
Print Sheet	Set Units	Custom Chem. Data...	*Help*

Exposure Pathway Identification

Site Name: Arrow Rentals
Location: 187 North L Street, Livermore, California
Compl. By: Aquifer Sciences, Inc.
Job ID: 971275 Date: 18-Jul-00

1. Groundwater Exposure



Groundwater Ingestion/ Surface Water Impact

Receptor Type:	Res.		
	On-site	Off-site1	Off-site2

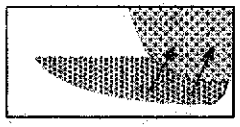
Source Media:

- [x] Affected Groundwater
- [x] Affected Soils Leaching to Groundwater

Distance to GW receptors

On-site	Off-site1	Off-site2	
0	0	0	(ft)
0	0	0	(ft)

GW Discharge to Surface Water Exposure

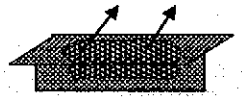


- [ ] Swimming
- [ ] Fish Consumption
- [ ] Aquatic Life Protection

Enter ALP Criteria

2. Surface Soil Exposure

Direct Ingestion and Dermal Contact

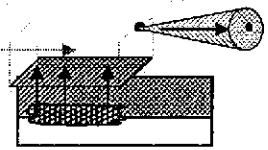


Receptor Type:	None	
	On-site	No off-site receptors

Construction Worker [ ]

3. Air Exposure

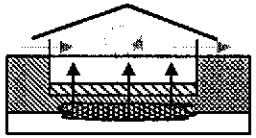
Volatilization and Particulates to Outdoor Air Inhalation



Receptor Type:	Res.		
	On-site	Off-site1	Off-site2
	0	0	0 (ft)

Construction worker [ ]

- [x] Affected Soils--Volatilization to Ambient Outdoor Air
- [x] Affected Groundwater--Volatilization to Ambient Outdoor Air
- [ ] Affected Surface Soils--Particulates to Ambient Outdoor Air



Volatilization to Indoor Air Inhalation

Receptor Type:	Res.	
	On-site	No off-site receptors

- [x] Affected Soils--Volatilization to Enclosed Space
- [x] Affected Groundwater--Volatilization to Enclosed Space

4. Commands and Options

Main Screen | Print Sheet | Set Units | *Help*

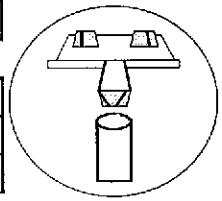
Exposure Factors & Target Risks | Exposure Flowchart

Exposure Factors and Target Risk Limits

Site Name: Arrow Rentals
Location: 187 North L Street, Livermore, California
Compl. By: Aquifer Sciences, Inc.
Job ID: 971275 Date: 17-Jul-00

1. Exposure Parameters

		Residential			Commercial	
Age Adjustment?		Adult	(Age 0-6)	(Age 0-16)	Chronic	Construc.
Averaging time, carcinogens (yr)		70				
Averaging time, non-carcinogens (yr)		30			25	1
Body weight (kg)		70	15	35	70	
Exposure duration (yr)		30	6	16	25	1
Exposure frequency (days/yr)		350			250	180
Dermal exposure frequency (days/yr)		350			250	
Skin surface area, soil contact (cm^2)	☐	5800		2023	5800	5800
Soil dermal adherence factor ($mg/cm^2/day$)		1				
Water ingestion rate (L/day)		2			1	
Soil ingestion rate (mg/day)	☐	100	200		50	100
Swimming exposure time (hr/event)		3				
Swimming event frequency (events/yr)		12	12	12		
Swimming water ingestion rate (L/hr)	☐	0.05	0.5			
Skin surface area, swimming (cm^2)	☐	23000		8100		
Fish consumption rate (kg/day)		0.025				
Contaminated fish fraction (unitless)		1				



2. Risk Goal Calculation Options

- ○ Individual Constituent Risk Goals Only
- ◉ Individual and Cumulative Risk Goals

3. Target Health Risk Limits

	Individual	Cumulative
Target Risk (Class A/B carcins.)	1.0E-6	1.0E-5
Target Risk (Class C carcinogens)	1.0E-5	
Target Hazard Quotient	1.0E+0	
Target Hazard Index		1.0E+0

4. Commands and Options

Return to Exposure Pathways

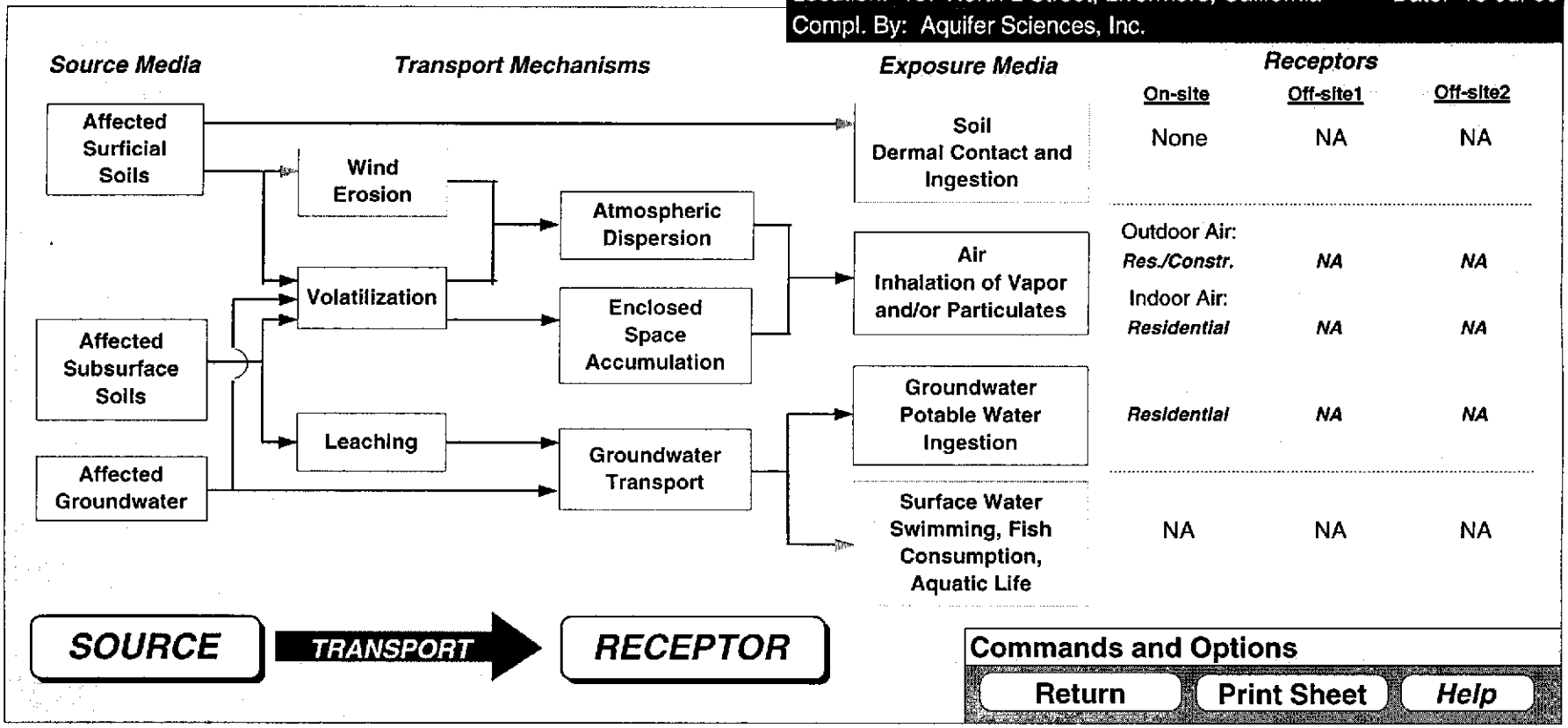
Use Default Values

Print Sheet

Help

Exposure Pathway Flowchart

Site Name: Arrow Rentals — Job ID: 971275
Location: 187 North L Street, Livermore, California — Date: 18-Jul-00
Compl. By: Aquifer Sciences, Inc.



Receptors	On-site	Off-site1	Off-site2
Soil Dermal Contact and Ingestion	None	NA	NA
Air Inhalation of Vapor and/or Particulates — Outdoor Air: *Res./Constr.*	*NA*	*NA*	*NA*
Air Inhalation of Vapor and/or Particulates — Indoor Air: *Residential*	*NA*	*NA*	*NA*
Groundwater Potable Water Ingestion — *Residential*	*NA*	*NA*	*NA*
Surface Water Swimming, Fish Consumption, Aquatic Life	NA	NA	NA

Commands and Options

Return | Print Sheet | Help

Site Name: Arrow Rentals
Location: 187 North L Street, Livermore, California
Compl. By: Aquifer Sciences, Inc.
Job ID: 971275
Date: 18-Jul-00

Commands and Options

Main Screen | Print Sheet | *Help*

Source Media Constituents of Concern (COCs)

☐ Apply Raoult's Law (?)

Selected COCs

COC Select: *Sort List:* (?)

Add/Insert | Top | MoveUp
Delete | Bottom | MoveDown

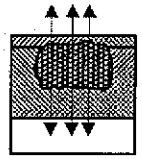
Representative COC Concentration (?)

Selected COCs	Groundwater Source Zone (Calculate / Enter Site Data)		Soil Source Zone (Enter Directly / ■ Enter Site Data)		Mole Fraction in Source Material
	(mg/L)	note	*(mg/kg)*	note	*(-)*
Benzene	9.3E+0	95% UCL at W-1s	2.5E+0	Max at 20 ft in W-1	
Toluene	9.4E+0	95% UCL at W-1s	2.1E+1	Max at 15 ft in W-1	
Ethylbenzene	2.4E+0	95% UCL at W-1s	2.0E+1	Max at 15 ft in W-1	
Xylene (mixed isomers)	1.4E+1	95% UCL at W-1s	1.3E+2	Max at 15 ft in W-1	
Methyl t-Butyl ether	5.7E-1	95% UCL at W-1s	0.0E+0		
Naphthalene	5.1E-1	Maximum at W-1s	3.4E+0	Max at 25 ft in B-1	
Phenol	0.0E+0		3.0E-1	Max at 25 ft in B-1	

Transport Modeling Options

Site Name: Arrow Rentals — Job ID: 971275
Location: 187 North L Street, Livermore, California — Date: 18-Jul-00
Compl. By: Aquifer Sciences, Inc.

1. Vertical Transport, Surface Soil Column



Outdoor Air Volatilization Factors (?)

- ○ Surface soil volatilization model only
- ◉ Combination surface soil/Johnson & Ettinger models
  - Thickness of surface soil zone: 1 *(ft)*
- ○ User-specified VF from other model — Enter VF Values

Indoor Air Volatilization Factors (?)

- ◉ Johnson & Ettinger model
- ○ User-specified VF from other model — Enter VF Values

Soil-to-Groundwater Leaching Factor (?)

- ◉ ASTM Model
  - ☐ Apply Soil Attenuation Model (SAM)
  - ☐ Allow first-order biodecay — Enter Decay Rates
- ○ User-specified LF from other model — Enter LF Values

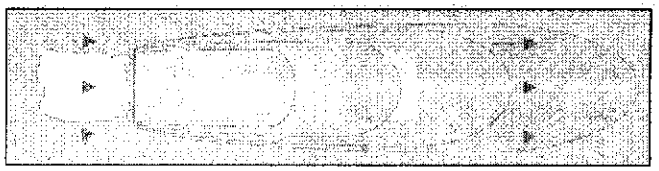
2. Lateral Air Dispersion Factor

(?)

- ○ 3-D Gaussian dispersion model
- ○ User-Specified ADF

Off-site 1	Off-site 2	
1.00E+0	1.00E+0	*(-)*

3. Groundwater Dilution Attenuation Factor



Calculate DAF using Domenico Model (?)

- ○ Domenico equation with dispersion only (no biodegradation)
- ○ Domenico equation first-order decay — Enter Decay Rates
- ○ Modified Domenico equation using electron acceptor superposition — Enter Site Data

Enter Directly — Biodegradation Capacity: NC *(mg/L)*

— or —

User-Specified DAF Values

- ○ DAF values from other model or site data — Enter DAF Values

n o

4. Commands and Options

Main Screen | Print Sheet | *Help*

Site-Specific Soil Parameters

Site Name: Arrow Rentals | Job ID: 971275
Location: 187 North L Street, Livermore, California | Date: 18-Jul-00
Compl. By: Aquifer Sciences, Inc.

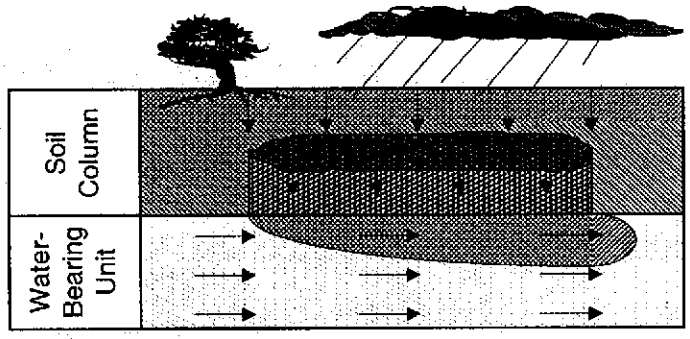
1. Soil Source Zone Characteristics

Hydrogeology

	General Case Construction	
Depth to water-bearing unit	25	(ft)
Capillary zone thickness	0.16	(ft)
Soil column thickness	24.84	(ft)

Affected Soil Zone

Depth to top of affected soils	15		(ft)
Depth to base of affected soils	25		(ft)
Affected soil area	1280	1280	(ft^2)
Length of affected soil parallel to assumed wind direction	40	40	(ft)
Length of affected soil parallel to assumed GW flow direction	40		(ft)



2. Surface Soil Column

	Vadose Zone	Capillary Fringe	
Predominant USCS Soil Type			ults
or Calculate	or		
Total porosity	0.3		(-)
Volumetric water content	0.12	0.26	(-)
Volumetric air content	0.18	0.04	(-)
Dry bulk density	2.65		(kg/L)
Vertical hydraulic conductivity	3.3E+2		(ft/yr)
Vapor permeability	1.1E-11		(ft^2)
Capillary zone thickness	1.6E-1		(ft)

Net Rainfall Infiltration

Net infiltration estimate	11.81102362	(in/yr)
or Calculate	or	
Average annual precipitation	0	(in/yr)

Partitioning Parameters

Fraction organic carbon	0.01	(-)
Soil/water pH	6.8	(-)

3. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | | Help

Site-Specific Groundwater Parameters

Site Name: Arrow Rentals | Job ID: 971275
Location: 187 North L Street, Livermore, California | Date: 18-Jul-00
Compl. By: Aquifer Sciences, Inc.

1. Water-Bearing Unit

Hydrogeology

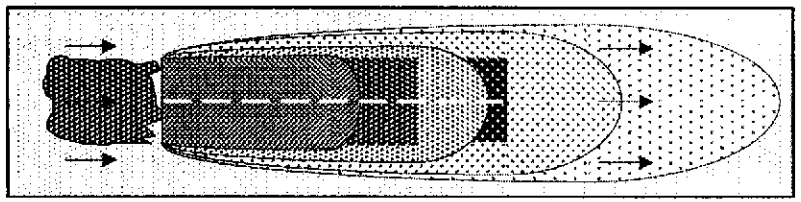
Groundwater Darcy velocity	8.2E+0	(ft/yr)
Groundwater seepage velocity	2.1E+1	(ft/yr)
or Enter Directly	or	
Hydraulic conductivity	4.1E+2	(ft/yr)
Hydraulic gradient	2.0E-2	(-)
Effective porosity	0.40	(-)

Sorption

Fraction organic carbon--saturated zone		(-)
Groundwater pH		(-)

2. Groundwater Source Zone

Groundwater plume width at source	32	(ft)
Plume (mixing zone) thickness at source	6.56167979	(ft)
or Calculate	or	
Saturated thickness	10	(ft)
Length of source zone		(ft)



3. Groundwater Dispersion

Model:

	GW Ingestion		Soil Leaching to GW	
	Off-site 1	Off-site 2	Off-site 1	Off-site 2
Distance to GW receptors	0	0	0	0 (ft)
or NA	or		or	
Longitudinal dispersivity				(ft)
Transverse dispersivity				(ft)
Vertical dispersivity				(ft)

4. Groundwater Discharge to Surface Water

	Off-site 2	
Distance to GW/SW disharge point	NA	(ft)
Plume width at GW/SW discharge	0	(ft)
Plume thickness at GW/SW discharge	0	(ft)
Surface water flowrate at GW/SW discharge	0.0E+0	(ft^3/s)

5. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | | *Help*

Site-Specific Air Parameters

Site Name: Arrow Rentals — Job ID: 971275
Location: 187 North L Street, Livermore, California — Date: 18-Jul-00
Compl. By: Aquifer Sciences, Inc.

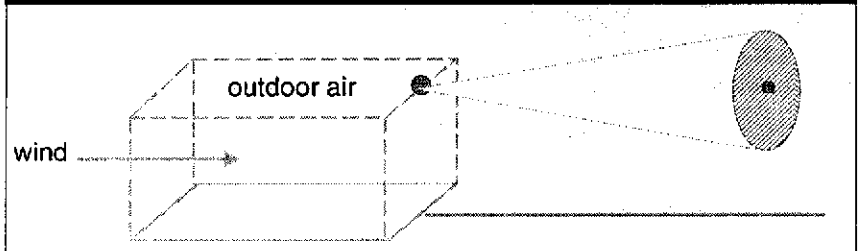
1. Outdoor Air Pathway

Dispersion in Air

	Off-site 1	Off-site 2	
Distance to offsite air receptor			(ft)
or	NA	*or*	
Horizontal dispersivity			(ft)
Vertical dispersivity			(ft)

Air Source Zone

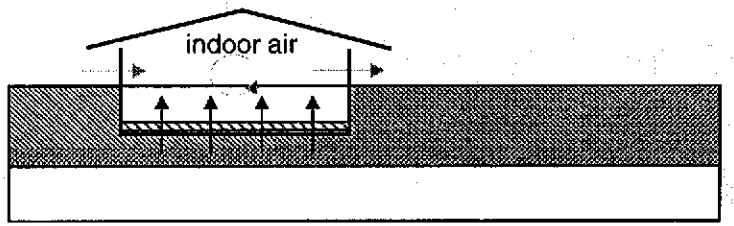
Air mixing zone height	6.56167979	(ft)
Ambient air velocity in mixing zone	7.381889764	(ft/s)
Areal particulate emission flux	6.9E-14	(g/cm^2/s)



2. Indoor Air Pathway

Building Parameters

	Residential	Commercial	
Building volume/area ratio	8	9.84252	(ft)
Foundation area	1000	20000	(ft^2)
Foundation perimeter	130	600	(ft)
Building air exchange rate	1.4E-4	1.4E-4	(1/s)
Depth to bottom of foundation slab	0.5	0.5	(ft)
Convective air flow through cracks	0.0E+0	0.0E+0	(ft^3/s)
Foundation thickness	0.5		(ft)
Foundation crack fraction	0.01		(-)
Volumetric water content of cracks	0.28		(-)
Volumetric air content of cracks	0.13		(-)
Indoor/Outdoor differential pressure	0		(Pa)



3. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | | *Help*

CHEMICAL DATA FOR SELECTED COCs

Physical Property Data

Constituent	CAS Number	type	Molecular Weight (g/mole) MW	ref	Diffusion Coefficients in air (cm2/s) Dair	ref	in water (cm2/s) Dwat	ref	log (Koc) or log(Kd) (@ 20 - 25 C) log(L/kg) partition		ref	Henry's Law Constant (@ 20 - 25 C) (atm-m3) mol	(unitless)	ref	Vapor Pressure (@ 20 - 25 C) (mm Hg)	ref	Solubility (@ 20 - 25 C) (mg/L)	ref	acid pKa	base pKb	ref
Benzene	71-43-2	A	78.1	PS	8.80E-02	PS	9.80E-06	PS	1.77	Koc	PS	5.55E-03	2.29E-01	PS	9.52E+01	PS	1.75E+03	PS	-	-	-
Toluene	108-88-3	A	92.4	5	8.50E-02	A	9.40E-06	A	2.13	Koc	A	6.30E-03	2.60E-01	A	3.00E+01	4	5.15E+02	29	-	-	-
Ethylbenzene	100-41-4	A	106.2	PS	7.50E-02	PS	7.80E-06	PS	2.56	Koc	PS	7.88E-03	3.25E-01	PS	1.00E+01	PS	1.69E+02	PS	-	-	-
Xylene (mixed isomers)	1330-20-7	A	106.2	5	7.20E-02	A	8.50E-06	A	2.38	Koc	A	7.03E-03	2.90E-01	A	7.00E+00	4	1.98E+02	5	-	-	-
Methyl t-Butyl ether	1634-04-4	O	88.146	5	7.92E-02	6	9.41E-05	7	1.08	Koc	A	5.77E-04	2.38E-02	-	2.49E+02	-	4.80E+04	A	-	-	-
Naphthalene	91-20-3	PAH	128.2	PS	5.90E-02	PS	7.50E-06	PS	3.30	Koc	PS	4.83E-04	1.99E-02	PS	2.30E-01	PS	3.10E+01	PS	-	-	-
Phenol	108-95-2	AP	94.1	PS	8.20E-02	PS	9.10E-06	PS	1.46	Koc	PS	3.97E-07	1.64E-05	PS	3.41E-01	PS	8.28E+04	PS	10	-	PS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 18-Jul-00

Job ID: 971275

CHEMICAL DATA FOR SELECTED COCs

Toxicity Data

Constituent	Reference Dose (mg/kg/day) Oral RfD_oral	ref	Reference Dose (mg/kg/day) Dermal RfD_dermal	ref	Reference Conc. (mg/m3) Inhalation RfC_inhal	ref	Slope Factors 1/(mg/kg/day) Oral SF_oral	ref	Slope Factors 1/(mg/kg/day) Dermal SF_dermal	ref	Unit Risk Factor 1/(µg/m3) Inhalation URF_inhal	ref	EPA Weight of Evidence	Is Constituent Carcinogenic ?
Benzene	3.00E-03	R	-	-	5.95E-03	R	2.90E-02	PS	2.99E-02	TX	8.29E-06	PS	A	TRUE
Toluene	2.00E-01	A,R	1.60E-01	TX	4.00E-01	A,R	-	-	-	-	-	-	D	FALSE
Ethylbenzene	1.00E-01	PS	9.70E-02	TX	1.00E+00	PS	-	-	-	-	-	-	D	FALSE
Xylene (mixed isomers)	2.00E+00	A,R	1.84E+00	TX	7.00E+00	A	-	-	-	-	-	-	D	FALSE
Methyl t-Butyl ether	1.00E-02	31	8.00E-03	TX	3.00E+00	R	-	-	-	-	-	-	-	FALSE
Naphthalene	4.00E-01	PS	3.56E-01	TX	1.40E+00	PS	-	-	-	-	-	-	D	FALSE
Phenol	6.00E-01	PS	5.40E-01	TX	2.10E+00	PS	-	-	-	-	-	-	D	FALSE

Site Name: Arrow Rentals

Site Location: 187 North L St

Miscellaneous Chemical Data

Constituent	Maximum Contaminant Level MCL (mg/L)	ref	Time-Weighted Average Workplace Criteria TWA (mg/m3)	ref	Aquatic Life Prot. Criteria AQL (mg/L)	ref	Biocon-centration Factor (L-wat/kg-fish)
Benzene	5.00E-03	52 FR 25690	3.25E+00	PS	-	-	12.6
Toluene	1.00E+00	56 FR 3526 (30 Jan 91)	1.47E+02	ACGIH	-	-	70
Ethylbenzene	7.00E-01	56 FR 3526 (30 Jan 91)	4.35E+02	PS	-	-	1
Xylene (mixed isomers)	1.00E+01	56 FR 3526 (30 Jan 91)	4.34E+02	ACGIH	-	-	1
Methyl t-Butyl ether	-	-	6.00E+01	NIOSH	-	-	1
Naphthalene	-	-	5.00E+01	PS	-	-	430
Phenol	-	-	1.90E+01	PS	-	-	1

Site Name: Arrow Rentals

Site Location: 187 North L St

CHEMICAL DATA FOR SELECTED COCs

Miscellaneous Chemical Data

Constituent	Dermal Relative Absorp. Factor (unitless)	Water Dermal Permeability Data: Dermal Permeability Coeff. (cm/hr)	Lag time for Dermal Exposure (hr)	Critical Exposure Time (hr)	Relative Contr of Derm Perm Coeff (unitless)	Water/Skin Derm Adsorp Factor (cm/event)	ref	Detection Limits: Groundwater (mg/L)	ref	Soil (mg/kg)	ref	Half Life (First-Order Decay) (days): Saturated	Unsaturated	ref
Benzene	0.5	0.021	0.26	0.63	0.013	7.3E-2	D	0.002	S	0.005	S	720	720	H
Toluene	0.5	0.045	0.32	0.77	0.054	1.6E-1	D	0.002	S	0.005	S	28	28	H
Ethylbenzene	0.5	0.074	0.39	1.3	0.14	2.7E-1	D	0.002	S	0.005	S	228	228	H
Xylene (mixed isomers)	0.5	0.08	0.39	1.4	0.16	2.9E-1	D	0.005	S	0.005	S	360	360	H
Methyl t-Butyl ether	0.5	-	-	-	-	-	-	-	-	-	-	360	180	H
Naphthalene	0.05	0.069	0.53	2.2	0.2	2.7E-1	D	0.01	32	0.01	32	258	258	H
Phenol	0.5	0.0055	0.33	0.79	0.0029	2.0E-2	D	0.01	32	0.66	32	10	10	H

Site Name: Arrow Rentals

Site Location: 187 North L St

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 18-Jul-00

Job ID: 971275

Exposure Parameters		Residential			Commercial/Industrial	
		Adult	(1-6yrs)	(1-16 yrs)	Chronic	Construc.
AT_c	Averaging time for carcinogens (yr)	70				
AT_n	Averaging time for non-carcinogens (yr)	30			25	1
BW	Body weight (kg)	70	15	35	70	
ED	Exposure duration (yr)	30	6	16	25	1
τ	Averaging time for vapor flux (yr)	30			25	1
EF	Exposure frequency (days/yr)	350			250	180
EF_D	Exposure frequency for dermal exposure	350			250	
IR_w	Ingestion rate of water (L/day)	2			1	
IR_s	Ingestion rate of soil (mg/day)	100	200		50	100
SA	Skin surface area (dermal) (cm^2)	5800		2023	5800	5800
M	Soil to skin adherence factor	1				
ET_{swim}	Swimming exposure time (hr/event)	3				
EV_{swim}	Swimming event frequency (events/yr)	12	12	12		
IR_{swim}	Water ingestion while swimming (L/hr)	0.05	0.5			
SA_{swim}	Skin surface area for swimming (cm^2)	23000		8100		
IR_{fish}	Ingestion rate of fish (kg/yr)	0.025				
FI_{fish}	Contaminated fish fraction (unitless)	1				

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	Residential	NA	NA
Soil Leaching to Groundwater Ingestion	Residential	NA	NA
Applicable Surface Water Exposure Routes:			
Swimming			NA
Fish Consumption			NA
Aquatic Life Protection			NA
Soil:			
Direct Ingestion and Dermal Contact	None		
Outdoor Air:			
Particulates from Surface Soils	None	NA	NA
Volatilization from Soils	Res./Constr.	NA	NA
Volatilization from Groundwater	Residential	NA	NA
Indoor Air:			
Volatilization from Subsurface Soils	Residential	NA	NA
Volatilization from Groundwater	Residential	NA	NA

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	0	NA	NA	(ft)
Soil leaching to groundwater receptor	0	NA	NA	(ft)
Outdoor air inhalation receptor	0	NA	NA	(ft)

Target Health Risk Values		Individual	Cumulative
TR_{ab}	Target Risk (class A&B carcinogens)	1.0E-6	1.0E-5
TR_c	Target Risk (class C carcinogens)	1.0E-5	
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 1
Outdoor air volatilization model	Surface & subsurface models
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable

Surface Parameters		General	Construction	(Units)
A	Source zone area	1.3E+3	1.3E+3	(ft^2)
W	Length of source-zone area parallel to wind	4.0E+1	4.0E+1	(ft)
W_{gw}	Length of source-zone area parallel to GW flow	4.0E+1		(ft)
U_{air}	Ambient air velocity in mixing zone	7.4E+0		(ft/s)
δ_{air}	Air mixing zone height	6.6E+0		(ft)
P_a	Areal particulate emission rate	NA		(g/cm^2/s)
L_{ss}	Thickness of affected surface soils	1.0E+0		(ft)

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	1.6E-1			(ft)
h_v	Vadose zone thickness	2.5E+1			(ft)
ρ_s	Soil bulk density	2.7E+0			(g/cm^3)
f_{oc}	Fraction organic carbon	1.0E-2			(-)
θ_T	Soil total porosity	3.0E-1			(-)
K_{vs}	Vertical hydraulic conductivity	3.3E+2			(ft/yr)
k_v	Vapor permeability	1.1E-11			(ft^2)
L_{gw}	Depth to groundwater	2.5E+1			(ft)
L_s	Depth to top of affected soils	1.5E+1			(ft)
L_{base}	Depth to base of affected soils	2.5E+1			(ft)
L_{subs}	Thickness of affected soils	1.0E+1			(ft)
pH	Soil/groundwater pH	6.8E+0			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.26	0.12	0.28	(-)
θ_a	Volumetric air content	0.04	0.18	0.13	(-)

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	8.00E+0	NA	(ft)
A_b	Foundation area	1.00E+3	NA	(cm^2)
X_{crk}	Foundation perimeter	1.30E+2	NA	(ft)
ER	Building air exchange rate	1.40E-4	NA	(1/s)
L_{crk}	Foundation thickness	5.00E-1	NA	(ft)
Z_{crk}	Depth to bottom of foundation slab	5.00E-1	NA	(ft)
η	Foundation crack fraction	1.00E-2	NA	(-)
dP	Indoor/outdoor differential pressure	0.00E+0	NA	(Pa)
Q_s	Convective air flow through slab	0.00E+0	NA	(ft^3/s)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	6.6E+0	(ft)
I	Net groundwater infiltration rate	1.2E+1	(in/yr)
U_{gw}	Groundwater Darcy velocity	8.2E+0	(ft/yr)
v_{gw}	Groundwater seepage velocity	2.1E+1	(ft/yr)
K_s	Saturated hydraulic conductivity	NA	(ft/yr)
i	Groundwater gradient	NA	(-)
S_w	Width of groundwater source zone	NA	(ft)
S_d	Depth of groundwater source zone	NA	(ft)
θ_{ae}	Effective porosity in water-bearing unit	NA	(-)
f_{oc-sat}	Fraction organic carbon in water-bearing unit	NA	(-)
pH_{sat}	Groundwater pH	NA	(-)
	Biodegradation considered?	NA	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Soil Leaching to GW		
α_x	Longitudinal dispersivity	NA	NA	NA	NA	(ft)
α_y	Transverse dispersivity	NA	NA	NA	NA	(ft)
α_z	Vertical dispersivity	NA	NA	NA	NA	(ft)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(ft)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(ft)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(ft^3/s)
W_{pl}	Width of GW plume at SW discharge	NA	(ft)
ϕ_{pl}	Thickness of GW plume at SW discharge	NA	(ft)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ☐ (CHECKED IF PATHWAY IS ACTIVE)

SURFACE SOILS:
VAPOR INHALATION

Constituents of Concern	1) Source Medium: Soil Conc. (mg/kg)	2) NAF Value (m^3/kg) Receptor: On-site (0 ft) Residential	On-site (0 ft) Construction Worker	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA	3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2): On-site (0 ft) Residential	On-site (0 ft) Construction Worker	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA
Benzene	2.5E+0								
Toluene	2.1E+1								
Ethylbenzene	2.0E+1								
Xylene (mixed isomers)	1.3E+2								
Methyl t-Butyl ether	0.0E+0								
Naphthalene	3.4E+0								
Phenol	3.0E-1								

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 18-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

SURFACE SOILS:

VAPOR INHALATION (cont'd)

Constituents of Concern	4) Exposure Multiplier (EFxED)/(ATx365) (unitless)				5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4)			
	On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)	On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)
	Residential	Construction Worker	NA	NA	Residential	Construction Worker	NA	NA
Benzene								
Toluene								
Ethylbenzene								
Xylene (mixed isomers)								
Methyl t-Butyl ether								
Naphthalene								
Phenol								

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr)

Site Name: Arrow Rentals
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RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAY IS ACTIVE)**

SUBSURFACE SOILS (15 - 25 ft):

VAPOR INHALATION

	1) Source Medium	2) NAF Value (m^3/kg) Receptor			3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)		
Constituents of Concern	Soil Conc. (mg/kg)	On-site (0 ft) Residential	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA	On-site (0 ft) Residential	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA
Benzene	2.5E+0	5.4E+4			4.6E-5		
Toluene	2.1E+1	5.4E+4			3.9E-4		
Ethylbenzene	2.0E+1	8.7E+4			2.3E-4		
Xylene (mixed isomers)	1.3E+2	6.8E+4			1.9E-3		
Methyl t-Butyl ether	0.0E+0	5.4E+4			0.0E+0		
Naphthalene	3.4E+0	9.7E+6			3.5E-7		
Phenol	3.0E-1	5.2E+7			5.8E-9		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
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RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

SUBSURFACE SOILS (15 - 25 ft):

VAPOR INHALATION (cont'd)

Constituents of Concern	4) Exposure Multiplier (EFxED)/(ATx365) (unitless)			5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4)		
	On-site (0 ft) Residential	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA	On-site (0 ft) Residential	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA
Benzene	4.1E-1			1.9E-5		
Toluene	9.6E-1			3.7E-4		
Ethylbenzene	9.6E-1			2.2E-4		
Xylene (mixed isomers)	9.6E-1			1.8E-3		
Methyl t-Butyl ether	9.6E-1			0.0E+0		
Naphthalene	9.6E-1			3.3E-7		
Phenol	9.6E-1			5.6E-9		

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr)

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
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RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER: VAPOR INHALATION

Constituents of Concern	Exposure Concentration 1) Source Medium: Groundwater Conc. (mg/L)	2) NAF Value (m^3/L) Receptor: On-site (0 ft) Residential	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA	3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2): On-site (0 ft) Residential	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA
Benzene	9.3E+0	8.4E+4			1.1E-4		
Toluene	9.4E+0	7.7E+4			1.2E-4		
Ethylbenzene	2.4E+0	7.1E+4			3.4E-5		
Xylene (mixed isomers)	1.4E+1	8.2E+4			1.7E-4		
Methyl t-Butyl ether	5.7E-1	5.2E+5			1.1E-6		
Naphthalene	5.1E-1	9.9E+5			5.2E-7		
Phenol	0.0E+0	2.6E+8			0.0E+0		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 18-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS	

GROUNDWATER: VAPOR INHALATION (cont'd)

Constituents of Concern	4) Exposure Multiplier (EFxED)/(ATx365) (unitless)			5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4)		
	On-site (0 ft) Residential	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA	On-site (0 ft) Residential	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA
Benzene	4.1E-1			4.6E-5		
Toluene	9.6E-1			1.2E-4		
Ethylbenzene	9.6E-1			3.2E-5		
Xylene (mixed isomers)	9.6E-1			1.6E-4		
Methyl t-Butyl ether	9.6E-1			1.1E-6		
Naphthalene	9.6E-1			4.9E-7		
Phenol	9.6E-1			0.0E+0		

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr)

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

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RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

TOTAL PATHWAY EXPOSURE (mg/m^3)

(Sum average expsosure concentrations from soil and groundwater routes.)

Constituents of Concern	On-site (0 ft) Residential	On-site (0 ft) Construction Worker	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA
Benzene	6.5E-5			
Toluene	4.9E-4			
Ethylbenzene	2.5E-4			
Xylene (mixed isomers)	2.0E-3			
Methyl t-Butyl ether	1.1E-6			
Naphthalene	8.3E-7			
Phenol	5.6E-9			

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

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RBCA SITE ASSESSMENT

TIER 1 PATHWAY RISK CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

CARCINOGENIC RISK

Constituents of Concern	(1) EPA Carcinogenic Classification	(2) Total Carcinogenic Exposure (mg/m^3) On-site (0 ft) Residential	(2) Total Carcinogenic Exposure (mg/m^3) On-site (0 ft) Construction Worker	(2) Total Carcinogenic Exposure (mg/m^3) Off-site 1 (0 ft) NA	(2) Total Carcinogenic Exposure (mg/m^3) Off-site 2 (0 ft) NA	(3) Inhalation Unit Risk Factor (µg/m^3)^-1	(4) Individual COC Risk (2) x (3) x 1000 On-site (0 ft) Residential	(4) Individual COC Risk (2) x (3) x 1000 On-site (0 ft) Construction Worker	(4) Individual COC Risk (2) x (3) x 1000 Off-site 1 (0 ft) NA	(4) Individual COC Risk (2) x (3) x 1000 Off-site 2 (0 ft) NA
Benzene	A	6.5E-5				8.3E-6	5.4E-7			
Toluene	D									
Ethylbenzene	D									
Xylene (mixed isomers)	D									
Methyl t-Butyl ether	-									
Naphthalene	D									
Phenol	D									
Total Pathway Carcinogenic Risk =							**5.4E-7**			

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 18-Jul-00

Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 PATHWAY RISK CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

TOXIC EFFECTS

Constituents of Concern	(5) Total Toxicant Exposure (mg/m^3) On-site (0 ft) Residential	On-site (0 ft) Construction Worker	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA	(6) Inhalation Reference Conc. (mg/m^3)	(7) Individual COC Hazard Quotient (5) / (6) On-site (0 ft) Residential	On-site (0 ft) Construction Worker	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA
Benzene	1.5E-4				6.0E-3	2.5E-2			
Toluene	4.9E-4				4.0E-1	1.2E-3			
Ethylbenzene	2.5E-4				1.0E+0	2.5E-4			
Xylene (mixed isomers)	2.0E-3				7.0E+0	2.9E-4			
Methyl t-Butyl ether	1.1E-6				3.0E+0	3.5E-7			
Naphthalene	8.3E-7				1.4E+0	5.9E-7			
Phenol	5.6E-9				2.1E+0	2.6E-9			
Total Pathway Hazard Index =						**2.7E-2**			

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 18-Jul-00

Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SOILS (15 - 25 ft): VAPOR INTRUSION INTO ON-SITE BUILDINGS

Constituents of Concern	1) Source Medium Soil Conc. (mg/kg)	2) NAF Value (m^3/kg) Receptor Residential	3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2) Residential	4) Exposure Multiplier (EFxED)/(ATx365) (unitless) Residential	5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4) Residential
Benzene	2.5E+0	2.6E+2	9.5E-3	4.1E-1	3.9E-3
Toluene	2.1E+1	5.2E+2	4.0E-2	9.6E-1	3.9E-2
Ethylbenzene	2.0E+1	1.2E+3	1.6E-2	9.6E-1	1.5E-2
Xylene (mixed isomers)	1.3E+2	9.7E+2	1.3E-1	9.6E-1	1.3E-1
Methyl t-Butyl ether	0.0E+0	4.6E+2	0.0E+0	9.6E-1	0.0E+0
Naphthalene	3.4E+0	1.3E+5	2.6E-5	9.6E-1	2.5E-5
Phenol	3.0E-1	6.0E+4	5.0E-6	9.6E-1	4.8E-6

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 18-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER: VAPOR INTRUSION INTO ON-SITE BUILDINGS

Constituents of Concern	Exposure Concentration 1) Source Medium Groundwater Conc. (mg/L)	2) NAF Value (m^3/L) Receptor Residential	3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2) Residential	4) Exposure Multiplier (EFxED)/(ATx365) (unitless) Residential	5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4) Residential
Benzene	9.3E+0	4.5E+2	2.1E-2	4.1E-1	8.6E-3
Toluene	9.4E+0	4.1E+2	2.3E-2	9.6E-1	2.2E-2
Ethylbenzene	2.4E+0	3.7E+2	6.5E-3	9.6E-1	6.2E-3
Xylene (mixed isomers)	1.4E+1	4.3E+2	3.2E-2	9.6E-1	3.1E-2
Methyl t-Butyl ether	5.7E-1	2.9E+3	2.0E-4	9.6E-1	1.9E-4
Naphthalene	5.1E-1	6.9E+3	7.4E-5	9.6E-1	7.1E-5
Phenol	0.0E+0	2.6E+5	0.0E+0	9.6E-1	0.0E+0

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 18-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS

Constituents of Concern	TOTAL PATHWAY EXPOSURE (mg/m^3) *(Sum average expsosure concentrations from soil and groundwater routes.)* Residential
Benzene	1.2E-2
Toluene	6.1E-2
Ethylbenzene	2.2E-2
Xylene (mixed isomers)	1.6E-1
Methyl t-Butyl ether	1.9E-4
Naphthalene	9.6E-5
Phenol	4.8E-6

Site Name: Arrow Rentals Date Completed: 18-Jul-00
Site Location: 187 North L Street, Livermore, Calif Job ID: 971275
Completed By: Aquifer Sciences, Inc.

RBCA SITE ASSESSMENT

TIER 1 PATHWAY RISK CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

Constituents of Concern	(1) EPA Carcinogenic Classification	(2) Total Carcinogenic Exposure (mg/m^3) Residential	(3) Inhalation Unit Risk Factor (µg/m^3)^-1	(4) Individual COC Risk (2) x (3) x 1000 Residential
		CARCINOGENIC RISK		
Benzene	A	1.2E-2	8.3E-6	1.0E-4
Toluene	D			
Ethylbenzene	D			
Xylene (mixed isomers)	D			
Methyl t-Butyl ether	-			
Naphthalene	D			
Phenol	D			

Total Pathway Carcinogenic Risk = **1.0E-4**

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 18-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 PATHWAY RISK CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

Constituents of Concern	(5) Total Toxicant Exposure (mg/m^3) Residential	(6) Inhalation Reference Concentration (mg/m^3)	(7) Individual COC Hazard Quotient (5) / (6) Residential
	TOXIC EFFECTS		
Benzene	2.9E-2	6.0E-3	4.9E+0
Toluene	6.1E-2	4.0E-1	1.5E-1
Ethylbenzene	2.2E-2	1.0E+0	2.2E-2
Xylene (mixed isomers)	1.6E-1	7.0E+0	2.3E-2
Methyl t-Butyl ether	1.9E-4	3.0E+0	6.3E-5
Naphthalene	9.6E-5	1.4E+0	6.9E-5
Phenol	4.8E-6	2.1E+0	2.3E-6

Total Pathway Hazard Index = **5.1E+0**

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 18-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAY IS ACTIVE)**

SOILS (15 - 25 ft): LEACHING TO GROUNDWATER INGESTION

	1) Source Medium	2) NAF Value (L/kg) Receptor			3) Exposure Medium Groundwater: POE Conc. (mg/L) (1)/(2)		
Constituents of Concern	Soil Conc. (mg/kg)	On-site (0 ft) Residential	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA	On-site (0 ft) Residential	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA
Benzene	2.5E+0	1.5E+0			1.6E+0		
Toluene	2.1E+1	3.3E+0			6.3E+0		
Ethylbenzene	2.0E+1	8.8E+0			2.3E+0		
Xylene (mixed isomers)	1.3E+2	5.8E+0			2.2E+1		
Methyl t-Butyl ether	0.0E+0	4.0E-1			0.0E+0		
Naphthalene	3.4E+0	4.7E+1			7.2E-2		
Phenol	3.0E-1	7.9E-1			3.8E-1		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 18-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

SOILS (15 - 25 ft): LEACHING TO GROUNDWATER INGESTION (cont'd)

Constituents of Concern	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg-day)			5) Average Daily Intake Rate (mg/kg/day) (3) x (4)		
	On-site (0 ft) Residential	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA	On-site (0 ft) Residential	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA
Benzene	1.2E-2			1.9E-2		
Toluene	2.7E-2			1.7E-1		
Ethylbenzene	2.7E-2			6.3E-2		
Xylene (mixed isomers)	2.7E-2			6.1E-1		
Methyl t-Butyl ether	2.7E-2			0.0E+0		
Naphthalene	2.7E-2			2.0E-3		
Phenol	2.7E-2			1.0E-2		

NOTE: AT = Averaging time (days) ED = Exposure duration (yr) IR = Ingestion rate (mg/day)
BW = Body weight (kg) EF = Exposure frequency (days/yr)

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 18-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAY IS ACTIVE)**

GROUNDWATER: INGESTION

	1) Source Medium	2) NAF Value (unitless) Receptor			3) Exposure Medium Groundwater: POE Conc. (mg/L) (1)/(2)		
Constituents of Concern	Groundwater Conc. (mg/L)	On-site (0 ft) Residential	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA	On-site (0 ft) Residential	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA
Benzene	9.3E+0	1.0E+0			9.3E+0		
Toluene	9.4E+0	1.0E+0			9.4E+0		
Ethylbenzene	2.4E+0	1.0E+0			2.4E+0		
Xylene (mixed isomers)	1.4E+1	1.0E+0			1.4E+1		
Methyl t-Butyl ether	5.7E-1	1.0E+0			5.7E-1		
Naphthalene	5.1E-1	1.0E+0			5.1E-1		
Phenol	0.0E+0	1.0E+0			0.0E+0		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 18-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

GROUNDWATER INGESTION (cont'd)

Constituents of Concern	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg/day)			5) Average Daily Intake Rate (mg/kg/day) (3) x (4)		
	On-site (0 ft) Residential	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA	On-site (0 ft) Residential	Off-site 1 (0 ft) NA	Off-site 2 (0 ft) NA
Benzene	1.2E-2			1.1E-1		
Toluene	2.7E-2			2.6E-1		
Ethylbenzene	2.7E-2			6.6E-2		
Xylene (mixed isomers)	2.7E-2			3.8E-1		
Methyl t-Butyl ether	2.7E-2			1.6E-2		
Naphthalene	2.7E-2			1.4E-2		
Phenol	2.7E-2			0.0E+0		

NOTE: AT = Averaging time (days) ED = Exposure duration (yr) IR = Ingestion rate (mg/day)
BW = Body weight (kg) EF = Exposure frequency (days/yr)

Site Name: Arrow Rentals Completed By: Aquifer Sciences, Inc. Job ID: 971275
Site Location: 187 North L Street, Livermore, California Date Completed: 18-Jul-00

RBCA SITE ASSESSMENT

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

MAXIMUM PATHWAY INTAKE (mg/kg/day)
(Maximum intake of active pathways soil leaching & groundwater routes.)

Constituents of Concern	On-site (0 ft) Residential	Off-site 1 NA	Off-site 2 NA
Benzene	1.1E-1		
Toluene	2.6E-1		
Ethylbenzene	6.6E-2		
Xylene (mixed isomers)	6.1E-1		
Methyl t-Butyl ether	1.6E-2		
Naphthalene	1.4E-2		
Phenol	1.0E-2		

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 18-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 PATHWAY RISK CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

CARCINOGENIC RISK

Constituents of Concern	(1) EPA Carcinogenic Classification	(2) Maximum Carcinogenic Intake Rate (mg/kg/day)			(3) Oral Slope Factor (mg/kg-day)^-1	(4) Individual COC Risk (2) x (3)		
		On-site (0 ft) Residential	Off-site 1 NA	Off-site 2 NA		On-site (0 ft) Residential	Off-site 1 NA	Off-site 2 NA
Benzene	A	1.1E-1			2.9E-2	3.2E-3		
Toluene	D							
Ethylbenzene	D							
Xylene (mixed isomers)	D							
Methyl t-Butyl ether	-							
Naphthalene	D							
Phenol	D							
Total Pathway Carcinogenic Risk =						**3.2E-3**		

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 18-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 1 PATHWAY RISK CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

Constituents of Concern	(5) Maximum Toxicant Intake Rate (mg/kg/day) TOXIC EFFECTS			(6) Oral Reference Dose (mg/kg/day)	(7) Individual COC Hazard Quotient (5) / (6)		
	On-site (0 ft) Residential	Off-site 1 NA	Off-site 2 NA		On-site (0 ft) Residential	Off-site 1 NA	Off-site 2 NA
Benzene	2.5E-1			3.0E-3	8.5E+1		
Toluene	2.6E-1			2.0E-1	1.3E+0		
Ethylbenzene	6.6E-2			1.0E-1	6.6E-1		
Xylene (mixed isomers)	6.1E-1			2.0E+0	3.1E-1		
Methyl t-Butyl ether	1.6E-2			1.0E-2	1.6E+0		
Naphthalene	1.4E-2			4.0E-1	3.5E-2		
Phenol	1.0E-2			6.0E-1	1.7E-2		
Total Pathway Hazard Index =					**8.9E+1**		

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 18-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT | **Baseline Risk Summary-All Pathways**

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 18-Jul-00

TIER 1 BASELINE RISK SUMMARY TABLE

EXPOSURE PATHWAY	BASELINE CARCINOGENIC RISK: Individual COC Risk – Maximum Value	Individual COC Risk – Target Risk	Cumulative COC Risk – Total Value	Cumulative COC Risk – Target Risk	Risk Limit(s) Exceeded?	BASELINE TOXIC EFFECTS: Hazard Quotient – Maximum Value	Hazard Quotient – Applicable Limit	Hazard Index – Total Value	Hazard Index – Applicable Limit	Toxicity Limit(s) Exceeded?
OUTDOOR AIR EXPOSURE PATHWAYS										
Complete:	5.4E-7	1.0E-6	5.4E-7	1.0E-5	☐	2.5E-2	1.0E+0	2.7E-2	1.0E+0	☐
INDOOR AIR EXPOSURE PATHWAYS										
Complete:	1.0E-4	1.0E-6	1.0E-4	1.0E-5	■	4.9E+0	1.0E+0	5.1E+0	1.0E+0	■
SOIL EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	☐	NA	NA	NA	NA	☐
GROUNDWATER EXPOSURE PATHWAYS										
Complete:	3.2E-3	1.0E-6	3.2E-3	1.0E-5	■	8.5E+1	1.0E+0	8.9E+1	1.0E+0	■
SURFACE WATER EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	☐	NA	NA	NA	NA	☐
CRITICAL EXPOSURE PATHWAY (Maximum Values From Complete Pathways)										
	3.2E-3	***1.0E-6***	***3.2E-3***	***1.0E-5***	■	***8.5E+1***	***1.0E+0***	***8.9E+1***	***1.0E+0***	■
	Groundwater		***Groundwater***			***Groundwater***		***Groundwater***		

RBCA SITE ASSESSMENT

Chemical-Specific Tier 1 Cleanup Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 18-Jul-00
Job ID: 971275

Constituent: Benzene **CAS No.: 71-43-2**

Risk-Based Screening Level (RBSL) Concentrations

		On-site
Groundwater Ingestion		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	1.1E-1
	TR = 1e-6	2.9E-3
Soil Leaching to Groundwater Ingestion		
Receptor Type / Distance (ft)		Residential / 0
RBSLs (mg/kg)	THQ = 1e+0	1.7E-1
	TR = 1e-6	4.5E-3
Surface Soil Ingestion and Dermal Contact		
Receptor Type / Distance (ft)		None
RBSLss (mg/kg)	THQ = 1e+0	NA
	TR = 1e-6	NA
Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBELair (µg/m3)	THQ = 1e+0	6.2E+0
	TR = 1e-6	2.9E-1
Soil Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Res./Constr. / 0
RBSLs (mg/kg)	THQ = 1e+0	#DIV/0!
	TR = 1e-6	#DIV/0!
Groundwater Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	5.2E+2
	TR = 1e-6	2.5E+1
Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBELair (µg/m3)	THQ = 1e+0	6.2E+0
	TR = 1e-6	2.9E-1
Soil Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLs (mg/kg)	THQ = 1e+0	1.6E+0
	TR = 1e-6	7.7E-2
Groundwater Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	2.8E+0
	TR = 1e-6	1.3E-1

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	7.8E+1	PS
Sol	(mg/L)	1.8E+3	PS
P_{vap}	(mmHg)	9.5E+1	PS
H_{atm}	(atm-m^3/mol)	5.6E-3	PS
pK_a	(log[mol/mol])	-	-
pK_b	(log[mol/mol])	-	-
log(K_{oc})	(log[L/kg])	1.8E+0	PS
D_{air}	(cm^2/sec)	8.8E-2	PS
D_{wat}	(cm^2/sec)	9.8E-6	PS
Toxicity Data			
Wt of Evd.		A	
SF_o	(1/[mg/kg/day])	2.9E-2	PS
SF_d	(1/[mg/kg/day])	3.0E-2	TX
URF_i	(1/[µg/m^3])	8.3E-6	PS
RfD_o	(mg/kg/day)	3.0E-3	R
RfD_d	(mg/kg/day)	-	-
RfC_i	(mg/m^3)	6.0E-3	R
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-1	D
K_p	(cm/hr)	2.1E-2	
tau_d	(hr/event)	2.6E-1	
t_{crit}	(hr)	6.3E-1	
B	(-)	1.3E-2	
Regulatory Standards			
MCL	(mg/L)	5.0E-3	*
TWA	(mg/m^3)	3.3E+0	PS
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	2.0E-3	S
ADL_s	(mg/kg)	5.0E-3	S
$t_{1/2,sat}$	(d)		H
$t_{1/2,unsat}$	(d)		H

* MCL ref = 52 FR 25690

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VFss	(kg-soil/L-air)	NC	NA	NC
VFsamb	(kg-soil/L-air)	1.9E-5	NA	5.4E-5
VFwamb	(L-wat/L-air)	1.2E-5	NA	1.2E-5
VFsesp	(kg-soil/L-air)	3.8E-3	NA	NA
VFwesp	(L-wat/L-air)	2.2E-3	NA	NA
LF	(kg-soil/L-wat)	All exposures: 6.5E-1		NA

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	2.3E-1
K_{sw}	(L-wat/kg-soil)	1.5E+0
C_{sat}	(mg/kg-soil)	1.1E+3
$C_{sat,vap}$	(µg/m^3-air)	4.0E+5
$D_{eff,s}$	(cm^2/sec)	3.2E-3
$D_{eff,crk}$	(cm^2/sec)	5.9E-4
$D_{eff,cap}$	(cm^2/sec)	2.7E-5
$D_{eff,ws}$	(cm^2/sec)	1.8E-3
R_{sat}	(-)	
R_{unsat}	(-)	1.4E+1
Z	(cm/event)	7.3E-2

NA = Not applicable; NC = Not calculated.

Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT | **Chemical-Specific Tier 1 Cleanup Summary**

Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, California | Date Completed: 18-Jul-00

Constituent: Toluene **CAS No.: 108-88-3**

Risk-Based Screening Level (RBSL) Concentrations

		On-site
Groundwater Ingestion		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	7.3E+0
	TR = 1e-6	NC
Soil Leaching to Groundwater Ingestion		
Receptor Type / Distance (ft)		Residential / 0
RBSLs (mg/kg)	THQ = 1e+0	2.4E+1
	TR = 1e-6	NC
Surface Soil Ingestion and Dermal Contact		
Receptor Type / Distance (ft)		None
RBSLss (mg/kg)	THQ = 1e+0	NA
	TR = 1e-6	NA
Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBELair (µg/m3)	THQ = 1e+0	4.2E+2
	TR = 1e-6	NC
Soil Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Res./Constr. / 0
RBSLs (mg/kg)	THQ = 1e+0	#DIV/0!
	TR = 1e-6	NC
Groundwater Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	>5.2E+2
	TR = 1e-6	NC
Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBELair (µg/m3)	THQ = 1e+0	4.2E+2
	TR = 1e-6	NC
Soil Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLs (mg/kg)	THQ = 1e+0	2.2E+2
	TR = 1e-6	NC
Groundwater Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	1.7E+2
	TR = 1e-6	NC

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VFss	(kg-soil/L-air)	NC	NA	NC
VFsamb	(kg-soil/L-air)	1.9E-5	NA	2.7E-5
VFwamb	(L-wat/L-air)	1.3E-5	NA	1.3E-5
VFsesp	(kg-soil/L-air)	1.9E-3	NA	NA
VFwesp	(L-wat/L-air)	2.4E-3	NA	NA
LF	(kg-soil/L-wat)	All exposures: 3.0E-1		NA

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	9.2E+1	5
Sol	(mg/L)	5.2E+2	29
P_{vap}	(mmHg)	3.0E+1	4
H_{atm}	(atm-m^3/mol)	6.3E-3	A
pK_a	(log[mol/mol])	-	-
pK_b	(log[mol/mol])	-	-
log(K_{oc})	(log[L/kg])	2.1E+0	A
D_{air}	(cm^2/sec)	8.5E-2	A
D_{wat}	(cm^2/sec)	9.4E-6	A
Toxicity Data			
Wt of Evd.		D	
SF_o	(1/[mg/kg/day])	-	-
SF_d	(1/[mg/kg/day])	-	-
URF_i	(1/[µg/m^3])	-	-
RfD_o	(mg/kg/day)	2.0E-1	A,R
RfD_d	(mg/kg/day)	1.6E-1	TX
RfC_i	(mg/m^3)	4.0E-1	A,R
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-1	D
K_p	(cm/hr)	4.5E-2	
tau_d	(hr/event)	3.2E-1	
t_{crit}	(hr)	7.7E-1	
B	(-)	5.4E-2	
Regulatory Standards			
MCL	(mg/L)	1.0E+0	*
TWA	(mg/m^3)	1.5E+2	ACGIH
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	2.0E-3	S
ADL_s	(mg/kg)	5.0E-3	S
$t_{1/2,sat}$	(d)		H
$t_{1/2,unsat}$	(d)		H

* MCL ref = 56 FR 3526 (30 Jan 91)

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	2.6E-1
K_{sw}	(L-wat/kg-soil)	7.1E-1
C_{sat}	(mg/kg-soil)	7.3E+2
$C_{sat,vap}$	(µg/m^3-air)	1.5E+5
$D_{eff,s}$	(cm^2/sec)	3.1E-3
$D_{eff,crk}$	(cm^2/sec)	5.7E-4
$D_{eff,cap}$	(cm^2/sec)	2.5E-5
$D_{eff,ws}$	(cm^2/sec)	1.8E-3
R_{sat}	(-)	
R_{unsat}	(-)	3.1E+1
Z	(cm/event)	1.6E-1

NA = Not applicable; NC = Not calculated.

Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT

Chemical-Specific Tier 1 Cleanup Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 18-Jul-00
Job ID: 971275

Constituent: Ethylbenzene **CAS No.: 100-41-4**

Risk-Based Screening Level (RBSL) Concentrations

		On-site
Groundwater Ingestion		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	3.7E+0
	TR = 1e-6	NC
Soil Leaching to Groundwater Ingestion		
Receptor Type / Distance (ft)		Residential / 0
RBSLs (mg/kg)	THQ = 1e+0	3.2E+1
	TR = 1e-6	NC
Surface Soil Ingestion and Dermal Contact		
Receptor Type / Distance (ft)		None
RBSLss (mg/kg)	THQ = 1e+0	NA
	TR = 1e-6	NA
Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBELair (µg/m3)	THQ = 1e+0	1.0E+3
	TR = 1e-6	NC
Soil Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Res./Constr. / 0
RBSLs (mg/kg)	THQ = 1e+0	#DIV/0!
	TR = 1e-6	NC
Groundwater Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	>1.7E+2
	TR = 1e-6	NC
Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBELair (µg/m3)	THQ = 1e+0	1.0E+3
	TR = 1e-6	NC
Soil Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLs (mg/kg)	THQ = 1e+0	>6.2E+2
	TR = 1e-6	NC
Groundwater Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	>1.7E+2
	TR = 1e-6	NC

Chemical Parameters

		Units	Value	Reference
Physical Properties				
MW		(g/mol)	1.1E+2	PS
Sol		(mg/L)	1.7E+2	PS
P_{vap}		(mmHg)	1.0E+1	PS
H_{atm}		(atm-m^3/mol)	7.9E-3	PS
pK_a		(log[mol/mol])	-	-
pK_b		(log[mol/mol])	-	-
log(K_{oc})		(log[L/kg])	2.6E+0	PS
D_{air}		(cm^2/sec)	7.5E-2	PS
D_{wat}		(cm^2/sec)	7.8E-6	PS
Toxicity Data				
Wt of Evd.			D	
SF_o		(1/[mg/kg/day])	-	-
SF_d		(1/[mg/kg/day])	-	-
URF_i		(1/[µg/m^3])	-	-
RfD_o		(mg/kg/day)	1.0E-1	PS
RfD_d		(mg/kg/day)	9.7E-2	TX
RfC_i		(mg/m^3)	1.0E+0	PS
Dermal Exposure Parameters				
RAF_d		(mg/mg)	5.0E-1	D
K_p		(cm/hr)	7.4E-2	
tau_d		(hr/event)	3.9E-1	
t_{crit}		(hr)	1.3E+0	
B		(-)	1.4E-1	
Regulatory Standards				
MCL		(mg/L)	7.0E-1	*
TWA		(mg/m^3)	4.4E+2	PS
AQL		(mg/L)	-	-
Miscellaneous Parameters				
ADL_{gw}		(mg/L)	2.0E-3	S
ADL_s		(mg/kg)	5.0E-3	S
$t_{1/2,sat}$		(d)		H
$t_{1/2,unsat}$		(d)		H

* MCL ref = 56 FR 3526 (30 Jan 91)

		Units	Residential	Commercial	Construction
Cross-Media Transfer Factors					
VFss		(kg-soil/L-air)	NC	NA	NC
VFsamb		(kg-soil/L-air)	1.1E-5	NA	1.1E-5
VFwamb		(L-wat/L-air)	1.4E-5	NA	1.4E-5
VFsesp		(kg-soil/L-air)	8.0E-4	NA	NA
VFwesp		(L-wat/L-air)	2.7E-3	NA	NA
LF		(kg-soil/L-wat)	All exposures: 1.1E+1		NA

		Units	Value
Derived Parameters			
H		(L-wat/L-air)	3.2E-1
K_{sw}		(L-wat/kg-soil)	2.7E-1
C_{sat}		(mg/kg-soil)	6.2E+2
$C_{sat,vap}$		(µg/m^3-air)	5.8E+4
$D_{eff,s}$		(cm^2/sec)	2.8E-3
$D_{eff,crk}$		(cm^2/sec)	5.0E-4
$D_{eff,cap}$		(cm^2/sec)	2.1E-5
$D_{eff,ws}$		(cm^2/sec)	1.5E-3
R_{sat}		(-)	
R_{unsat}		(-)	8.1E+1
Z		(cm/event)	2.7E-1

NA = Not applicable; NC = Not calculated.

Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT | **Chemical-Specific Tier 1 Cleanup Summary**

Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, California | Date Completed: 18-Jul-00 |

Constituent: Xylene (mixed isomers) **CAS No.: 1330-20-7**

Risk-Based Screening Level (RBSL) Concentrations

		On-site
Groundwater Ingestion		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	7.3E+1
	TR = 1e-6	NC
Soil Leaching to Groundwater Ingestion		
Receptor Type / Distance (ft)		Residential / 0
RBSLs (mg/kg)	THQ = 1e+0	4.3E+2
	TR = 1e-6	NC
Surface Soil Ingestion and Dermal Contact		
Receptor Type / Distance (ft)		None
RBSLss (mg/kg)	THQ = 1e+0	NA
	TR = 1e-6	NA
Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBELair (µg/m3)	THQ = 1e+0	7.3E+3
	TR = 1e-6	NC
Soil Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Res./Constr. / 0
RBSLs (mg/kg)	THQ = 1e+0	#DIV/0!
	TR = 1e-6	NC
Groundwater Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	>2.0E+2
	TR = 1e-6	NC
Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBELair (µg/m3)	THQ = 1e+0	7.3E+3
	TR = 1e-6	NC
Soil Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLs (mg/kg)	THQ = 1e+0	>4.9E+2
	TR = 1e-6	NC
Groundwater Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	>2.0E+2
	TR = 1e-6	NC

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	1.1E+2	5
Sol	(mg/L)	2.0E+2	5
P_{vap}	(mmHg)	7.0E+0	4
H_{atm}	(atm-m^3/mol)	7.0E-3	A
pK_a	(log[mol/mol])	-	-
pK_b	(log[mol/mol])	-	-
log(K_{oc})	(log[L/kg])	2.4E+0	A
D_{air}	(cm^2/sec)	7.2E-2	A
D_{wat}	(cm^2/sec)	8.5E-6	A
Toxicity Data			
Wt of Evd.		D	
SF_o	(1/[mg/kg/day])	-	-
SF_d	(1/[mg/kg/day])	-	-
URF_i	(1/[µg/m^3])	-	-
RfD_o	(mg/kg/day)	2.0E+0	A,R
RfD_d	(mg/kg/day)	1.8E+0	TX
RfC_i	(mg/m^3)	7.0E+0	A
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-1	D
K_p	(cm/hr)	8.0E-2	
tau_d	(hr/event)	3.9E-1	
t_{crit}	(hr)	1.4E+0	
B	(-)	1.6E-1	
Regulatory Standards			
MCL	(mg/L)	1.0E+1	*
TWA	(mg/m^3)	4.3E+2	ACGIH
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	5.0E-3	S
ADL_s	(mg/kg)	5.0E-3	S
$t_{1/2,sat}$	(d)		H
$t_{1/2,unsat}$	(d)		H

* MCL ref = 56 FR 3526 (30 Jan 91)

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VFss	(kg-soil/L-air)	NC	NA	NC
VFsamb	(kg-soil/L-air)	1.5E-5	NA	1.5E-5
VFwamb	(L-wat/L-air)	1.2E-5	NA	1.2E-5
VFsesp	(kg-soil/L-air)	1.0E-3	NA	NA
VFwesp	(L-wat/L-air)	2.3E-3	NA	NA
LF	(kg-soil/L-wat)	All exposures: 1.7E-1		NA

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	2.9E-1
K_{sw}	(L-wat/kg-soil)	4.1E-1
C_{sat}	(mg/kg-soil)	4.9E+2
$C_{sat,vap}$	(µg/m^3-air)	4.0E+4
$D_{eff,a}$	(cm^2/sec)	2.6E-3
$D_{eff,crk}$	(cm^2/sec)	4.8E-4
$D_{eff,cap}$	(cm^2/sec)	2.1E-5
$D_{eff,ws}$	(cm^2/sec)	1.5E-3
R_{sat}	(-)	
R_{unsat}	(-)	5.4E+1
Z	(cm/event)	2.9E-1

NA = Not applicable; NC = Not calculated.

Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT — Chemical-Specific Tier 1 Cleanup Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 18-Jul-00
Job ID: 971275

Constituent: Methyl t-Butyl ether **CAS No.: 1634-04-4**

Risk-Based Screening Level (RBSL) Concentrations

		On-site
Groundwater Ingestion		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	3.7E-1
	TR = 1e-6	NC
Soil Leaching to Groundwater Ingestion		
Receptor Type / Distance (ft)		Residential / 0
RBSLs (mg/kg)	THQ = 1e+0	1.4E-1
	TR = 1e-6	NC
Surface Soil Ingestion and Dermal Contact		
Receptor Type / Distance (ft)		None
RBSLss (mg/kg)	THQ = 1e+0	NA
	TR = 1e-6	NA
Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBELair (µg/m3)	THQ = 1e+0	3.1E+3
	TR = 1e-6	NC
Soil Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Res./Constr. / 0
RBSLs (mg/kg)	THQ = 1e+0	#DIV/0!
	TR = 1e-6	NC
Groundwater Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	>4.8E+4
	TR = 1e-6	NC
Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBELair (µg/m3)	THQ = 1e+0	3.1E+3
	TR = 1e-6	NC
Soil Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLs (mg/kg)	THQ = 1e+0	1.4E+3
	TR = 1e-6	NC
Groundwater Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	9.1E+3
	TR = 1e-6	NC

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	8.8E+1	5
Sol	(mg/L)	4.8E+4	A
P_{vap}	(mmHg)	2.5E+2	-
H_{atm}	(atm-m^3/mol)	5.8E-4	-
pK_a	(log[mol/mol])	-	-
pK_b	(log[mol/mol])	-	-
$\log(K_{oc})$	(log[L/kg])	1.1E+0	A
D_{air}	(cm^2/sec)	7.9E-2	6
D_{wat}	(cm^2/sec)	9.4E-5	7
Toxicity Data			
Wt of Evd.		-	
SF_o	(1/[mg/kg/day])	-	-
SF_d	(1/[mg/kg/day])	-	-
URF_i	(1/[µg/m^3])	-	-
RfD_o	(mg/kg/day)	1.0E-2	31
RfD_d	(mg/kg/day)	8.0E-3	TX
RfC_i	(mg/m^3)	3.0E+0	R
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-1	*
K_p	(cm/hr)	-	
tau_d	(hr/event)	-	
t_{crit}	(hr)	-	
B	(-)	-	
Regulatory Standards			
MCL	(mg/L)	-	*
TWA	(mg/m^3)	6.0E+1	NIOSH
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	-	-
ADL_s	(mg/kg)	-	-
$t_{1/2,sat}$	(d)		H
$t_{1/2,unsat}$	(d)		H

* MCL ref = -

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VFss	(kg-soil/L-air)	NC	NA	NC
VFsamb	(kg-soil/L-air)	1.9E-5	NA	2.0E-5
VFwamb	(L-wat/L-air)	1.9E-6	NA	1.9E-6
VFsesp	(kg-soil/L-air)	2.2E-3	NA	NA
VFwesp	(L-wat/L-air)	3.4E-4	NA	NA
LF	(kg-soil/L-wat)	All exposures: 2.5E+0		NA

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	2.4E-2
K_{sw}	(L-wat/kg-soil)	6.0E+0
C_{sat}	(mg/kg-soil)	8.0E+3
$C_{sat,vap}$	(µg/m^3-air)	1.2E+6
$D_{eff,a}$	(cm^2/sec)	3.0E-3
$D_{eff,crk}$	(cm^2/sec)	8.7E-4
$D_{eff,cap}$	(cm^2/sec)	5.1E-4
$D_{eff,ws}$	(cm^2/sec)	2.9E-3
R_{sat}	(-)	
R_{unsat}	(-)	3.7E+0
Z	(cm/event)	-

NA = Not applicable; NC = Not calculated.

Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT

Chemical-Specific Tier 1 Cleanup Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 18-Jul-00
Job ID: 971275

Constituent: Naphthalene **CAS No.: 91-20-3**

Risk-Based Screening Level (RBSL) Concentrations

		On-site
Groundwater Ingestion		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	1.5E+1
	TR = 1e-6	NC
Soil Leaching to Groundwater Ingestion		
Receptor Type / Distance (ft)		Residential / 0
RBSLs (mg/kg)	THQ = 1e+0	>6.2E+2
	TR = 1e-6	NC
Surface Soil Ingestion and Dermal Contact		
Receptor Type / Distance (ft)		None
RBSLss (mg/kg)	THQ = 1e+0	NA
	TR = 1e-6	NA
Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBELair (µg/m3)	THQ = 1e+0	1.5E+3
	TR = 1e-6	NC
Soil Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Res./Constr. / 0
RBSLs (mg/kg)	THQ = 1e+0	#DIV/0!
	TR = 1e-6	NC
Groundwater Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	>3.1E+1
	TR = 1e-6	NC
Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBELair (µg/m3)	THQ = 1e+0	1.5E+3
	TR = 1e-6	NC
Soil Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLs (mg/kg)	THQ = 1e+0	>6.2E+2
	TR = 1e-6	NC
Groundwater Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	>3.1E+1
	TR = 1e-6	NC

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	1.3E+2	PS
Sol	(mg/L)	3.1E+1	PS
P_{vap}	(mmHg)	2.3E-1	PS
H_{atm}	(atm-m^3/mol)	4.8E-4	PS
pK_a	(log[mol/mol])	-	-
pK_b	(log[mol/mol])	-	-
$\log(K_{oc})$	(log[L/kg])	3.3E+0	PS
D_{air}	(cm^2/sec)	5.9E-2	PS
D_{wat}	(cm^2/sec)	7.5E-6	PS
Toxicity Data			
Wt of Evd.		D	
SF_o	(1/[mg/kg/day])	-	-
SF_d	(1/[mg/kg/day])	-	-
URF_i	(1/[µg/m^3])	-	-
RfD_o	(mg/kg/day)	4.0E-1	PS
RfD_d	(mg/kg/day)	3.6E-1	TX
RfC_i	(mg/m^3)	1.4E+0	PS
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-2	D
K_p	(cm/hr)	6.9E-2	
tau_d	(hr/event)	5.3E-1	
t_{crit}	(hr)	2.2E+0	
B	(-)	2.0E-1	
Regulatory Standards			
MCL	(mg/L)	-	*
TWA	(mg/m^3)	5.0E+1	PS
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	1.0E-2	32
ADL_s	(mg/kg)	1.0E-2	32
$t_{1/2,sat}$	(d)		H
$t_{1/2,unsat}$	(d)		H

* MCL ref = -

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VFss	(kg-soil/L-air)	NC	NA	NC
VFsamb	(kg-soil/L-air)	1.0E-7	NA	1.0E-7
VFwamb	(L-wat/L-air)	1.0E-6	NA	1.0E-6
VFsesp	(kg-soil/L-air)	7.7E-6	NA	NA
VFwesp	(L-wat/L-air)	1.5E-4	NA	NA
LF	(kg-soil/L-wat)	All exposures: 2.1E-2		NA

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	2.0E-2
K_{sw}	(L-wat/kg-soil)	5.0E-2
C_{sat}	(mg/kg-soil)	6.2E+2
$C_{sat,vap}$	(µg/m^3-air)	1.6E+3
$D_{eff,s}$	(cm^2/sec)	2.2E-3
$D_{eff,crk}$	(cm^2/sec)	4.3E-4
$D_{eff,cap}$	(cm^2/sec)	6.2E-5
$D_{eff,ws}$	(cm^2/sec)	1.8E-3
R_{sat}	(-)	
R_{unsat}	(-)	4.4E+2
Z	(cm/event)	2.7E-1

NA = Not applicable; NC = Not calculated.

Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT

Chemical-Specific Tier 1 Cleanup Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 18-Jul-00

Job ID: 971275

Constituent: Phenol **CAS No.: 108-95-2**

Risk-Based Screening Level (RBSL) Concentrations

		On-site
Groundwater Ingestion		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	2.2E+1
	TR = 1e-6	NC
Soil Leaching to Groundwater Ingestion		
Receptor Type / Distance (ft)		Residential / 0
RBSLs (mg/kg)	THQ = 1e+0	1.7E+1
	TR = 1e-6	NC
Surface Soil Ingestion and Dermal Contact		
Receptor Type / Distance (ft)		None
RBSLss (mg/kg)	THQ = 1e+0	NA
	TR = 1e-6	NA
Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBELair (µg/m3)	THQ = 1e+0	>1.7E+3
	TR = 1e-6	NC
Soil Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Res./Constr. / 0
RBSLs (mg/kg)	THQ = 1e+0	#DIV/0!
	TR = 1e-6	NC
Groundwater Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	>8.3E+4
	TR = 1e-6	NC
Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBELair (µg/m3)	THQ = 1e+0	>1.7E+3
	TR = 1e-6	NC
Soil Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLs (mg/kg)	THQ = 1e+0	>2.8E+4
	TR = 1e-6	NC
Groundwater Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	>8.3E+4
	TR = 1e-6	NC

Chemical Parameters

		Units	Value	Reference
Physical Properties				
MW		(g/mol)	9.4E+1	PS
Sol		(mg/L)	8.3E+4	PS
P_{vap}		(mmHg)	3.4E-1	PS
H_{atm}		(atm-m^3/mol)	4.0E-7	PS
pK_a		(log[mol/mol])	1.0E+1	PS
pK_b		(log[mol/mol])	-	PS
$\log(K_{oc})$		(log[L/kg])	1.5E+0	PS
D_{air}		(cm^2/sec)	8.2E-2	PS
D_{wat}		(cm^2/sec)	9.1E-6	PS
Toxicity Data				
Wt of Evd.			D	
SF_o		(1/[mg/kg/day])	-	-
SF_d		(1/[mg/kg/day])	-	-
URF_i		(1/[µg/m^3])	-	-
RfD_o		(mg/kg/day)	6.0E-1	PS
RfD_d		(mg/kg/day)	5.4E-1	TX
RfC_i		(mg/m^3)	2.1E+0	PS
Dermal Exposure Parameters				
RAF_d		(mg/mg)	5.0E-1	D
K_p		(cm/hr)	5.5E-3	
tau_d		(hr/event)	3.3E-1	
t_{crit}		(hr)	7.9E-1	
B		(-)	2.9E-3	
Regulatory Standards				
MCL		(mg/L)	-	*
TWA		(mg/m^3)	1.9E+1	PS
AQL		(mg/L)	-	-
Miscellaneous Parameters				
ADL_{gw}		(mg/L)	1.0E-2	32
ADL_s		(mg/kg)	6.6E-1	32
$t_{1/2,sat}$		(d)		H
$t_{1/2,unsat}$		(d)		H

* MCL ref = -

Cross-Media Transfer Factors

		Units	Residential	Commercial	Construction
Cross-Media Transfer Factors					
VFss		(kg-soil/L-air)	NC	NA	NC
VFsamb		(kg-soil/L-air)	1.9E-8	NA	1.9E-8
VFwamb		(L-wat/L-air)	3.9E-9	NA	3.9E-9
VFsesp		(kg-soil/L-air)	1.7E-5	NA	NA
VFwesp		(L-wat/L-air)	3.9E-6	NA	NA
LF		(kg-soil/L-wat)	All exposures: 1.3E+0		NA

Derived Parameters

	Units	Value
H	(L-wat/L-air)	1.6E-5
K_{sw}	(L-wat/kg-soil)	3.0E+0
C_{sat}	(mg/kg-soil)	2.8E+4
$C_{sat,vap}$	(µg/m^3-air)	1.7E+3
$D_{eff,s}$	(cm^2/sec)	8.3E-3
$D_{eff,crk}$	(cm^2/sec)	4.8E-2
$D_{eff,cap}$	(cm^2/sec)	7.0E-2
$D_{eff,ws}$	(cm^2/sec)	8.4E-3
R_{sat}	(-)	
R_{unsat}	(-)	7.4E+0
Z	(cm/event)	2.0E-2

NA = Not applicable; NC = Not calculated.

Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT

Chemical-Specific Tier 1 Cleanup Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 18-Jul-00

Definitions

Risk-Based Screening Level Concentrations	
RBSLgw	Risk-based screening level for groundwater (mg/L)
RBSLs	Risk-based screening level for soil (mg/kg)
RBELair	Risk-based exposure limit for air (µg/m3)
THQ	Target hazard quotient
TR	Target risk

Cross-Media Transfer Factors	
VF_{ss}	Volatilization factor, surface soil to outdoor air (kg-soil/L-air)
VF_{samb}	Volatilization factor, subsurface soil to outdoor air (kg-soil/L-air)
VF_{wamb}	Volatilization factor, groundwater to outdoor air (L-wat/L-air)
VF_{sesp}	Volatilization factor, subsurface soil to indoor air (kg-soil/L-air)
VF_{wesp}	Volatilization factor, groundwater to indoor air (L-wat/L-air)
LF	Leaching factor, soil to groundwater (kg-soil/L-wat)

Cross-Media Transfer Factors	
DAF_{gw}	Dilution-attenuation factor, groundwater (-)
DAF_{sgw}	Dilution-attenuation factor, soil leaching to groundwater (-)

Physical Properties	
MW	Molecular weight (g/mol)
Sol	Aqueous solubility limit (mg/L)
P_{vap}	Vapor pressure (mmHg)
H_{atm}	Henry's Law constant (atm-m^3/mol)
pK_a	Acid ionization constant (log[mol/mol])
pK_b	Base ionization constant (log[mol/mol])
K_{oc}	Organic carbon/Water partition coeffiecient (L/kg)
K_d	Soil/Water distribution coeffient (L/kg)
D_{air}	Molecular diffusion coeffient in air (cm^2/sec)
D_{wat}	Molecular diffusion coeffient in water (cm^2/sec)

Toxicity Data	
Wt of Evd.	Weight of evidence
SF_o	Oral slope factor for carcinogens (1/[mg/kg/day])
SF_d	Dermal slope factor for carcinogens (1/[mg/kg/day])
URF_i	Inhalation unit risk facor for carcinogens (1/[µg/m^3])
RfD_o	Oral reference dose (mg/kg/day)
RfD_d	Dermal reference dose (mg/kg/day)
RfC_i	Inhalation reference concentration (mg/m^3)

Dermal Exposure Parameters	
RAF_d	Dermal relative absorption factor (mg/mg)
K_p	Dermal permeability coeff. (cm/hr)
tau_d	Lag time for dermal exposure (hr/event)
t_{crit}	Critical exposure time (hr)
B	Relative contribution of permeability coeff. (-)

Regulatory Standards	
MCL	Maximum contaminant level for drinking water protection (mg/L)
TWA	Time-weighted average workplace air criterion (mg/m^3)
AQL	Aquatic life protection criterion (mg/L)

Miscellaneous Parameters	
ADL_{gw}	Analytical detection limit in groundwater (mg/L)
ADL_s	Analytical detection limit in soil (mg/kg)
$t_{1/2,sat}$	Half life, saturated zone (d)
$t_{1/2,unsat}$	Half life, unsaturated zone (d)

Derived Parameters	
H	Dimensionless Henry's Law contant (L-wat/L-air)
K_{sw}	Soil to pore-water partitioning factor (L-wat/kg-soil)
C_{sat}	Saturated residual conc. in vadose zone soils (mg/kg-soil)
$C_{sat,vap}$	Saturated concentration in vapors (mg/m3-air)
$D_{eff,s}$	Effective diffusion coeff. in vadose zone soils (cm^2/sec)
$D_{eff,crk}$	Effective diffusion coeff. in foundation cracks (cm^2/sec)
$D_{eff,cap}$	Effective diffusion coeff. in capillary zone (cm^2/sec)
$D_{eff,ws}$	Effective diffusion coeff., water table to ground surface (cm^2/sec)
R_{sat}	Retardation factor, saturated zone (-)
R_{unsat}	Retardation factor, unsaturated zone (-)
Z	Water to skin dermal absorption factor (cm/event)

Chemical Parameter References

PS	Standard Provisional Guide for Risk-Based Corrective Action, ASTM PS 104-98.
A	Emergency Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites.
D	USEPA, Dermal Exposure Assessment: Principles and Applications, ORD, EPA/600/8-91/011B.
H	Howard, Handbook of Environmental Degradation Rates, Lewis Publishers, Chelsea, MI, 1989
R	EPA Region III Risk Based Concentration Table, EPA Region 3, March 7, 1995.
S	USEPA, Test Methods for Evaluating Solid Waste, SW-846, Third Edition, OSWER, November 1986.
T	TPH Criteria Working Group, 1996.
TX	TNRCC Risk-Based Corrective Action for Leaking Storage Tank Sites, January 1994.
3	based on Kow from (2) and DiToro, D. M., 1985:"A Particle Interaction Model of Reversible Organic Chemical Sorption", Chemosphere, 14(10), 1505-1538. log(Koc) = 0.00028 + 0.983 log(Kow)
4	USEPA, 1989: Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF) - USEPA, OAQPS, Air Emission Models, (EPA-450/3-87-026).
5	Verschueren, Karel, 1983: Handbook of Environmental data on organic Chemicals, Second Ed., (Van nostrand Reinhold Company Inc., New York), ISBN: 0-442-28802-6.
6	Calculated diffusivity using the method of Fuller, Schettler, and Giddings from (9).
7	Calculated diffusivity using the method of Hayduk and Laudie and the reference from (9).
8	Calculated using Kenaga ang Goring Kow/solubility regression equation reference (9) and Kow data from (2), log(S, mg/l) = -0.922 log(Kow) + 4.184
9	Handbook of Chemical Property Estimation Methods, 1982, W.J. Lyman, (McGraw-Hill, New York), ISBN -0-07-039175-0.
10	Calculated from (Pv/Patm)/(solubility/mol wt).
11	Back calculated from solubility, Note (8) and (3).
12	Aldrich Chemical Catalog, 1991.
13	Calculated using Modified Watson Correlation from (9) and normal boiling point.
14	USEPA, 1979: Water Related Environmental Fate of 129 Priority Pollutants, Vol.1, USEPA, OWQPS,(EPA-4404-79-029a).
15	The Agrochemicals Handbook, (The Royal Society of Chemistry, The University, Nottingham, England), ISBN 0-85186-406-6.
16	Vapor pressure specified at elevated temperature, adjustments to 25C using methods presented by (9).
17	Wauchope, R. D., T. M. Butler, A. G. Hornsby, P. W. M. Augustijn-Beckers, and J.P. Burt, 1992: "The SCS/ARS/CES Pesticide Properties Database for Environmental Decision Making", Reviews of Environmental Contamination and Toxicology, vol 123, 1-155.
18	Farm Chemicals Handbook 91, C. Sine, ed., (Meister Publishing Company, Willoughby, Ohio).
19	Structure and Nomenclature Search System, (Version 7.007.03) December, 1992.
20	From Syracuse Research Corporation Calculated Value from pcchem-pcgems, 1988. ref no. 255435 in Enlrofate database, Accession no. 105543.
23	NIOSH, 1990: Pocket Guide to Chemical Hazards, (U. S. Dept. of Health & Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health).
24	Buchter, B. et al., 1989: Correlation of Freundlich Kd and N retention Parameters with Soils and Elements, Soil Science, 148, 370-379.
25	USEPA, 1993: Air/Superfund National Technical Guidance Study series: Estimation of Air Impacts for Thermal Desorption Units Used at Superfund Sites, US Environmental Protection Agency, Office of Air Quality Planning and Standards, EPA-451/R-93-005.
26	NTIS Accession No. PB93-215630, April 1993.
27	Based on salt solubilities in Table 3-120, R. H. Perry and D. W. Green, "Perry's Chemical Engineering Handbook" Sixth Edition, (McGraw-Hill, New York), 1973.
28	Based on salt solubilities in Table of Physical Constants for Inorganic Compounds, Weast, R. C., CRC Handbook of Chemistry and Physics, 67th edition, (CRC Press, Inc., Boca Raton), 1987.
29	Montgomery and Welkom, "Groundwater Chemicals Desk Reference", Lewis Publishers, Chelsea, MI. 1990.
30	USEPA, 1996: Soil Screening Guidance: Technical Background Doc., (EPA/540/R-95/128)
31	TNRCC Risk Reduction Rule Implementation, July 23, 1998. (update to Reference "TX")
32	USEPA, Method 8270C, Revision 3, "Semivolatile Organic Compounds by GC/MS", December 1996.
33	40 CFR 131.36, July 1, 1997
34	40 CFR 141.23, July 1, 1997
35	USEPA, Manual for the Certification of Laboratories Analyzing Drinking Water, EPA 815-B-97-001, March 1997
36	Calculated using Chiou et al. equation reported in (9); S (µmol/L) from (15).
37	Calculated using Chiou et al. equation reported in (9); S (µmol/L) from (23).
38	Calculated using Chiou et al. equation reported in (9); S (µmol/L) from (4).

RBCA SITE ASSESSMENT

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 18-Jul-00
Job ID: 971275

SOIL (15 - 25 ft) RBSL VALUES

Target Risk (Class A & B) 1.0E-6
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 1.0E+0

RBSL Results For Complete Exposure Pathways ("X" If Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	X Soil Leaching to Groundwater Ingestion			X Soil Vol. to Indoor Air	X Soil Volatilization to Outdoor Air				Surface Soil Inhalation, Ingestion, Dermal Contact		Applicable RBSL	RBSL Exceeded ?	Required CRF
			On-site (0 ft)	NA	NA	On-site (0 ft)	On-site (0 ft)		NA	NA	On-site (0 ft)				Only if "yes" left
CAS No.	Name	(mg/kg)	Residential	NA	NA	Residential	Residential	Construction Worker	NA	NA	None	Construction Worker	(mg/kg)	"■" if yes	
71-43-2	Benzene	2.5E+0	4.5E-3	NA	NA	7.7E-2	1.6E+1	NA	NA	NA	NA	NA	4.5E-3	■	5.5E+2
108-88-3	Toluene	2.1E+1	2.4E+1	NA	NA	2.2E+2	>7.3E+2	NA	NA	NA	NA	NA	2.4E+1	☐	<1
100-41-4	Ethylbenzene	2.0E+1	3.2E+1	NA	NA	>6.2E+2	>6.2E+2	NA	NA	NA	NA	NA	3.2E+1	☐	<1
1330-20-7	Xylene (mixed isomers)	1.3E+2	4.3E+2	NA	NA	>4.9E+2	>4.9E+2	NA	NA	NA	NA	NA	4.3E+2	☐	<1
1634-04-4	Methyl t-Butyl ether	0.0E+0	1.4E-1	NA	NA	1.4E+3	>8.0E+3	NA	NA	NA	NA	NA	1.4E-1	☐	<1
91-20-3	Naphthalene	3.4E+0	>6.2E+2	NA	NA	>6.2E+2	>6.2E+2	NA	NA	NA	NA	NA	>6.2E+2	☐	NA
108-95-2	Phenol	3.0E-1	1.7E+1	NA	NA	>2.8E+4	>2.8E+4	NA	NA	NA	NA	NA	1.7E+1	☐	<1

">" indicates risk-based target concentration greater than constituent residual saturation value. NA = Not applicable. NC = Not calculated.

RBCA SITE ASSESSMENT

Site Name: Arrow Rentals
Completed By: Aquifer Sciences, Inc.
Job ID: 971275
Site Location: 187 North L Street, Livermore, California
Date Completed: 18-Jul-00

GROUNDWATER RBSL VALUES

Target Risk (Class A & B) 1.0E-6
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 1.0E+0

RBSL Results For Complete Exposure Pathways ("X" if Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	X Groundwater Ingestion			X GW Vol. to Indoor Air	X Groundwater Volatilization to Outdoor Air			Applicable RBSL	RBSL Exceeded ?	Required CRF
			On-site (0 ft)	NA	NA	On-site (0 ft)	On-site (0 ft)	NA	NA			Only if "yes" left
CAS No.	Name	(mg/L)	Residential	NA	NA	Residential	Residential	NA	NA	(mg/L)	"■" if yes	
71-43-2	Benzene	9.3E+0	2.9E-3	NA	NA	1.3E-1	2.5E+1	NA	NA	2.9E-3	■	3.2E+3
108-88-3	Toluene	9.4E+0	7.3E+0	NA	NA	1.7E+2	>5.2E+2	NA	NA	7.3E+0	■	1.3E+0
100-41-4	Ethylbenzene	2.4E+0	3.7E+0	NA	NA	>1.7E+2	>1.7E+2	NA	NA	3.7E+0	□	<1
1330-20-7	Xylene (mixed isomers)	1.4E+1	7.3E+1	NA	NA	>2.0E+2	>2.0E+2	NA	NA	7.3E+1	□	<1
1634-04-4	Methyl t-Butyl ether	5.7E-1	3.7E-1	NA	NA	9.1E+3	>4.8E+4	NA	NA	3.7E-1	■	1.6E+0
91-20-3	Naphthalene	5.1E-1	1.5E+1	NA	NA	>3.1E+1	>3.1E+1	NA	NA	1.5E+1	□	<1
108-95-2	Phenol	0.0E+0	2.2E+1	NA	NA	>8.3E+4	>8.3E+4	NA	NA	2.2E+1	□	<1

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

RBCA SITE ASSESSMENT | **Cumulative Risk Worksheet**

Site Name: Arrow Rentals
Completed By: Aquifer Sciences, Inc.
Job ID: 971275

Site Location: 187 North L Street, Livermore, California
Date Completed: 18-Jul-00

CUMULATIVE RISK WORKSHEET

CONSTITUENTS OF CONCERN		Representative Concentration		Proposed CRF		Resultant Target Concentration	
CAS No.	Name	Soil (mg/kg)	Groundwater (mg/L)	Soil	GW	Soil (mg/kg)	Groundwater (mg/L)
71-43-2	Benzene	2.5E+0	9.3E+0	1.0E+0	1.0E+0	2.5E+0	9.3E+0
108-88-3	Toluene	2.1E+1	9.4E+0	1.0E+0	1.0E+0	2.1E+1	9.4E+0
100-41-4	Ethylbenzene	2.0E+1	2.4E+0	1.0E+0	1.0E+0	2.0E+1	2.4E+0
1330-20-7	Xylene (mixed isomers)	1.3E+2	1.4E+1	1.0E+0	1.0E+0	1.3E+2	1.4E+1
1634-04-4	Methyl t-Butyl ether	0.0E+0	5.7E-1	1.0E+0	1.0E+0	0.0E+0	5.7E-1
91-20-3	Naphthalene	3.4E+0	5.1E-1	1.0E+0	1.0E+0	3.4E+0	5.1E-1
108-95-2	Phenol	3.0E-1	0.0E+0	1.0E+0	1.0E+0	3.0E-1	0.0E+0

Cumulative Values:

RBCA SITE ASSESSMENT | **Cumulative Risk Worksheet**

Site Name: Arrow Rentals | Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, Californi | Site Location: 187 North L Street, Livermore, Californi | Date Completed: 18-Jul-00

CUMULATIVE RISK WORKSHEET

Cumulative Target Risk: 1.0E-5 Target Hazard Index: 1.0E+0

ON-SITE RECEPTORS

CONSTITUENTS OF CONCERN		Outdoor Air Exposure: Residential		Indoor Air Exposure: Residential		Soil Exposure: None		Groundwater Exposure: Residential	
		Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0
CAS No.	Name	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient
71-43-2	Benzene	5.4E-7	2.5E-2	1.0E-4	4.9E+0			3.2E-3	8.5E+1
108-88-3	Toluene		1.2E-3		1.5E-1				1.3E+0
100-41-4	Ethylbenzene		2.5E-4		2.2E-2				6.6E-1
1330-20-7	Xylene (mixed isomers)		2.9E-4		2.3E-2				3.1E-1
1634-04-4	Methyl t-Butyl ether		3.5E-7		6.3E-5				1.6E+0
91-20-3	Naphthalene		5.9E-7		6.9E-5				3.5E-2
108-95-2	Phenol		2.6E-9		2.3E-6				1.7E-2
Cumulative Values:		**5.4E-7**	**2.7E-2**	**1.0E-4** ■	**5.1E+0** ■	**0.0E+0**	**0.0E+0**	**3.2E-3** ■	**8.9E+1** ■

■ indicates risk level exceeding target risk

RBCA SITE ASSESSMENT | **Cumulative Risk Worksheet**

Site Name: Arrow Rentals | Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, Californ | Site Location: 187 North L Street, Livermore, California | Date Completed: 18-Jul-00

CUMULATIVE RISK WORKSHEET

Cumulative Target Risk: 1.0E-5 | Target Hazard Index: 1.0E+0

Groundwater DAF Option: FALSE

OFF-SITE RECEPTORS

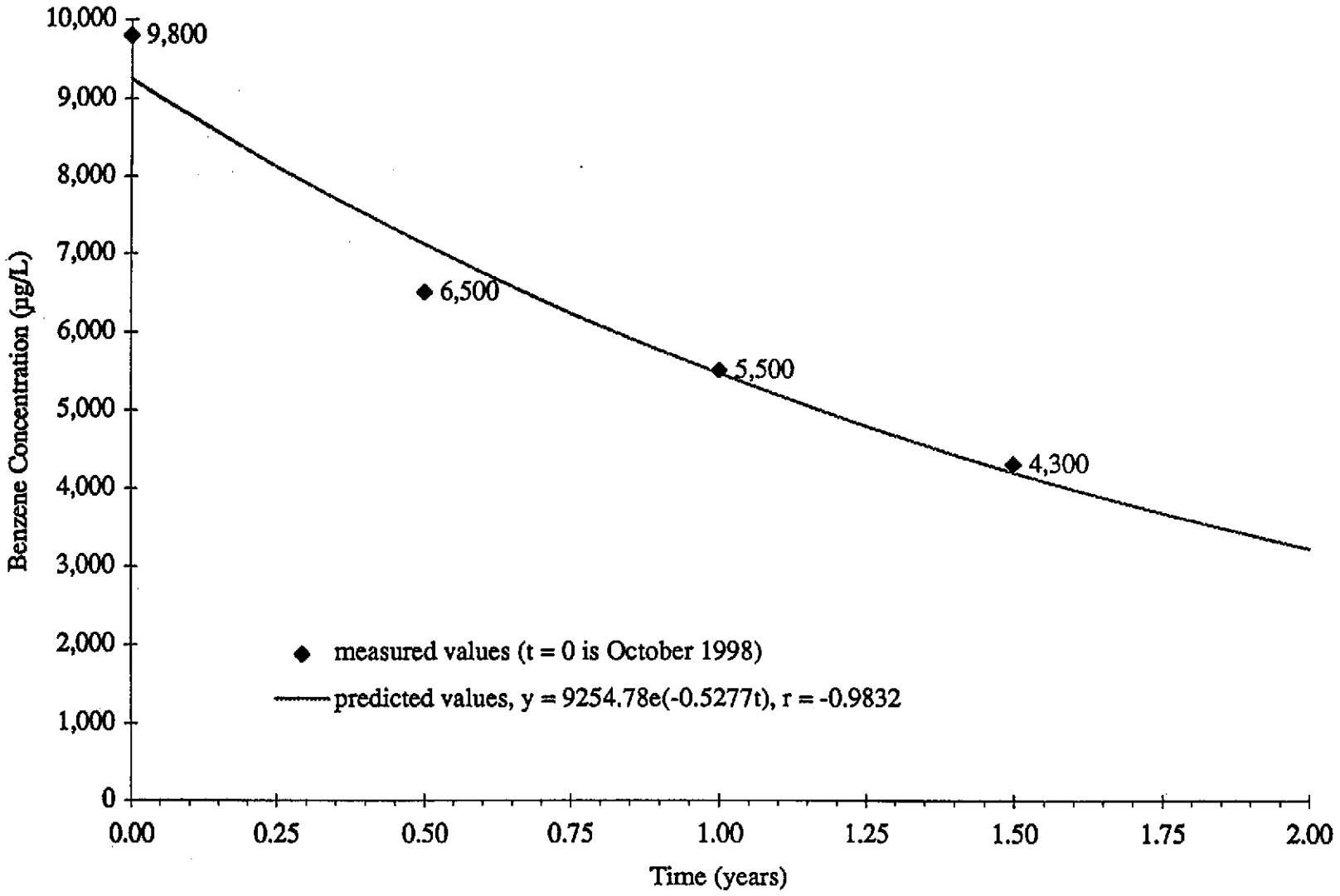
CONSTITUENTS OF CONCERN		Outdoor Air Exposure:				Groundwater Exposure:			
		None		None		None		None	
		Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0
CAS No.	Name	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient
71-43-2	Benzene								
108-88-3	Toluene								
100-41-4	Ethylbenzene								
1330-20-7	Xylene (mixed isomers)								
1634-04-4	Methyl t-Butyl ether								
91-20-3	Naphthalene								
108-95-2	Phenol								
Cumulative Values:		0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0

■ indicates risk level exceeding target risk

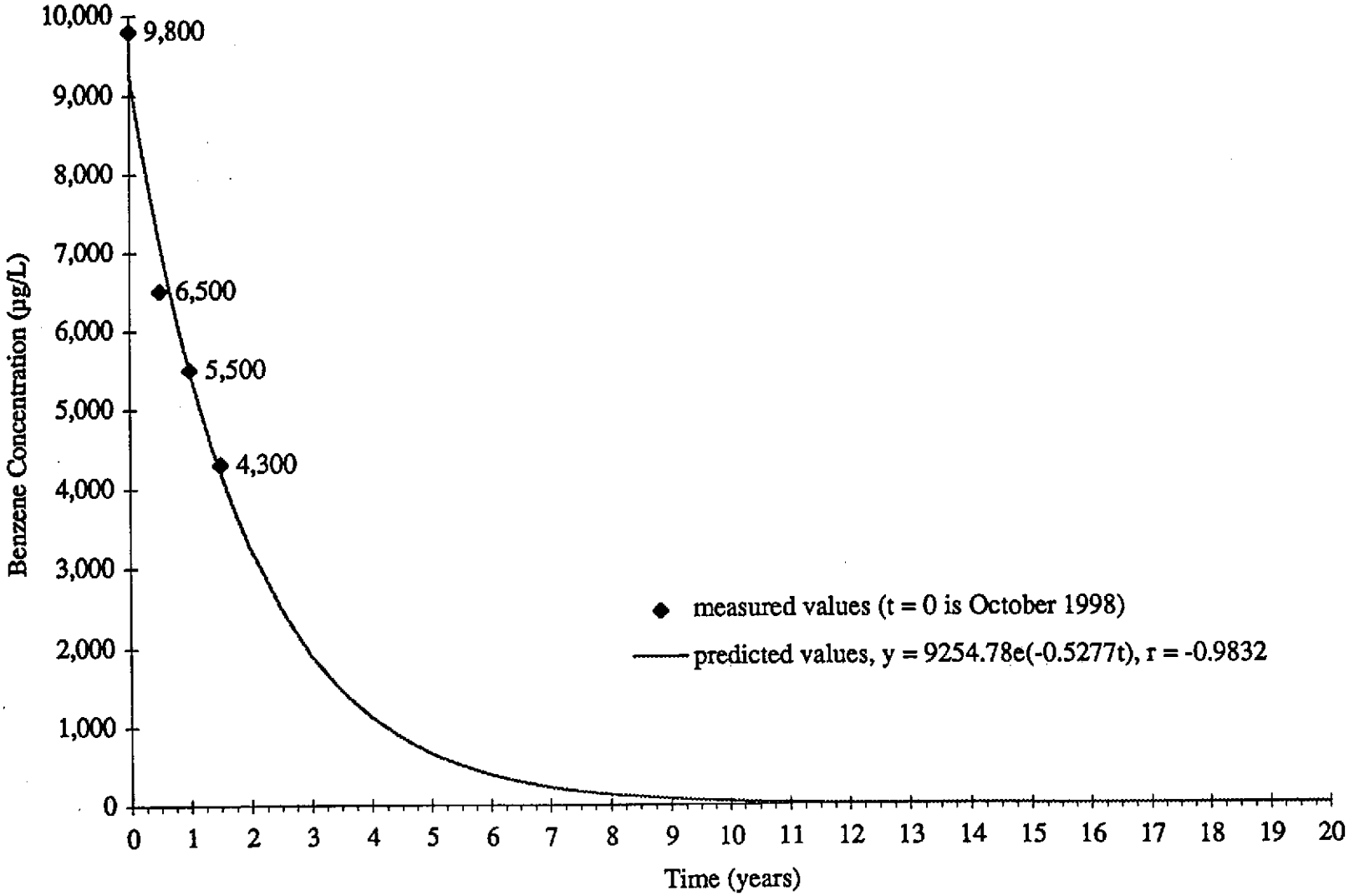
APPENDIX E

GRAPHS OF CHEMICAL CONCENTRATIONS VERSUS TIME

Measured and Predicted Benzene Concentrations Versus Time

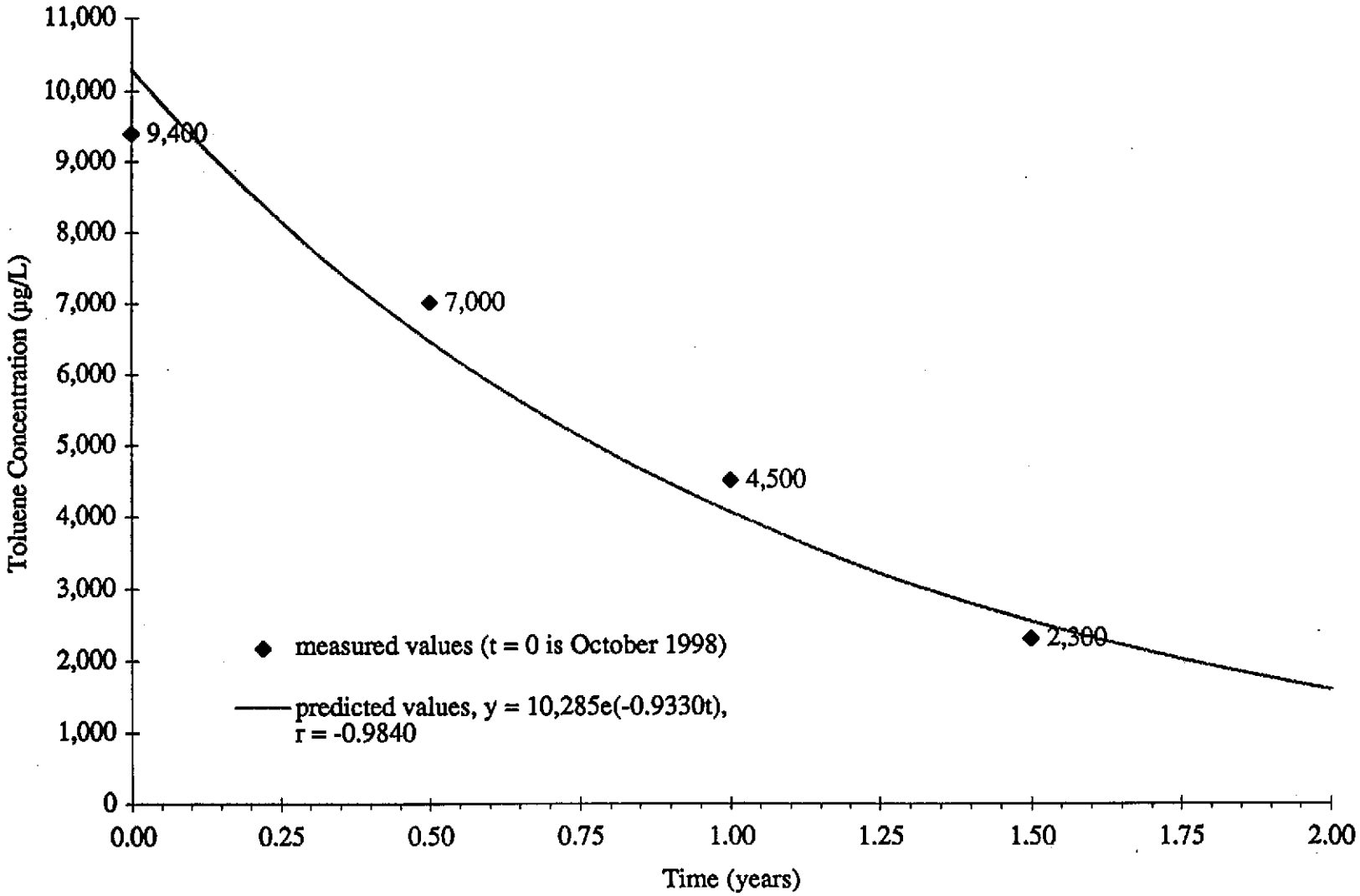


Measured and Predicted Benzene Concentrations Versus Time

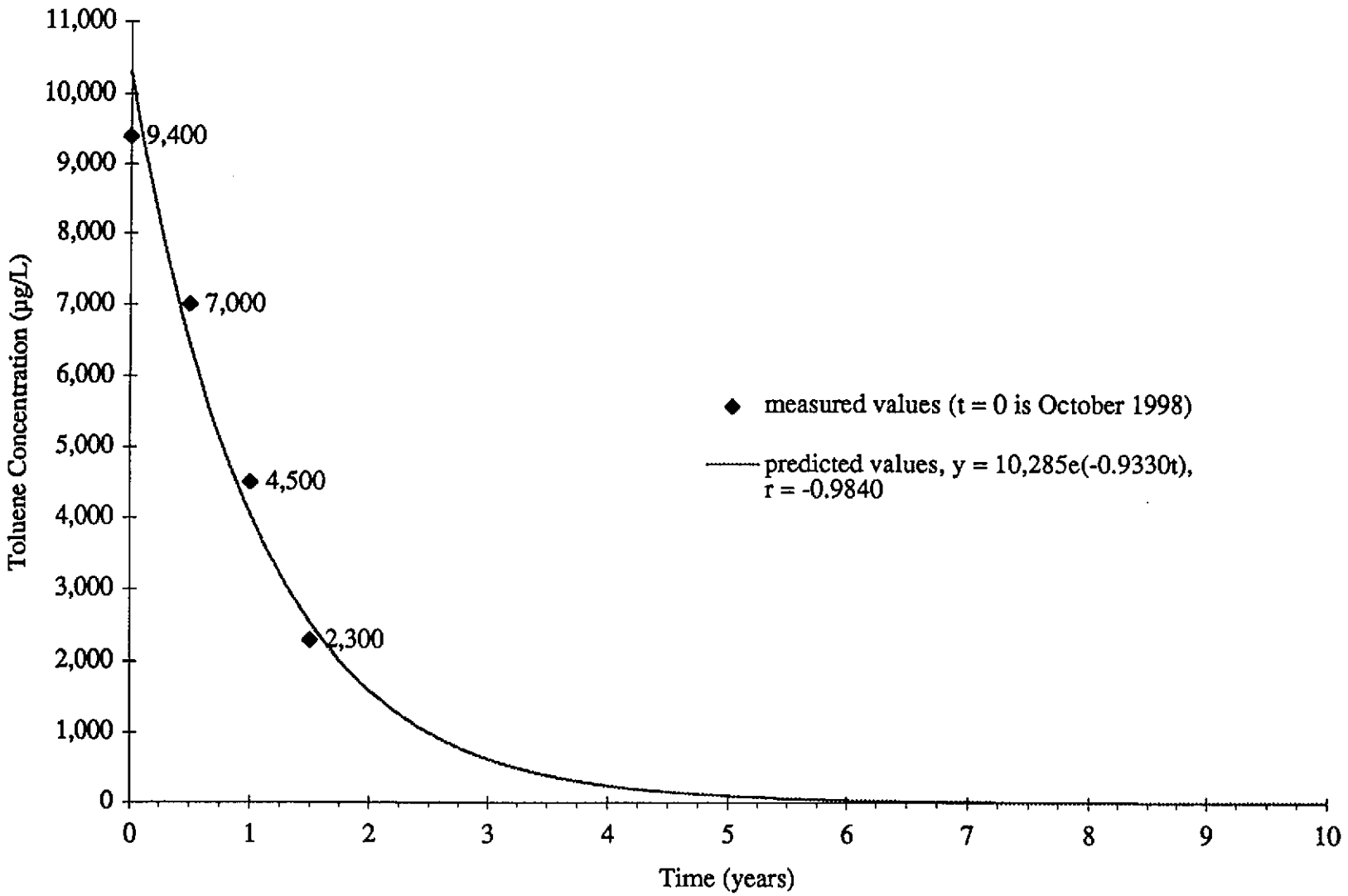


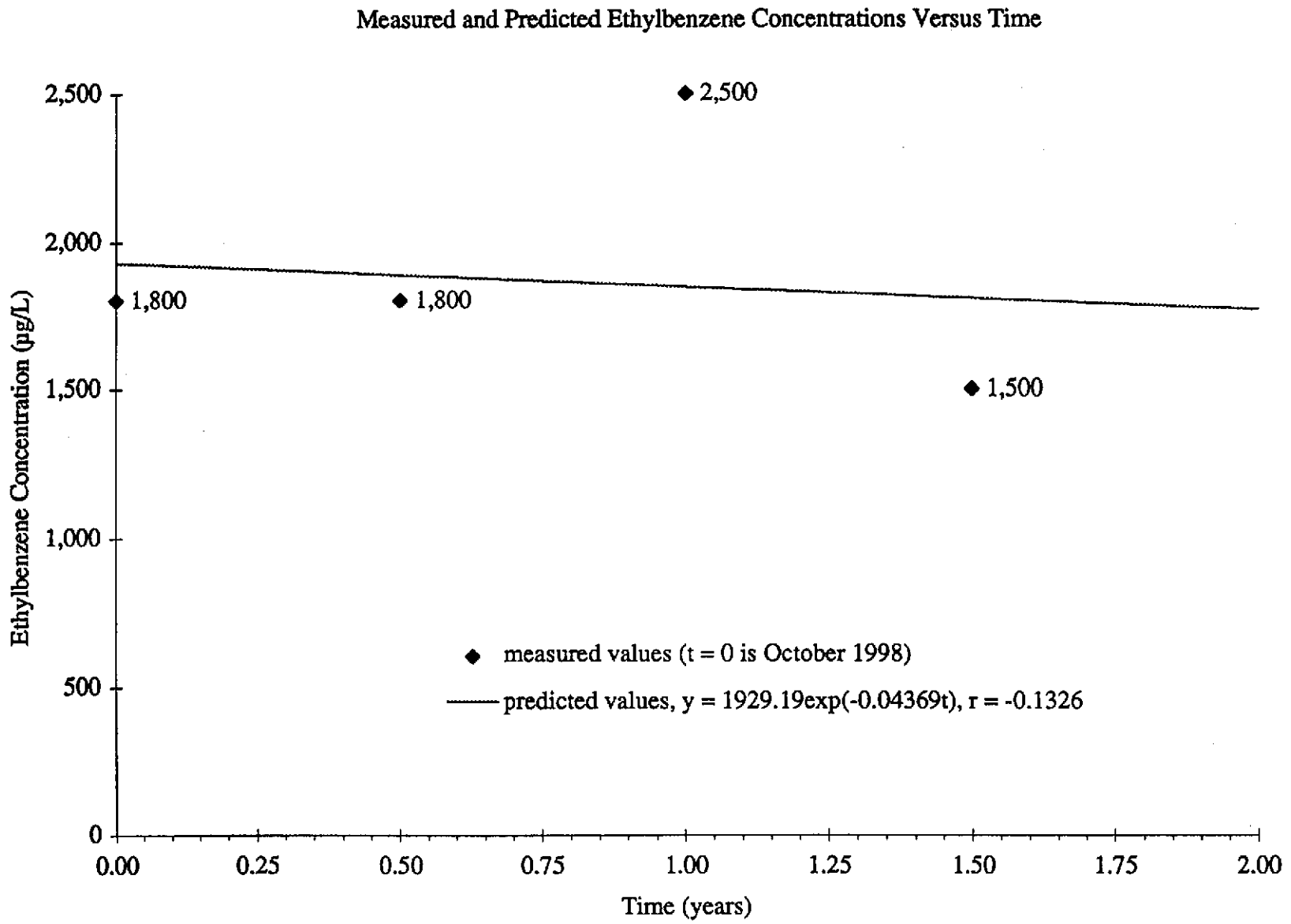
AQUIFER SCIENCES, INC.

Measured and Predicted Toluene Concentrations Versus Time

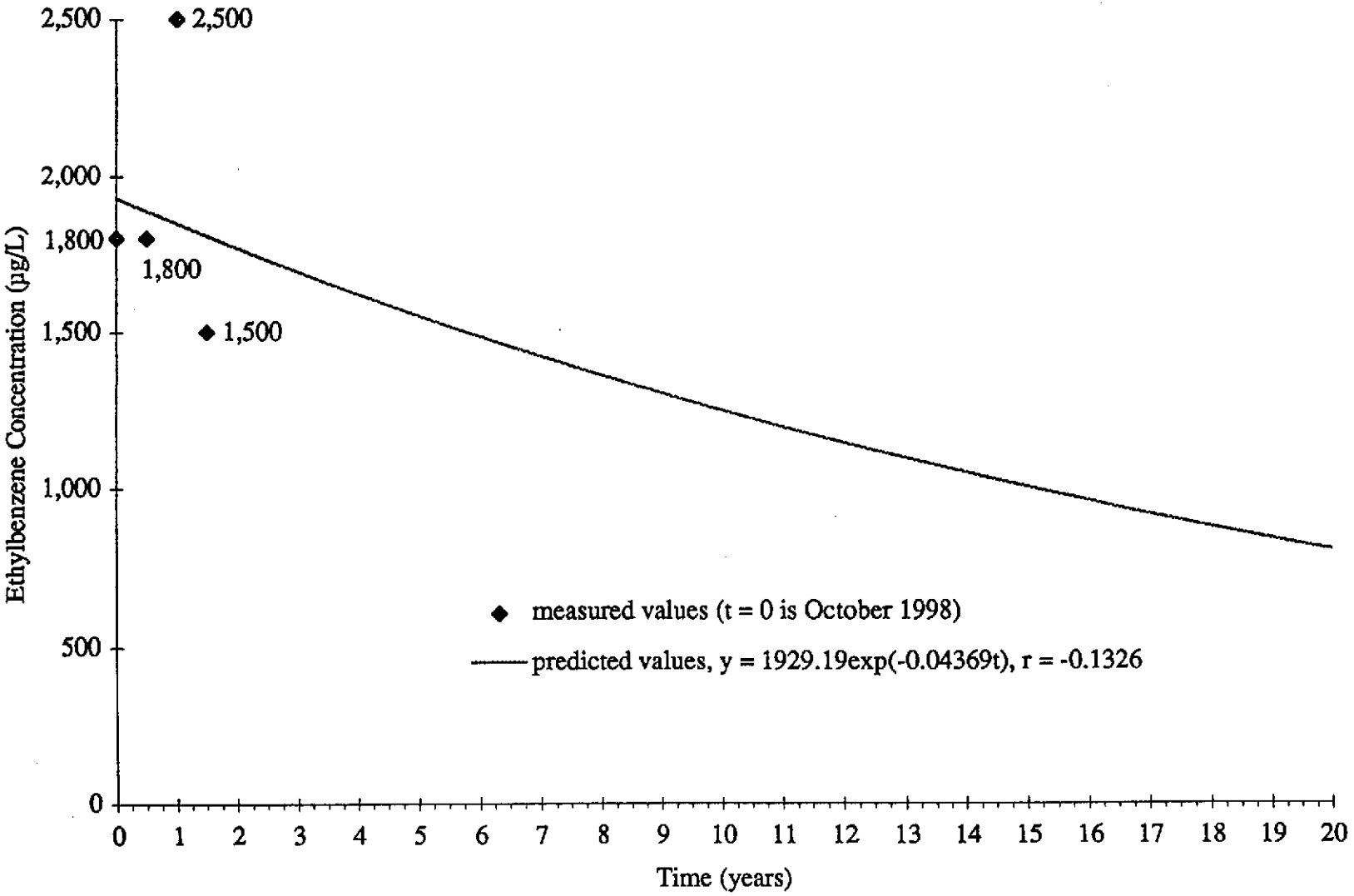


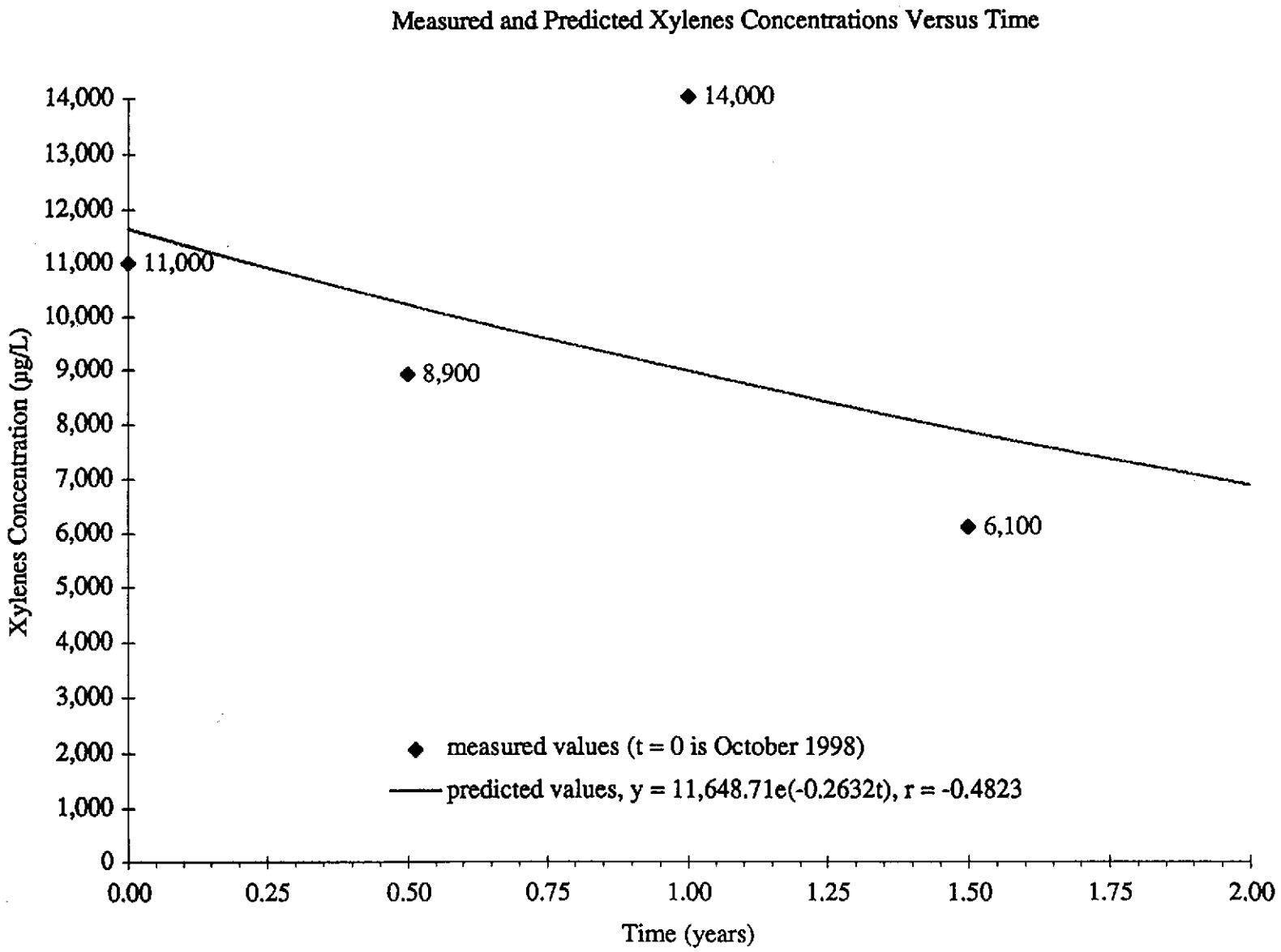
Measured and Predicted Toluene Concentrations Versus Time



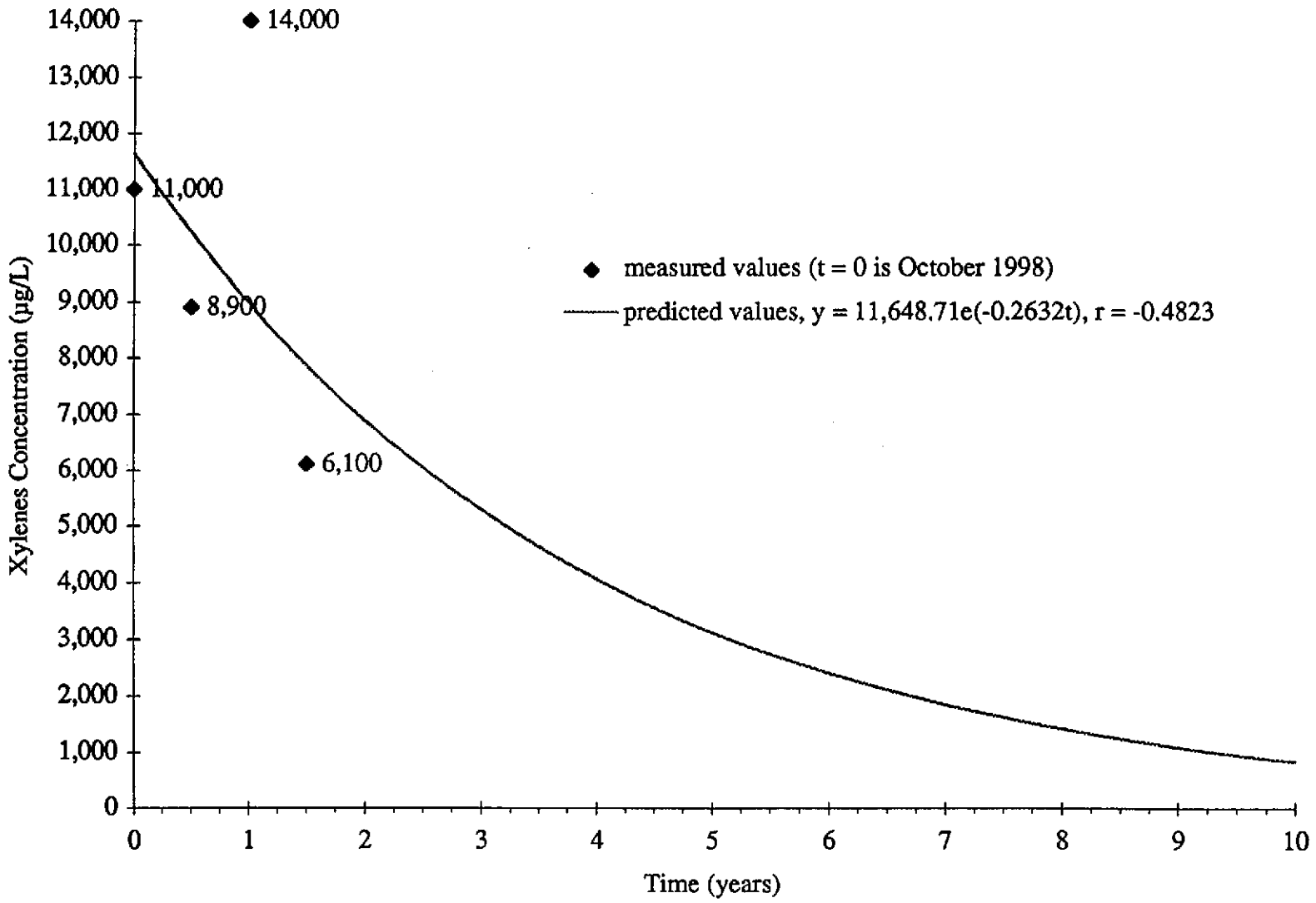

Measured and Predicted Ethylbenzene Concentrations Versus Time
Ethylbenzene Concentration (µg/L)
2,500
2,000
1,500
1,000
500
0
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Time (years)
◆ 2,500
◆ 1,800
◆ 1,800
◆ 1,500
◆ measured values (t = 0 is October 1998)
predicted values, y = 1929.19exp(-0.04369t), r = -0.1326

Measured and Predicted Ethylbenzene Concentrations Versus Time

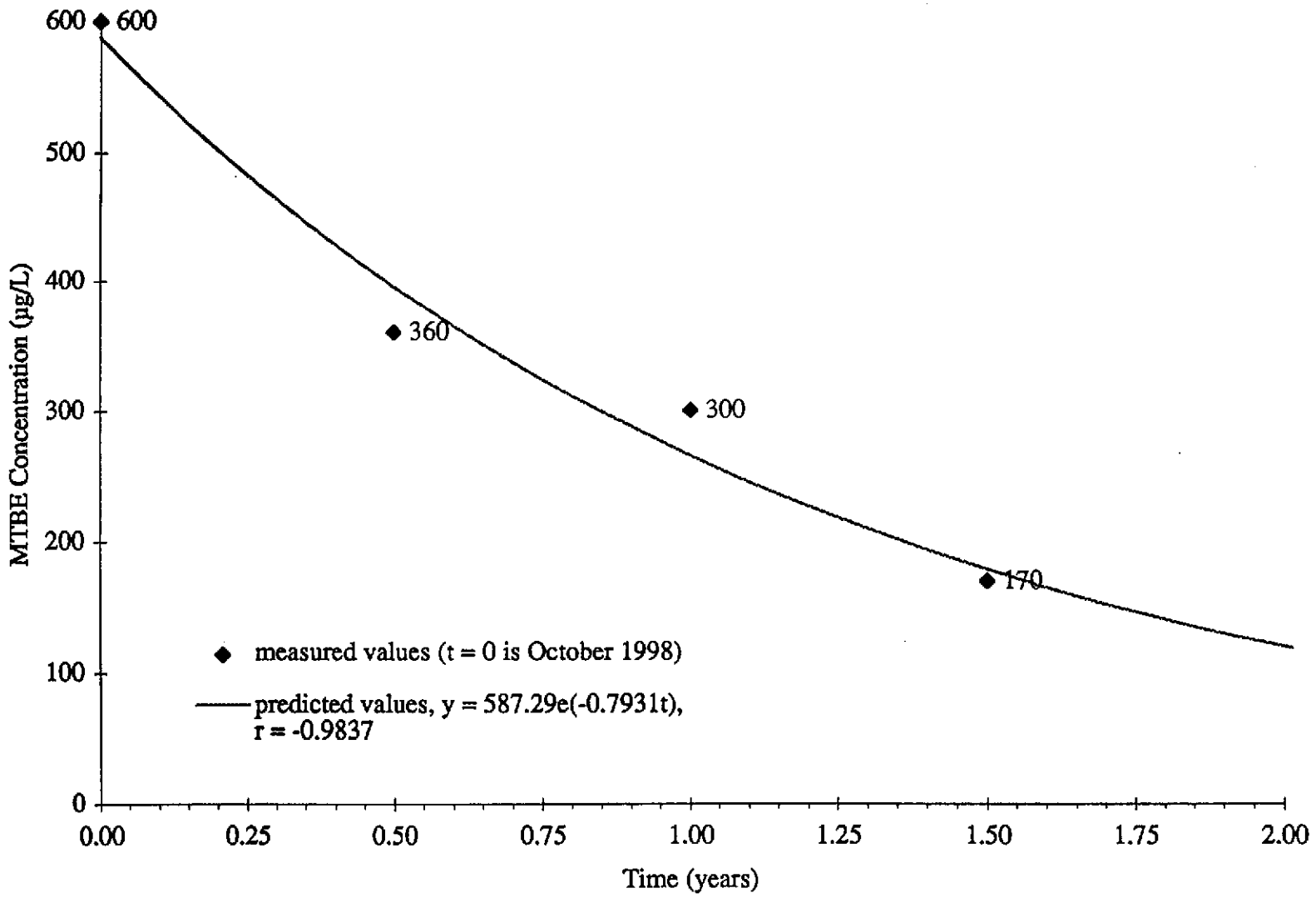



Measured and Predicted Xylenes Concentrations Versus Time
Xylenes Concentration (µg/L)
14,000
13,000
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
◆ 14,000
◆ 11,000
◆ 8,900
◆ 6,100
◆ measured values (t = 0 is October 1998)
predicted values, y = 11,648.71e(-0.2632t), r = -0.4823
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Time (years)

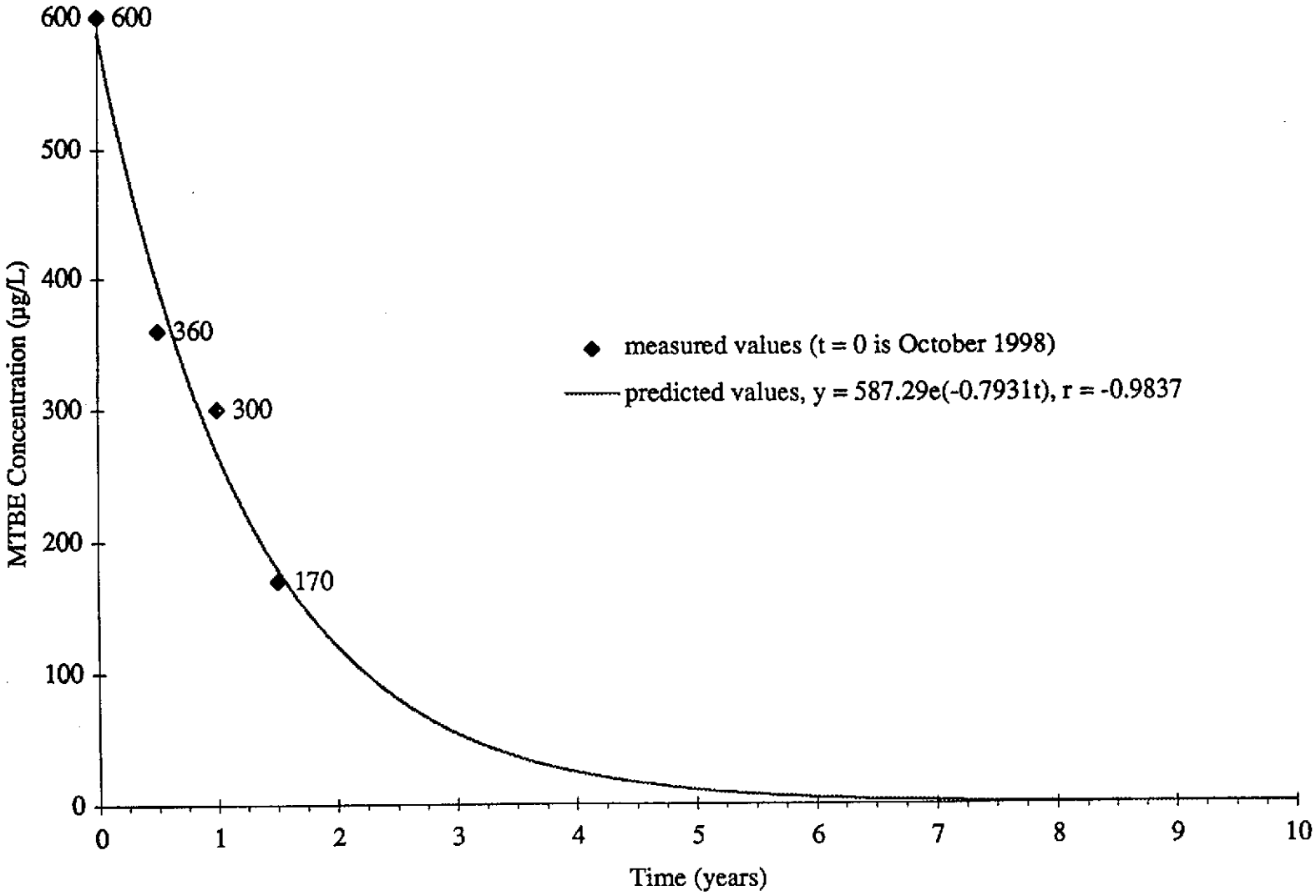
Measured and Predicted Xylenes Concentrations Versus Time



Measured and Predicted MTBE Concentrations Versus Time



Measured and Predicted MTBE Concentrations Versus Time



APPENDIX F

TIER 2 BASELINE RISK ASSESSMENT - ONSITE COMMERCIAL SCENARIO

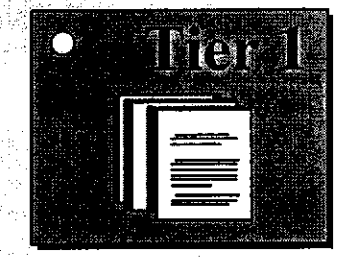
Main Screen

RBCA Tool Kit for Chemical Releases
Version 1.2 © 1999

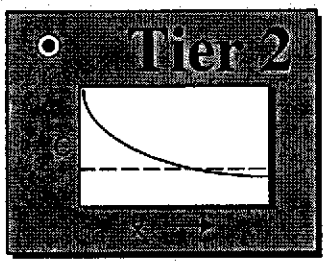
1. Project Information

Site Name:	Arrow Rentals		
Location:	187 North L Street, Livermore, California		
Compl. By:	Aquifer Sciences, Inc.		
Date:	19-Jul-00	Job ID:	971275

2. Which Type of RBCA Analysis? (?)



Generic Values
On-Site
Exposure



Site-Specific Values
On- or Off-Site Exposure

3. Calculation Options (?)

Affects which input data are required

- ☑ ***Baseline Risks (Forward mode)***
- ☑ ***RBCA Cleanup Standards (Backward mode)***

4. RBCA Evaluation Process

Prepare Input Data

Data Complete? (■= yes, ■= no)

- ■□ Exposure Pathways
- ■□ Constituents of Concern (COCs)
- ■□ Transport Models
- ■□ Soil Parameters
- ■□ GW Parameters
- ■□ Air Parameters

Review Output

- Exposure Flowchart
- COC Chem. Parameters
- Input Data Summary
- User-Spec. COC Data...
- Transient Domenico Analysis...
- Baseline Risks...
- Cleanup Standards...

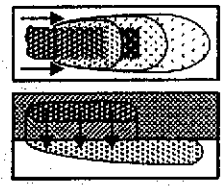
5. Commands and Options

New Site	Load Data...	Save Data As...	Quit
Print Sheet	Set Units	Custom Chem. Data...	*Help*

Exposure Pathway Identification

Site Name: Arrow Rentals
Location: 187 North L Street, Livermore, California
Compl. By: Aquifer Sciences, Inc.
Job ID: 971275 Date: 19-Jul-00

1. Groundwater Exposure



Groundwater Ingestion/ Surface Water Impact

Receptor Type:	Com. On-site	Res. Off-site1	Com. Off-site2
Distance to GW receptors	0	100	100 (ft)

Source Media:

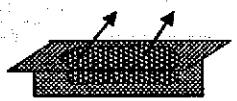
- [x] Affected Groundwater
- [x] Affected Soils Leaching to Groundwater

GW Discharge to Surface Water Exposure

- [ ] Swimming
- [ ] Fish Consumption
- [ ] Aquatic Life Protection

Enter ALP Criteria

2. Surface Soil Exposure

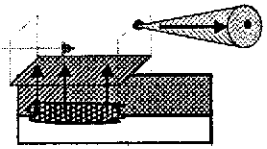


Direct Ingestion and Dermal Contact

Receptor Type:	None On-site	No off-site receptors

Construction Worker ☐

3. Air Exposure

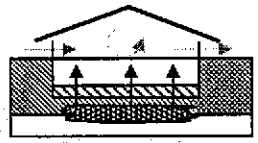


Volatilization and Particulates to Outdoor Air Inhalation

Receptor Type:	Com. On-site	Res. Off-site1	Com. Off-site2
Distance to GW receptors	0	100	100 (ft)

Construction worker ☐

- [x] Affected Soils--Volatilization to Ambient Outdoor Air
- [x] Affected Groundwater--Volatilization to Ambient Outdoor Air
- [ ] Affected Surface Soils--Particulates to Ambient Outdoor Air



Volatilization to Indoor Air Inhalation

Receptor Type:	Com. On-site	No off-site receptors

- [x] Affected Soils--Volatilization to Enclosed Space
- [x] Affected Groundwater--Volatilization to Enclosed Space

4. Commands and Options

Main Screen | Print Sheet | Set Units | Help

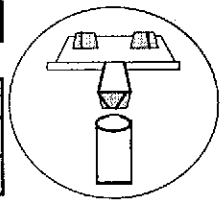
■□ Exposure Factors & Target Risks | Exposure Flowchart

Exposure Factors and Target Risk Limits

Site Name: Arrow Rentals
Location: 187 North L Street, Livermore, California
Compl. By: Aquifer Sciences, Inc.
Job ID: 971275 Date: 19-Jul-00

1. Exposure Parameters

		Residential			Commercial	
Age Adjustment?		Adult	(Age 0-6)	(Age 0-16)	Chronic	Construc.
Averaging time, carcinogens (yr)		70				
Averaging time, non-carcinogens (yr)		30			25	1
Body weight (kg)		70	15	35	70	
Exposure duration (yr)		30	6	16	25	1
Exposure frequency (days/yr)		350			250	180
Dermal exposure frequency (days/yr)		350			250	
Skin surface area, soil contact (cm^2)	☐	5800		2023	5800	5800
Soil dermal adherence factor ($mg/cm^2/day$)		1				
Water ingestion rate (L/day)		2			1	
Soil ingestion rate (mg/day)	☐	100	200		50	100
Swimming exposure time (hr/event)		3				
Swimming event frequency (events/yr)		12	12	12		
Swimming water ingestion rate (L/hr)	☐	0.05	0.5			
Skin surface area, swimming (cm^2)	☐	23000		8100		
Fish consumption rate (kg/day)		0.025				
Contaminated fish fraction (unitless)		1				



2. Risk Goal Calculation Options

- ○ Individual Constitiuent Risk Goals Only
- ◉ Individual and Cumulative Risk Goals

3. Target Health Risk Limits

	Individual	Cumulative
Target Risk (Class A/B carcins.)	1.0E-6	1.0E-5
Target Risk (Class C carcinogens)	1.0E-5	
Target Hazard Quotient	1.0E+0	
Target Hazard Index		1.0E+0

4. Commands and Options

Return to Exposure Pathways

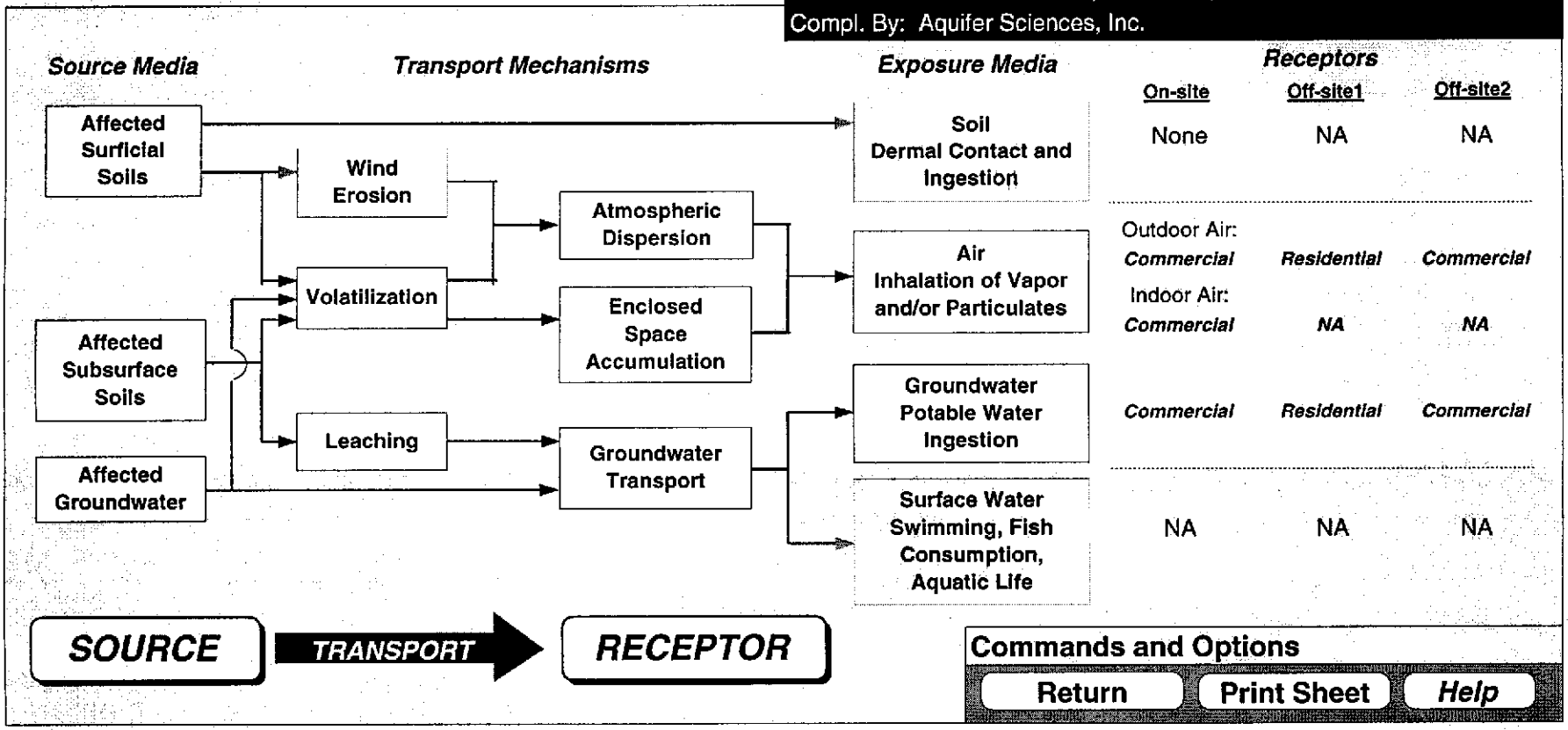
Use Default Values

Print Sheet

Help

Exposure Pathway Flowchart

Site Name: Arrow Rentals
Location: 187 North L Street, Livermore, California
Compl. By: Aquifer Sciences, Inc.
Job ID: 971275
Date: 19-Jul-00



Commands and Options

Return | Print Sheet | Help

Site Name: Arrow Rentals
Location: 187 North L Street, Livermore, California
Compl. By: Aquifer Sciences, Inc.

Job ID: 971275
Date: 19-Jul-00

Commands and Options

Main Screen | Print Sheet | *Help*

Source Media Constituents of Concern (COCs)

Apply Raoult's Law ?

Selected COCs

COC Select: *Sort List:* ?

Add/Insert | Top | MoveUp
Delete | Bottom | MoveDown

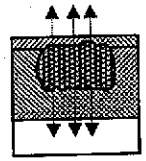
Representative COC Concentration ?

Selected COCs	Groundwater Source Zone		Soil Source Zone		Mole Fraction in Source Material
	Calculate / Enter Site Data		Enter Directly / Enter Site Data		
	(mg/L)	note	*(mg/kg)*	note	*(-)*
Benzene	9.3E+0	95% UCL at W-1s	2.5E+0	Max at 20 ft in W-1	
Toluene	9.4E+0	95% UCL at W-1s	2.1E+1	Max at 15 ft in W-1	
Ethylbenzene	2.4E+0	95% UCL at W-1s	2.0E+1	Max at 15 ft in W-1	
Xylene (mixed isomers)	1.4E+1	95% UCL at W-1s	1.3E+2	Max at 15 ft in W-1	
Methyl t-Butyl ether	5.7E-1	95% UCL at W-1s	0.0E+0		
Naphthalene	5.1E-1	Maximum at W-1s	3.4E+0	Max at 25 ft in B-1	
Phenol	0.0E+0		3.0E-1	Max at 25 ft in B-1	

Transport Modeling Options

Site Name: Arrow Rentals
Location: 187 North L Street, Livermore, California
Compl. By: Aquifer Sciences, Inc.
Job ID: 971275
Date: 19-Jul-00

1. Vertical Transport, Surface Soil Column



Outdoor Air Volatilization Factors (?)

- ○ Surface soil volatilization model only
- ◉ Combination surface soil/Johnson & Ettinger models
  - Thickness of surface soil zone: 1 *(ft)*
- ○ User-specified VF from other model — Enter VF Values

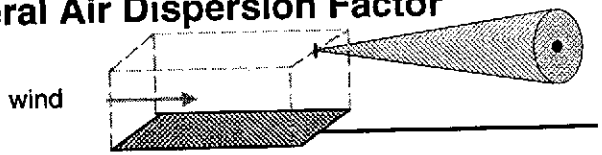
Indoor Air Volatilization Factors (?)

- ◉ Johnson & Ettinger model
- ○ User-specified VF from other model — Enter VF Values

Soil-to-Groundwater Leaching Factor (?)

- ◉ ASTM Model
  - ☑ Apply Soil Attenuation Model (SAM)
  - ☐ Allow first-order biodecay
  - Enter Decay Rates
- ○ User-specified LF from other model — Enter LF Values

2. Lateral Air Dispersion Factor

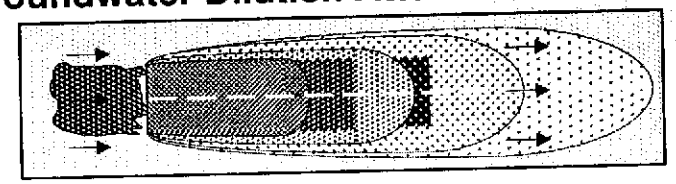


(?)

- ◉ 3-D Gaussian dispersion model
- ○ User-Specified ADF

	Off-site 1	Off-site 2	
	1.00E+0	1.00E+0	(-)

3. Groundwater Dilution Attenuation Factor



Calculate DAF using Domenico Model (?)

- ○ Domenico equation with dispersion only (no biodegradation)
- ◉ Domenico equation first-order decay — ■□ Enter Decay Rates
- ○ Modified Domenico equation using electron acceptor superposition — Enter Site Data

Enter Directly — Biodegradation Capacity: NC *(mg/L)*

— or —

User-Specified DAF Values

- ○ DAF values from other model or site data — Enter DAF Values

n	o

4. Commands and Options

Main Screen | Print Sheet | *Help*

Site Name: Arrow Rentals
Location: 187 North L Street, Livermore, California
Compl. By: Aquifer Sciences, Inc.
Job ID: 971275
Date: 19-Jul-00

Commands and Options

Return | Print Sheet | Paste Default Values | *Help*

Constituent Half-Life Values

Constituent	Saturated Zone Half-Life *(day)*	Saturated Zone First-Order Decay Coeffecient *(1/day)*	Unsaturated Zone Half-Life *(day)*	Unsaturated Zone First-Order Decay Coeffecient *(1/day)*
Benzene	4.8E+2	1.4E-3	4.8E+2	1.4E-3
Toluene	2.7E+2	2.6E-3	2.7E+2	2.6E-3
Ethylbenzene	5.8E+3	1.2E-4	5.8E+3	1.2E-4
Xylene (mixed isomers)	9.6E+2	7.2E-4	9.6E+2	7.2E-4
Methyl t-Butyl ether	3.2E+2	2.2E-3	3.2E+2	2.2E-3
Naphthalene	7.3E+3	9.5E-5	7.3E+3	9.5E-5
Phenol	7.3E+3	9.5E-5	7.3E+3	9.5E-5

Site-Specific Soil Parameters

Site Name: Arrow Rentals | Job ID: 971275
Location: 187 North L Street, Livermore, California | Date: 19-Jul-00
Compl. By: Aquifer Sciences, Inc.

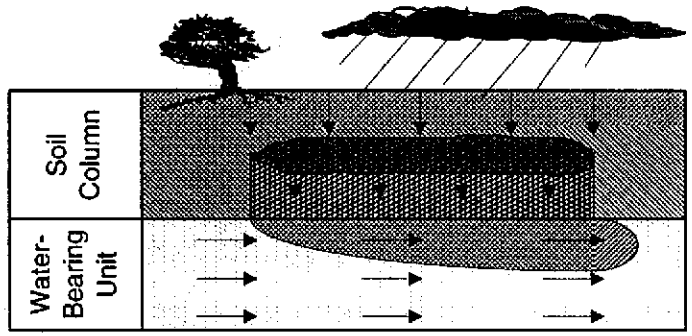
1. Soil Source Zone Characteristics

Hydrogeology

	General Case Construction	
Depth to water-bearing unit	25	(ft)
Capillary zone thickness	0.16	(ft)
Soil column thickness	24.84	(ft)

Affected Soil Zone

Depth to top of affected soils	15		(ft)
Depth to base of affected soils	25		(ft)
Affected soil area	1280	1280	(ft^2)
Length of affected soil parallel to assumed wind direction	40	40	(ft)
Length of affected soil parallel to assumed GW flow direction	40		(ft)



2. Surface Soil Column

	Vadose Zone	Capillary Fringe	
Predominant USCS Soil Type			ults
or Calculate	or		
Total porosity	0.3		(-)
Volumetric water content	0.12	0.26	(-)
Volumetric air content	0.18	0.04	(-)
Dry bulk density	2.65		(kg/L)
Vertical hydraulic conductivity	3.3E+2		(ft/yr)
Vapor permeability	1.1E-11		(ft^2)
Capillary zone thickness	1.6E-1		(ft)

Net Rainfall Infiltration

Net infiltration estimate	11.81102362	(in/yr)
or Calculate	or	
Average annual precipitation	0	(in/yr)

Partitioning Parameters

Fraction organic carbon	0.01	(-)
Soil/water pH	6.9	(-)

3. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | | Help

Site-Specific Groundwater Parameters

Site Name: Arrow Rentals — Job ID: 971275
Location: 187 North L Street, Livermore, California — Date: 19-Jul-00
Compl. By: Aquifer Sciences, Inc.

1. Water-Bearing Unit

Hydrogeology

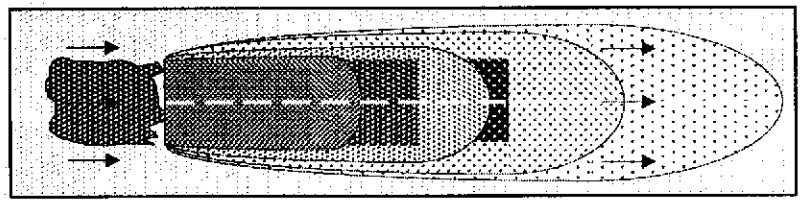
Groundwater Darcy velocity	8.2E+0	(ft/yr)
Groundwater seepage velocity	2.1E+1	(ft/yr)
or Enter Directly	↑ or	
Hydraulic conductivity	4.1E+2	(ft/yr)
Hydraulic gradient	2.0E-2	(-)
Effective porosity	0.40	(-)

Sorption

Fraction organic carbon--saturated zone	0.01	(-)
Groundwater pH	6.90	(-)

2. Groundwater Source Zone

Groundwater plume width at source	32	(ft)
Plume (mixing zone) thickness at source	6.56167979	(ft)
or Calculate	↑ or	
Saturated thickness	10	(ft)
Length of source zone		(ft)



3. Groundwater Dispersion

Model: ASTM Default

	GW Ingestion Off-site 1	GW Ingestion Off-site 2	Soil Leaching to GW Off-site 1	Soil Leaching to GW Off-site 2	
Distance to GW receptors	100	100	100	100	(ft)
or Enter Directly	↓ or	↓	↓ or	↓	
Longitudinal dispersivity	10	10	10	10	(ft)
Transverse dispersivity	3.3	3.3	3.3	3.3	(ft)
Vertical dispersivity	0.5	0.5	0.5	0.5	(ft)

4. Groundwater Discharge to Surface Water

	Off-site 2	
Distance to GW/SW disharge point	NA	(ft)
Plume width at GW/SW discharge	0	(ft)
Plume thickness at GW/SW discharge	0	(ft)
Surface water flowrate at GW/SW discharge	0.0E+0	(ft^3/s)

5. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | | *Help*

Site-Specific Air Parameters

Site Name: Arrow Rentals — Job ID: 971275
Location: 187 North L Street, Livermore, California — Date: 19-Jul-00
Compl. By: Aquifer Sciences, Inc.

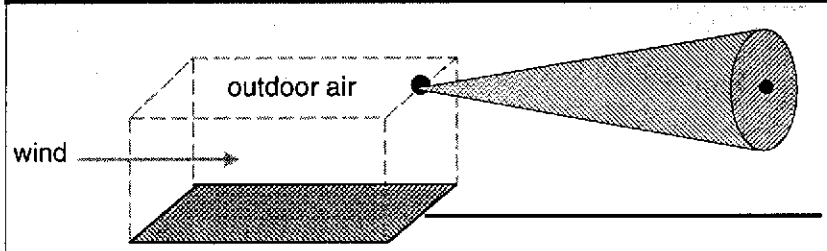
1. Outdoor Air Pathway

Dispersion in Air

	Off-site 1	Off-site 2	
Distance to offsite air receptor	100	100	(ft)
or (Enter Directly)	↓ or	↓	
Horizontal dispersivity	11.26	11.26	(ft)
Vertical dispersivity	7.61	7.61	(ft)

Air Source Zone

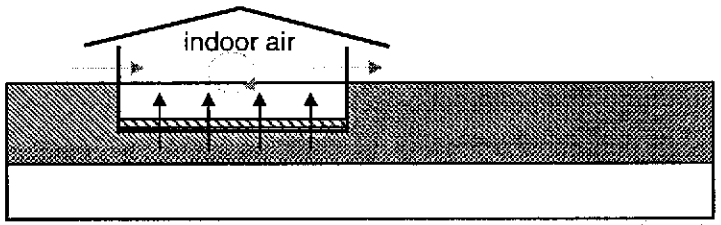
Air mixing zone height	6.56167979	(ft)
Ambient air velocity in mixing zone	7.381889764	(ft/s)
Areal particulate emission flux	6.9E-14	(g/cm^2/s)



2. Indoor Air Pathway

Building Parameters

	Residential	Commercial	
Building volume/area ratio	8	9.84252	(ft)
Foundation area	1000	20000	(ft^2)
Foundation perimeter	130	600	(ft)
Building air exchange rate	1.4E-4	1.4E-4	(1/s)
Depth to bottom of foundation slab	0.5	0.5	(ft)
Convective air flow through cracks	0.0E+0	0.0E+0	(ft^3/s)
Foundation thickness	0.5		(ft)
Foundation crack fraction	0.01		(-)
Volumetric water content of cracks	0.28		(-)
Volumetric air content of cracks	0.13		(-)
Indoor/Outdoor differential pressure	0		(Pa)



3. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | | *Help*

CHEMICAL DATA FOR SELECTED COCs

Physical Property Data

Constituent	CAS Number	type	Molecular Weight (g/mole) MW	ref	Diffusion Coefficients in air (cm2/s) Dair	ref	Diffusion Coefficients in water (cm2/s) Dwat	ref	log (Koc) or log(Kd) (@ 20 - 25 C) log(L/kg) partition		ref	Henry's Law Constant (@ 20 - 25 C) (atm-m3) mol	(unitless)	ref	Vapor Pressure (@ 20 - 25 C) (mm Hg)	ref	Solubility (@ 20 - 25 C) (mg/L)	ref	acid pKa	base pKb	ref
Benzene	71-43-2	A	78.1	PS	8.80E-02	PS	9.80E-06	PS	1.77	Koc	PS	5.55E-03	2.29E-01	PS	9.52E+01	PS	1.75E+03	PS	-	-	-
Toluene	108-88-3	A	92.4	5	8.50E-02	A	9.40E-06	A	2.13	Koc	A	6.30E-03	2.60E-01	A	3.00E+01	4	5.15E+02	29	-	-	-
Ethylbenzene	100-41-4	A	106.2	PS	7.50E-02	PS	7.80E-06	PS	2.56	Koc	PS	7.88E-03	3.25E-01	PS	1.00E+01	PS	1.69E+02	PS	-	-	-
Xylene (mixed isomers)	1330-20-7	A	106.2	5	7.20E-02	A	8.50E-06	A	2.38	Koc	A	7.03E-03	2.90E-01	A	7.00E+00	4	1.98E+02	5	-	-	-
Methyl t-Butyl ether	1634-04-4	O	88.146	5	7.92E-02	6	9.41E-05	7	1.08	Koc	A	5.77E-04	2.38E-02	-	2.49E+02	-	4.80E+04	A	-	-	-
Naphthalene	91-20-3	PAH	128.2	PS	5.90E-02	PS	7.50E-06	PS	3.30	Koc	PS	4.83E-04	1.99E-02	PS	2.30E-01	PS	3.10E+01	PS	-	-	-
Phenol	108-95-2	AP	94.1	PS	8.20E-02	PS	9.10E-06	PS	1.46	Koc	PS	3.97E-07	1.64E-05	PS	3.41E-01	PS	8.28E+04	PS	10	-	PS

Site Name: Arrow Rentals

Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00

Job ID: 971275

CHEMICAL DATA FOR SELECTED COCs

Toxicity Data

Constituent	Reference Dose (mg/kg/day) Oral RfD_oral	ref	Reference Dose (mg/kg/day) Dermal RfD_dermal	ref	Reference Conc. (mg/m3) Inhalation RfC_inhal	ref	Slope Factors 1/(mg/kg/day) Oral SF_oral	ref	Slope Factors 1/(mg/kg/day) Dermal SF_dermal	ref	Unit Risk Factor 1/(µg/m3) Inhalation URF_inhal	ref	EPA Weight of Evidence	Is Constituent Carcinogenic ?
Benzene	3.00E-03	R	-	-	5.95E-03	R	2.90E-02	PS	2.99E-02	TX	8.29E-06	PS	A	TRUE
Toluene	2.00E-01	A,R	1.60E-01	TX	4.00E-01	A,R	-	-	-	-	-	-	D	FALSE
Ethylbenzene	1.00E-01	PS	9.70E-02	TX	1.00E+00	PS	-	-	-	-	-	-	D	FALSE
Xylene (mixed isomers)	2.00E+00	A,R	1.84E+00	TX	7.00E+00	A	-	-	-	-	-	-	D	FALSE
Methyl t-Butyl ether	1.00E-02	31	8.00E-03	TX	3.00E+00	R	-	-	-	-	-	-	-	FALSE
Naphthalene	4.00E-01	PS	3.56E-01	TX	1.40E+00	PS	-	-	-	-	-	-	D	FALSE
Phenol	6.00E-01	PS	5.40E-01	TX	2.10E+00	PS	-	-	-	-	-	-	D	FALSE

Site Name: Arrow Rentals

Site Location: 187 North L St

Miscellaneous Chemical Data

Constituent	Maximum Contaminant Level MCL (mg/L)	Maximum Contaminant Level ref	Time-Weighted Average Workplace Criteria TWA (mg/m3)	Time-Weighted Average Workplace Criteria ref	Aquatic Life Prot. Criteria AQL (mg/L)	Aquatic Life Prot. Criteria ref	Bioconcentration Factor (L-wat/kg-fish)
Benzene	5.00E-03	52 FR 25690	3.25E+00	PS	-	-	12.6
Toluene	1.00E+00	56 FR 3526 (30 Jan 91)	1.47E+02	ACGIH	-	-	70
Ethylbenzene	7.00E-01	56 FR 3526 (30 Jan 91)	4.35E+02	PS	-	-	1
Xylene (mixed isomers)	1.00E+01	56 FR 3526 (30 Jan 91)	4.34E+02	ACGIH	-	-	1
Methyl t-Butyl ether	-	-	6.00E+01	NIOSH	-	-	1
Naphthalene	-	-	5.00E+01	PS	-	-	430
Phenol	-	-	1.90E+01	PS	-	-	1

Site Name: Arrow Rentals

Site Location: 187 North L St

CHEMICAL DATA FOR SELECTED COCs

Miscellaneous Chemical Data

Constituent	Dermal Relative Absorp. Factor (unitless)	Water Dermal Permeability Data: Dermal Permeability Coeff. (cm/hr)	Lag time for Dermal Exposure (hr)	Critical Exposure Time (hr)	Relative Contr of Derm Perm Coeff (unitless)	Water/Skin Derm Adsorp Factor (cm/event)	ref	Detection Limits: Groundwater (mg/L)	ref	Soil (mg/kg)	ref	Half Life (First-Order Decay) (days): Saturated	Unsaturated	ref
Benzene	0.5	0.021	0.26	0.63	0.013	7.3E-2	D	0.002	S	0.005	S	720	720	H
Toluene	0.5	0.045	0.32	0.77	0.054	1.6E-1	D	0.002	S	0.005	S	28	28	H
Ethylbenzene	0.5	0.074	0.39	1.3	0.14	2.7E-1	D	0.002	S	0.005	S	228	228	H
Xylene (mixed isomers)	0.5	0.08	0.39	1.4	0.16	2.9E-1	D	0.005	S	0.005	S	360	360	H
Methyl t-Butyl ether	0.5	-	-	-	-	-	-	-	-	-	-	360	180	H
Naphthalene	0.05	0.069	0.53	2.2	0.2	2.7E-1	D	0.01	32	0.01	32	258	258	H
Phenol	0.5	0.0055	0.33	0.79	0.0029	2.0E-2	D	0.01	32	0.66	32	10	10	H

Site Name: Arrow Rentals

Site Location: 187 North L St

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

Job ID: 971275

Exposure Parameters		Residential			Commercial/Industrial	
		Adult	(1-6yrs)	(1-16 yrs)	Chronic	Construc.
AT_c	Averaging time for carcinogens (yr)	70				
AT_n	Averaging time for non-carcinogens (yr)	30			25	1
BW	Body weight (kg)	70	15	35	70	
ED	Exposure duration (yr)	30	6	16	25	1
t	Averaging time for vapor flux (yr)	30			25	1
EF	Exposure frequency (days/yr)	350			250	180
EF_D	Exposure frequency for dermal exposure	350			250	
IR_w	Ingestion rate of water (L/day)	2			1	
IR_s	Ingestion rate of soil (mg/day)	100	200		50	100
SA	Skin surface area (dermal) (cm^2)	5800		2023	5800	5800
M	Soil to skin adherence factor	1				
ET_{swim}	Swimming exposure time (hr/event)	3				
EV_{swim}	Swimming event frequency (events/yr)	12	12	12		
IR_{swim}	Water ingestion while swimming (L/hr)	0.05	0.5			
SA_{swim}	Skin surface area for swimming (cm^2)	23000		8100		
IR_{fish}	Ingestion rate of fish (kg/yr)	0.025				
FI_{fish}	Contaminated fish fraction (unitless)	1				

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	Commercial	Residential	Commercial
Soil Leaching to Groundwater Ingestion	Commercial	Residential	Commercial
Applicable Surface Water Exposure Routes:			
Swimming			NA
Fish Consumption			NA
Aquatic Life Protection			NA
Soil:			
Direct Ingestion and Dermal Contact	None		
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	Commercial	Residential	Commercial
Volatilization from Groundwater	Commercial	Residential	Commercial
Indoor Air:			
Volatilization from Subsurface Soils	Commercial	NA	NA
Volatilization from Groundwater	Commercial	NA	NA

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	0	100	100	(ft)
Soil leaching to groundwater receptor	0	100	100	(ft)
Outdoor air inhalation receptor	0	100	100	(ft)

Target Health Risk Values		Individual	Cumulative
TR_{ab}	Target Risk (class A&B carcinogens)	1.0E-6	1.0E-5
TR_c	Target Risk (class C carcinogens)	1.0E-5	
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	Surface & subsurface models
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	Yes
Air dilution factor	3-D Gaussian dispersion
Groundwater dilution-attenuation factor	Domenico model w/ biodeg.

NOTE: NA = Not applicable

Surface Parameters		General	Construction	(Units)
A	Source zone area	1.3E+3	NA	(ft^2)
W	Length of source-zone area parallel to wind	4.0E+1	NA	(ft)
W_{gw}	Length of source-zone area parallel to GW flow	4.0E+1		(ft)
U_{air}	Ambient air velocity in mixing zone	7.4E+0		(ft/s)
δ_{air}	Air mixing zone height	6.6E+0		(ft)
P_a	Areal particulate emission rate	NA		(g/cm^2/s)
L_{ss}	Thickness of affected surface soils	1.0E+0		(ft)

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	1.6E-1			(ft)
h_v	Vadose zone thickness	2.5E+1			(ft)
ρ_s	Soil bulk density	2.7E+0			(g/cm^3)
f_{oc}	Fraction organic carbon	1.0E-2			(-)
θ_T	Soil total porosity	3.0E-1			(-)
K_{vs}	Vertical hydraulic conductivity	3.3E+2			(ft/yr)
k_v	Vapor permeability	1.1E-11			(ft^2)
L_{gw}	Depth to groundwater	2.5E+1			(ft)
L_s	Depth to top of affected soils	1.5E+1			(ft)
L_{base}	Depth to base of affected soils	2.5E+1			(ft)
L_{subs}	Thickness of affected soils	1.0E+1			(ft)
pH	Soil/groundwater pH	6.9E+0			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.26	0.12	0.26	(-)
θ_a	Volumetric air content	0.04	0.18	0.13	(-)

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	9.84E+0	(ft)
A_b	Foundation area	NA	2.00E+4	(cm^2)
X_{crk}	Foundation perimeter	NA	6.00E+2	(ft)
ER	Building air exchange rate	NA	1.40E-4	(1/s)
L_{crk}	Foundation thickness	NA	5.00E-1	(ft)
Z_{crk}	Depth to bottom of foundation slab	NA	5.00E-1	(ft)
η	Foundation crack fraction	NA	1.00E-2	(-)
dP	Indoor/outdoor differential pressure	NA	0.00E+0	(Pa)
U_a	Convective air flow through slab	NA	0.00E+0	(ft^3/s)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	6.6E+0	(ft)
I_f	Net groundwater infiltration rate	1.2E+1	(in/yr)
U_{gw}	Groundwater Darcy velocity	8.2E+0	(ft/yr)
V_{gw}	Groundwater seepage velocity	2.1E+1	(ft/yr)
K_s	Saturated hydraulic conductivity	4.1E+2	(ft/yr)
i	Groundwater gradient	2.0E-2	(-)
S_w	Width of groundwater source zone	3.2E+1	(ft)
S_d	Depth of groundwater source zone	6.6E+0	(ft)
θ_{ef}	Effective porosity in water-bearing unit	4.0E-1	(-)
f_{oc-sat}	Fraction organic carbon in water-bearing unit	1.0E-2	(-)
pH_{sat}	Groundwater pH	6.9E+0	(-)
	Biodegradation considered?	1st Order	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Soil Leaching to GW		
α_x	Longitudinal dispersivity	1.0E+1	1.0E+1	1.0E+1	1.0E+1	(ft)
α_y	Transverse dispersivity	3.3E+0	3.3E+0	3.3E+0	3.3E+0	(ft)
α_z	Vertical dispersivity	5.0E-1	5.0E-1	5.0E-1	5.0E-1	(ft)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	1.1E+1	1.1E+1	1.1E+1	1.1E+1	(ft)
σ_z	Vertical dispersion coefficient	7.6E+0	7.6E+0	7.6E+0	7.6E+0	(ft)
ADF	Air dispersion factor	2.1E+0	2.1E+0	2.1E+0	2.1E+0	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(ft^3/s)
W_{pl}	Width of GW plume at SW discharge	NA	(ft)
δ_{pl}	Thickness of GW plume at SW discharge	NA	(ft)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

RBCA SITE ASSESSMENT | **User-Specified COC Data**

REPRESENTATIVE COC CONCENTRATIONS IN SOURCE MEDIA

CONSTITUENT	Representative COC Concentration			
	Groundwater		Soils (15 - 25 ft)	
	value (mg/L)	note	value (mg/kg)	note
Benzene	9.3E+0	95% UCL at W-1s	2.5E+0	Max at 20 ft in W-1
Toluene	9.4E+0	95% UCL at W-1s	2.1E+1	Max at 15 ft in W-1
Ethylbenzene	2.4E+0	95% UCL at W-1s	2.0E+1	Max at 15 ft in W-1
Xylene (mixed isomers)	1.4E+1	95% UCL at W-1s	1.3E+2	Max at 15 ft in W-1
Methyl t-Butyl ether	5.7E-1	95% UCL at W-1s	0.0E+0	
Naphthalene	5.1E-1	Maximum at W-1s	3.4E+0	Max at 25 ft in B-1
Phenol	0.0E+0		3.0E-1	Max at 25 ft in B-1

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT | **User-Specified COC Data**

CONSTITUENT HALF-LIFE VALUES

CONSTITUENT	Saturated Zone Half-Life (days)	Unsaturated Zone Half-Life (days)
Benzene	480	480
Toluene	271	271
Ethylbenzene	5790	5790
Xylene (mixed isomers)	961	961
Methyl t-Butyl ether	319	319
Naphthalene	7300	7300
Phenol	7300	7300

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT | **Tier 2 Domenico Groundwater Modeling Summary**

Site Name: Arrow Rentals Site Location: 187 North L Street, Livermore, Completed By: Aquifer Sciences, Inc. Date Completed: 19-Jul-00

DOMENICO GROUNDWATER MODELING SUMMARY

OFF-SITE GROUNDWATER EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAY IS ACTIVE)**

SOILS (15 - 25 ft): LEACHING TO GROUNDWATER INGESTION

Exposure Concentration

Constituents of Concern	1) Source Medium: Soil Conc. (mg/kg)	2) Steady-state Exposure Concentration, Groundwater: POE Conc. (mg/L): Off-site 1 (100 ft) Residential	2) Steady-state Exposure Concentration, Groundwater: POE Conc. (mg/L): Off-site 2 (100 ft) Commercial	3) POE Concentration Limit, Groundwater: POE Conc. (mg/L): Off-site 1 (100 ft) Residential	3) POE Concentration Limit, Groundwater: POE Conc. (mg/L): Off-site 2 (100 ft) Commercial	4) Time to Reach POE Conc. Limit, Conc. limit reached? ("■" if yes) ; Time (yr): Off-site 1 (100 ft) Residential	4) Time to Reach POE Conc. Limit, Conc. limit reached? ("■" if yes) ; Time (yr): Off-site 2 (100 ft) Commercial
Benzene	2.5E+0	2.5E-4	2.5E-4	2.9E-3	9.9E-3	□ NA	□ NA
Toluene	2.1E+1	6.8E-8	6.8E-8	7.3E+0	2.0E+1	□ NA	□ NA
Ethylbenzene	2.0E+1	1.1E-2	1.1E-2	3.7E+0	1.0E+1	□ NA	□ NA
Xylene (mixed isomers)	1.3E+2	1.3E-4	1.3E-4	7.3E+1	2.0E+2	□ NA	□ NA
Methyl t-Butyl ether	0.0E+0	0.0E+0	0.0E+0	3.7E-1	1.0E+0	□ NA	□ NA
Naphthalene	3.4E+0	3.3E-7	3.3E-7	1.5E+1	4.1E+1	□ NA	□ NA
Phenol	3.0E-1	5.4E-2	5.4E-2	2.2E+1	6.1E+1	□ NA	□ NA

NOTE: POE = Point of exposure

RBCA SITE ASSESSMENT | **Tier 2 Domenico Groundwater Modeling Summary**

Site Name: Arrow Rentals Site Location: 187 North L Street, Livermore, Completed By: Aquifer Sciences, Inc. Date Completed: 19-Jul-00 *2 OF 2*

DOMENICO GROUNDWATER MODELING SUMMARY

OFF-SITE GROUNDWATER EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAY IS ACTIVE)**

GROUNDWATER: INGESTION

Exposure Concentration

Constituents of Concern	1) Source Medium	2) Steady-state Exposure Concentration Groundwater: POE Conc. (mg/L)		3) POE Concentration Limit Groundwater: POE Conc. (mg/L)		4) Time to Reach POE Conc. Limit Conc reaches limit? ("■" If yes) ; Time (yr)	
	Groundwater Conc. (mg/L)	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial
Benzene	9.3E+0	1.4E-3	1.4E-3	2.9E-3	9.9E-3	☐ NA	☐ NA
Toluene	9.4E+0	1.0E-7	1.0E-7	7.3E+0	2.0E+1	☐ NA	☐ NA
Ethylbenzene	2.4E+0	1.2E-2	1.2E-2	3.7E+0	1.0E+1	☐ NA	☐ NA
Xylene (mixed isomers)	1.4E+1	8.3E-5	8.3E-5	7.3E+1	2.0E+2	☐ NA	☐ NA
Methyl t-Butyl ether	5.7E-1	1.2E-3	1.2E-3	3.7E-1	1.0E+0	☐ NA	☐ NA
Naphthalene	5.1E-1	2.3E-6	2.3E-6	1.5E+1	4.1E+1	☐ NA	☐ NA
Phenol	0.0E+0	0.0E+0	0.0E+0	2.2E+1	6.1E+1	☐ NA	☐ NA

NOTE: POE = Point of exposure

RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

Constituent: Benzene
Source Medium: Affected Groundwater
Biodegredation: 1st Order

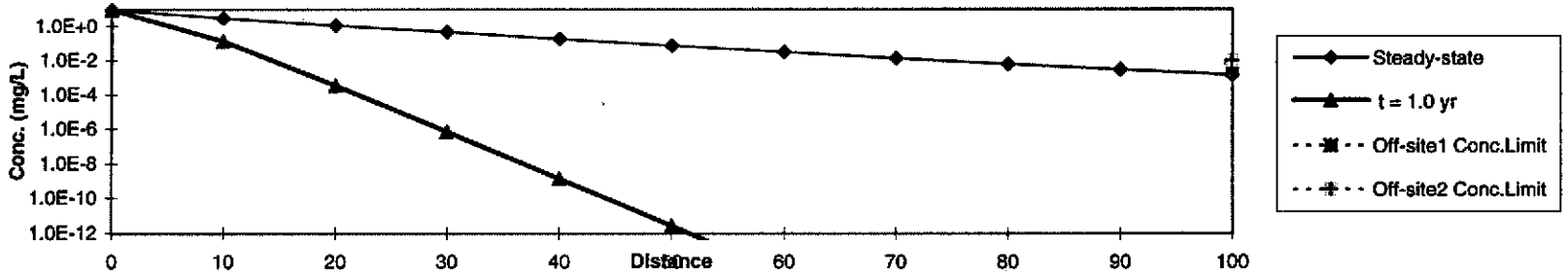
Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	9.3E+0	1.4E-1	3.3E-4	7.2E-7	1.4E-9	2.7E-12	5.0E-15	9.7E-18	0.0E+0	0.0E+0	0.0E+0
Steady-state		9.3E+0	3.0E+0	1.2E+0	4.7E-1	1.8E-1	7.4E-2	3.1E-2	1.3E-2	6.1E-3	2.9E-3	1.4E-3

Off-site1 Residential	Off-site2 Commercial
100	100
0.0E+0	0.0E+0
1.4E-3	1.4E-3
2.9E-3	9.9E-3

POE Concentration Limit (mg/L)

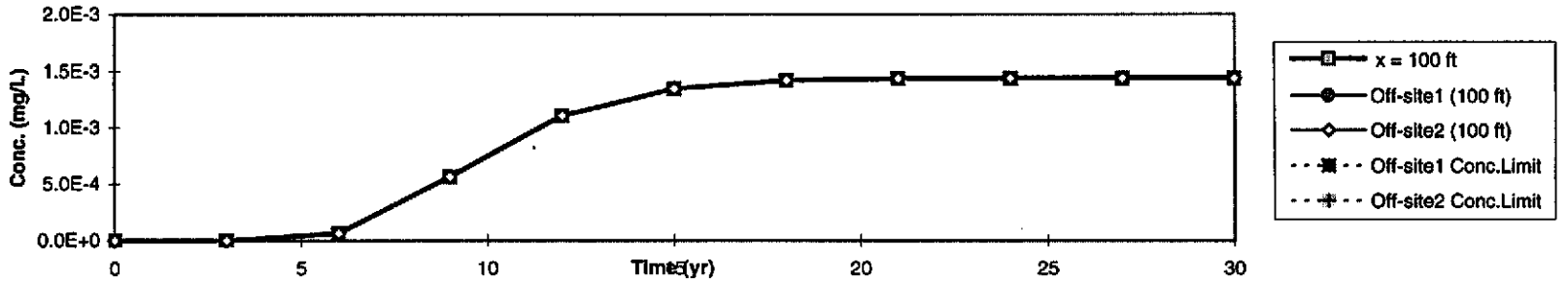


Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	9.2E-9	6.3E-5	5.7E-4	1.1E-3	1.4E-3	1.4E-3	1.4E-3	1.4E-3	1.4E-3	1.4E-3
Off-site1 (100 ft)		0.0E+0	9.2E-9	6.3E-5	5.7E-4	1.1E-3	1.4E-3	1.4E-3	1.4E-3	1.4E-3	1.4E-3	1.4E-3
Off-site2 (100 ft)		0.0E+0	9.2E-9	6.3E-5	5.7E-4	1.1E-3	1.4E-3	1.4E-3	1.4E-3	1.4E-3	1.4E-3	1.4E-3

Time to Reach Conc. Limit (yr)	
Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

Job ID: 971275

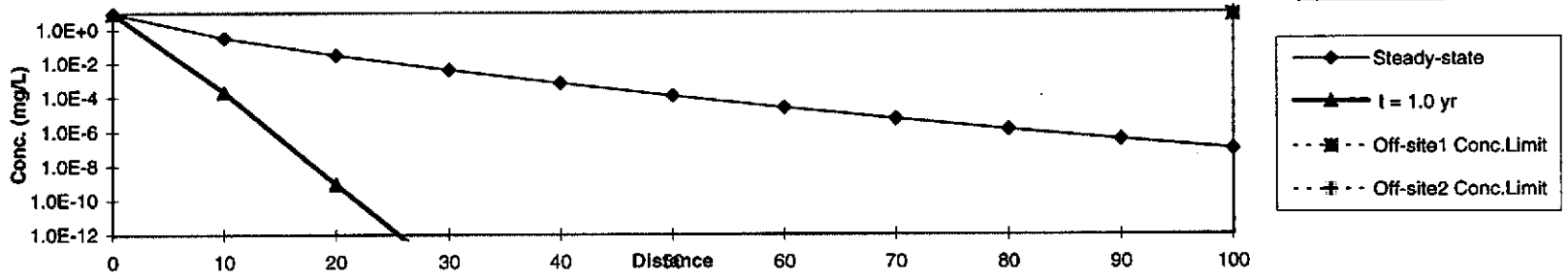
Constituent: Toluene
Source Medium: Affected Groundwater
Biodegredation: 1st Order

Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	9.4E+0	2.0E-4	9.0E-10	3.9E-15	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Steady-state		9.4E+0	3.2E-1	3.0E-2	4.0E-3	6.4E-4	1.2E-4	2.3E-5	5.3E-6	1.3E-6	3.5E-7	1.0E-7

	Off-site1 Residential	Off-site2 Commercial
	100	100
	0.0E+0	0.0E+0
	1.0E-7	1.0E-7
POE Concentration Limit (mg/L)	7.3E+0	2.0E+1

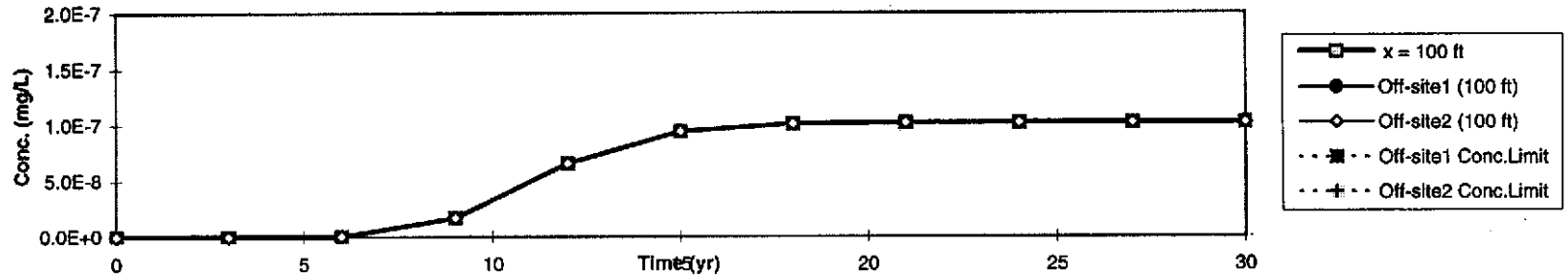


Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	2.8E-18	1.8E-10	1.7E-8	6.6E-8	9.4E-8	1.0E-7	1.0E-7	1.0E-7	1.0E-7	1.0E-7
Off-site1 (100 ft)		0.0E+0	2.8E-18	1.8E-10	1.7E-8	6.6E-8	9.4E-8	1.0E-7	1.0E-7	1.0E-7	1.0E-7	1.0E-7
Off-site2 (100 ft)		0.0E+0	2.8E-18	1.8E-10	1.7E-8	6.6E-8	9.4E-8	1.0E-7	1.0E-7	1.0E-7	1.0E-7	1.0E-7

Time to Reach Conc. Limit (yr)	
Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

Constituent: Ethylbenzene
Source Medium: Affected Groundwater
Biodegredation: 1st Order

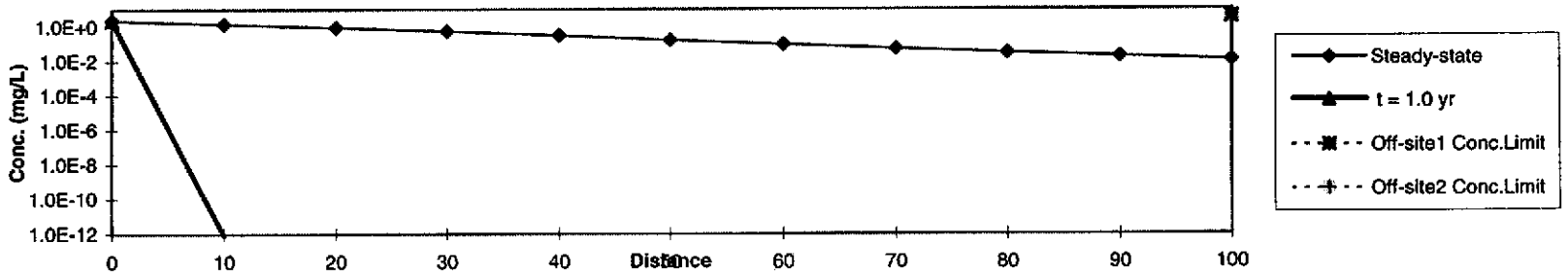
Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	2.4E+0	8.2E-13	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Steady-state		2.4E+0	1.4E+0	9.0E-1	5.5E-1	3.1E-1	1.7E-1	9.5E-2	5.4E-2	3.1E-2	1.9E-2	1.2E-2

Off-site1 Residential	Off-site2 Commercial
100	100
0.0E+0	0.0E+0
1.2E-2	1.2E-2
3.7E+0	1.0E+1

POE Concentration Limit (mg/L)

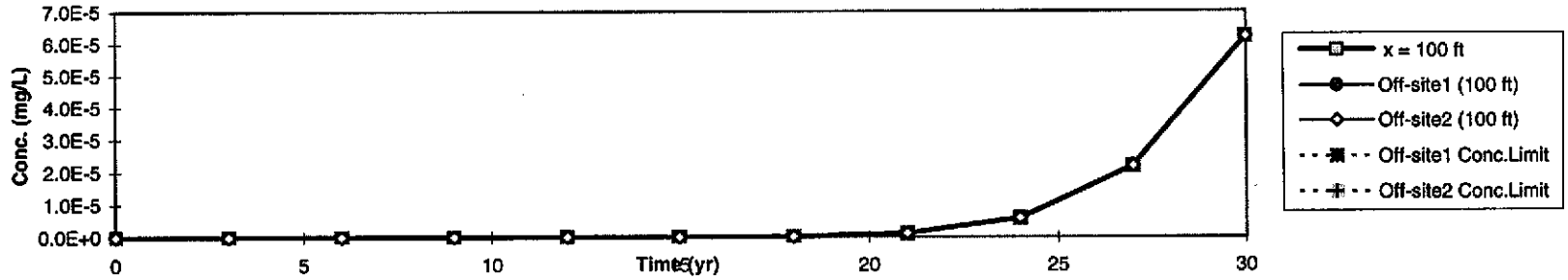


Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	0.0E+0	0.0E+0	4.5E-15	2.2E-11	3.4E-9	9.6E-8	1.0E-6	5.8E-6	2.2E-5	6.2E-5
Off-site1 (100 ft)		0.0E+0	0.0E+0	0.0E+0	4.5E-15	2.2E-11	3.4E-9	9.6E-8	1.0E-6	5.8E-6	2.2E-5	6.2E-5
Off-site2 (100 ft)		0.0E+0	0.0E+0	0.0E+0	4.5E-15	2.2E-11	3.4E-9	9.6E-8	1.0E-6	5.8E-6	2.2E-5	6.2E-5

Time to Reach Conc. Limit (yr)	
Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

Job ID: 971275

Constituent: Xylene (mixed isomers)
Source Medium: Affected Groundwater
Biodegredation: 1st Order

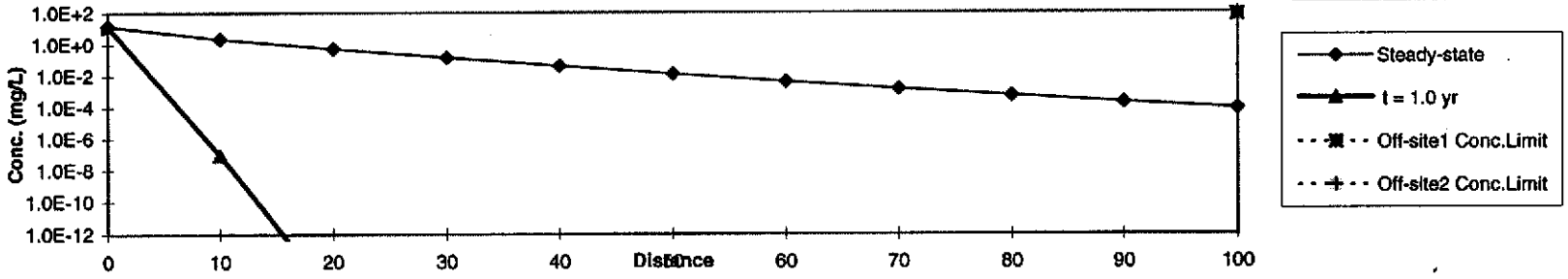
Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	1.4E+1	9.6E-8	8.8E-17	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Steady-state		1.4E+1	2.2E+0	5.3E-1	1.5E-1	4.2E-2	1.3E-2	4.1E-3	1.4E-3	5.2E-4	2.0E-4	8.3E-5

Off-site1 Residential	Off-site2 Commercial
100	100
0.0E+0	0.0E+0
8.3E-5	8.3E-5
7.3E+1	2.0E+2

POE Concentration Limit (mg/L)

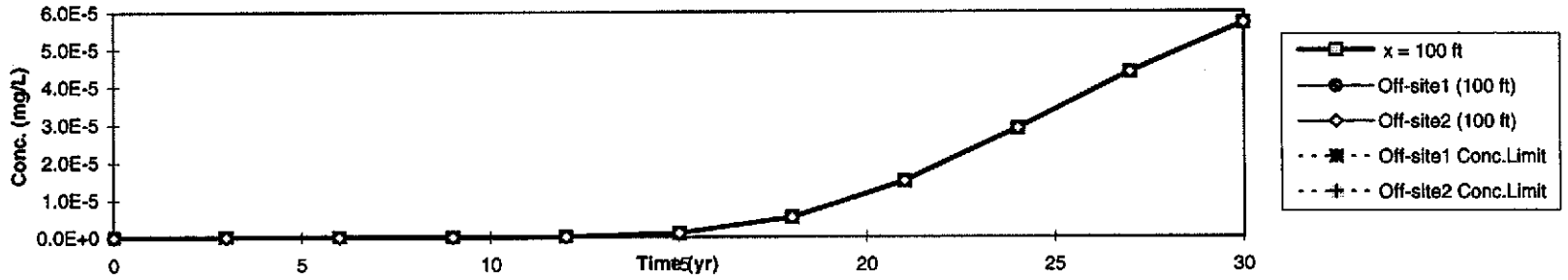


Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	0.0E+0	6.1E-15	3.3E-10	5.6E-8	9.6E-7	5.2E-6	1.5E-5	2.9E-5	4.4E-5	5.7E-5
Off-site1 (100 ft)		0.0E+0	0.0E+0	6.1E-15	3.3E-10	5.6E-8	9.6E-7	5.2E-6	1.5E-5	2.9E-5	4.4E-5	5.7E-5
Off-site2 (100 ft)		0.0E+0	0.0E+0	6.1E-15	3.3E-10	5.6E-8	9.6E-7	5.2E-6	1.5E-5	2.9E-5	4.4E-5	5.7E-5

Time to Reach Conc. Limit (yr)	
Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

Constiuent: Methyl t-Butyl ether
Source Medium: Affected Groundwater
Biodegredation: 1st Order

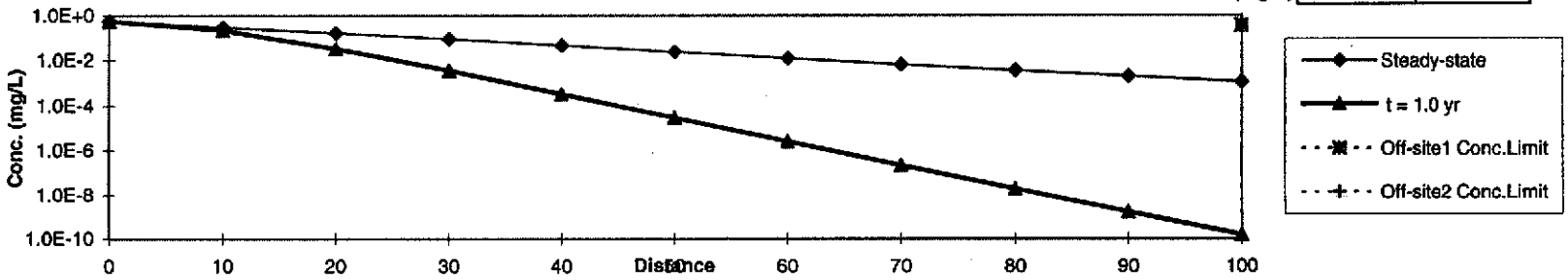
Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	5.7E-1	2.2E-1	3.2E-2	3.6E-3	3.3E-4	2.9E-5	2.5E-6	2.1E-7	1.9E-8	1.7E-9	1.5E-10
Steady-state		5.7E-1	3.0E-1	1.6E-1	9.1E-2	4.7E-2	2.4E-2	1.2E-2	6.5E-3	3.5E-3	2.0E-3	1.2E-3

Off-site1 Residential	Off-site2 Commercial
100	100
1.5E-10	1.5E-10
1.2E-3	1.2E-3
3.7E-1	1.0E+0

POE Concentration Limit (mg/L)

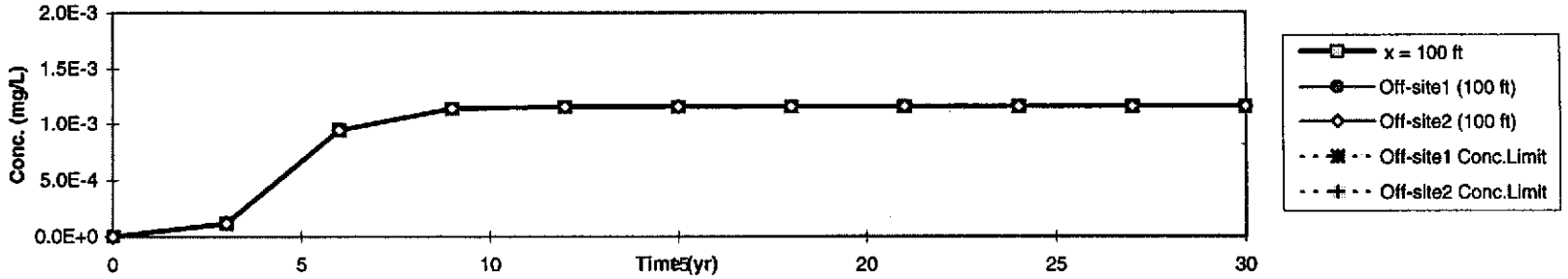


Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	1.2E-4	9.4E-4	1.1E-3	1.2E-3	1.2E-3	1.2E-3	1.2E-3	1.2E-3	1.2E-3	1.2E-3
Off-site1 (100 ft)		0.0E+0	1.2E-4	9.4E-4	1.1E-3	1.2E-3	1.2E-3	1.2E-3	1.2E-3	1.2E-3	1.2E-3	1.2E-3
Off-site2 (100 ft)		0.0E+0	1.2E-4	9.4E-4	1.1E-3	1.2E-3	1.2E-3	1.2E-3	1.2E-3	1.2E-3	1.2E-3	1.2E-3

Time to Reach Conc. Limit (yr)	
Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

Job ID: 971275

Constituent: Naphthalene
Source Medium: Affected Groundwater
Biodegredation: 1st Order

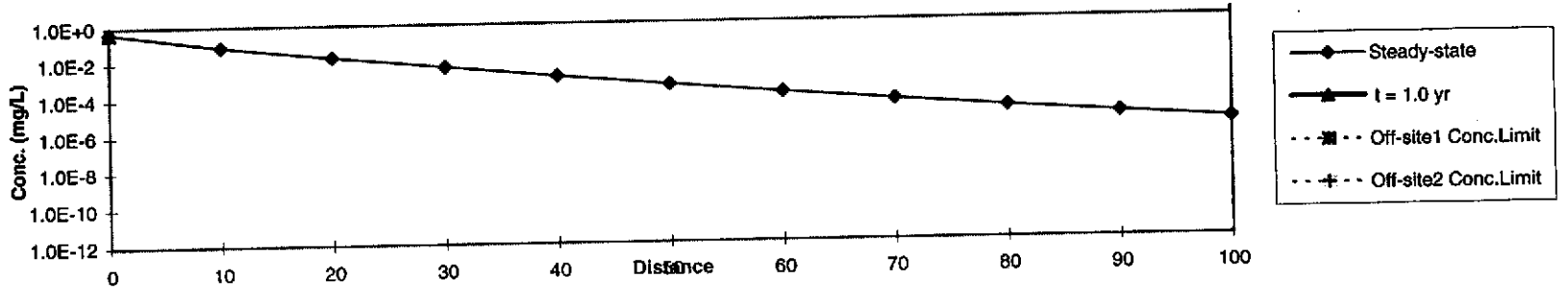
Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	5.1E-1	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Steady-state		5.1E-1	7.7E-2	1.7E-2	4.7E-3	1.3E-3	3.9E-4	1.2E-4	4.2E-5	1.5E-5	5.8E-6	2.3E-6

Off-site1	Off-site2
Residential	Commercial
100	100
0.0E+0	0.0E+0
2.3E-6	2.3E-6
1.5E+1	4.1E+1

POE Concentration Limit (mg/L)



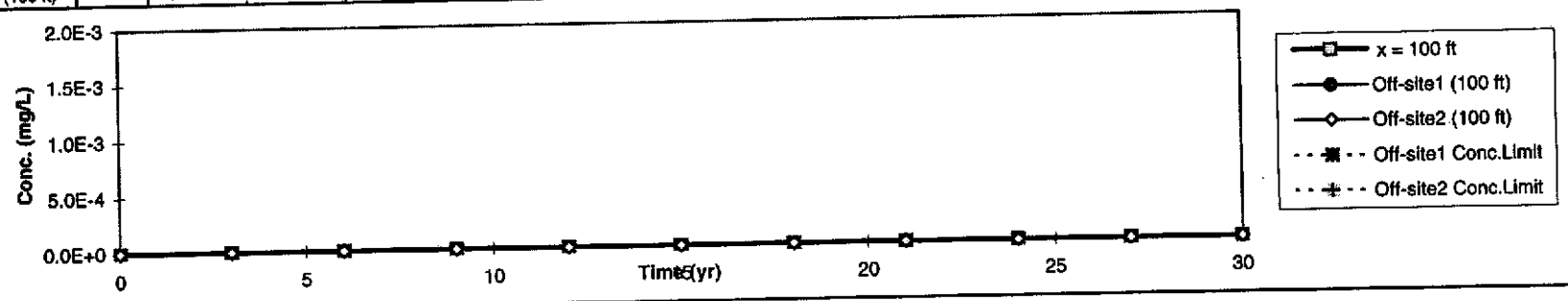
Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Off-site1 (100 ft)		0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Off-site2 (100 ft)		0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0

Time to Reach Conc. Limit (yr)

Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

Constituent: Phenol
Source Medium: Affected Groundwater
Biodegredation: 1st Order

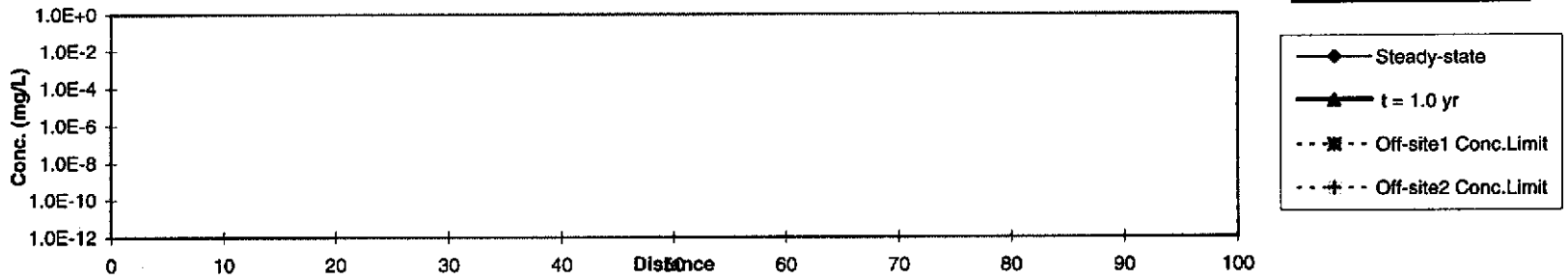
Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Steady-state		0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0

Off-site1	Off-site2
Residential	Commercial
100	100
0.0E+0	0.0E+0
0.0E+0	0.0E+0
2.2E+1	6.1E+1

POE Concentration Limit (mg/L)

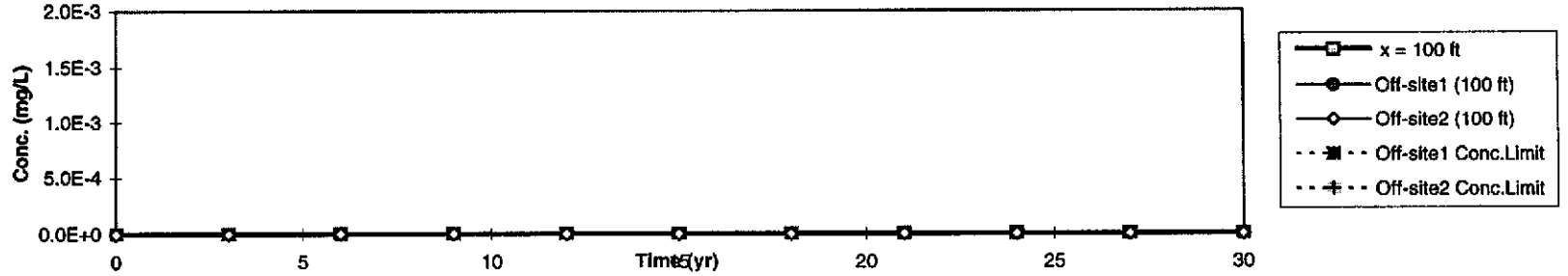


Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Off-site1 (100 ft)		0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Off-site2 (100 ft)		0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0

Time to Reach Conc. Limit (yr)	
Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

Job ID: 971275

Constituent: Benzene
Source Medium: Affected Soils Leaching to Groundwater
Biodegredation: 1st Order

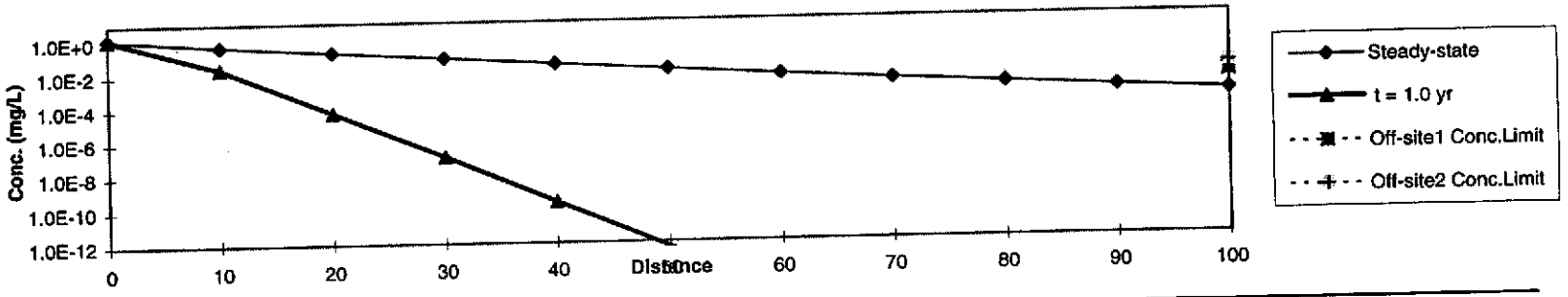
Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	1.6E+0	2.4E-2	5.8E-5	1.3E-7	2.5E-10	4.6E-13	8.7E-16	1.7E-18	0.0E+0	0.0E+0	0.0E+0
Steady-state		1.6E+0	5.2E-1	2.0E-1	8.1E-2	3.2E-2	1.3E-2	5.4E-3	2.4E-3	1.1E-3	5.1E-4	2.5E-4

Off-site1	Off-site2
Residential	Commercial
100	100
0.0E+0	0.0E+0
2.5E-4	2.5E-4
2.9E-3	9.9E-3

POE Concentration Limit (mg/L)



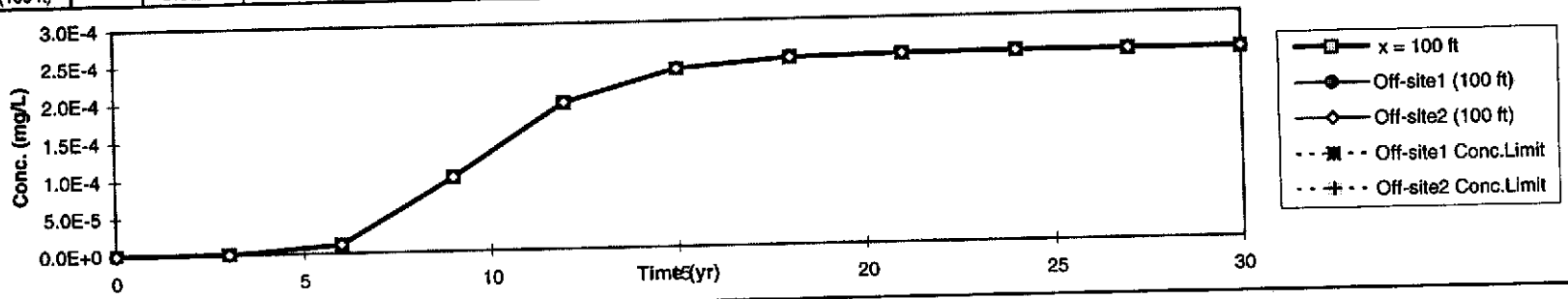
Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	1.6E-9	1.1E-5	9.9E-5	1.9E-4	2.4E-4	2.5E-4	2.5E-4	2.5E-4	2.5E-4	2.5E-4
Off-site1 (100 ft)		0.0E+0	1.6E-9	1.1E-5	9.9E-5	1.9E-4	2.4E-4	2.5E-4	2.5E-4	2.5E-4	2.5E-4	2.5E-4
Off-site2 (100 ft)		0.0E+0	1.6E-9	1.1E-5	9.9E-5	1.9E-4	2.4E-4	2.5E-4	2.5E-4	2.5E-4	2.5E-4	2.5E-4

Time to Reach Conc. Limit (yr)

Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

Constiuent: Benzene
Source Medium: Affected Soils Leaching to Groundwater
Biodegredation: 1st Order

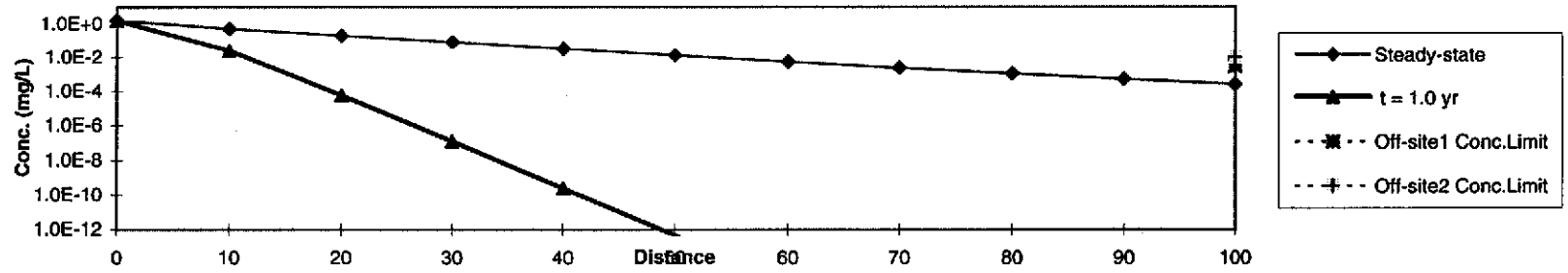
Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	1.6E+0	2.4E-2	5.8E-5	1.3E-7	2.5E-10	4.6E-13	8.7E-16	1.7E-18	0.0E+0	0.0E+0	0.0E+0
Steady-state		1.6E+0	5.2E-1	2.0E-1	8.1E-2	3.2E-2	1.3E-2	5.4E-3	2.4E-3	1.1E-3	5.1E-4	2.5E-4

Off-site1 Residential	Off-site2 Commercial
100	100
0.0E+0	0.0E+0
2.5E-4	2.5E-4
2.9E-3	9.9E-3

POE Concentration Limit (mg/L)

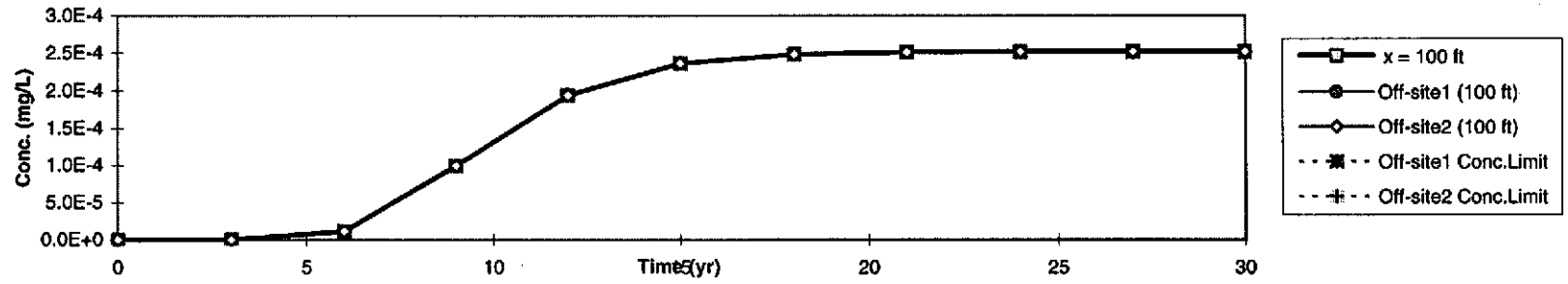


Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	1.6E-9	1.1E-5	9.9E-5	1.9E-4	2.4E-4	2.5E-4	2.5E-4	2.5E-4	2.5E-4	2.5E-4
Off-site1 (100 ft)		0.0E+0	1.6E-9	1.1E-5	9.9E-5	1.9E-4	2.4E-4	2.5E-4	2.5E-4	2.5E-4	2.5E-4	2.5E-4
Off-site2 (100 ft)		0.0E+0	1.6E-9	1.1E-5	9.9E-5	1.9E-4	2.4E-4	2.5E-4	2.5E-4	2.5E-4	2.5E-4	2.5E-4

Time to Reach Conc. Limit (yr)	
Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Job ID: 971275

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

Constituent: Ethylbenzene
Source Medium: Affected Soils Leaching to Groundwater
Biodegredation: 1st Order

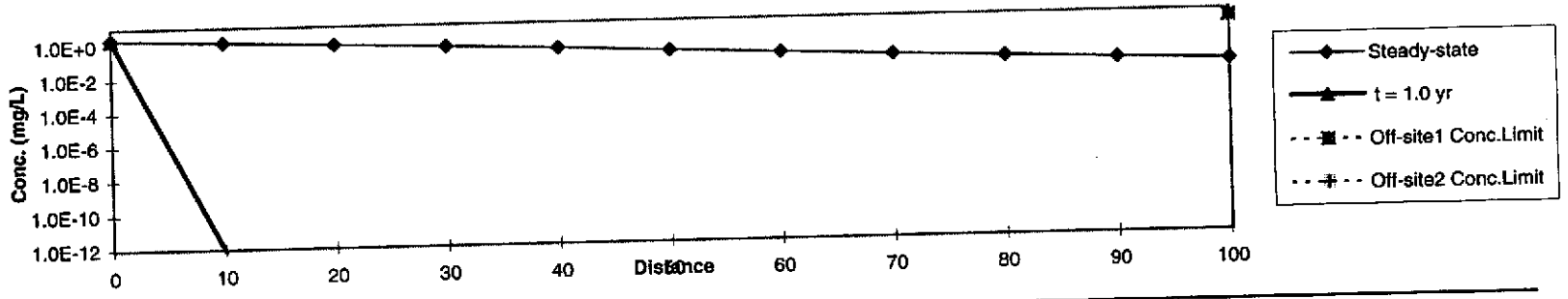
Concentration vs. Distance from Source (for given time)

Time (yr) 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	2.3E+0	7.8E-13	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Steady-state		2.3E+0	1.4E+0	8.6E-1	5.2E-1	3.0E-1	1.6E-1	9.0E-2	5.1E-2	3.0E-2	1.8E-2	1.1E-2

Off-site1	Off-site2
Residential	Commercial
100	100
0.0E+0	0.0E+0
1.1E-2	1.1E-2
3.7E+0	1.0E+1

POE Concentration Limit (mg/L)



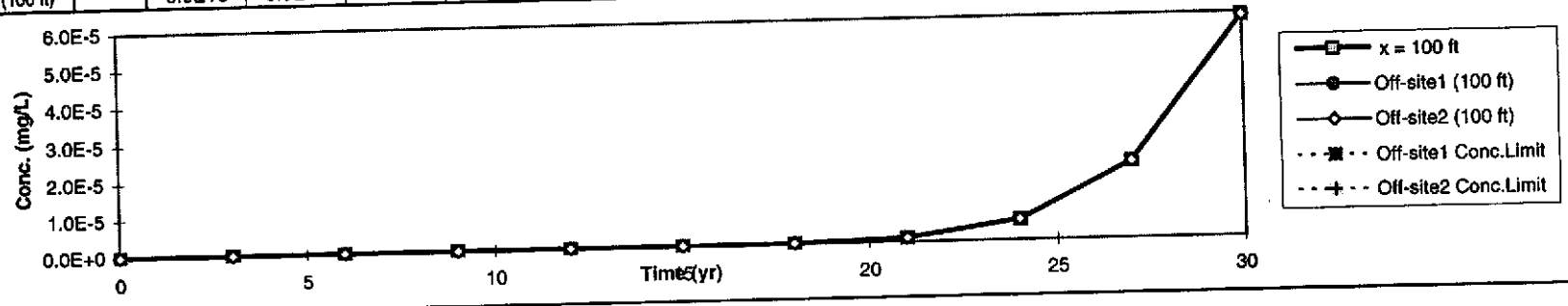
Concentration vs. Time (for given distance from source)

Distance (ft) 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	0.0E+0	0.0E+0	4.3E-15	2.1E-11	3.2E-9	9.1E-8	9.6E-7	5.5E-6	2.1E-5	5.9E-5
Off-site1 (100 ft)		0.0E+0	0.0E+0	0.0E+0	4.3E-15	2.1E-11	3.2E-9	9.1E-8	9.6E-7	5.5E-6	2.1E-5	5.9E-5
Off-site2 (100 ft)		0.0E+0	0.0E+0	0.0E+0	4.3E-15	2.1E-11	3.2E-9	9.1E-8	9.6E-7	5.5E-6	2.1E-5	5.9E-5

Time to Reach Conc. Limit (yr)

Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT | **TIER 2 TRANSIENT DOMENICO ANALYSIS**

Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, California | Date Completed: 19-Jul-00

Constituent: Xylene (mixed isomers)

Source Medium: Affected Soils Leaching to Groundwater

Biodegredation: 1st Order

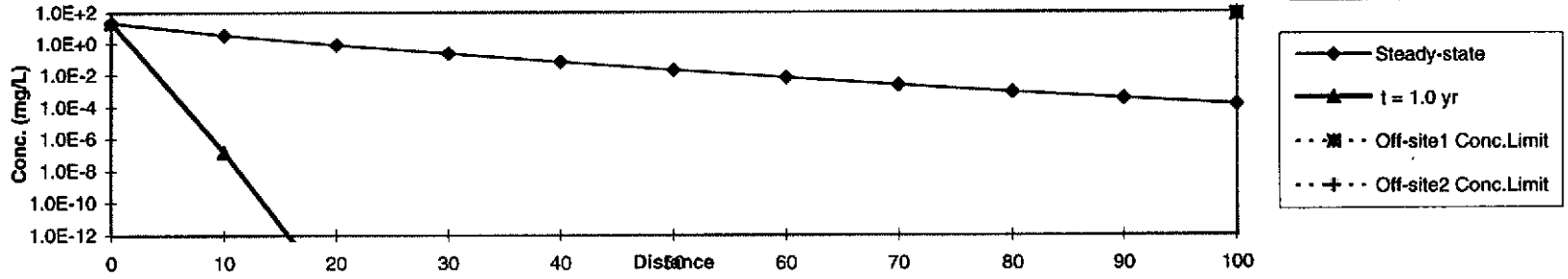
Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	2.2E+1	1.5E-7	1.4E-16	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Steady-state		2.2E+1	3.6E+0	8.4E-1	2.3E-1	6.7E-2	2.0E-2	6.5E-3	2.3E-3	8.3E-4	3.2E-4	1.3E-4

Off-site1	Off-site2
Residential	Commercial
100	100
0.0E+0	0.0E+0
1.3E-4	1.3E-4
7.3E+1	2.0E+2

POE Concentration Limit (mg/L)

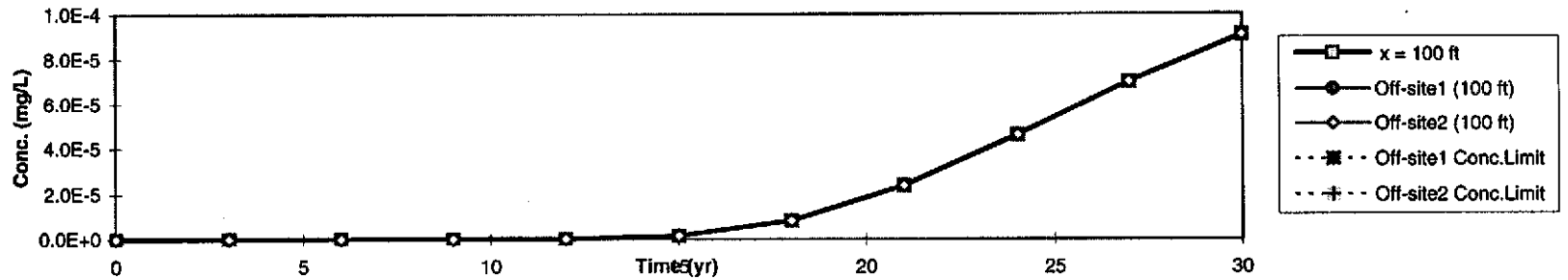


Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	0.0E+0	9.7E-15	5.2E-10	8.9E-8	1.5E-6	8.3E-6	2.4E-5	4.6E-5	7.0E-5	9.1E-5
Off-site1 (100 ft)		0.0E+0	0.0E+0	9.7E-15	5.2E-10	8.9E-8	1.5E-6	8.3E-6	2.4E-5	4.6E-5	7.0E-5	9.1E-5
Off-site2 (100 ft)		0.0E+0	0.0E+0	9.7E-15	5.2E-10	8.9E-8	1.5E-6	8.3E-6	2.4E-5	4.6E-5	7.0E-5	9.1E-5

Time to Reach Conc. Limit (yr)	
Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

Job ID: 971275

Constituent: Methyl t-Butyl ether
Source Medium: Affected Soils Leaching to Groundwater
Biodegredation: 1st Order

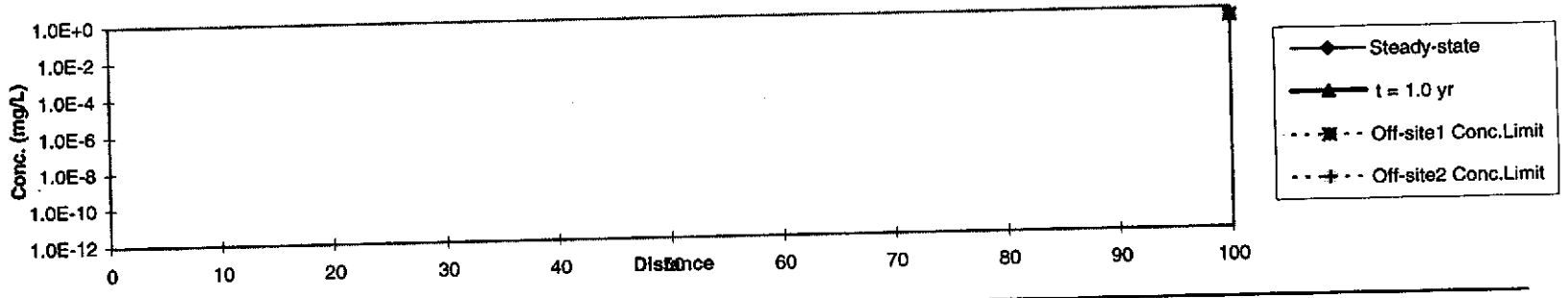
Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Steady-state		0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0

Off-site1	Off-site2
Residential	Commercial
100	100
0.0E+0	0.0E+0
0.0E+0	0.0E+0
3.7E-1	1.0E+0

POE Concentration Limit (mg/L)



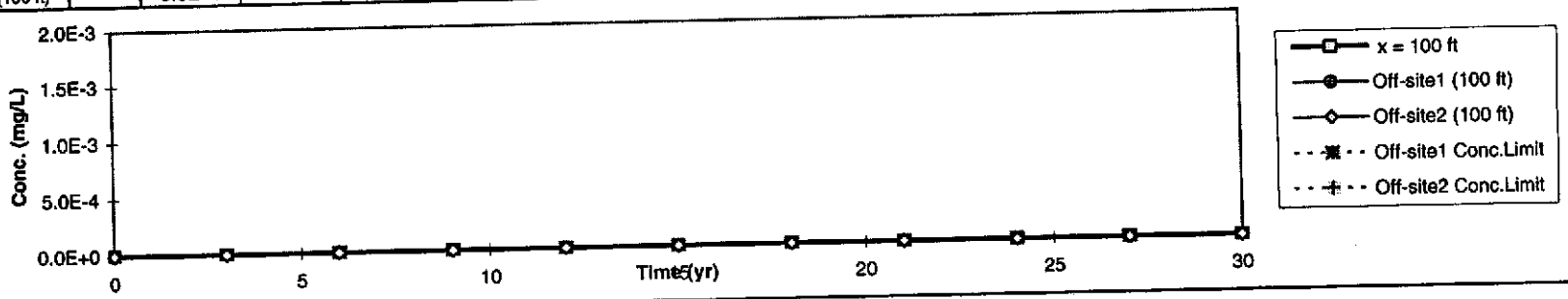
Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Off-site1 (100 ft)		0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Off-site2 (100 ft)		0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0

Time to Reach Conc. Limit (yr)

Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

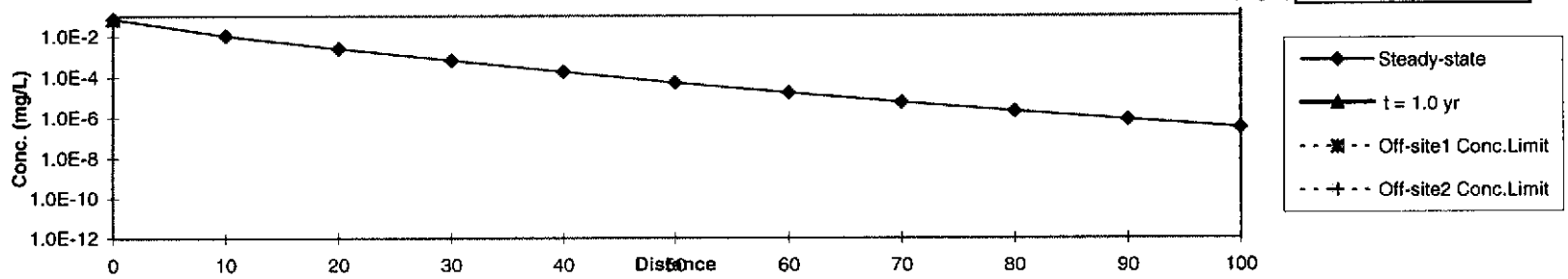
Constiuent: Naphthalene
Source Medium: Affected Soils Leaching to Groundwater
Biodegredation: 1st Order

Concentration vs. Distance from Source (for given time)

Time (yr) 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	7.2E-2	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Steady-state		7.2E-2	1.1E-2	2.5E-3	6.6E-4	1.8E-4	5.5E-5	1.7E-5	5.9E-6	2.1E-6	8.1E-7	3.3E-7

	Off-site1 Residential	Off-site2 Commercial
	100	100
	0.0E+0	0.0E+0
	3.3E-7	3.3E-7
POE Concentration Limit (mg/L)	1.5E+1	4.1E+1

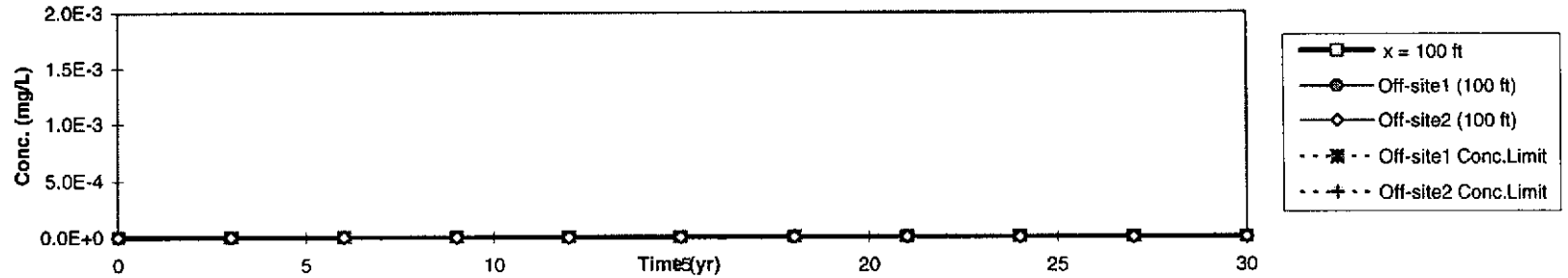


Concentration vs. Time (for given distance from source)

Distance (ft) 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Off-site1 (100 ft)		0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Off-site2 (100 ft)		0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0

Time to Reach Conc. Limit (yr)	
Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

Job ID: 971275

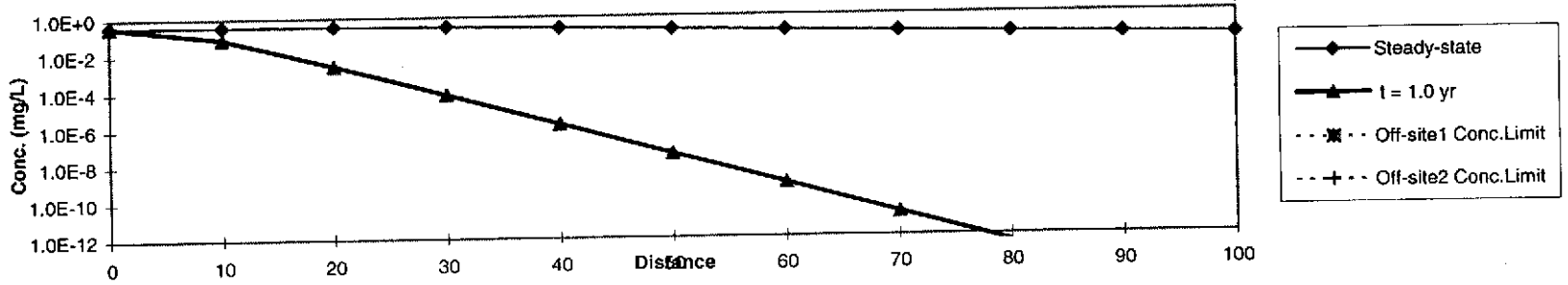
Constiuent: Phenol
Source Medium: Affected Soils Leaching to Groundwater
Biodegredation: 1st Order

Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	3.8E-1	8.0E-2	2.7E-3	7.1E-5	1.7E-6	3.6E-8	7.9E-10	1.7E-11	3.9E-13	8.7E-15	2.0E-16
Steady-state		3.8E-1	3.6E-1	3.4E-1	3.1E-1	2.5E-1	1.9E-1	1.4E-1	1.1E-1	8.6E-2	6.8E-2	5.4E-2

POE Concentration Limit (mg/L)	Off-site1	Off-site2
	Residential	Commercial
	100	100
	2.0E-16	2.0E-16
	5.4E-2	5.4E-2
	2.2E+1	6.1E+1

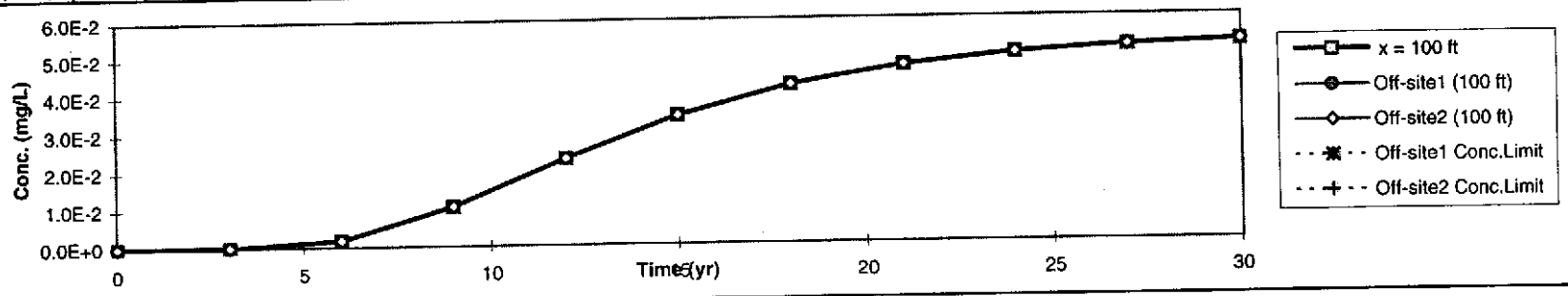


Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	5.0E-6	1.7E-3	1.1E-2	2.3E-2	3.4E-2	4.2E-2	4.7E-2	5.0E-2	5.2E-2	5.3E-2
Off-site1 (100 ft)		0.0E+0	5.0E-6	1.7E-3	1.1E-2	2.3E-2	3.4E-2	4.2E-2	4.7E-2	5.0E-2	5.2E-2	5.3E-2
Off-site2 (100 ft)		0.0E+0	5.0E-6	1.7E-3	1.1E-2	2.3E-2	3.4E-2	4.2E-2	4.7E-2	5.0E-2	5.2E-2	5.3E-2

Time to Reach Conc. Limit (yr)	
Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ☐ (CHECKED IF PATHWAY IS ACTIVE)

SURFACE SOILS:
VAPOR INHALATION

Constituents of Concern	1) Source Medium: Soil Conc. (mg/kg)	2) NAF Value (m^3/kg) Receptor: On-site (0 ft) Commercial	On-site (0 ft) Construction Worker	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial	3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2): On-site (0 ft) Commercial	On-site (0 ft) Construction Worker	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial
Benzene	2.5E+0								
Toluene	2.1E+1								
Ethylbenzene	2.0E+1								
Xylene (mixed isomers)	1.3E+2								
Methyl t-Butyl ether	0.0E+0								
Naphthalene	3.4E+0								
Phenol	3.0E-1								

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

SURFACE SOILS:
VAPOR INHALATION (cont'd)

Constituents of Concern	4) Exposure Multiplier (EFxED)/(ATx365) (unitless)				5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4)			
	On-site (0 ft)		Off-site 1 (100 ft)	Off-site 2 (100 ft)	On-site (0 ft)		Off-site 1 (100 ft)	Off-site 2 (100 ft)
	Commercial	Construction Worker	Residential	Commercial	Commercial	Construction Worker	Residential	Commercial
Benzene								
Toluene								
Ethylbenzene								
Xylene (mixed isomers)								
Methyl t-Butyl ether								
Naphthalene								
Phenol								

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr)

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAY IS ACTIVE)**

SUBSURFACE SOILS (15 - 25 ft):

VAPOR INHALATION

	1) Source Medium	2) NAF Value (m^3/kg) Receptor			3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)		
Constituents of Concern	Soil Conc. (mg/kg)	On-site (0 ft) Commercial	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial	On-site (0 ft) Commercial	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial
Benzene	2.5E+0	4.5E+4	1.1E+5	9.4E+4	5.6E-5	2.2E-5	2.7E-5
Toluene	2.1E+1	4.5E+4	1.1E+5	9.4E+4	4.7E-4	1.9E-4	2.2E-4
Ethylbenzene	2.0E+1	8.7E+4	1.8E+5	1.8E+5	2.3E-4	1.1E-4	1.1E-4
Xylene (mixed isomers)	1.3E+2	6.8E+4	1.4E+5	1.4E+5	1.9E-3	9.2E-4	9.2E-4
Methyl t-Butyl ether	0.0E+0	5.0E+4	1.1E+5	1.0E+5	0.0E+0	0.0E+0	0.0E+0
Naphthalene	3.4E+0	9.7E+6	2.0E+7	2.0E+7	3.5E-7	1.7E-7	1.7E-7
Phenol	3.0E-1	5.2E+7	1.1E+8	1.1E+8	5.8E-9	2.8E-9	2.8E-9

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

SUBSURFACE SOILS (15 - 25 ft):
VAPOR INHALATION (cont'd)

Constituents of Concern	4) Exposure Multiplier (EFxED)/(ATx365) (unitless)			5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4)		
	On-site (0 ft) Commercial	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial	On-site (0 ft) Commercial	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial
Benzene	2.4E-1	4.1E-1	2.4E-1	1.4E-5	9.1E-6	6.5E-6
Toluene	6.8E-1	9.6E-1	6.8E-1	3.2E-4	1.8E-4	1.5E-4
Ethylbenzene	6.8E-1	9.6E-1	6.8E-1	1.6E-4	1.1E-4	7.5E-5
Xylene (mixed isomers)	6.8E-1	9.6E-1	6.8E-1	1.3E-3	8.8E-4	6.3E-4
Methyl t-Butyl ether	6.8E-1	9.6E-1	6.8E-1	0.0E+0	0.0E+0	0.0E+0
Naphthalene	6.8E-1	9.6E-1	6.8E-1	2.4E-7	1.6E-7	1.1E-7
Phenol	6.8E-1	9.6E-1	6.8E-1	4.0E-9	2.7E-9	1.9E-9

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr)

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER: VAPOR INHALATION

Exposure Concentration

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/L) Receptor			3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)		
	Groundwater Conc. (mg/L)	On-site (0 ft) Commercial	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial	On-site (0 ft) Commercial	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial
Benzene	9.3E+0	8.4E+4	1.7E+5	1.7E+5	1.1E-4	5.3E-5	5.3E-5
Toluene	9.4E+0	7.7E+4	1.6E+5	1.6E+5	1.2E-4	5.8E-5	5.8E-5
Ethylbenzene	2.4E+0	7.1E+4	1.5E+5	1.5E+5	3.4E-5	1.6E-5	1.6E-5
Xylene (mixed isomers)	1.4E+1	8.2E+4	1.7E+5	1.7E+5	1.7E-4	8.2E-5	8.2E-5
Methyl t-Butyl ether	5.7E-1	5.2E+5	1.1E+6	1.1E+6	1.1E-6	5.3E-7	5.3E-7
Naphthalene	5.1E-1	9.9E+5	2.1E+6	2.1E+6	5.2E-7	2.5E-7	2.5E-7
Phenol	0.0E+0	2.6E+8	5.4E+8	5.4E+8	0.0E+0	0.0E+0	0.0E+0

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

GROUNDWATER: VAPOR INHALATION (cont'd)

Constituents of Concern	4) Exposure Multiplier (EFxED)/(ATx365) (unitless)			5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4)		
	On-site (0 ft) Commercial	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial	On-site (0 ft) Commercial	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial
Benzene	2.4E-1	4.1E-1	2.4E-1	2.7E-5	2.2E-5	1.3E-5
Toluene	6.8E-1	9.6E-1	6.8E-1	8.4E-5	5.6E-5	4.0E-5
Ethylbenzene	6.8E-1	9.6E-1	6.8E-1	2.3E-5	1.5E-5	1.1E-5
Xylene (mixed isomers)	6.8E-1	9.6E-1	6.8E-1	1.2E-4	7.8E-5	5.6E-5
Methyl t-Butyl ether	6.8E-1	9.6E-1	6.8E-1	7.6E-7	5.1E-7	3.6E-7
Naphthalene	6.8E-1	9.6E-1	6.8E-1	3.5E-7	2.4E-7	1.7E-7
Phenol	6.8E-1	9.6E-1	6.8E-1	0.0E+0	0.0E+0	0.0E+0

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr)

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

TOTAL PATHWAY EXPOSURE (mg/m^3)

(Sum average expsosure concentrations from soil and groundwater routes.)

Constituents of Concern	On-site (0 ft) Commercial	On-site (0 ft) Construction Worker	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial
Benzene	4.1E-5		3.1E-5	2.0E-5
Toluene	4.0E-4		2.3E-4	1.9E-4
Ethylbenzene	1.8E-4		1.2E-4	8.6E-5
Xylene (mixed isomers)	1.4E-3		9.6E-4	6.9E-4
Methyl t-Butyl ether	7.6E-7		5.1E-7	3.6E-7
Naphthalene	5.9E-7		4.0E-7	2.8E-7
Phenol	4.0E-9		2.7E-9	1.9E-9

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAYS ARE ACTIVE)

CARCINOGENIC RISK

Constituents of Concern	(1) EPA Carcinogenic Classification	(2) Total Carcinogenic Exposure (mg/m^3) On-site (0 ft) Commercial	(2) Total Carcinogenic Exposure (mg/m^3) On-site (0 ft) Construction Worker	(2) Total Carcinogenic Exposure (mg/m^3) Off-site 1 (100 ft) Residential	(2) Total Carcinogenic Exposure (mg/m^3) Off-site 2 (100 ft) Commercial	(3) Inhalation Unit Risk Factor (µg/m^3)^-1	(4) Individual COC Risk (2) x (3) x 1000 On-site (0 ft) Commercial	(4) Individual COC Risk (2) x (3) x 1000 On-site (0 ft) Construction Worker	(4) Individual COC Risk (2) x (3) x 1000 Off-site 1 (100 ft) Residential	(4) Individual COC Risk (2) x (3) x 1000 Off-site 2 (100 ft) Commercial
Benzene	A	4.1E-5		3.1E-5	2.0E-5	8.3E-6	3.4E-7		2.6E-7	1.6E-7
Toluene	D									
Ethylbenzene	D									
Xylene (mixed isomers)	D									
Methyl t-Butyl ether	-									
Naphthalene	D									
Phenol	D									
Total Pathway Carcinogenic Risk =							**3.4E-7**		**2.6E-7**	**1.6E-7**

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

TOXIC EFFECTS

Constituents of Concern	(5) Total Toxicant Exposure (mg/m^3)				(6) Inhalation Reference Conc. (mg/m^3)	(7) Individual COC Hazard Quotient (5) / (6)			
	On-site (0 ft)		Off-site 1 (100 ft)	Off-site 2 (100 ft)		On-site (0 ft)		Off-site 1 (100 ft)	Off-site 2 (100 ft)
	Commercial	Construction Worker	Residential	Commercial		Commercial	Construction Worker	Residential	Commercial
Benzene	1.1E-4		7.2E-5	5.5E-5	6.0E-3	1.9E-2		1.2E-2	9.2E-3
Toluene	4.0E-4		2.3E-4	1.9E-4	4.0E-1	1.0E-3		5.9E-4	4.8E-4
Ethylbenzene	1.8E-4		1.2E-4	8.6E-5	1.0E+0	1.8E-4		1.2E-4	8.6E-5
Xylene (mixed isomers)	1.4E-3		9.6E-4	6.9E-4	7.0E+0	2.0E-4		1.4E-4	9.8E-5
Methyl t-Butyl ether	7.6E-7		5.1E-7	3.6E-7	3.0E+0	2.5E-7		1.7E-7	1.2E-7
Naphthalene	5.9E-7		4.0E-7	2.8E-7	1.4E+0	4.2E-7		2.8E-7	2.0E-7
Phenol	4.0E-9		2.7E-9	1.9E-9	2.1E+0	1.9E-9		1.3E-9	9.0E-10
Total Pathway Hazard Index =						**2.1E-2**		**1.3E-2**	**9.8E-3**

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SOILS (15 - 25 ft): VAPOR INTRUSION INTO ON-SITE BUILDINGS

Constituents of Concern	1) Source Medium Soil Conc. (mg/kg)	2) NAF Value (m^3/kg) Receptor Commercial	3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2) Commercial	4) Exposure Multiplier (EFxED)/(ATx365) (unitless) Commercial	5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4) Commercial
Benzene	2.5E+0	3.2E+2	7.7E-3	2.4E-1	1.9E-3
Toluene	2.1E+1	6.4E+2	3.3E-2	6.8E-1	2.2E-2
Ethylbenzene	2.0E+1	1.5E+3	1.3E-2	6.8E-1	9.0E-3
Xylene (mixed isomers)	1.3E+2	1.2E+3	1.1E-1	6.8E-1	7.5E-2
Methyl t-Butyl ether	0.0E+0	5.6E+2	0.0E+0	6.8E-1	0.0E+0
Naphthalene	3.4E+0	1.6E+5	2.1E-5	6.8E-1	1.5E-5
Phenol	3.0E-1	7.4E+4	4.0E-6	6.8E-1	2.8E-6

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER: VAPOR INTRUSION INTO ON-SITE BUILDINGS

Exposure Concentration

Constituents of Concern	1) Source Medium Groundwater Conc. (mg/L)	2) NAF Value (m^3/L) Receptor Commercial	3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2) Commercial	4) Exposure Multiplier (EFxED)/(ATx365) (unitless) Commercial	5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4) Commercial
Benzene	9.3E+0	5.5E+2	1.7E-2	2.4E-1	4.1E-3
Toluene	9.4E+0	5.0E+2	1.9E-2	6.8E-1	1.3E-2
Ethylbenzene	2.4E+0	4.6E+2	5.2E-3	6.8E-1	3.6E-3
Xylene (mixed isomers)	1.4E+1	5.3E+2	2.6E-2	6.8E-1	1.8E-2
Methyl t-Butyl ether	5.7E-1	3.6E+3	1.6E-4	6.8E-1	1.1E-4
Naphthalene	5.1E-1	8.5E+3	6.0E-5	6.8E-1	4.1E-5
Phenol	0.0E+0	3.1E+5	0.0E+0	6.8E-1	0.0E+0

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS

Constituents of Concern	TOTAL PATHWAY EXPOSURE (mg/m^3) *(Sum average expsosure concentrations from soil and groundwater routes.)* Commercial
Benzene	6.0E-3
Toluene	3.5E-2
Ethylbenzene	1.3E-2
Xylene (mixed isomers)	9.3E-2
Methyl t-Butyl ether	1.1E-4
Naphthalene	5.6E-5
Phenol	2.8E-6

Site Name: Arrow Rentals Date Completed: 19-Jul-00
Site Location: 187 North L Street, Livermore, Calif Job ID: 971275
Completed By: Aquifer Sciences, Inc.

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

CARCINOGENIC RISK

Constituents of Concern	(1) EPA Carcinogenic Classification	(2) Total Carcinogenic Exposure (mg/m^3) Commercial	(3) Inhalation Unit Risk Factor (µg/m^3)^-1	(4) Individual COC Risk (2) x (3) x 1000 Commercial
Benzene	A	6.0E-3	8.3E-6	5.0E-5
Toluene	D			
Ethylbenzene	D			
Xylene (mixed isomers)	D			
Methyl t-Butyl ether	-			
Naphthalene	D			
Phenol	D			

Total Pathway Carcinogenic Risk = **5.0E-5**

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

	TOXIC EFFECTS		
Constituents of Concern	(5) Total Toxicant Exposure (mg/m^3) Commercial	(6) Inhalation Reference Concentration (mg/m^3)	(7) Individual COC Hazard Quotient (5) / (6) Commercial
Benzene	1.7E-2	6.0E-3	2.8E+0
Toluene	3.5E-2	4.0E-1	8.8E-2
Ethylbenzene	1.3E-2	1.0E+0	1.3E-2
Xylene (mixed isomers)	9.3E-2	7.0E+0	1.3E-2
Methyl t-Butyl ether	1.1E-4	3.0E+0	3.6E-5
Naphthalene	5.6E-5	1.4E+0	4.0E-5
Phenol	2.8E-6	2.1E+0	1.3E-6

Total Pathway Hazard Index = **2.9E+0**

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAY IS ACTIVE)**

SOILS (15 - 25 ft): LEACHING TO GROUNDWATER INGESTION

Constituents of Concern	1) Source Medium	2) NAF Value (L/kg) Receptor			3) Exposure Medium Groundwater: POE Conc. (mg/L) (1)/(2)		
	Soil Conc. (mg/kg)	On-site (0 ft) Commercial	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial	On-site (0 ft) Commercial	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial
Benzene	2.5E+0	1.5E+0	9.9E+3	9.9E+3	1.6E+0	2.5E-4	2.5E-4
Toluene	2.1E+1	3.3E+0	3.1E+8	3.1E+8	6.3E+0	6.8E-8	6.8E-8
Ethylbenzene	2.0E+1	8.8E+0	1.8E+3	1.8E+3	2.3E+0	1.1E-2	1.1E-2
Xylene (mixed isomers)	1.3E+2	5.8E+0	9.9E+5	9.9E+5	2.2E+1	1.3E-4	1.3E-4
Methyl t-Butyl ether	0.0E+0	4.0E-1	2.0E+2	2.0E+2	0.0E+0	0.0E+0	0.0E+0
Naphthalene	3.4E+0	4.7E+1	1.0E+7	1.0E+7	7.2E-2	3.3E-7	3.3E-7
Phenol	3.0E-1	7.9E-1	5.5E+0	5.5E+0	3.8E-1	5.4E-2	5.4E-2

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

SOILS (15 - 25 ft): LEACHING TO GROUNDWATER INGESTION (cont'd)

Constituents of Concern	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg-day)			5) Average Daily Intake Rate (mg/kg/day) (3) x (4)		
	On-site (0 ft) Commercial	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial	On-site (0 ft) Commercial	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial
Benzene	3.5E-3	1.2E-2	3.5E-3	5.7E-3	3.0E-6	8.8E-7
Toluene	9.8E-3	2.7E-2	9.8E-3	6.1E-2	1.9E-9	6.7E-10
Ethylbenzene	9.8E-3	2.7E-2	9.8E-3	2.2E-2	3.0E-4	1.1E-4
Xylene (mixed isomers)	9.8E-3	2.7E-2	9.8E-3	2.2E-1	3.6E-6	1.3E-6
Methyl t-Butyl ether	9.8E-3	2.7E-2	9.8E-3	0.0E+0	0.0E+0	0.0E+0
Naphthalene	9.8E-3	2.7E-2	9.8E-3	7.0E-4	9.0E-9	3.2E-9
Phenol	9.8E-3	2.7E-2	9.8E-3	3.7E-3	1.5E-3	5.3E-4

NOTE: AT = Averaging time (days) ED = Exposure duration (yr) IR = Ingestion rate (mg/day)
BW = Body weight (kg) EF = Exposure frequency (days/yr)

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAY IS ACTIVE)**

GROUNDWATER: INGESTION

	1) Source Medium	2) NAF Value (unitless) Receptor			3) Exposure Medium Groundwater: POE Conc. (mg/L) (1)/(2)		
Constituents of Concern	Groundwater Conc. (mg/L)	On-site (0 ft) Commercial	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial	On-site (0 ft) Commercial	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial
Benzene	9.3E+0	1.0E+0	6.4E+3	6.4E+3	9.3E+0	1.4E-3	1.4E-3
Toluene	9.4E+0	1.0E+0	9.2E+7	9.2E+7	9.4E+0	1.0E-7	1.0E-7
Ethylbenzene	2.4E+0	1.0E+0	2.1E+2	2.1E+2	2.4E+0	1.2E-2	1.2E-2
Xylene (mixed isomers)	1.4E+1	1.0E+0	1.7E+5	1.7E+5	1.4E+1	8.3E-5	8.3E-5
Methyl t-Butyl ether	5.7E-1	1.0E+0	4.9E+2	4.9E+2	5.7E-1	1.2E-3	1.2E-3
Naphthalene	5.1E-1	1.0E+0	2.2E+5	2.2E+5	5.1E-1	2.3E-6	2.3E-6
Phenol	0.0E+0	1.0E+0	7.0E+0	7.0E+0	0.0E+0	0.0E+0	0.0E+0

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

GROUNDWATER INGESTION (cont'd)

Constituents of Concern	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg/day)			5) Average Daily Intake Rate (mg/kg/day) (3) x (4)		
	On-site (0 ft) Commercial	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial	On-site (0 ft) Commercial	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial
Benzene	3.5E-3	1.2E-2	3.5E-3	3.2E-2	1.7E-5	5.0E-6
Toluene	9.8E-3	2.7E-2	9.8E-3	9.2E-2	2.8E-9	1.0E-9
Ethylbenzene	9.8E-3	2.7E-2	9.8E-3	2.3E-2	3.2E-4	1.1E-4
Xylene (mixed isomers)	9.8E-3	2.7E-2	9.8E-3	1.4E-1	2.3E-6	8.1E-7
Methyl t-Butyl ether	9.8E-3	2.7E-2	9.8E-3	5.6E-3	3.2E-5	1.1E-5
Naphthalene	9.8E-3	2.7E-2	9.8E-3	5.0E-3	6.4E-8	2.3E-8
Phenol	9.8E-3	2.7E-2	9.8E-3	0.0E+0	0.0E+0	0.0E+0

NOTE: AT = Averaging time (days) ED = Exposure duration (yr) IR = Ingestion rate (mg/day)
BW = Body weight (kg) EF = Exposure frequency (days/yr)

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

MAXIMUM PATHWAY INTAKE (mg/kg/day)

(Maximum intake of active pathways soil leaching & groundwater routes.)

Constituents of Concern	On-site (0 ft) Commercial	Off-site 1 Residential	Off-site 2 Commercial
Benzene	3.2E-2	1.7E-5	5.0E-6
Toluene	9.2E-2	2.8E-9	1.0E-9
Ethylbenzene	2.3E-2	3.2E-4	1.1E-4
Xylene (mixed isomers)	2.2E-1	3.6E-6	1.3E-6
Methyl t-Butyl ether	5.6E-3	3.2E-5	1.1E-5
Naphthalene	5.0E-3	6.4E-8	2.3E-8
Phenol	3.7E-3	1.5E-3	5.3E-4

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

CARCINOGENIC RISK

Constituents of Concern	(1) EPA Carcinogenic Classification	(2) Maximum Carcinogenic Intake Rate (mg/kg/day)			(3) Oral Slope Factor (mg/kg-day)^-1	(4) Individual COC Risk (2) x (3)		
		On-site (0 ft) Commercial	Off-site 1 Residential	Off-site 2 Commercial		On-site (0 ft) Commercial	Off-site 1 Residential	Off-site 2 Commercial
Benzene	A	3.2E-2	1.7E-5	5.0E-6	2.9E-2	9.4E-4	4.9E-7	1.5E-7
Toluene	D							
Ethylbenzene	D							
Xylene (mixed isomers)	D							
Methyl t-Butyl ether	-							
Naphthalene	D							
Phenol	D							
Total Pathway Carcinogenic Risk =						**9.4E-4**	**4.9E-7**	**1.5E-7**

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

TOXIC EFFECTS

Constituents of Concern	(5) Maximum Toxicant Intake Rate (mg/kg/day)			(6) Oral Reference Dose (mg/kg/day)	(7) Individual COC Hazard Quotient (5) / (6)		
	On-site (0 ft) Commercial	Off-site 1 Residential	Off-site 2 Commercial		On-site (0 ft) Commercial	Off-site 1 Residential	Off-site 2 Commercial
Benzene	9.1E-2	4.0E-5	1.4E-5	3.0E-3	3.0E+1	1.3E-2	4.7E-3
Toluene	9.2E-2	2.8E-9	1.0E-9	2.0E-1	4.6E-1	1.4E-8	5.0E-9
Ethylbenzene	2.3E-2	3.2E-4	1.1E-4	1.0E-1	2.3E-1	3.2E-3	1.1E-3
Xylene (mixed isomers)	2.2E-1	3.6E-6	1.3E-6	2.0E+0	1.1E-1	1.8E-6	6.5E-7
Methyl t-Butyl ether	5.6E-3	3.2E-5	1.1E-5	1.0E-2	5.6E-1	3.2E-3	1.1E-3
Naphthalene	5.0E-3	6.4E-8	2.3E-8	4.0E-1	1.2E-2	1.6E-7	5.7E-8
Phenol	3.7E-3	1.5E-3	5.3E-4	6.0E-1	6.2E-3	2.5E-3	8.8E-4
Total Pathway Hazard Index =					**3.2E+1**	**2.2E-2**	**7.8E-3**

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT | **Baseline Risk Summary-All Pathways**

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

TIER 2 BASELINE RISK SUMMARY TABLE

EXPOSURE PATHWAY	BASELINE CARCINOGENIC RISK: Individual COC Risk – Maximum Value	Individual COC Risk – Target Risk	Cumulative COC Risk – Total Value	Cumulative COC Risk – Target Risk	Risk Limit(s) Exceeded?	BASELINE TOXIC EFFECTS: Hazard Quotient – Maximum Value	Hazard Quotient – Applicable Limit	Hazard Index – Total Value	Hazard Index – Applicable Limit	Toxicity Limit(s) Exceeded?
OUTDOOR AIR EXPOSURE PATHWAYS										
Complete:	3.4E-7	1.0E-6	3.4E-7	1.0E-5	☐	1.9E-2	1.0E+0	2.1E-2	1.0E+0	☐
INDOOR AIR EXPOSURE PATHWAYS										
Complete:	5.0E-5	1.0E-6	5.0E-5	1.0E-5	■	2.8E+0	1.0E+0	2.9E+0	1.0E+0	■
SOIL EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	☐	NA	NA	NA	NA	☐
GROUNDWATER EXPOSURE PATHWAYS										
Complete:	9.4E-4	1.0E-6	9.4E-4	1.0E-5	■	3.0E+1	1.0E+0	3.2E+1	1.0E+0	■
SURFACE WATER EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	☐	NA	NA	NA	NA	☐
CRITICAL EXPOSURE PATHWAY (Maximum Values From Complete Pathways)										
	9.4E-4	***1.0E-6***	***9.4E-4***	***1.0E-5***	■	***3.0E+1***	***1.0E+0***	***3.2E+1***	***1.0E+0***	■
	Groundwater		***Groundwater***			***Groundwater***		***Groundwater***		

RBCA SITE ASSESSMENT | **Chemical-Specific Tier 2 Cleanup Summary**

Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, California | Date Completed: 19-Jul-00 |

Constituent: Benzene **CAS No.: 71-43-2**

Site-Specific Target Level (SSTL) Concentrations

		On-site	Off-site1	Off-site2
Groundwater Ingestion				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	3.1E-1	7.1E+2	>1.8E+3
	TR = 1e-6	9.9E-3	1.9E+1	6.4E+1
Soil Leaching to Groundwater Ingestion				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	4.7E-1	1.1E+3	>1.1E+3
	TR = 1e-6	1.5E-2	2.9E+1	9.8E+1
Surface Soil Ingestion and Dermal Contact				
Receptor Type / Distance (ft)		None	No Off-site Receptors	
$SSTL_{ss}$ (mg/kg)	THQ = 1e+0	NA		
	TR = 1e-6	NA		
Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	8.7E+0	8.7E-3	8.7E-3
	TR = 1e-6	4.9E-1	4.9E-4	4.9E-4
Soil Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	3.9E+2	9.8E+2	8.2E+2
	TR = 1e-6	2.2E+1	5.6E+1	4.6E+1
Groundwater Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	7.3E+2	1.5E+3	1.5E+3
	TR = 1e-6	4.1E+1	8.6E+1	8.6E+1
Indoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	No Off-site Receptors	
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	8.7E+0		
	TR = 1e-6	4.9E-1		
Soil Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	No Off-site Receptors	
$SSTL_s$ (mg/kg)	THQ = 1e+0	2.8E+0		
	TR = 1e-6	1.6E-1		
Groundwater Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	No Off-site Receptors	
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	4.8E+0		
	TR = 1e-6	2.7E-1		

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VF_{ss}	(kg-soil/L-air)	NC	NC	NA
VF_{samb}	(kg-soil/L-air)	1.9E-5	2.2E-5	NA
VF_{wamb}	(L-wat/L-air)	1.2E-5	1.2E-5	NA
VF_{sesp}	(kg-soil/L-air)	NA	3.1E-3	NA
VF_{wesp}	(L-wat/L-air)	NA	1.8E-3	NA
LF	(kg-soil/L-wat)	All exposures: 6.5E-1		NA

	Units	On-Site	Off-Site1	Off-Site2
Lateral Transport Factors				
DAFgw	(-)	1.0E+0	6.4E+3	6.4E+3
DAFs/gw	(-)	1.0E+0	6.4E+3	6.4E+3

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	7.8E+1	PS
Sol	(mg/L)	1.8E+3	PS
P_{vap}	(mmHg)	9.5E+1	PS
H_{atm}	(atm-m^3/mol)	5.6E-3	PS
pK_a	(log[mol/mol])	-	-
pK_b	(log[mol/mol])	-	-
$\log(K_{oc})$	(log[L/kg])	1.8E+0	PS
D_{air}	(cm^2/sec)	8.8E-2	PS
D_{wat}	(cm^2/sec)	9.8E-6	PS
Toxicity Data			
Wt of Evd.		A	
SF_o	(1/[mg/kg/day])	2.9E-2	PS
SF_d	(1/[mg/kg/day])	3.0E-2	TX
URF_i	(1/[$\mu g/m^3$])	8.3E-6	PS
RfD_o	(mg/kg/day)	3.0E-3	R
RfD_d	(mg/kg/day)	-	-
RfC_i	(mg/m^3)	6.0E-3	R
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-1	D
K_p	(cm/hr)	2.1E-2	
tau_d	(hr/event)	2.6E-1	
t_{cri}	(hr)	6.3E-1	
B	(-)	1.3E-2	
Regulatory Standards			
MCL	(mg/L)	5.0E-3	*
TWA	(mg/m^3)	3.3E+0	PS
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	2.0E-3	S
ADL_s	(mg/kg)	5.0E-3	S
$t_{1/2,sat}$	(d)	7.2E+2	H
$t_{1/2,unsat}$	(d)	7.2E+2	H

* MCL ref = 52 FR 25690

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	2.3E-1
K_{sw}	(L-wat/kg-soil)	1.5E+0
C_{sat}	(mg/kg-soil)	1.1E+3
$C_{sat,vap}$	($\mu g/m^3$-air)	4.0E+5
$D_{eff,s}$	(cm^2/sec)	3.2E-3
$D_{eff,crk}$	(cm^2/sec)	5.9E-4
$D_{eff,cap}$	(cm^2/sec)	2.7E-5
$D_{eff,ws}$	(cm^2/sec)	1.8E-3
R_{sat}	(-)	4.9E+0
R_{unsat}	(-)	1.4E+1
Z	(cm/event)	7.3E-2

Notes: 1) NA = Not applicable; NC = Not calculated.

2) Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT

Chemical-Specific Tier 2 Cleanup Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

Constituent: Toluene **CAS No.: 108-88-3**

Site-Specific Target Level (SSTL) Concentrations

		On-site	Off-site1	Off-site2
Groundwater Ingestion				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	2.0E+1	>5.2E+2	>5.2E+2
	TR = 1e-6	NC	NC	NC
Soil Leaching to Groundwater Ingestion				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	6.8E+1	>7.3E+2	>7.3E+2
	TR = 1e-6	NC	NC	NC
Surface Soil Ingestion and Dermal Contact				
Receptor Type / Distance (ft)		None	No Off-site Receptors	
$SSTL_{ss}$ (mg/kg)	THQ = 1e+0	NA		
	TR = 1e-6	NA		
Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	5.8E+2	5.8E-1	5.8E-1
	TR = 1e-6	NC	NC	NC
Soil Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	>7.3E+2	>7.3E+2	>7.3E+2
	TR = 1e-6	NC	NC	NC
Groundwater Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	>5.2E+2	>5.2E+2	>5.2E+2
	TR = 1e-6	NC	NC	NC
Indoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	No Off-site Receptors	
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	5.8E+2		
	TR = 1e-6	NC		
Soil Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	No Off-site Receptors	
$SSTL_s$ (mg/kg)	THQ = 1e+0	3.8E+2		
	TR = 1e-6	NC		
Groundwater Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	No Off-site Receptors	
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	2.9E+2		
	TR = 1e-6	NC		

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	9.2E+1	5
Sol	(mg/L)	5.2E+2	29
P_{vap}	(mmHg)	3.0E+1	4
H_{atm}	(atm-m^3/mol)	6.3E-3	A
pK_a	(log[mol/mol])	-	-
pK_b	(log[mol/mol])	-	-
$\log(K_{oc})$	(log[L/kg])	2.1E+0	A
D_{air}	(cm^2/sec)	8.5E-2	A
D_{wat}	(cm^2/sec)	9.4E-6	A
Toxicity Data			
Wt of Evd.		D	
SF_o	(1/[mg/kg/day])	-	-
SF_d	(1/[mg/kg/day])	-	-
URF_i	(1/[$\mu g/m^3$])	-	-
RfD_o	(mg/kg/day)	2.0E-1	A,R
RfD_d	(mg/kg/day)	1.6E-1	TX
RfC_i	(mg/m^3)	4.0E-1	A,R
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-1	D
K_p	(cm/hr)	4.5E-2	
tau_d	(hr/event)	3.2E-1	
t_{crit}	(hr)	7.7E-1	
B	(-)	5.4E-2	
Regulatory Standards			
MCL	(mg/L)	1.0E+0	*
TWA	(mg/m^3)	1.5E+2	ACGIH
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	2.0E-3	S
ADL_s	(mg/kg)	5.0E-3	S
$t_{1/2,sat}$	(d)	2.8E+1	H
$t_{1/2,unsat}$	(d)	2.8E+1	H

* MCL ref = 56 FR 3526 (30 Jan 91)

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VF_{ss}	(kg-soil/L-air)	NC	NC	NA
VF_{samb}	(kg-soil/L-air)	1.9E-5	2.2E-5	NA
VF_{wamb}	(L-wat/L-air)	1.3E-5	1.3E-5	NA
VF_{sesp}	(kg-soil/L-air)	NA	1.6E-3	NA
VF_{wesp}	(L-wat/L-air)	NA	2.0E-3	NA
LF	(kg-soil/L-wat)	All exposures: 3.0E-1		NA

	Units	On-Site	Off-Site1	Off-Site2
Lateral Transport Factors				
DAFgw	(-)	1.0E+0	9.2E+7	9.2E+7
DAFs/gw	(-)	1.0E+0	9.2E+7	9.2E+7

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	2.6E-1
K_{sw}	(L-wat/kg-soil)	7.1E-1
C_{sat}	(mg/kg-soil)	7.3E+2
$C_{sat,vap}$	($\mu g/m^3$-air)	1.5E+5
$D_{eff,s}$	(cm^2/sec)	3.1E-3
$D_{eff,crk}$	(cm^2/sec)	5.7E-4
$D_{eff,cap}$	(cm^2/sec)	2.5E-5
$D_{eff,ws}$	(cm^2/sec)	1.8E-3
R_{sat}	(-)	9.9E+0
R_{unsat}	(-)	3.1E+1
Z	(cm/event)	1.6E-1

Notes: 1) NA = Not applicable; NC = Not calculated.

2) Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT | **Chemical-Specific Tier 2 Cleanup Summary**

Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, California | Date Completed: 19-Jul-00 |

Constituent: Ethylbenzene **CAS No.: 100-41-4**

Site-Specific Target Level (SSTL) Concentrations

		On-site	Off-site1	Off-site2
Groundwater Ingestion				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	1.0E+1	>1.7E+2	>1.7E+2
	TR = 1e-6	NC	NC	NC
Soil Leaching to Groundwater Ingestion				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	8.9E+1	>6.2E+2	>6.2E+2
	TR = 1e-6	NC	NC	NC
Surface Soil Ingestion and Dermal Contact				
Receptor Type / Distance (ft)		None	No Off-site Receptors	
$SSTL_{ss}$ (mg/kg)	THQ = 1e+0	NA		
	TR = 1e-6	NA		
Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	1.5E+3	1.5E+0	1.5E+0
	TR = 1e-6	NC	NC	NC
Soil Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	>6.2E+2	>6.2E+2	>6.2E+2
	TR = 1e-6	NC	NC	NC
Groundwater Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	>1.7E+2	>1.7E+2	>1.7E+2
	TR = 1e-6	NC	NC	NC
Indoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	No Off-site Receptors	
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	1.5E+3		
	TR = 1e-6	NC		
Soil Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	No Off-site Receptors	
$SSTL_s$ (mg/kg)	THQ = 1e+0	>6.2E+2		
	TR = 1e-6	NC		
Groundwater Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	No Off-site Receptors	
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	>1.7E+2		
	TR = 1e-6	NC		

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VF_{ss}	(kg-soil/L-air)	NC	NC	NA
VF_{samb}	(kg-soil/L-air)	1.1E-5	1.1E-5	NA
VF_{wamb}	(L-wat/L-air)	1.4E-5	1.4E-5	NA
VF_{sesp}	(kg-soil/L-air)	NA	6.5E-4	NA
VF_{wesp}	(L-wat/L-air)	NA	2.2E-3	NA
LF	(kg-soil/L-wat)	All exposures: 1.1E-1		NA

	Units	On-Site	Off-Site1	Off-Site2
Lateral Transport Factors				
DAFgw	(-)	1.0E+0	2.1E+2	2.1E+2
DAFs/gw	(-)	1.0E+0	2.1E+2	2.1E+2

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	1.1E+2	PS
Sol	(mg/L)	1.7E+2	PS
P_{vap}	(mmHg)	1.0E+1	PS
H_{atm}	(atm-m^3/mol)	7.9E-3	PS
pK_a	(log[mol/mol])	-	-
pK_b	(log[mol/mol])	-	-
$\log(K_{oc})$	(log[L/kg])	2.6E+0	PS
D_{air}	(cm^2/sec)	7.5E-2	PS
D_{wat}	(cm^2/sec)	7.8E-6	PS
Toxicity Data			
Wt of Evd.		D	
SF_o	(1/[mg/kg/day])	-	-
SF_d	(1/[mg/kg/day])	-	-
URF_i	(1/[$\mu g/m^3$])	-	-
RfD_o	(mg/kg/day)	1.0E-1	PS
RfD_d	(mg/kg/day)	9.7E-2	TX
RfC_i	(mg/m^3)	1.0E+0	PS
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-1	D
K_p	(cm/hr)	7.4E-2	
tau_d	(hr/event)	3.9E-1	
t_{crit}	(hr)	1.3E+0	
B	(-)	1.4E-1	
Regulatory Standards			
MCL	(mg/L)	7.0E-1	*
TWA	(mg/m^3)	4.4E+2	PS
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	2.0E-3	S
ADL_s	(mg/kg)	5.0E-3	S
$t_{1/2,sat}$	(d)	2.3E+2	H
$t_{1/2,unsat}$	(d)	2.3E+2	H

* MCL ref = 56 FR 3526 (30 Jan 91)

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	3.2E-1
K_{sw}	(L-wat/kg-soil)	2.7E-1
C_{sat}	(mg/kg-soil)	6.2E+2
$C_{sat,vap}$	($\mu g/m^3$-air)	5.8E+4
$D_{eff,s}$	(cm^2/sec)	2.8E-3
$D_{eff,crk}$	(cm^2/sec)	5.0E-4
$D_{eff,cap}$	(cm^2/sec)	2.1E-5
$D_{eff,ws}$	(cm^2/sec)	1.5E-3
R_{sat}	(-)	2.5E+1
R_{unsat}	(-)	8.1E+1
Z	(cm/event)	2.7E-1

Notes: 1) NA = Not applicable; NC = Not calculated.

2) Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT

Chemical-Specific Tier 2 Cleanup Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

Constituent: Xylene (mixed isomers) **CAS No.: 1330-20-7**

Site-Specific Target Level (SSTL) Concentrations

		On-site	Off-site1	Off-site2
Groundwater Ingestion				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	>2.0E+2	>2.0E+2	>2.0E+2
	TR = 1e-6	NC	NC	NC
Soil Leaching to Groundwater Ingestion				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	>4.9E+2	>4.9E+2	>4.9E+2
	TR = 1e-6	NC	NC	NC
Surface Soil Ingestion and Dermal Contact				
Receptor Type / Distance (ft)		None	No Off-site Receptors	
$SSTL_{ss}$ (mg/kg)	THQ = 1e+0	NA		
	TR = 1e-6	NA		
Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	1.0E+4	1.0E+1	1.0E+1
	TR = 1e-6	NC	NC	NC
Soil Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	>4.9E+2	>4.9E+2	>4.9E+2
	TR = 1e-6	NC	NC	NC
Groundwater Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	>2.0E+2	>2.0E+2	>2.0E+2
	TR = 1e-6	NC	NC	NC
Indoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	No Off-site Receptors	
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	1.0E+4		
	TR = 1e-6	NC		
Soil Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	No Off-site Receptors	
$SSTL_s$ (mg/kg)	THQ = 1e+0	>4.9E+2		
	TR = 1e-6	NC		
Groundwater Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	No Off-site Receptors	
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	>2.0E+2		
	TR = 1e-6	NC		

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	1.1E+2	5
Sol	(mg/L)	2.0E+2	5
P_{vap}	(mmHg)	7.0E+0	4
H_{atm}	(atm-m^3/mol)	7.0E-3	A
pK_a	(log[mol/mol])	-	-
pK_b	(log[mol/mol])	-	-
$\log(K_{oc})$	(log[L/kg])	2.4E+0	A
D_{air}	(cm^2/sec)	7.2E-2	A
D_{wat}	(cm^2/sec)	8.5E-6	A
Toxicity Data			
Wt of Evd.		D	
SF_o	(1/[mg/kg/day])	-	-
SF_d	(1/[mg/kg/day])	-	-
URF_i	(1/[$\mu g/m^3$])	-	-
RfD_o	(mg/kg/day)	2.0E+0	A,R
RfD_d	(mg/kg/day)	1.8E+0	TX
RfC_i	(mg/m^3)	7.0E+0	A
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-1	D
K_p	(cm/hr)	8.0E-2	
tau_d	(hr/event)	3.9E-1	
t_{crit}	(hr)	1.4E+0	
B	(-)	1.6E-1	
Regulatory Standards			
MCL	(mg/L)	1.0E+1	*
TWA	(mg/m^3)	4.3E+2	ACGIH
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	5.0E-3	S
ADL_s	(mg/kg)	5.0E-3	S
$t_{1/2,sat}$	(d)	3.6E+2	H
$t_{1/2,unsat}$	(d)	3.6E+2	H

* MCL ref = 56 FR 3526 (30 Jan 91)

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VF_{ss}	(kg-soil/L-air)	NC	NC	NA
VF_{samb}	(kg-soil/L-air)	1.5E-5	1.5E-5	NA
VF_{wamb}	(L-wat/L-air)	1.2E-5	1.2E-5	NA
VF_{seep}	(kg-soil/L-air)	NA	8.4E-4	NA
VF_{wesp}	(L-wat/L-air)	NA	1.9E-3	NA
LF	(kg-soil/L-wat)	All exposures: 1.7E-1		NA

	Units	On-Site	Off-Site1	Off-Site2
Lateral Transport Factors				
DAFgw	(-)	1.0E+0	1.7E+5	1.7E+5
DAFs/gw	(-)	1.0E+0	1.7E+5	1.7E+5

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	2.9E-1
K_{sw}	(L-wat/kg-soil)	4.1E-1
C_{sat}	(mg/kg-soil)	4.9E+2
$C_{sat,vap}$	($\mu g/m^3$-air)	4.0E+4
$D_{eff,s}$	(cm^2/sec)	2.6E-3
$D_{eff,crk}$	(cm^2/sec)	4.8E-4
$D_{eff,cap}$	(cm^2/sec)	2.1E-5
$D_{eff,ws}$	(cm^2/sec)	1.5E-3
R_{sat}	(-)	1.7E+1
R_{unsat}	(-)	5.4E+1
Z	(cm/event)	2.9E-1

Notes: 1) NA = Not applicable; NC = Not calculated.

2) Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT | **Chemical-Specific Tier 2 Cleanup Summary**

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

Constituent: Methyl t-Butyl ether **CAS No.: 1634-04-4**

Site-Specific Target Level (SSTL) Concentrations

		On-site	Off-site1	Off-site2
Groundwater Ingestion				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	1.0E+0	1.8E+2	5.1E+2
	TR = 1e-6	NC	NC	NC
Soil Leaching to Groundwater Ingestion				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	4.0E-1	7.1E+1	2.0E+2
	TR = 1e-6	NC	NC	NC
Surface Soil Ingestion and Dermal Contact				
Receptor Type / Distance (ft)		None	No Off-site Receptors	
$SSTL_{ss}$ (mg/kg)	THQ = 1e+0	NA		
	TR = 1e-6	NA		
Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	4.4E+3	4.4E+0	4.4E+0
	TR = 1e-6	NC	NC	NC
Soil Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	>8.0E+3	>8.0E+3	>8.0E+3
	TR = 1e-6	NC	NC	NC
Groundwater Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	>4.8E+4	>4.8E+4	>4.8E+4
	TR = 1e-6	NC	NC	NC
Indoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	No Off-site Receptors	
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	4.4E+3		
	TR = 1e-6	NC		
Soil Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	No Off-site Receptors	
$SSTL_s$ (mg/kg)	THQ = 1e+0	2.5E+3		
	TR = 1e-6	NC		
Groundwater Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	No Off-site Receptors	
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	1.6E+4		
	TR = 1e-6	NC		

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VF_{ss}	(kg-soil/L-air)	NC	NC	NA
VF_{samb}	(kg-soil/L-air)	1.9E-5	2.0E-5	NA
VF_{wamb}	(L-wat/L-air)	1.9E-6	1.9E-6	NA
VF_{ssep}	(kg-soil/L-air)	NA	1.8E-3	NA
VF_{wsep}	(L-wat/L-air)	NA	2.8E-4	NA
LF	(kg-soil/L-wat)	All exposures: 2.5E+0		NA

	Units	On-Site	Off-Site1	Off-Site2
Lateral Transport Factors				
DAFgw	(-)	1.0E+0	4.9E+2	4.9E+2
DAFs/gw	(-)	1.0E+0	4.9E+2	4.9E+2

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	8.8E+1	5
Sol	(mg/L)	4.8E+4	A
P_{vap}	(mmHg)	2.5E+2	-
H_{atm}	(atm-m^3/mol)	5.8E-4	-
pK_a	(log[mol/mol])	-	-
pK_b	(log[mol/mol])	-	-
$\log(K_{oc})$	(log[L/kg])	1.1E+0	A
D_{air}	(cm^2/sec)	7.9E-2	6
D_{wat}	(cm^2/sec)	9.4E-5	7
Toxicity Data			
Wt of Evd.		-	
SF_o	(1/[mg/kg/day])	-	-
SF_d	(1/[mg/kg/day])	-	-
URF_i	(1/[$\mu g/m^3$])	-	-
RfD_o	(mg/kg/day)	1.0E-2	31
RfD_d	(mg/kg/day)	8.0E-3	TX
RfC_i	(mg/m^3)	3.0E+0	R
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-1	-
K_p	(cm/hr)	-	
tau_d	(hr/event)	-	
t_{crit}	(hr)	-	
B	(-)	-	
Regulatory Standards			
MCL	(mg/L)	-	*
TWA	(mg/m^3)	6.0E+1	NIOSH
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	-	-
ADL_s	(mg/kg)	-	-
$t_{1/2,sat}$	(d)	3.6E+2	H
$t_{1/2,unsat}$	(d)	1.8E+2	H

* MCL ref = -

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	2.4E-2
K_{sw}	(L-wat/kg-soil)	6.0E+0
C_{sat}	(mg/kg-soil)	8.0E+3
$C_{sat,vap}$	($\mu g/m^3$-air)	1.2E+6
$D_{eff,a}$	(cm^2/sec)	3.0E-3
$D_{eff,crk}$	(cm^2/sec)	8.7E-4
$D_{eff,cap}$	(cm^2/sec)	5.1E-4
$D_{eff,ws}$	(cm^2/sec)	2.9E-3
R_{sat}	(-)	1.8E+0
R_{unsat}	(-)	3.7E+0
Z	(cm/event)	-

Notes: 1) NA = Not applicable; NC = Not calculated.
2) Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT

Chemical-Specific Tier 2 Cleanup Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

Constituent: Naphthalene **CAS No.: 91-20-3**

Site-Specific Target Level (SSTL) Concentrations

		On-site	Off-site1	Off-site2
Groundwater Ingestion				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	>3.1E+1	>3.1E+1	>3.1E+1
	TR = 1e-6	NC	NC	NC
Soil Leaching to Groundwater Ingestion				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	>6.2E+2	>6.2E+2	>6.2E+2
	TR = 1e-6	NC	NC	NC
Surface Soil Ingestion and Dermal Contact				
Receptor Type / Distance (ft)		None	No Off-site Receptors	
$SSTL_{ss}$ (mg/kg)	THQ = 1e+0	NA		
	TR = 1e-6	NA		
Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	>1.6E+3	2.0E+0	2.0E+0
	TR = 1e-6	NC	NC	NC
Soil Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	>6.2E+2	>6.2E+2	>6.2E+2
	TR = 1e-6	NC	NC	NC
Groundwater Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	>3.1E+1	>3.1E+1	>3.1E+1
	TR = 1e-6	NC	NC	NC
Indoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	No Off-site Receptors	
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	>1.6E+3		
	TR = 1e-6	NC		
Soil Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	No Off-site Receptors	
$SSTL_s$ (mg/kg)	THQ = 1e+0	>6.2E+2		
	TR = 1e-6	NC		
Groundwater Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	No Off-site Receptors	
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	>3.1E+1		
	TR = 1e-6	NC		

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	1.3E+2	PS
Sol	(mg/L)	3.1E+1	PS
P_{vap}	(mmHg)	2.3E-1	PS
H_{atm}	(atm-m^3/mol)	4.8E-4	PS
pK_a	(log[mol/mol])	-	-
pK_b	(log[mol/mol])	-	-
$\log(K_{oc})$	(log[L/kg])	3.3E+0	PS
D_{air}	(cm^2/sec)	5.9E-2	PS
D_{wat}	(cm^2/sec)	7.5E-6	PS
Toxicity Data			
Wt of Evd.		D	
SF_o	(1/[mg/kg/day])	-	-
SF_d	(1/[mg/kg/day])	-	-
URF_i	(1/[$\mu g/m^3$])	-	-
RfD_o	(mg/kg/day)	4.0E-1	PS
RfD_d	(mg/kg/day)	3.6E-1	TX
RfC_i	(mg/m^3)	1.4E+0	PS
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-2	D
K_p	(cm/hr)	6.9E-2	
tau_d	(hr/event)	5.3E-1	
t_{crit}	(hr)	2.2E+0	
B	(-)	2.0E-1	
Regulatory Standards			
MCL	(mg/L)	-	*
TWA	(mg/m^3)	5.0E+1	PS
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	1.0E-2	32
ADL_s	(mg/kg)	1.0E-2	32
$t_{1/2,sat}$	(d)	2.6E+2	H
$t_{1/2,unsat}$	(d)	2.6E+2	H

* MCL ref = -

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VF_{ss}	(kg-soil/L-air)	NC	NC	NA
VF_{samb}	(kg-soil/L-air)	1.0E-7	1.0E-7	NA
VF_{wamb}	(L-wat/L-air)	1.0E-6	1.0E-6	NA
VF_{sesp}	(kg-soil/L-air)	NA	6.3E-6	NA
VF_{wesp}	(L-wat/L-air)	NA	1.2E-4	NA
LF	(kg-soil/L-wat)	All exposures: 2.1E-2		NA

	Units	On-Site	Off-Site1	Off-Site2
Lateral Transport Factors				
DAFgw	(-)	1.0E+0	2.2E+5	2.2E+5
DAFs/gw	(-)	1.0E+0	2.2E+5	2.2E+5

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	2.0E-2
K_{sw}	(L-wat/kg-soil)	5.0E-2
C_{sat}	(mg/kg-soil)	6.2E+2
$C_{sat,vap}$	($\mu g/m^3$-air)	1.6E+3
$D_{eff,s}$	(cm^2/sec)	2.2E-3
$D_{eff,crk}$	(cm^2/sec)	4.3E-4
$D_{eff,cap}$	(cm^2/sec)	6.2E-5
$D_{eff,ws}$	(cm^2/sec)	1.8E-3
R_{sat}	(-)	1.3E+2
R_{unsat}	(-)	4.4E+2
Z	(cm/event)	2.7E-1

Notes: 1) NA = Not applicable; NC = Not calculated.
2) Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT | **Chemical-Specific Tier 2 Cleanup Summary**

Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, California | Date Completed: 19-Jul-00 | *7 of 8*

Constituent: Phenol **CAS No.: 108-95-2**

Site-Specific Target Level (SSTL) Concentrations

		On-site	Off-site1	Off-site2
Groundwater Ingestion				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	6.1E+1	1.5E+2	4.3E+2
	TR = 1e-6	NC	NC	NC
Soil Leaching to Groundwater Ingestion				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	4.8E+1	1.2E+2	3.4E+2
	TR = 1e-6	NC	NC	NC
Surface Soil Ingestion and Dermal Contact				
Receptor Type / Distance (ft)		None	No Off-site Receptors	
$SSTL_{ss}$ (mg/kg)	THQ = 1e+0	NA		
	TR = 1e-6	NA		
Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	>1.7E+3	3.1E+0	3.1E+0
	TR = 1e-6	NC	NC	NC
Soil Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	>2.8E+4	>2.8E+4	>2.8E+4
	TR = 1e-6	NC	NC	NC
Groundwater Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	>8.3E+4	>8.3E+4	>8.3E+4
	TR = 1e-6	NC	NC	NC
Indoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	No Off-site Receptors	
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	>1.7E+3		
	TR = 1e-6	NC		
Soil Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	No Off-site Receptors	
$SSTL_s$ (mg/kg)	THQ = 1e+0	>2.8E+4		
	TR = 1e-6	NC		
Groundwater Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Commercial / 0	No Off-site Receptors	
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	>8.3E+4		
	TR = 1e-6	NC		

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VF_{ss}	(kg-soil/L-air)	NC	NC	NA
VF_{samb}	(kg-soil/L-air)	1.9E-8	1.9E-8	NA
VF_{wamb}	(L-wat/L-air)	3.9E-9	3.9E-9	NA
VF_{asap}	(kg-soil/L-air)	NA	1.3E-5	NA
VF_{wsap}	(L-wat/L-air)	NA	3.2E-6	NA
LF	(kg-soil/L-wat)	All exposures: 1.3E+0		NA

	Units	On-Site	Off-Site1	Off-Site2
Lateral Transport Factors				
DAFgw	(-)	1.0E+0	7.0E+0	7.0E+0
DAFs/gw	(-)	1.0E+0	7.0E+0	7.0E+0

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	9.4E+1	PS
Sol	(mg/L)	8.3E+4	PS
P_{vap}	(mmHg)	3.4E-1	PS
H_{atm}	(atm-m^3/mol)	4.0E-7	PS
pK_a	(log[mol/mol])	1.0E+1	PS
pK_b	(log[mol/mol])	-	PS
$\log(K_{oc})$	(log[L/kg])	1.5E+0	PS
D_{air}	(cm^2/sec)	8.2E-2	PS
D_{wat}	(cm^2/sec)	9.1E-6	PS
Toxicity Data			
Wt of Evd.		D	
SF_o	(1/[mg/kg/day])	-	-
SF_d	(1/[mg/kg/day])	-	-
URF_i	(1/[$\mu g/m^3$])	-	-
RfD_o	(mg/kg/day)	6.0E-1	PS
RfD_d	(mg/kg/day)	5.4E-1	TX
RfC_i	(mg/m^3)	2.1E+0	PS
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-1	D
K_p	(cm/hr)	5.5E-3	
tau_d	(hr/event)	3.3E-1	
t_{crit}	(hr)	7.9E-1	
B	(-)	2.9E-3	
Regulatory Standards			
MCL	(mg/L)	-	*
TWA	(mg/m^3)	1.9E+1	PS
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	1.0E-2	32
ADL_s	(mg/kg)	6.6E-1	32
$t_{1/2,sat}$	(d)	1.0E+1	H
$t_{1/2,unsat}$	(d)	1.0E+1	H

* MCL ref = -

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	1.6E-5
K_{sw}	(L-wat/kg-soil)	3.0E+0
C_{sat}	(mg/kg-soil)	2.8E+4
$C_{sat,vap}$	($\mu g/m^3$-air)	1.7E+3
$D_{eff,a}$	(cm^2/sec)	8.3E-3
$D_{eff,crk}$	(cm^2/sec)	4.8E-2
$D_{eff,cap}$	(cm^2/sec)	7.0E-2
$D_{eff,ws}$	(cm^2/sec)	8.4E-3
R_{sat}	(-)	2.9E+0
R_{unsat}	(-)	7.4E+0
Z	(cm/event)	2.0E-2

Notes: 1) NA = Not applicable; NC = Not calculated.

2) Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT | **Chemical-Specific Tier 2 Cleanup Summary**

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

Definitions

Site-Specific Target Level Concentrations	
SSTLgw	Site-specific target level for groundwater (mg/L)
SSTLs	Site-specific target level for soil (mg/kg)
RBELair	Risk-based exposure limit for air (µg/m3)
THQ	Target hazard quotient
TR	Target risk

Cross-Media Transfer Factors	
VF_{es}	Volatilization factor, surface soil to outdoor air (kg-soil/L-air)
VF_{semb}	Volatilization factor, subsurface soil to outdoor air (kg-soil/L-air)
VF_{wemb}	Volatilization factor, groundwater to outdoor air (L-wat/L-air)
VF_{esap}	Volatilization factor, subsurface soil to indoor air (kg-soil/L-air)
VF_{wesp}	Volatilization factor, groundwater to indoor air (L-wat/L-air)
LF	Leaching factor, soil to groundwater (kg-soil/L-wat)

Cross-Media Transfer Factors	
DAF_{gw}	Dilution-attenuation factor, groundwater (-)
DAF_{sfgw}	Dilution-attenuation factor, soil leaching to groundwater (-)

Physical Properties	
MW	Molecular weight (g/mol)
Sol	Aqueous solubility limit (mg/L)
P_{vap}	Vapor pressure (mmHg)
H_{atm}	Henry's Law constant (atm-m^3/mol)
pK_a	Acid ionization constant (log[mol/mol])
pK_b	Base ionization constant (log[mol/mol])
K_{oc}	Organic carbon/Water partition coeffiecient (L/kg)
K_d	Soil/Water distribution coeffient (L/kg)
D_{air}	Molecular diffusion coeffient in air (cm^2/sec)
D_{wat}	Molecular diffusion coeffient in water (cm^2/sec)

Toxicity Data	
Wt of Evd.	Weight of evidence
SF_o	Oral slope factor for carcinogens (1/[mg/kg/day])
SF_d	Dermal slope factor for carcinogens (1/[mg/kg/day])
URF_i	Inhalation unit risk facor for carcinogens (1/[µg/m^3])
RfD_o	Oral reference dose (mg/kg/day)
RfD_d	Dermal reference dose (mg/kg/day)
RfC_i	Inhalation reference concentration (mg/m^3)

Dermal Exposure Parameters	
RAF_d	Dermal relative absorption factor (mg/mg)
K_p	Dermal permeability coeff. (cm/hr)
tau_d	Lag time for dermal exposure (hr/event)
t_{crit}	Critical exposure time (hr)
B	Relative contribution of permeability coeff. (-)

Regulatory Standards	
MCL	Maximum contaminant level for drinking water protection (mg/L)
TWA	Time-weighted average workplace air criterion (mg/m^3)
AQL	Aquatic life protection criterion (mg/L)

Miscellaneous Parameters	
ADL_{gw}	Analytical detection limit in groundwater (mg/L)
ADL_s	Analytical detection limit in soil (mg/kg)
$t_{1/2,sat}$	Half life, saturated zone (d)
$t_{1/2,unsat}$	Half life, unsaturated zone (d)

Derived Parameters	
H	Dimensionless Henry's Law contant (L-wat/L-air)
K_{sw}	Soil to pore-water partitioning factor (L-wat/kg-soil)
C_{sat}	Saturated residual conc. in vadose zone soils (mg/kg-soil)
$C_{sat,vap}$	Saturated concentration in vapors (mg/m3-air)
$D_{eff,s}$	Effective diffusion coeff. in vadose zone soils (cm^2/sec)
$D_{eff,crk}$	Effective diffusion coeff. in foundation cracks (cm^2/sec)
$D_{eff,cap}$	Effective diffusion coeff. in capillary zone (cm^2/sec)
$D_{eff,ws}$	Effective diffusion coeff., water table to ground surface (cm^2/sec)
R_{sat}	Retardation factor, saturated zone (-)
R_{unsat}	Retardation factor, unsaturated zone (-)
Z	Water to skin dermal absorption factor (cm/event)

Chemical Parameter References

PS	Standard Provisional Guide for Risk-Based Corrective Action, ASTM PS 104-98.
A	Emergency Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites.
D	USEPA, Dermal Exposure Assessment: Principles and Applications, ORD, EPA/600/8-91/011B.
H	Howard, Handbook of Environmental Degradation Rates, Lewis Publishers, Chelsea, MI, 1989
R	EPA Region III Risk Based Concentration Table, EPA Region 3, March 7, 1995.
S	USEPA, Test Methods for Evaluating Solid Waste, SW-846, Third Edition, OSWER, November 1986.
T	TPH Criteria Working Group, 1996.
TX	TNRCC Risk-Based Corrective Action for Leaking Storage Tank Sites, January 1994.
3	based on Kow from (2) and DiToro, D. M., 1985:"A Particle Interaction Model of Reversible Organic Chemical Sorption", Chemosphere, 14(10), 1505-1538. log(Koc) = 0.00028 + 0.983 log(Kow)
4	USEPA, 1989: Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF) - USEPA, OAQPS, Air Emission Models, (EPA-450/3-87-026).
5	Verschueren, Karel, 1983: Handbook of Environmental data on organic Chemicals, Second Ed., (Van nostrand Reinhold Company Inc., New York), ISBN: 0-442-28802-6.
6	Calculated diffusivity using the method of Fuller, Schettler, and Giddings from (9).
7	Calculated diffusivity using the method of Hayduk and Laudie and the reference from (9).
8	Calculated using Kenega ang Goring Kow/solubility regression equation reference (9) and Kow data from (2), log(S, mg/l) = -0.922 log(Kow) + 4.184
9	Handbook of Chemical Property Estimation Methods, 1982, W.J. Lyman, (McGraw-Hill, New York), ISBN -0-07-039175-0.
10	Calculated from (Pv/Patm)/(solubility/mol wt).
11	Back calculated from solubility, Note (8) and (3).
12	Aldrich Chemical Catalog, 1991.
13	Calculated using Modified Watson Correlation from (9) and normal boiling point.
14	USEPA, 1979: Water Related Environmental Fate of 129 Priority Pollutants, Vol.1, USEPA, OWQPS,(EPA-4404-79-029a).
15	The Agrochemicals Handbook, (The Royal Society of Chemistry, The University, Nottingham, England), ISBN 0-85186-406-6.
16	Vapor pressure specified at elevated temperature, adjustments to 25C using methods presented by (9).
17	Wauchope, R. D., T. M. Butler, A. G. Hornsby, P. W. M. Augustijn-Beckers, and J.P. Burt, 1992: "The SCS/ARS/CES Pesticide Properties Database for Environmental Decision Making", Reviews of Environmental Contamination and Toxicology. vol 123, 1-155.
18	Farm Chemicals Handbook 91, C. Sine, ed., (Meister Publishing Company, Willoughby, Ohio).
19	Structure and Nomenclature Search System, (Version 7.00/7.03) December, 1992.
20	From Syracuse Research Corporation Calculated Value from pochem-pcgems, 1988, ref no. 255435 in Enviofate database, Accession no. 105543.
23	NIOSH, 1990: Pocket Guide to Chemical Hazards, (U. S. Dept. of Health & Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health).
24	Buchter, B. et al., 1989: Correlation of Greundäch Kd and N retention Parameters with Soils and Elements, Soil Science, 148. 370-379.
25	USEPA, 1993: Air/Superfund National Technical Guidance Study series: Estimation of Air Impacts for Thermal Desorption Units Used at Superfund Sites, US Environmental Protection Agency, Office of Air Quality Planning and Standards, EPA-451/R-93-005.
26	NTIS Accession No. PB93-215630, April 1993.
27	Based on salt solubilities in Table 3-120, R. H. Perry and D. W. Green, " Perry's Chemical Engineering Handbook" Sixth Edition, (McGraw-Hill, New York), 1973.
28	Based on salt solubilities in Table of Physical Constants for Inorganic Compounds, Weast, R. C., CRC Handbook of Chemistry and Physics, 67th edition, (CRC Press, Inc., Boca Raton), 1987.
29	Montgomery and Welkom, "Groundwater Chemicals Desk Reference", Lewis Publishers, Chelsea, MI, 1990.
30	USEPA, 1996: Soil Screening Guidance: Technical Background Doc., (EPA/540/R-95/128)
31	TNRCC Risk Reduction Rule Implementation, July 23, 1998. (update to Reference "TX")
32	USEPA, Method 8270C, Revision 3. "Semivolatile Organic Compounds by GC/MS", December 1996.
33	40 CFR 131.36, July 1, 1997
34	40 CFR 141.23, July 1, 1997
35	USEPA, Manual for the Certification of Laboratories Analyzing Drinking Water, EPA 815-B-97-001, March 1997
36	Calculated using Chiou et al. equation reported in (9); S (µmol/L) from (15).
37	Calculated using Chiou et al. equation reported in (9); S (µmol/L) from (23).
38	Calculated using Chiou et al. equation reported in (9); S (µmol/L) from (4).

RBCA SITE ASSESSMENT

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

SOIL (15 - 25 ft) SSTL VALUES

Target Risk (Class A & B) 1.0E-6
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - First Order (One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways ("X" If Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	X Soil Leaching to Groundwater Ingestion			X Soil Vol. to Indoor Air	X Soil Volatilization to Outdoor Air				Surface Soil Inhalation, Ingestion, Dermal Contact		Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 ft)	Off-site 1 (100 ft)	Off-site 2 (100 ft)	On-site (0 ft)	On-site (0 ft)		Off-site 1 (100 ft)	Off-site 2 (100 ft)	On-site (0 ft)				Only If "yes" left
CAS No.	Name	(mg/kg)	Commercial	Residential	Commercial	Commercial	Commercial	Construction Worker	Residential	Commercial	None	Construction Worker	(mg/kg)	"■" If yes	
71-43-2	Benzene	2.5E+0	1.5E-2	2.9E+1	9.8E+1	1.6E[3]1	2.2E+1	NA	5.6E+1	4.6E+1	NA	NA	1.5E-2	■	1.6E+2
108-88-3	Toluene	2.1E+1	6.8E+1	>7.3E+2	>7.3E+2	3.8E+2	>7.3E+2	NA	>7.3E+2	>7.3E+2	NA	NA	6.8E+1	□	<1
100-41-4	Ethylbenzene	2.0E+1	8.9E+1	>6.2E+2	>6.2E+2	>6.2E+2	>6.2E+2	NA	>6.2E+2	>6.2E+2	NA	NA	8.9E+1	□	<1
1330-20-7	Xylene (mixed isomers)	1.3E+2	>4.9E+2	>4.9E+2	>4.9E+2	>4.9E+2	>4.9E+2	NA	>4.9E+2	>4.9E+2	NA	NA	>4.9E+2	□	NA
1634-04-4	Methyl t-Butyl ether	0.0E+0	4.0E-1	7.1E+1	2.0E+2	2.5E+3	>8.0E+3	NA	>8.0E+3	>8.0E+3	NA	NA	4.0E-1	□	<1
91-20-3	Naphthalene	3.4E+0	>6.2E+2	>6.2E+2	>6.2E+2	>6.2E+2	>6.2E+2	NA	>6.2E+2	>6.2E+2	NA	NA	>6.2E+2	□	NA
108-95-2	Phenol	3.0E-1	4.8E+1	1.2E+2	3.4E+2	>2.8E+4	>2.8E+4	NA	>2.8E+4	>2.8E+4	NA	NA	4.8E+1	□	<1

">" indicates risk-based target concentration greater than constituent residual saturation value. NA = Not applicable. NC = Not calculated.

Is site also zoned for residential ? if so, calc soil vapor to indoor air for residential scenario

RBCA SITE ASSESSMENT

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

Job ID: 971275

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-6
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - First Order (One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways ("X" if Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	X Groundwater Ingestion			X GW Vol. to Indoor Air	X Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 ft)	Off-site 1 (100 ft)	Off-site 2 (100 ft)	On-site (0 ft)	On-site (0 ft)	Off-site 1 (100 ft)	Off-site 2 (100 ft)			Only if "yes" left
CAS No.	Name	(mg/L)	Commercial	Residential	Commercial	Commercial	Commercial	Residential	Commercial	(mg/L)	"■" if yes	
71-43-2	Benzene	9.3E+0	9.9E-3	1.9E+1	6.4E+1	2.7E-1	4.1E+1	8.6E+1	8.6E+1	9.9E-3	■	9.4E+2
108-88-3	Toluene	9.4E+0	2.0E+1	>5.2E+2	>5.2E+2	2.9E+2	>5.2E+2	>5.2E+2	>5.2E+2	2.0E+1	□	<1
100-41-4	Ethylbenzene	2.4E+0	1.0E+1	>1.7E+2	>1.7E+2	>1.7E+2	>1.7E+2	>1.7E+2	>1.7E+2	1.0E+1	□	<1
1330-20-7	Xylene (mixed isomers)	1.4E+1	>2.0E+2	>2.0E+2	>2.0E+2	>2.0E+2	>2.0E+2	>2.0E+2	>2.0E+2	>2.0E+2	□	NA
1634-04-4	Methyl t-Butyl ether	5.7E-1	1.0E+0	1.8E+2	5.1E+2	1.6E+4	>4.8E+4	>4.8E+4	>4.8E+4	1.0E+0	□	<1
91-20-3	Naphthalene	5.1E-1	>3.1E+1	>3.1E+1	>3.1E+1	>3.1E+1	>3.1E+1	>3.1E+1	>3.1E+1	>3.1E+1	□	NA
108-95-2	Phenol	0.0E+0	6.1E+1	1.5E+2	4.3E+2	>8.3E+4	>8.3E+4	>8.3E+4	>8.3E+4	6.1E+1	□	<1

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

RBCA SITE ASSESSMENT | **Cumulative Risk Worksheet**

Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, California | Date Completed: 19-Jul-00

CUMULATIVE RISK WORKSHEET

CONSTITUENTS OF CONCERN		Representative Concentration		Proposed CRF		Resultant Target Concentration	
CAS No.	Name	Soil (mg/kg)	Groundwater (mg/L)	Soil	GW	Soil (mg/kg)	Groundwater (mg/L)
71-43-2	Benzene	2.5E+0	9.3E+0	1.0E+0	1.0E+0	2.5E+0	9.3E+0
108-88-3	Toluene	2.1E+1	9.4E+0	1.0E+0	1.0E+0	2.1E+1	9.4E+0
100-41-4	Ethylbenzene	2.0E+1	2.4E+0	1.0E+0	1.0E+0	2.0E+1	2.4E+0
1330-20-7	Xylene (mixed isomers)	1.3E+2	1.4E+1	1.0E+0	1.0E+0	1.3E+2	1.4E+1
1634-04-4	Methyl t-Butyl ether	0.0E+0	5.7E-1	1.0E+0	1.0E+0	0.0E+0	5.7E-1
91-20-3	Naphthalene	3.4E+0	5.1E-1	1.0E+0	1.0E+0	3.4E+0	5.1E-1
108-95-2	Phenol	3.0E-1	0.0E+0	1.0E+0	1.0E+0	3.0E-1	0.0E+0

Cumulative Values:

RBCA SITE ASSESSMENT | **Cumulative Risk Worksheet**

Site Name: Arrow Rentals | Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, Californ | Site Location: 187 North L Street, Livermore, Californi | Date Completed: 19-Jul-00

CUMULATIVE RISK WORKSHEET

Cumulative Target Risk: 1.0E-5 Target Hazard Index: 1.0E+0

ON-SITE RECEPTORS

CONSTITUENTS OF CONCERN		Outdoor Air Exposure: Commercial		Indoor Air Exposure: Commercial		Soil Exposure: None		Groundwater Exposure: Commercial	
		Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0
CAS No.	Name	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient
71-43-2	Benzene	3.4E-7	1.9E-2	5.0E-5	2.8E+0			9.4E-4	3.0E+1
108-88-3	Toluene		1.0E-3		8.8E-2				4.6E-1
100-41-4	Ethylbenzene		1.8E-4		1.3E-2				2.3E-1
1330-20-7	Xylene (mixed isomers)		2.0E-4		1.3E-2				1.1E-1
1634-04-4	Methyl t-Butyl ether		2.5E-7		3.6E-5				5.6E-1
91-20-3	Naphthalene		4.2E-7		4.0E-5				1.2E-2
108-95-2	Phenol		1.9E-9		1.3E-6				6.2E-3
Cumulative Values:		3.4E-7	2.1E-2	5.0E-5 ■	2.9E+0 ■	0.0E+0	0.0E+0	9.4E-4 ■	3.2E+1 ■

■ indicates risk level exceeding target risk

RBCA SITE ASSESSMENT | **Cumulative Risk Worksheet**

Site Name: Arrow Rentals | Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, Californ | Site Location: 187 North L Street, Livermore, Californi | Date Completed: 19-Jul-00

CUMULATIVE RISK WORKSHEET

Cumulative Target Risk: 1.0E-5 | Target Hazard Index: 1.0E+0

Groundwater DAF Option: Domenico - First Order

OFF-SITE RECEPTORS

CONSTITUENTS OF CONCERN		Outdoor Air Exposure:				Groundwater Exposure:			
		Residential (100 ft) Target Risk: 1.0E-6 / 1.0E-5	Residential (100 ft) Target HQ: 1.0E+0	Commercial (100 ft) Target Risk: 1.0E-6 / 1.0E-5	Commercial (100 ft) Target HQ: 1.0E+0	Residential (100 ft) Target Risk: 1.0E-6 / 1.0E-5	Residential (100 ft) Target HQ: 1.0E+0	Commercial (100 ft) Target Risk: 1.0E-6 / 1.0E-5	Commercial (100 ft) Target HQ: 1.0E+0
CAS No.	Name	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient
71-43-2	Benzene	2.6E-7	1.2E-2	1.6E-7	9.2E-3	4.9E-7	1.3E-2	1.5E-7	4.7E-3
108-88-3	Toluene		5.9E-4		4.8E-4		1.4E-8		5.0E-9
100-41-4	Ethylbenzene		1.2E-4		8.6E-5		3.2E-3		1.1E-3
1330-20-7	Xylene (mixed isomers)		1.4E-4		9.8E-5		1.8E-6		6.5E-7
1634-04-4	Methyl t-Butyl ether		1.7E-7		1.2E-7		3.2E-3		1.1E-3
91-20-3	Naphthalene		2.8E-7		2.0E-7		1.6E-7		5.7E-8
108-95-2	Phenol		1.3E-9		9.0E-10		2.5E-3		8.8E-4
	Cumulative Values:	**2.6E-7**	**1.3E-2**	**1.6E-7**	**9.8E-3**	**4.9E-7**	**2.2E-2**	**1.5E-7**	**7.8E-3**

■ indicates risk level exceeding target risk

APPENDIX G

TIER 2 BASELINE RISK ASSESSMENT - ONSITE RESIDENTIAL SCENARIO

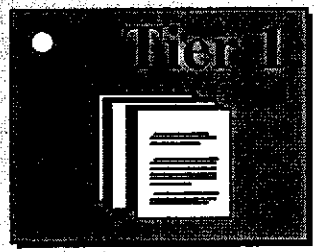
Main Screen

RBCA Tool Kit for Chemical Releases
Version 1.2 © 1999

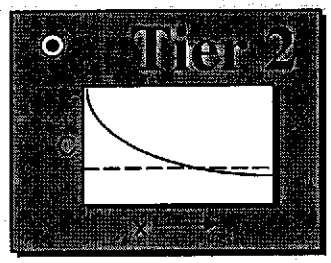
1. Project Information

Site Name:	Arrow Rentals		
Location:	187 North L Street, Livermore, California		
Compl. By:	Aquifer Sciences, Inc.		
Date:	19-Jul-00	Job ID:	971275

2. Which Type of RBCA Analysis? (?)



Generic Values
On-Site
Exposure



Site-Specific Values
On- or Off-Site Exposure

3. Calculation Options (?)

Affects which input data are required

- ☑ ***Baseline Risks (Forward mode)***
- ☑ ***RBCA Cleanup Standards (Backward mode)***

4. RBCA Evaluation Process

Prepare Input Data

Data Complete? (■= yes, ■= no)

- ■□ Exposure Pathways
- ■□ Constituents of Concern (COCs)
- ■□ Transport Models
- ■□ Soil Parameters
- ■□ GW Parameters
- ■□ Air Parameters

Review Output

- Exposure Flowchart
- COC Chem. Parameters
- Input Data Summary
- User-Spec. COC Data...
- Transient Domenico Analysis...
- Baseline Risks...
- Cleanup Standards...

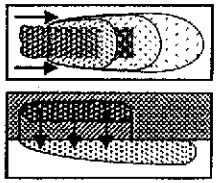
5. Commands and Options

New Site	Load Data...	Save Data As...	Quit
Print Sheet	Set Units	Custom Chem. Data...	*Help*

Exposure Pathway Identification

Site Name: Arrow Rentals
Location: 187 North L Street, Livermore, California
Compl. By: Aquifer Sciences, Inc.
Job ID: 971275 Date: 19-Jul-00

1. Groundwater Exposure



Groundwater Ingestion/ Surface Water Impact

Receptor Type:	Res. On-site	Res. Off-site1	Com. Off-site2

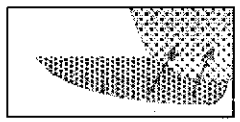
Source Media:

- [x] Affected Groundwater
- [x] Affected Soils Leaching to Groundwater

Distance to GW receptors

	On-site	Off-site1	Off-site2	
Affected Groundwater	0	100	100	(ft)
Affected Soils Leaching to Groundwater	0	100	100	(ft)

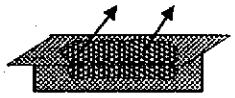
GW Discharge to Surface Water Exposure



- [ ] Swimming
- [ ] Fish Consumption
- [ ] Aquatic Life Protection

Enter ALR Criteria**

2. Surface Soil Exposure

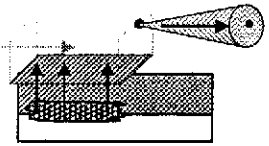


Direct Ingestion and Dermal Contact

Receptor Type:	None	On-site	No off-site receptors

Construction Worker ☐

3. Air Exposure

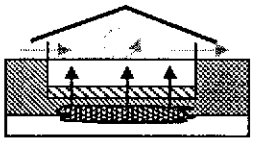


Volatilization and Particulates to Outdoor Air Inhalation

Receptor Type:	Res. On-site	Res. Off-site1	Com. Off-site2
	0	100	100 (ft)

Construction worker ☐

- [x] Affected Soils--Volatilization to Ambient Outdoor Air
- [x] Affected Groundwater--Volatilization to Ambient Outdoor Air
- [ ] Affected Surface Soils--Particulates to Ambient Outdoor Air



Volatilization to Indoor Air Inhalation

Receptor Type:	Res. On-site	No off-site receptors

- [x] Affected Soils--Volatilization to Enclosed Space
- [x] Affected Groundwater--Volatilization to Enclosed Space

4. Commands and Options

Main Screen | Print Sheet | Set Units | *Help*

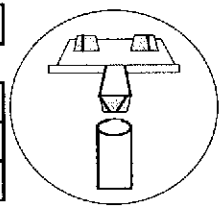
Exposure Factors & Target Risks | Exposure Flowchart

Exposure Factors and Target Risk Limits

Site Name: Arrow Rentals
Location: 187 North L Street, Livermore, California
Compl. By: Aquifer Sciences, Inc.
Job ID: 971275 Date: 19-Jul-00

1. Exposure Parameters

		Residential			Commercial	
Age Adjustment?		Adult	(Age 0-6)	(Age 0-16)	Chronic	Construc.
Averaging time, carcinogens (yr)		70				
Averaging time, non-carcinogens (yr)		30			25	1
Body weight (kg)		70	15	35	70	
Exposure duration (yr)		30	6	16	25	1
Exposure frequency (days/yr)		350			250	180
Dermal exposure frequency (days/yr)		350			250	
Skin surface area, soil contact (cm^2)	☐	5800		2023	5800	5800
Soil dermal adherence factor ($mg/cm^2/day$)		1				
Water ingestion rate (L/day)		2			1	
Soil ingestion rate (mg/day)	☐	100	200		50	100
Swimming exposure time (hr/event)		3				
Swimming event frequency (events/yr)		12	12	12		
Swimming water ingestion rate (L/hr)	☐	0.05	0.5			
Skin surface area, swimming (cm^2)	☐	23000		8100		
Fish consumption rate (kg/day)		0.025				
Contaminated fish fraction (unitless)		1				



2. Risk Goal Calculation Options

- ○ Individual Constitiuent Risk Goals Only
- ◉ Individual and Cumulative Risk Goals

3. Target Health Risk Limits

	Individual	Cumulative
Target Risk (Class A/B carcins.)	1.0E-6	1.0E-5
Target Risk (Class C carcinogens)	1.0E-5	
Target Hazard Quotient	1.0E+0	
Target Hazard Index		1.0E+0

4. Commands and Options

Return to Exposure Pathways

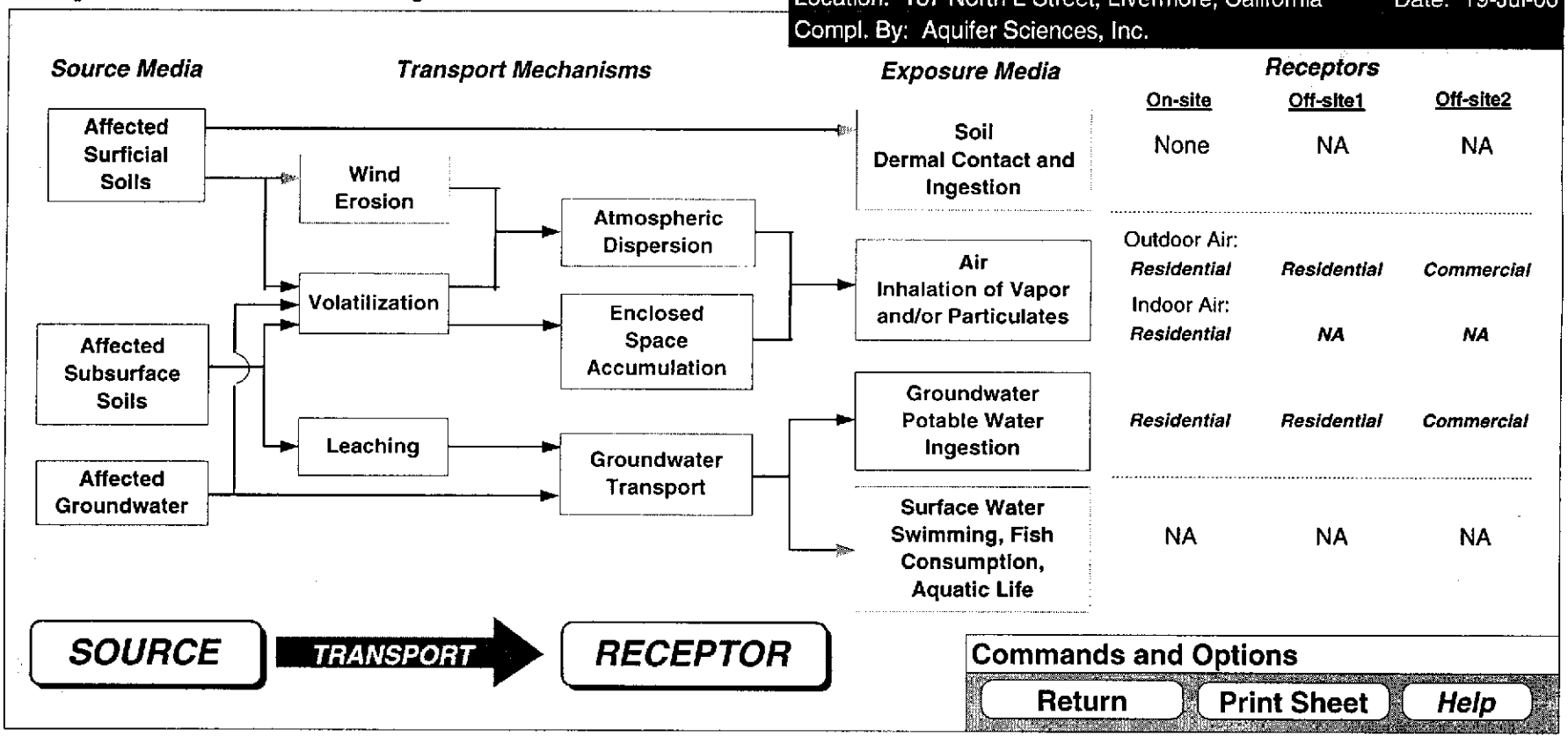
Use Default Values

Print Sheet

Help

Exposure Pathway Flowchart

Site Name: Arrow Rentals
Location: 187 North L Street, Livermore, California
Compl. By: Aquifer Sciences, Inc.
Job ID: 971275
Date: 19-Jul-00



Receptors	On-site	Off-site1	Off-site2
Soil Dermal Contact and Ingestion	None	NA	NA
Air Inhalation of Vapor and/or Particulates	Outdoor Air: *Residential* / Indoor Air: *Residential*	*Residential* / *NA*	*Commercial* / *NA*
Groundwater Potable Water Ingestion	*Residential*	*Residential*	*Commercial*
Surface Water Swimming, Fish Consumption, Aquatic Life	NA	NA	NA

Commands and Options

Return | Print Sheet | Help

Site Name: Arrow Rentals
Location: 187 North L Street, Livermore, California
Compl. By: Aquifer Sciences, Inc.

Job ID: 971275
Date: 19-Jul-00

Commands and Options

Main Screen | Print Sheet | *Help*

Source Media Constituents of Concern (COCs)

Apply Raoult's Law ?

Selected COCs

COC Select: *Sort List:* ?

Add/Insert | Top | MoveUp
Delete | Bottom | MoveDown

Representative COC Concentration ?

Groundwater Source Zone

Calculate | Enter Site Data

Soil Source Zone

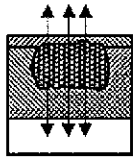
Enter Directly | Enter Site Data

Selected COCs	Groundwater Source Zone (mg/L)	Groundwater Source Zone note	Soil Source Zone (mg/kg)	Soil Source Zone note	Mole Fraction in Source Material (-)
Benzene	9.3E+0	95% UCL at W-1s	2.5E+0	Max at 20 ft in W-1	
Toluene	9.4E+0	95% UCL at W-1s	2.1E+1	Max at 15 ft in W-1	
Ethylbenzene	2.4E+0	95% UCL at W-1s	2.0E+1	Max at 15 ft in W-1	
Xylene (mixed isomers)	1.4E+1	95% UCL at W-1s	1.3E+2	Max at 15 ft in W-1	
Methyl t-Butyl ether	5.7E-1	95% UCL at W-1s	0.0E+0		
Naphthalene	5.1E-1	Maximum at W-1s	3.4E+0	Max at 25 ft in B-1	
Phenol	0.0E+0		3.0E-1	Max at 25 ft in B-1	

Transport Modeling Options

Site Name: Arrow Rentals — Job ID: 971275
Location: 187 North L Street, Livermore, California — Date: 19-Jul-00
Compl. By: Aquifer Sciences, Inc.

1. Vertical Transport, Surface Soil Column



Outdoor Air Volatilization Factors (?)

- ○ Surface soil volatilization model only
- ◉ Combination surface soil/Johnson & Ettinger models
  - Thickness of surface soil zone: 1 *(ft)*
- ○ User-specified VF from other model — Enter VF Values

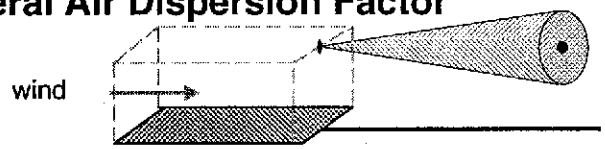
Indoor Air Volatilization Factors (?)

- ◉ Johnson & Ettinger model
- ○ User-specified VF from other model — Enter VF Values

Soil-to-Groundwater Leaching Factor

- ◉ ASTM Model (?)
  - ☑ Apply Soil Attenuation Model (SAM) — Enter Decay Rates
  - ☐ Allow first-order biodecay
- ○ User-specified LF from other model — Enter LF Values

2. Lateral Air Dispersion Factor

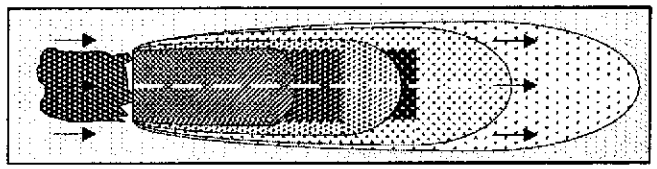


(?)

- ◉ 3-D Gaussian dispersion model
- ○ User-Specified ADF

Off-site 1	Off-site 2	
1.00E+0	1.00E+0	*(-)*

3. Groundwater Dilution Attenuation Factor



Calculate DAF using Domenico Model (?)

- ○ Domenico equation with dispersion only (no biodegradation)
- ◉ Domenico equation first-order decay — ■□ Enter Decay Rates
- ○ Modified Domenico equation using electron acceptor superposition — Enter Site Data
  - Enter Directly — Biodegradation Capacity: NC *(mg/L)*

— or —

User-Specified DAF Values

- ○ DAF values from other model or site data — Enter DAF Values

n o

4. Commands and Options

Main Screen | Print Sheet | *Help*

Site Name: Arrow Rentals
Location: 187 North L Street, Livermore, California
Compl. By: Aquifer Sciences, Inc.
Job ID: 971275
Date: 19-Jul-00

Commands and Options

Return | Print Sheet | Paste Default Values | *Help*

Constituent Half-Life Values

Constituent	Saturated Zone Half-Life *(day)*	Saturated Zone First-Order Decay Coeffecient *(1/day)*	Unsaturated Zone Half-Life *(day)*	Unsaturated Zone First-Order Decay Coeffecient *(1/day)*
Benzene	4.8E+2	1.4E-3	4.8E+2	1.4E-3
Toluene	2.7E+2	2.6E-3	2.7E+2	2.6E-3
Ethylbenzene	5.8E+3	1.2E-4	5.8E+3	1.2E-4
Xylene (mixed isomers)	9.6E+2	7.2E-4	9.6E+2	7.2E-4
Methyl t-Butyl ether	3.2E+2	2.2E-3	3.2E+2	2.2E-3
Naphthalene	7.3E+3	9.5E-5	7.3E+3	9.5E-5
Phenol	7.3E+3	9.5E-5	7.3E+3	9.5E-5

Site-Specific Soil Parameters

Site Name: Arrow Rentals | Job ID: 971275
Location: 187 North L Street, Livermore, California | Date: 19-Jul-00
Compl. By: Aquifer Sciences, Inc.

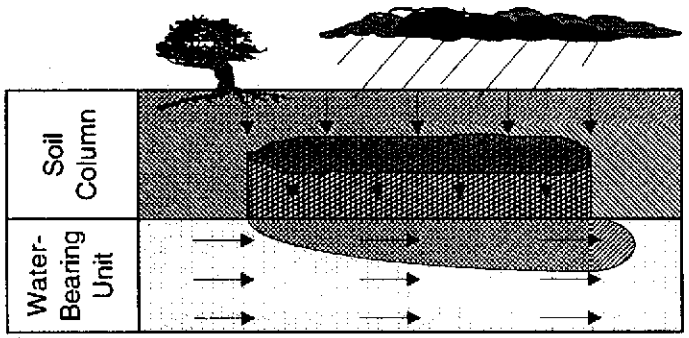
1. Soil Source Zone Characteristics

Hydrogeology

	General Case Construction	
Depth to water-bearing unit	25	(ft)
Capillary zone thickness	0.16	(ft)
Soil column thickness	24.84	(ft)

Affected Soil Zone

Depth to top of affected soils	15		(ft)
Depth to base of affected soils	25		(ft)
Affected soil area	1280	1280	(ft^2)
Length of affected soil parallel to assumed wind direction	40	40	(ft)
Length of affected soil parallel to assumed GW flow direction	40		(ft)



2. Surface Soil Column

Vadose Zone | Capillary Fringe

Predominant USCS Soil Type

ults

or Calculate

or

Total porosity	0.3		(-)
Volumetric water content	0.12	0.26	(-)
Volumetric air content	0.18	0.04	(-)
Dry bulk density	2.65		(kg/L)
Vertical hydraulic conductivity	3.3E+2		(ft/yr)
Vapor permeability	1.1E-11		(ft^2)
Capillary zone thickness	1.6E-1		(ft)

Net Rainfall Infiltration

Net infiltration estimate	11.81102362	(in/yr)
or Calculate	or	
Average annual precipitation	0	(in/yr)

Partitioning Parameters

Fraction organic carbon	0.01	(-)
Soil/water pH	6.9	(-)

3. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | | Help

Site-Specific Groundwater Parameters

Site Name: Arrow Rentals | Job ID: 971275
Location: 187 North L Street, Livermore, California | Date: 19-Jul-00
Compl. By: Aquifer Sciences, Inc.

1. Water-Bearing Unit

Hydrogeology

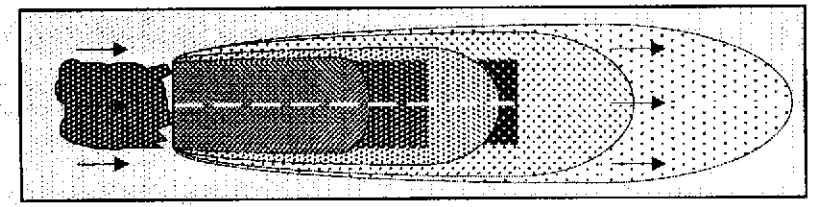
Groundwater Darcy velocity	8.2E+0	(ft/yr)
Groundwater seepage velocity	2.1E+1	(ft/yr)
or Enter Directly	↑ or	
Hydraulic conductivity	4.1E+2	(ft/yr)
Hydraulic gradient	2.0E-2	(-)
Effective porosity	0.40	(-)

Sorption

Fraction organic carbon--saturated zone	0.01	(-)
Groundwater pH	6.90	(-)

2. Groundwater Source Zone

Groundwater plume width at source	32	(ft)
Plume (mixing zone) thickness at source	6.56167979	(ft)
or Calculate	↑ or	
Saturated thickness	10	(ft)
Length of source zone		(ft)



3. Groundwater Dispersion

Model: ASTM Default

	GW Ingestion		Soil Leaching to GW		
	Off-site 1	Off-site 2	Off-site 1	Off-site 2	
Distance to GW receptors	100	100	100	100	(ft)
or Enter Directly	↓ or	↓	↓ or	↓	
Longitudinal dispersivity	10	10	10	10	(ft)
Transverse dispersivity	3.3	3.3	3.3	3.3	(ft)
Vertical dispersivity	0.5	0.5	0.5	0.5	(ft)

4. Groundwater Discharge to Surface Water

	Off-site 2	
Distance to GW/SW disharge point	NA	(ft)
Plume width at GW/SW discharge	0	(ft)
Plume thickness at GW/SW discharge	0	(ft)
Surface water flowrate at GW/SW discharge	0.0E+0	(ft^3/s)

5. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | | Help

Site-Specific Air Parameters

Site Name: Arrow Rentals | Job ID: 971275
Location: 187 North L Street, Livermore, California | Date: 19-Jul-00
Compl. By: Aquifer Sciences, Inc.

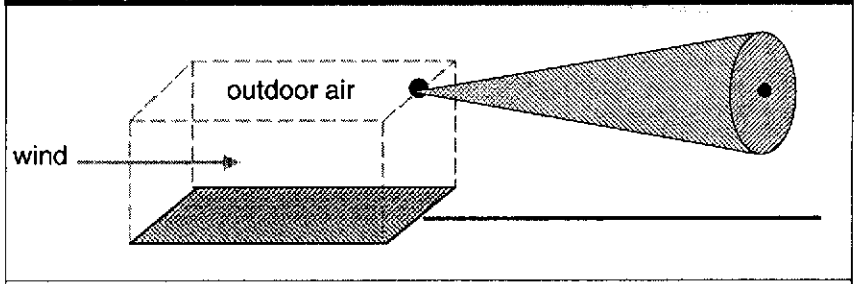
1. Outdoor Air Pathway

Dispersion in Air

	Off-site 1	Off-site 2	
Distance to offsite air receptor	100	100	(ft)
or Enter Directly	↓ or	↓	
Horizontal dispersivity	11.26	11.26	(ft)
Vertical dispersivity	7.61	7.61	(ft)

Air Source Zone

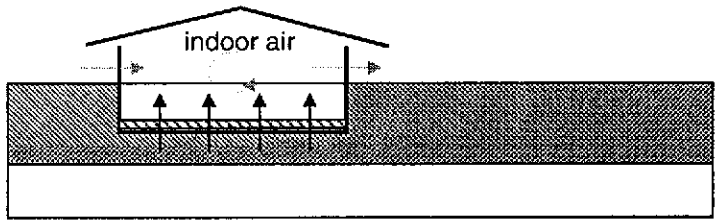
Air mixing zone height	6.56167979	(ft)
Ambient air velocity in mixing zone	7.381889764	(ft/s)
Areal particulate emission flux	6.9E-14	(g/cm^2/s)



2. Indoor Air Pathway

Building Parameters

	Residential	Commercial	
Building volume/area ratio	8	9.84252	(ft)
Foundation area	1000	20000	(ft^2)
Foundation perimeter	130	600	(ft)
Building air exchange rate	1.4E-4	1.4E-4	(1/s)
Depth to bottom of foundation slab	0.5	0.5	(ft)
Convective air flow through cracks	0.0E+0	0.0E+0	(ft^3/s)
Foundation thickness	0.5		(ft)
Foundation crack fraction	0.01		(-)
Volumetric water content of cracks	0.28		(-)
Volumetric air content of cracks	0.13		(-)
Indoor/Outdoor differential pressure	0		(Pa)



3. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | | *Help*

CHEMICAL DATA FOR SELECTED COCs

Physical Property Data

Constituent	CAS Number	type	Molecular Weight (g/mole) MW	ref	Diffusion Coefficients in air (cm2/s) Dair	rel	in water (cm2/s) Dwat	ref	log (Koc) or log(Kd) (@ 20 - 25 C) log(L/kg) partition		ref	Henry's Law Constant (@ 20 - 25 C) (atm-m3) mol	(unitless)	ref	Vapor Pressure (@ 20 - 25 C) (mm Hg)	rel	Solubility (@ 20 - 25 C) (mg/L)	ref	acid pKa	base pKb	ref
Benzene	71-43-2	A	78.1	PS	8.80E-02	PS	9.80E-06	PS	1.77	Koc	PS	5.55E-03	2.29E-01	PS	9.52E+01	PS	1.75E+03	PS	-	-	-
Toluene	108-88-3	A	92.4	5	8.50E-02	A	9.40E-06	A	2.13	Koc	A	6.30E-03	2.60E-01	A	3.00E+01	4	5.15E+02	29	-	-	-
Ethylbenzene	100-41-4	A	106.2	PS	7.50E-02	PS	7.80E-06	PS	2.56	Koc	PS	7.88E-03	3.25E-01	PS	1.00E+01	PS	1.69E+02	PS	-	-	-
Xylene (mixed isomers)	1330-20-7	A	106.2	5	7.20E-02	A	8.50E-06	A	2.38	Koc	A	7.03E-03	2.90E-01	A	7.00E+00	4	1.98E+02	5	-	-	-
Methyl t-Butyl ether	1634-04-4	O	88.146	5	7.92E-02	6	9.41E-05	7	1.08	Koc	A	5.77E-04	2.38E-02	-	2.49E+02	-	4.80E+04	A	-	-	-
Naphthalene	91-20-3	PAH	128.2	PS	5.90E-02	PS	7.50E-06	PS	3.30	Koc	PS	4.83E-04	1.99E-02	PS	2.30E-01	PS	3.10E+01	PS	-	-	-
Phenol	108-95-2	AP	94.1	PS	8.20E-02	PS	9.10E-06	PS	1.46	Koc	PS	3.97E-07	1.64E-05	PS	3.41E-01	PS	8.28E+04	PS	10	-	PS

Site Name: Arrow Rentals

Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00

Job ID: 971275

CHEMICAL DATA FOR SELECTED COCs

Toxicity Data

Constituent	Reference Dose (mg/kg/day) Oral RfD_oral	ref	Reference Dose (mg/kg/day) Dermal RfD_dermal	ref	Reference Conc. (mg/m3) Inhalation RfC_inhal	ref	Slope Factors 1/(mg/kg/day) Oral SF_oral	ref	Slope Factors 1/(mg/kg/day) Dermal SF_dermal	ref	Unit Risk Factor 1/(µg/m3) Inhalation URF_inhal	ref	EPA Weight of Evidence	Is Constituent Carcinogenic ?
Benzene	3.00E-03	R	-	-	5.95E-03	R	2.90E-02	PS	2.99E-02	TX	8.29E-06	PS	A	TRUE
Toluene	2.00E-01	A,R	1.60E-01	TX	4.00E-01	A,R	-	-	-	-	-	-	D	FALSE
Ethylbenzene	1.00E-01	PS	9.70E-02	TX	1.00E+00	PS	-	-	-	-	-	-	D	FALSE
Xylene (mixed isomers)	2.00E+00	A,R	1.84E+00	TX	7.00E+00	A	-	-	-	-	-	-	D	FALSE
Methyl t-Butyl ether	1.00E-02	31	8.00E-03	TX	3.00E+00	R	-	-	-	-	-	-	-	FALSE
Naphthalene	4.00E-01	PS	3.56E-01	TX	1.40E+00	PS	-	-	-	-	-	-	D	FALSE
Phenol	6.00E-01	PS	5.40E-01	TX	2.10E+00	PS	-	-	-	-	-	-	D	FALSE

Site Name: Arrow Rentals

Site Location: 187 North L St

Miscellaneous Chemical Data

Constituent	Maximum Contaminant Level MCL (mg/L)	ref	Time-Weighted Average Workplace Criteria TWA (mg/m3)	ref	Aquatic Life Prot. Criteria AQL (mg/L)	ref	Bioconcentration Factor (L-wat/kg-fish)
Benzene	5.00E-03	52 FR 25690	3.25E+00	PS	-	-	12.6
Toluene	1.00E+00	56 FR 3526 (30 Jan 91)	1.47E+02	ACGIH	-	-	70
Ethylbenzene	7.00E-01	56 FR 3526 (30 Jan 91)	4.35E+02	PS	-	-	1
Xylene (mixed isomers)	1.00E+01	56 FR 3526 (30 Jan 91)	4.34E+02	ACGIH	-	-	1
Methyl t-Butyl ether	-	-	6.00E+01	NIOSH	-	-	1
Naphthalene	-	-	5.00E+01	PS	-	-	430
Phenol	-	-	1.90E+01	PS	-	-	1

Site Name: Arrow Rentals

Site Location: 187 North L St

CHEMICAL DATA FOR SELECTED COCs

Miscellaneous Chemical Data

Constituent	Dermal Relative Absorp. Factor (unitless)	Water Dermal Permeability Data: Dermal Permeability Coeff. (cm/hr)	Lag time for Dermal Exposure (hr)	Critical Exposure Time (hr)	Relative Contr of Derm Perm Coeff (unitless)	Water/Skin Derm Adsorp Factor (cm/event)	ref	Detection Limits: Groundwater (mg/L)	ref	Soil (mg/kg)	ref	Half Life (First-Order Decay) (days): Saturated	Unsaturated	ref
Benzene	0.5	0.021	0.26	0.63	0.013	7.3E-2	D	0.002	S	0.005	S	720	720	H
Toluene	0.5	0.045	0.32	0.77	0.054	1.6E-1	D	0.002	S	0.005	S	28	28	H
Ethylbenzene	0.5	0.074	0.39	1.3	0.14	2.7E-1	D	0.002	S	0.005	S	228	228	H
Xylene (mixed isomers)	0.5	0.08	0.39	1.4	0.16	2.9E-1	D	0.005	S	0.005	S	360	360	H
Methyl t-Butyl ether	0.5	-	-	-	-	-	-	-	-	-	-	360	180	H
Naphthalene	0.05	0.069	0.53	2.2	0.2	2.7E-1	D	0.01	32	0.01	32	258	258	H
Phenol	0.5	0.0055	0.33	0.79	0.0029	2.0E-2	D	0.01	32	0.66	32	10	10	H

Site Name: Arrow Rentals

Site Location: 187 North L St

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

Job ID: 971275

Exposure Parameters		Residential			Commercial/Industrial	
		Adult	(1-6yrs)	(1-16 yrs)	Chronic	Construc.
AT_c	Averaging time for carcinogens (yr)	70				
AT_n	Averaging time for non-carcinogens (yr)	30			25	1
BW	Body weight (kg)	70	15	35	70	
ED	Exposure duration (yr)	30	6	16	25	1
τ	Averaging time for vapor flux (yr)	30			25	1
EF	Exposure frequency (days/yr)	350			250	180
EF_D	Exposure frequency for dermal exposure	350			250	
IR_w	Ingestion rate of water (L/day)	2			1	
IR_s	Ingestion rate of soil (mg/day)	100	200		50	100
SA	Skin surface area (dermal) (cm^2)	5800		2023	5800	5800
M	Soil to skin adherence factor	1				
ET_{swim}	Swimming exposure time (hr/event)	3				
EV_{swim}	Swimming event frequency (events/yr)	12	12	12		
IR_{swim}	Water ingestion while swimming (L/hr)	0.05	0.5			
SA_{swim}	Skin surface area for swimming (cm^2)	23000		8100		
IR_{fish}	Ingestion rate of fish (kg/yr)	0.025				
FI_{fish}	Contaminated fish fraction (unitless)	1				

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	Residential	Residential	Commercial
Soil Leaching to Groundwater Ingestion	Residential	Residential	Commercial
Applicable Surface Water Exposure Routes:			
Swimming			NA
Fish Consumption			NA
Aquatic Life Protection			NA
Soil:			
Direct Ingestion and Dermal Contact	None		
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	Residential	Residential	Commercial
Volatilization from Groundwater	Residential	Residential	Commercial
Indoor Air:			
Volatilization from Subsurface Soils	Residential	NA	NA
Volatilization from Groundwater	Residential	NA	NA

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	0	100	100	(ft)
Soil leaching to groundwater receptor	0	100	100	(ft)
Outdoor air inhalation receptor	0	100	100	(ft)

Target Health Risk Values		Individual	Cumulative
TR_{ab}	Target Risk (class A&B carcinogens)	1.0E-6	1.0E-5
TR_c	Target Risk (class C carcinogens)	1.0E-5	
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	Surface & subsurface models
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	Yes
Air dilution factor	3-D Gaussian dispersion
Groundwater dilution-attenuation factor	Domenico model w/ biodeg.

NOTE: NA = Not applicable

Surface Parameters		General	Construction	(Units)
A	Source zone area	1.3E+3	NA	(ft^2)
W	Length of source-zone area parallel to wind	4.0E+1	NA	(ft)
W_{gw}	Length of source-zone area parallel to GW flow	4.0E+1		(ft)
U_{air}	Ambient air velocity in mixing zone	7.4E+0		(ft/s)
δ_{air}	Air mixing zone height	6.6E+0		(ft)
P_a	Areal particulate emission rate	NA		(g/cm^2/s)
L_{ss}	Thickness of affected surface soils	1.0E+0		(ft)

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	1.6E-1			(ft)
h_v	Vadose zone thickness	2.5E+1			(ft)
ρ_s	Soil bulk density	2.7E+0			(g/cm^3)
f_{oc}	Fraction organic carbon	1.0E-2			(-)
θ_T	Soil total porosity	3.0E-1			(-)
K_{vs}	Vertical hydraulic conductivity	3.3E+2			(ft/yr)
k_v	Vapor permeability	1.1E-11			(ft^2)
L_{gw}	Depth to groundwater	2.5E+1			(ft)
L_s	Depth to top of affected soils	1.5E+1			(ft)
L_{base}	Depth to base of affected soils	2.5E+1			(ft)
L_{scs}	Thickness of affected soils	1.0E+1			(ft)
pH	Soil/groundwater pH	6.9E+0			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.26	0.12	0.28	(-)
θ_a	Volumetric air content	0.04	0.18	0.13	(-)

Building Parameters		Residential	Commercial	(Units)
L_B	Building volume/area ratio	8.00E+0	NA	(ft)
A_B	Foundation area	1.00E+3	NA	(cm^2)
X_{crk}	Foundation perimeter	1.30E+2	NA	(ft)
ER	Building air exchange rate	1.40E-4	NA	(1/s)
L_{crk}	Foundation thickness	5.00E-1	NA	(ft)
Z_{crk}	Depth to bottom of foundation slab	5.00E-1	NA	(ft)
η	Foundation crack fraction	1.00E-2	NA	(-)
dP	Indoor/outdoor differential pressure	0.00E+0	NA	(Pa)
Q_s	Convective air flow through slab	0.00E+0	NA	(ft^3/s)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	6.6E+0	(ft)
I	Net groundwater infiltration rate	1.2E+1	(in/yr)
U_{gw}	Groundwater Darcy velocity	8.2E+0	(ft/yr)
V_{gw}	Groundwater seepage velocity	2.1E+1	(ft/yr)
K_s	Saturated hydraulic conductivity	4.1E+2	(ft/yr)
i	Groundwater gradient	2.0E-2	(-)
S_w	Width of groundwater source zone	3.2E+1	(ft)
S_d	Depth of groundwater source zone	6.6E+0	(ft)
θ_{eff}	Effective porosity in water-bearing unit	4.0E-1	(-)
f_{oc-sat}	Fraction organic carbon in water-bearing unit	1.0E-2	(-)
pH_{sat}	Groundwater pH	6.9E+0	(-)
	Biodegradation considered?	1st Order	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Soil Leaching to GW		
α_x	Longitudinal dispersivity	1.0E+1	1.0E+1	1.0E+1	1.0E+1	(ft)
α_y	Transverse dispersivity	3.3E+0	3.3E+0	3.3E+0	3.3E+0	(ft)
α_z	Vertical dispersivity	5.0E-1	5.0E-1	5.0E-1	5.0E-1	(ft)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	1.1E+1	1.1E+1	1.1E+1	1.1E+1	(ft)
σ_z	Vertical dispersion coefficient	7.6E+0	7.6E+0	7.6E+0	7.6E+0	(ft)
ADF	Air dispersion factor	2.1E+0	2.1E+0	2.1E+0	2.1E+0	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(ft^3/s)
W_{pl}	Width of GW plume at SW discharge	NA	(ft)
δ_{pl}	Thickness of GW plume at SW discharge	NA	(ft)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

RBCA SITE ASSESSMENT | **User-Specified COC Data**

REPRESENTATIVE COC CONCENTRATIONS IN SOURCE MEDIA

CONSTITUENT	Representative COC Concentration			
	Groundwater		Soils (15 - 25 ft)	
	value (mg/L)	note	value (mg/kg)	note
Benzene	9.3E+0	95% UCL at W-1s	2.5E+0	Max at 20 ft in W-1
Toluene	9.4E+0	95% UCL at W-1s	2.1E+1	Max at 15 ft in W-1
Ethylbenzene	2.4E+0	95% UCL at W-1s	2.0E+1	Max at 15 ft in W-1
Xylene (mixed isomers)	1.4E+1	95% UCL at W-1s	1.3E+2	Max at 15 ft in W-1
Methyl t-Butyl ether	5.7E-1	95% UCL at W-1s	0.0E+0	
Naphthalene	5.1E-1	Maximum at W-1s	3.4E+0	Max at 25 ft in B-1
Phenol	0.0E+0		3.0E-1	Max at 25 ft in B-1

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT | **User-Specified COC Data**

CONSTITUENT HALF-LIFE VALUES

CONSTITUENT	Saturated Zone Half-Life (days)	Unsaturated Zone Half-Life (days)
Benzene	480	480
Toluene	271	271
Ethylbenzene	5790	5790
Xylene (mixed isomers)	961	961
Methyl t-Butyl ether	319	319
Naphthalene	7300	7300
Phenol	7300	7300

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT | **Tier 2 Domenico Groundwater Modeling Summary**

Site Name: Arrow Rentals Site Location: 187 North L Street, Livermore, Completed By: Aquifer Sciences, Inc. Date Completed: 19-Jul-00 *1 OF 2*

DOMENICO GROUNDWATER MODELING SUMMARY

OFF-SITE GROUNDWATER EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAY IS ACTIVE)**

SOILS (15 - 25 ft): LEACHING TO GROUNDWATER INGESTION

Exposure Concentration

Constituents of Concern	1) Source Medium	2) Steady-state Exposure Concentration Groundwater: POE Conc. (mg/L)		3) POE Concentration Limit Groundwater: POE Conc. (mg/L)		4) Time to Reach POE Conc. Limit Conc. limit reached? ("■" if yes) ; Time (yr)			
	Soil Conc. (mg/kg)	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial	Off-site 1 (100 ft) Residential		Off-site 2 (100 ft) Commercial	
Benzene	2.5E+0	2.5E-4	2.5E-4	2.9E-3	9.9E-3	□	NA	□	NA
Toluene	2.1E+1	6.8E-8	6.8E-8	7.3E+0	2.0E+1	□	NA	□	NA
Ethylbenzene	2.0E+1	1.1E-2	1.1E-2	3.7E+0	1.0E+1	□	NA	□	NA
Xylene (mixed isomers)	1.3E+2	1.3E-4	1.3E-4	7.3E+1	2.0E+2	□	NA	□	NA
Methyl t-Butyl ether	0.0E+0	0.0E+0	0.0E+0	3.7E-1	1.0E+0	□	NA	□	NA
Naphthalene	3.4E+0	3.3E-7	3.3E-7	1.5E+1	4.1E+1	□	NA	□	NA
Phenol	3.0E-1	5.4E-2	5.4E-2	2.2E+1	6.1E+1	□	NA	□	NA

NOTE: POE = Point of exposure

RBCA SITE ASSESSMENT | **Tier 2 Domenico Groundwater Modeling Summary**

Site Name: Arrow Rentals | Site Location: 187 North L Street, Livermore, | Completed By: Aquifer Sciences, Inc. | Date Completed: 19-Jul-00 | *2 OF 2*

DOMENICO GROUNDWATER MODELING SUMMARY

OFF-SITE GROUNDWATER EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAY IS ACTIVE)**

GROUNDWATER: INGESTION

Exposure Concentration

Constituents of Concern	1) Source Medium	2) Steady-state Exposure Concentration Groundwater: POE Conc. (mg/L)		3) POE Concentration Limit Groundwater: POE Conc. (mg/L)		4) Time to Reach POE Conc. Limit Conc reaches limit? ("■" If yes) ; Time (yr)	
	Groundwater Conc. (mg/L)	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial
Benzene	9.3E+0	1.4E-3	1.4E-3	2.9E-3	9.9E-3	□ NA	□ NA
Toluene	9.4E+0	1.0E-7	1.0E-7	7.3E+0	2.0E+1	□ NA	□ NA
Ethylbenzene	2.4E+0	1.2E-2	1.2E-2	3.7E+0	1.0E+1	□ NA	□ NA
Xylene (mixed isomers)	1.4E+1	8.3E-5	8.3E-5	7.3E+1	2.0E+2	□ NA	□ NA
Methyl t-Butyl ether	5.7E-1	1.2E-3	1.2E-3	3.7E-1	1.0E+0	□ NA	□ NA
Naphthalene	5.1E-1	2.3E-6	2.3E-6	1.5E+1	4.1E+1	□ NA	□ NA
Phenol	0.0E+0	0.0E+0	0.0E+0	2.2E+1	6.1E+1	□ NA	□ NA

NOTE: POE = Point of exposure

RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

Constiuent: Benzene
Source Medium: Affected Groundwater
Biodegredation: 1st Order

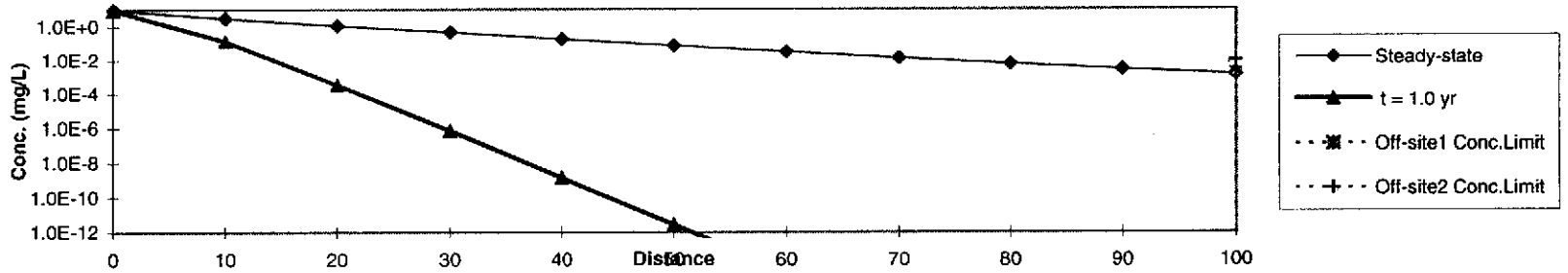
Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	9.3E+0	1.4E-1	3.3E-4	7.2E-7	1.4E-9	2.7E-12	5.0E-15	9.7E-18	0.0E+0	0.0E+0	0.0E+0
Steady-state		9.3E+0	3.0E+0	1.2E+0	4.7E-1	1.8E-1	7.4E-2	3.1E-2	1.3E-2	6.1E-3	2.9E-3	1.4E-3

Off-site1 Residential	Off-site2 Commercial
100	100
0.0E+0	0.0E+0
1.4E-3	1.4E-3
2.9E-3	9.9E-3

POE Concentration Limit (mg/L)

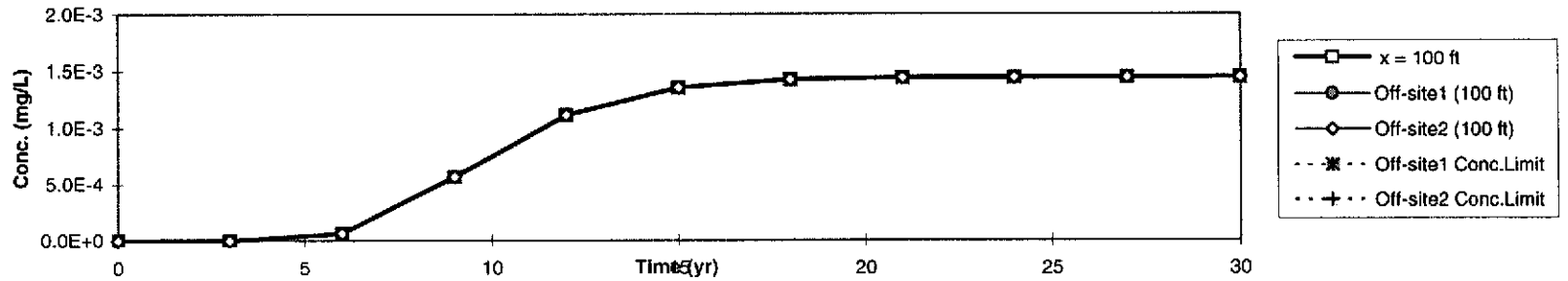


Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	9.2E-9	6.3E-5	5.7E-4	1.1E-3	1.4E-3	1.4E-3	1.4E-3	1.4E-3	1.4E-3	1.4E-3
Off-site1 (100 ft)		0.0E+0	9.2E-9	6.3E-5	5.7E-4	1.1E-3	1.4E-3	1.4E-3	1.4E-3	1.4E-3	1.4E-3	1.4E-3
Off-site2 (100 ft)		0.0E+0	9.2E-9	6.3E-5	5.7E-4	1.1E-3	1.4E-3	1.4E-3	1.4E-3	1.4E-3	1.4E-3	1.4E-3

Time to Reach Conc. Limit (yr)	
Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

Constiuent: Toluene
Source Medium: Affected Groundwater
Biodegredation: 1st Order

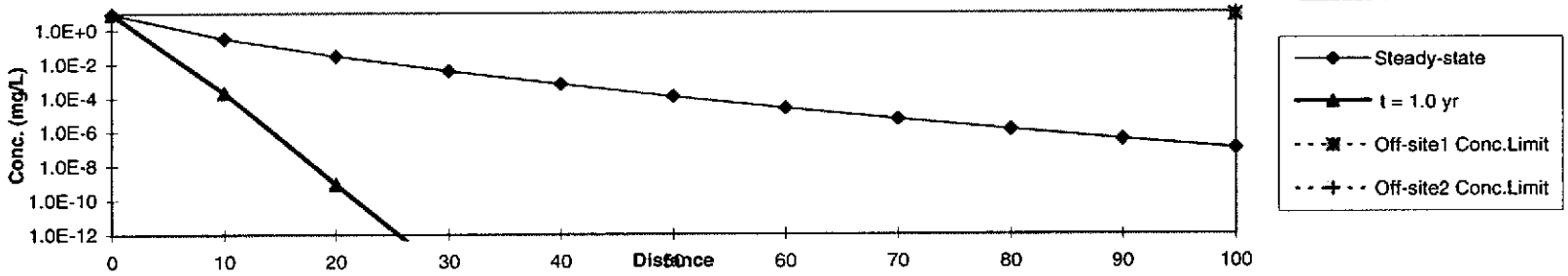
Concentration vs. Distance from Source (for given time)

Time (yr) 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	9.4E+0	2.0E-4	9.0E-10	3.9E-15	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Steady-state		9.4E+0	3.2E-1	3.0E-2	4.0E-3	6.4E-4	1.2E-4	2.3E-5	5.3E-6	1.3E-6	3.5E-7	1.0E-7

Off-site1	Off-site2
Residential	Commercial
100	100
0.0E+0	0.0E+0
1.0E-7	1.0E-7
7.3E+0	2.0E+1

POE Concentration Limit (mg/L)



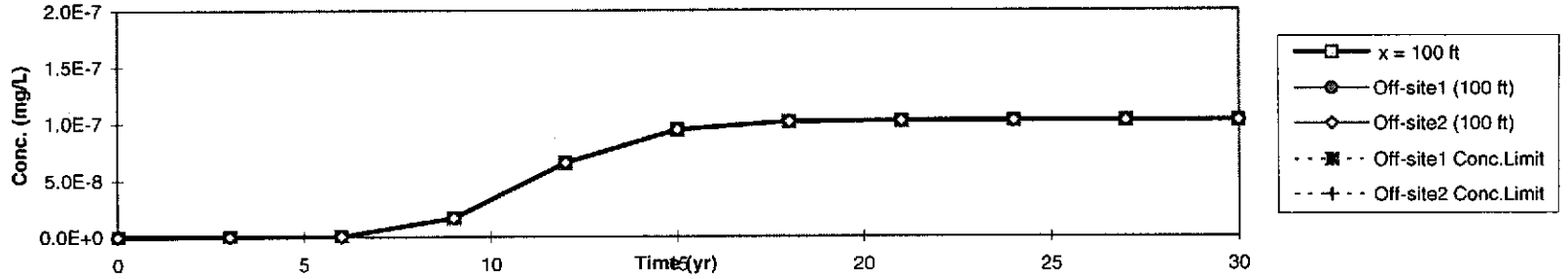
Concentration vs. Time (for given distance from source)

Distance (ft) 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	2.8E-18	1.8E-10	1.7E-8	6.6E-8	9.4E-8	1.0E-7	1.0E-7	1.0E-7	1.0E-7	1.0E-7
Off-site1 (100 ft)		0.0E+0	2.8E-18	1.8E-10	1.7E-8	6.6E-8	9.4E-8	1.0E-7	1.0E-7	1.0E-7	1.0E-7	1.0E-7
Off-site2 (100 ft)		0.0E+0	2.8E-18	1.8E-10	1.7E-8	6.6E-8	9.4E-8	1.0E-7	1.0E-7	1.0E-7	1.0E-7	1.0E-7

Time to Reach Conc. Limit (yr)

Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

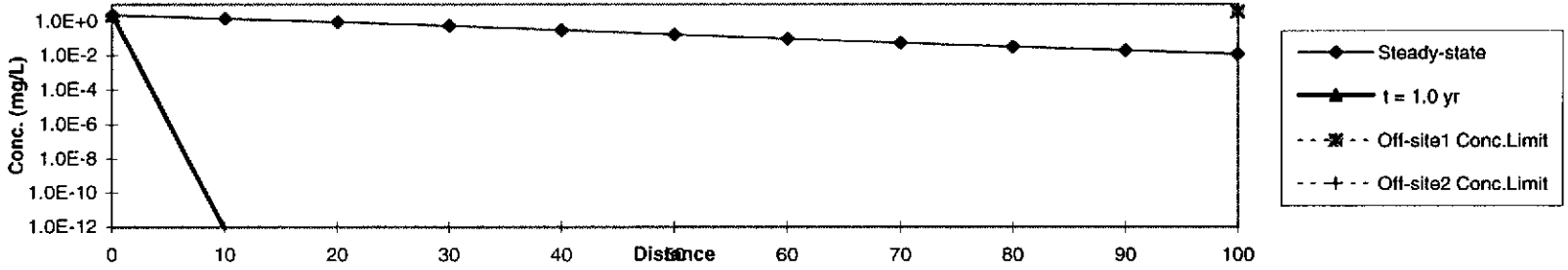
Constiuent: Ethylbenzene
Source Medium: Affected Groundwater
Biodegredation: 1st Order

Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	2.4E+0	8.2E-13	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Steady-state		2.4E+0	1.4E+0	9.0E-1	5.5E-1	3.1E-1	1.7E-1	9.5E-2	5.4E-2	3.1E-2	1.9E-2	1.2E-2

	Off-site1 Residential	Off-site2 Commercial
Distance (ft)	100	100
t = 1.0 yr	0.0E+0	0.0E+0
Steady-state	1.2E-2	1.2E-2
POE Concentration Limit (mg/L)	3.7E+0	1.0E+1

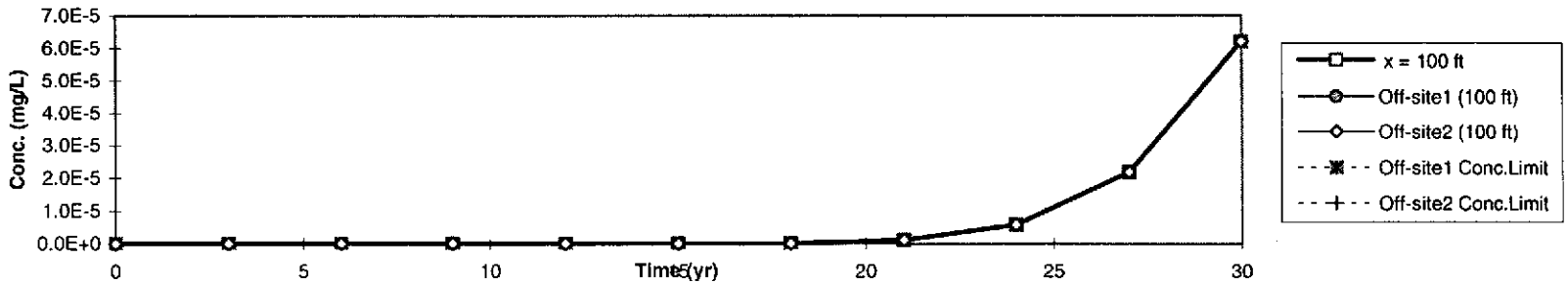


Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	0.0E+0	0.0E+0	4.5E-15	2.2E-11	3.4E-9	9.6E-8	1.0E-6	5.8E-6	2.2E-5	6.2E-5
Off-site1 (100 ft)		0.0E+0	0.0E+0	0.0E+0	4.5E-15	2.2E-11	3.4E-9	9.6E-8	1.0E-6	5.8E-6	2.2E-5	6.2E-5
Off-site2 (100 ft)		0.0E+0	0.0E+0	0.0E+0	4.5E-15	2.2E-11	3.4E-9	9.6E-8	1.0E-6	5.8E-6	2.2E-5	6.2E-5

Time to Reach Conc. Limit (yr)	
Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

Job ID: 971275

Constiuent: Xylene (mixed isomers)
Source Medium: Affected Groundwater
Biodegredation: 1st Order

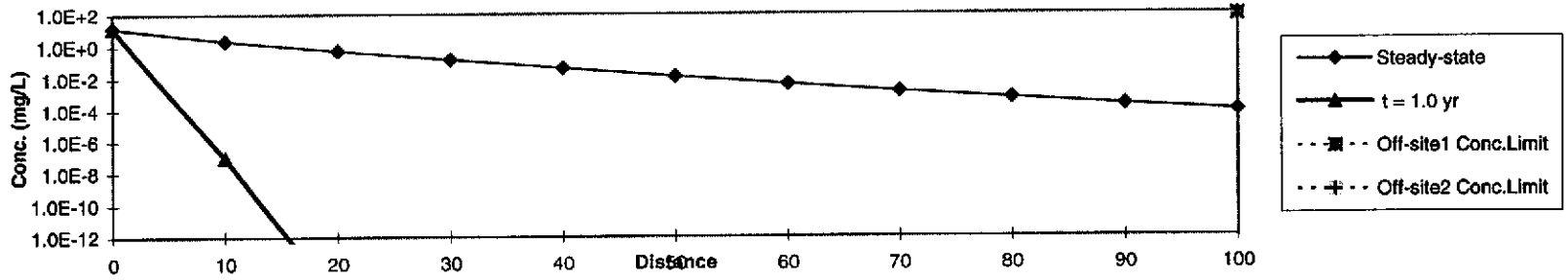
Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	1.4E+1	9.6E-8	8.8E-17	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Steady-state		1.4E+1	2.2E+0	5.3E-1	1.5E-1	4.2E-2	1.3E-2	4.1E-3	1.4E-3	5.2E-4	2.0E-4	8.3E-5

Off-site1	Off-site2
Residential	Commercial
100	100
0.0E+0	0.0E+0
8.3E-5	8.3E-5
7.3E+1	2.0E+2

POE Concentration Limit (mg/L)



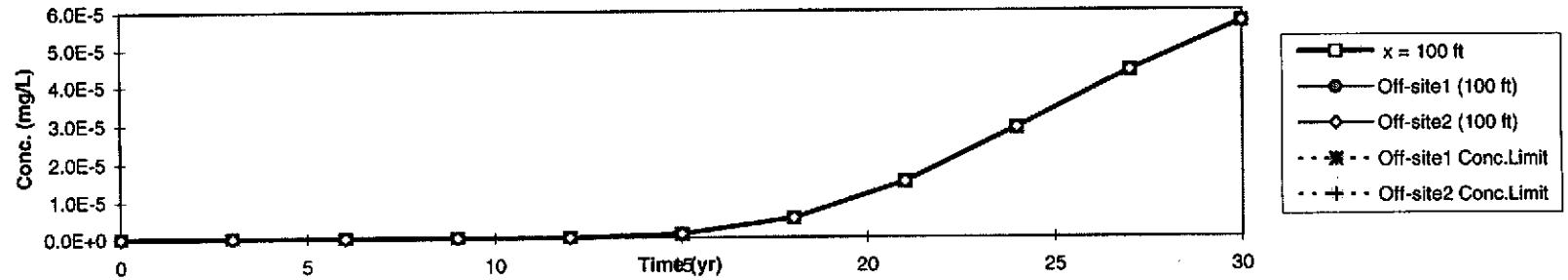
Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	0.0E+0	6.1E-15	3.3E-10	5.6E-8	9.6E-7	5.2E-6	1.5E-5	2.9E-5	4.4E-5	5.7E-5
Off-site1 (100 ft)		0.0E+0	0.0E+0	6.1E-15	3.3E-10	5.6E-8	9.6E-7	5.2E-6	1.5E-5	2.9E-5	4.4E-5	5.7E-5
Off-site2 (100 ft)		0.0E+0	0.0E+0	6.1E-15	3.3E-10	5.6E-8	9.6E-7	5.2E-6	1.5E-5	2.9E-5	4.4E-5	5.7E-5

Time to Reach Conc. Limit (yr)

Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

Constiuent: Methyl t-Butyl ether
Source Medium: Affected Groundwater
Biodegredation: 1st Order

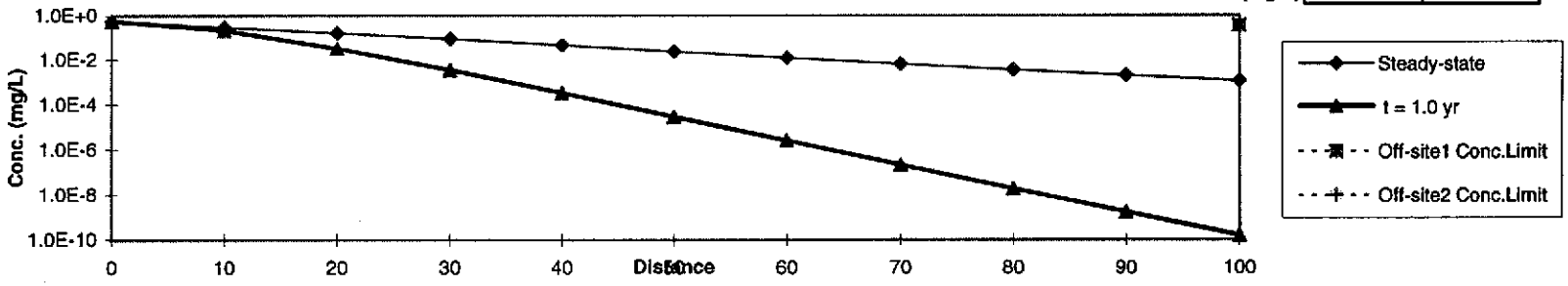
Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	5.7E-1	2.2E-1	3.2E-2	3.6E-3	3.3E-4	2.9E-5	2.5E-6	2.1E-7	1.9E-8	1.7E-9	1.5E-10
Steady-state		5.7E-1	3.0E-1	1.6E-1	9.1E-2	4.7E-2	2.4E-2	1.2E-2	6.5E-3	3.5E-3	2.0E-3	1.2E-3

Off-site1 Residential	Off-site2 Commercial
100	100
1.5E-10	1.5E-10
1.2E-3	1.2E-3
3.7E-1	1.0E+0

POE Concentration Limit (mg/L)

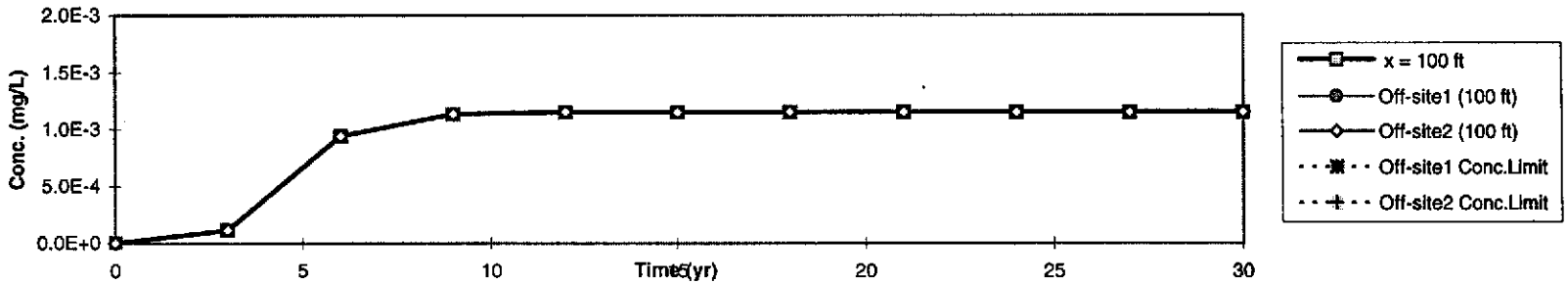


Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	1.2E-4	9.4E-4	1.1E-3	1.2E-3	1.2E-3	1.2E-3	1.2E-3	1.2E-3	1.2E-3	1.2E-3
Off-site1 (100 ft)		0.0E+0	1.2E-4	9.4E-4	1.1E-3	1.2E-3	1.2E-3	1.2E-3	1.2E-3	1.2E-3	1.2E-3	1.2E-3
Off-site2 (100 ft)		0.0E+0	1.2E-4	9.4E-4	1.1E-3	1.2E-3	1.2E-3	1.2E-3	1.2E-3	1.2E-3	1.2E-3	1.2E-3

Time to Reach Conc. Limit (yr)	
Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

Job ID: 971275

Constituent: Naphthalene
Source Medium: Affected Groundwater
Biodegredation: 1st Order

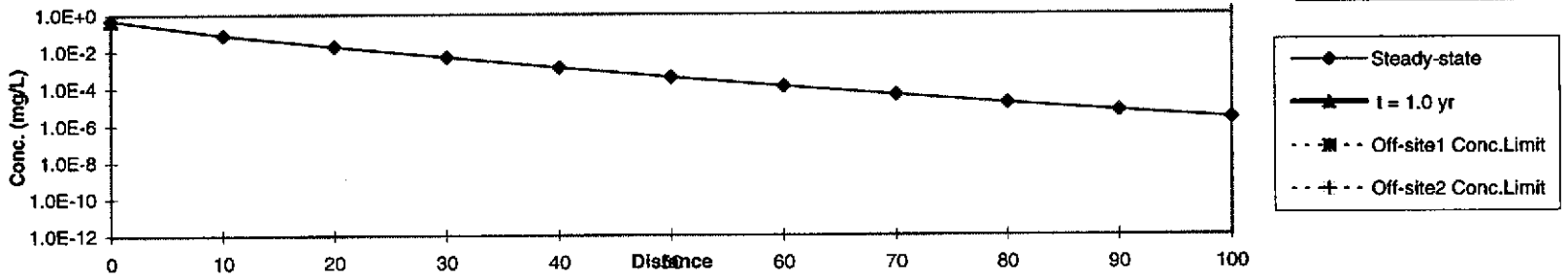
Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	5.1E-1	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Steady-state		5.1E-1	7.7E-2	1.7E-2	4.7E-3	1.3E-3	3.9E-4	1.2E-4	4.2E-5	1.5E-5	5.8E-6	2.3E-6

Off-site1 Residential	Off-site2 Commercial
100	100
0.0E+0	0.0E+0
2.3E-6	2.3E-6
1.5E+1	4.1E+1

POE Concentration Limit (mg/L)

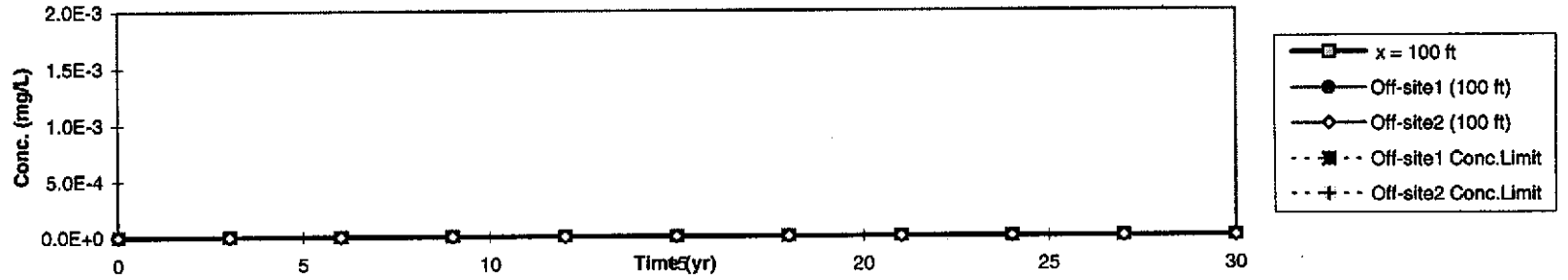


Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Off-site1 (100 ft)		0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Off-site2 (100 ft)		0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0

Time to Reach Conc. Limit (yr)	
Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

Constiuent: Phenol
Source Medium: Affected Groundwater
Biodegredation: 1st Order

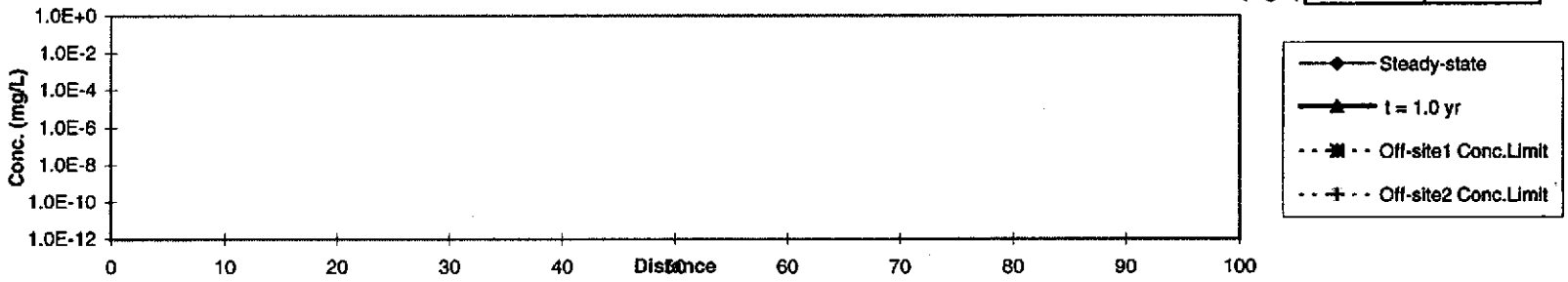
Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Steady-state		0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0

Off-site1 Residential	Off-site2 Commercial
100	100
0.0E+0	0.0E+0
0.0E+0	0.0E+0
2.2E+1	6.1E+1

POE Concentration Limit (mg/L)

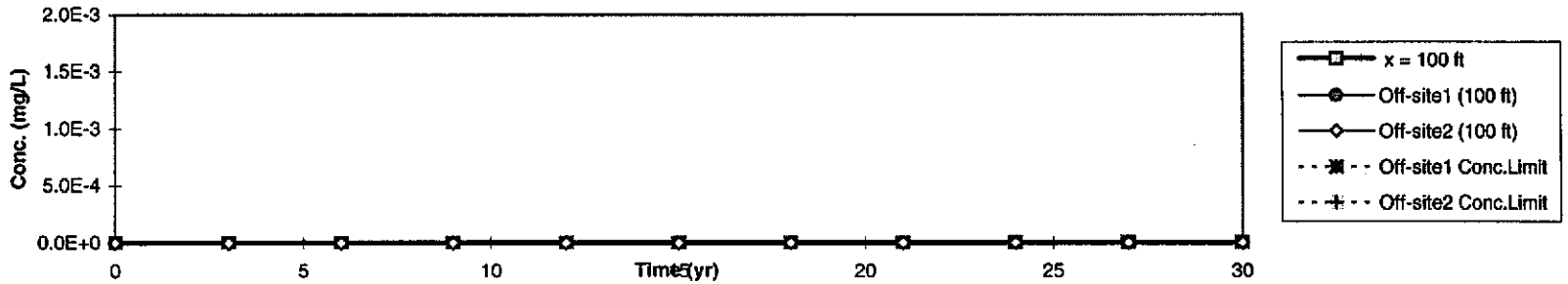


Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Off-site1 (100 ft)		0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Off-site2 (100 ft)		0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0

Time to Reach Conc. Limit (yr)	
Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

Job ID: 971275

Constituent: Benzene
Source Medium: Affected Soils Leaching to Groundwater
Biodegredation: 1st Order

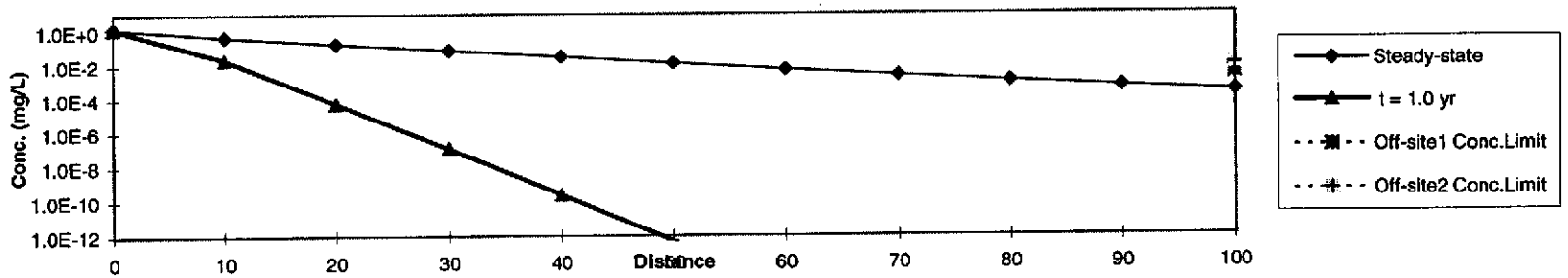
Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	1.6E+0	2.4E-2	5.8E-5	1.3E-7	2.5E-10	4.6E-13	8.7E-16	1.7E-18	0.0E+0	0.0E+0	0.0E+0
Steady-state		1.6E+0	5.2E-1	2.0E-1	8.1E-2	3.2E-2	1.3E-2	5.4E-3	2.4E-3	1.1E-3	5.1E-4	2.5E-4

Off-site1 Residential	Off-site2 Commercial
100	100
0.0E+0	0.0E+0
2.5E-4	2.5E-4
2.9E-3	9.9E-3

POE Concentration Limit (mg/L)

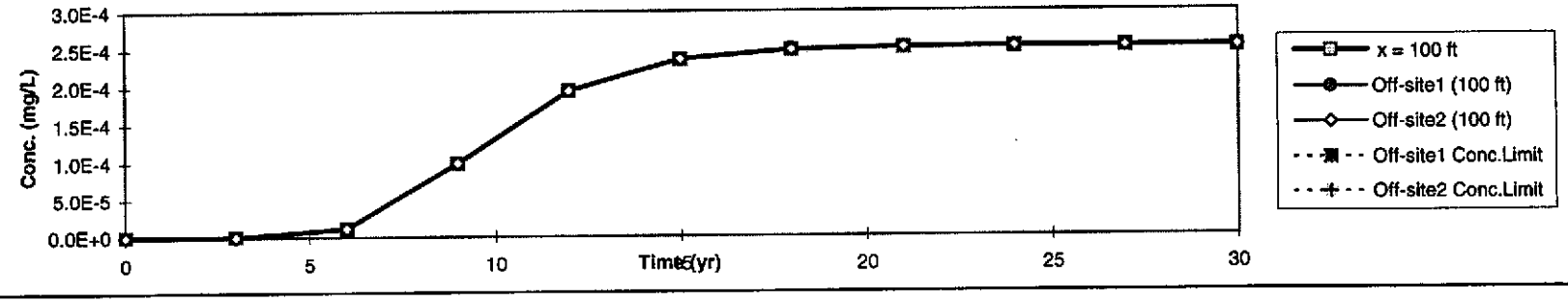


Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	1.6E-9	1.1E-5	9.9E-5	1.9E-4	2.4E-4	2.5E-4	2.5E-4	2.5E-4	2.5E-4	2.5E-4
Off-site1 (100 ft)		0.0E+0	1.6E-9	1.1E-5	9.9E-5	1.9E-4	2.4E-4	2.5E-4	2.5E-4	2.5E-4	2.5E-4	2.5E-4
Off-site2 (100 ft)		0.0E+0	1.6E-9	1.1E-5	9.9E-5	1.9E-4	2.4E-4	2.5E-4	2.5E-4	2.5E-4	2.5E-4	2.5E-4

Time to Reach Conc. Limit (yr)	
Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

Constituent: Toluene
Source Medium: Affected Soils Leaching to Groundwater
Biodegredation: 1st Order

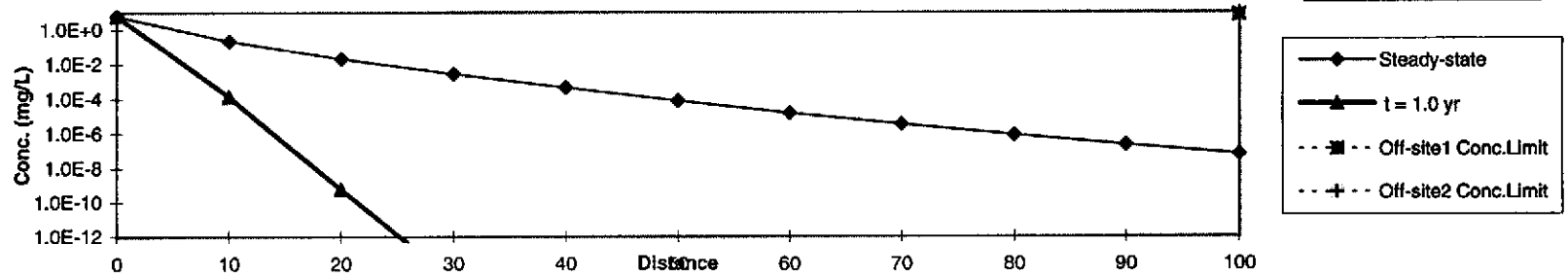
Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	6.3E+0	1.4E-4	6.0E-10	2.6E-15	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Steady-state		6.3E+0	2.1E-1	2.0E-2	2.7E-3	4.3E-4	7.7E-5	1.6E-5	3.5E-6	8.8E-7	2.4E-7	6.8E-8

Off-site1 Residential	Off-site2 Commercial
100	100
0.0E+0	0.0E+0
6.8E-8	6.8E-8
7.3E+0	2.0E+1

POE Concentration Limit (mg/L)

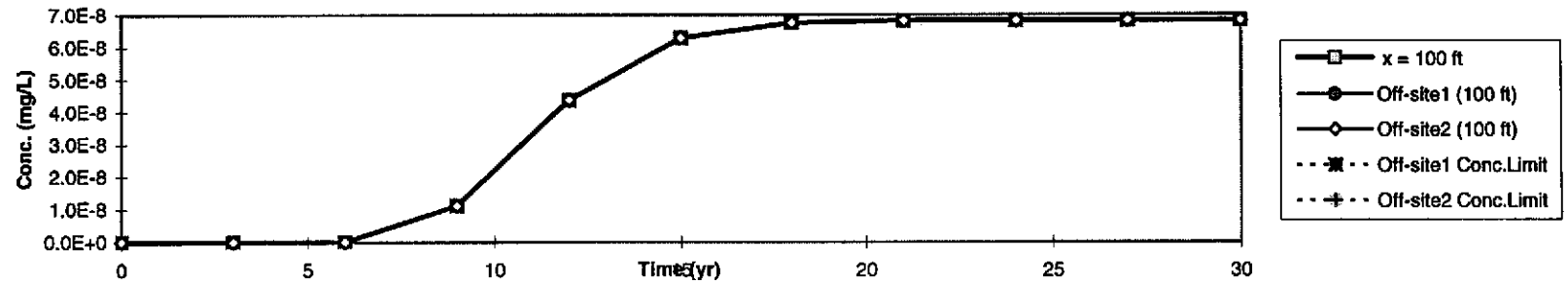


Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	1.9E-18	1.2E-10	1.1E-8	4.4E-8	6.3E-8	6.7E-8	6.8E-8	6.8E-8	6.8E-8	6.8E-8
Off-site1 (100 ft)		0.0E+0	1.9E-18	1.2E-10	1.1E-8	4.4E-8	6.3E-8	6.7E-8	6.8E-8	6.8E-8	6.8E-8	6.8E-8
Off-site2 (100 ft)		0.0E+0	1.9E-18	1.2E-10	1.1E-8	4.4E-8	6.3E-8	6.7E-8	6.8E-8	6.8E-8	6.8E-8	6.8E-8

Time to Reach Conc. Limit (yr)	
Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

Job ID: 971275

Constiuent: Ethylbenzene
Source Medium: Affected Soils Leaching to Groundwater
Biodegredation: 1st Order

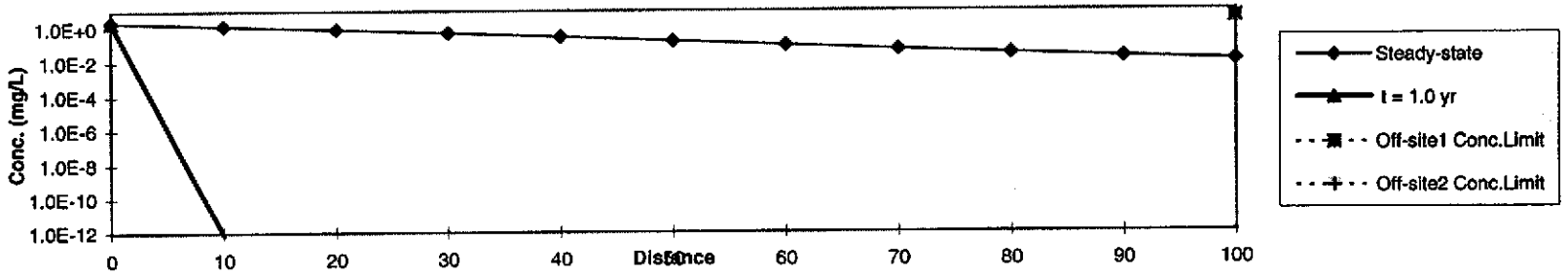
Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	2.3E+0	7.8E-13	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Steady-state		2.3E+0	1.4E+0	8.6E-1	5.2E-1	3.0E-1	1.6E-1	9.0E-2	5.1E-2	3.0E-2	1.8E-2	1.1E-2

Off-site1	Off-site2
Residential	Commercial
100	100
0.0E+0	0.0E+0
1.1E-2	1.1E-2
3.7E+0	1.0E+1

POE Concentration Limit (mg/L)

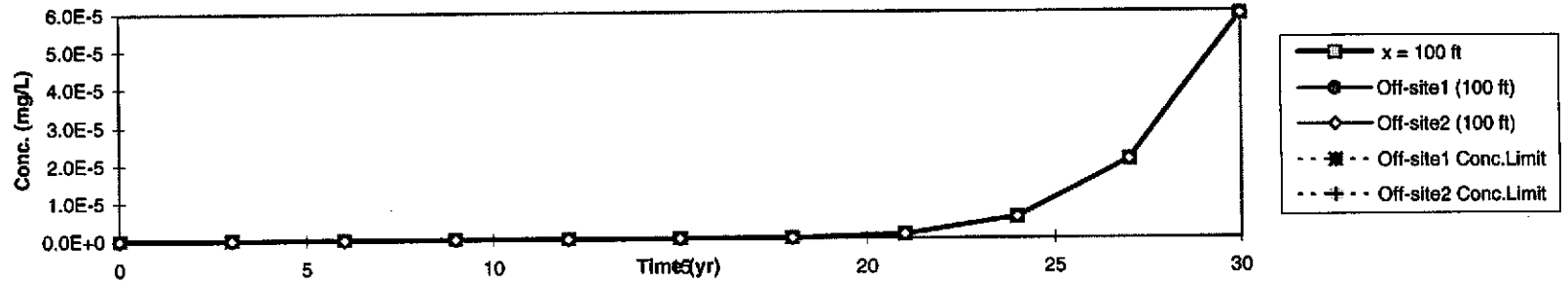


Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	0.0E+0	0.0E+0	4.3E-15	2.1E-11	3.2E-9	9.1E-8	9.6E-7	5.5E-6	2.1E-5	5.9E-5
Off-site1 (100 ft)		0.0E+0	0.0E+0	0.0E+0	4.3E-15	2.1E-11	3.2E-9	9.1E-8	9.6E-7	5.5E-6	2.1E-5	5.9E-5
Off-site2 (100 ft)		0.0E+0	0.0E+0	0.0E+0	4.3E-15	2.1E-11	3.2E-9	9.1E-8	9.6E-7	5.5E-6	2.1E-5	5.9E-5

Time to Reach Conc. Limit (yr)	
Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

Constituent: Xylene (mixed isomers)
Source Medium: Affected Soils Leaching to Groundwater
Biodegredation: 1st Order

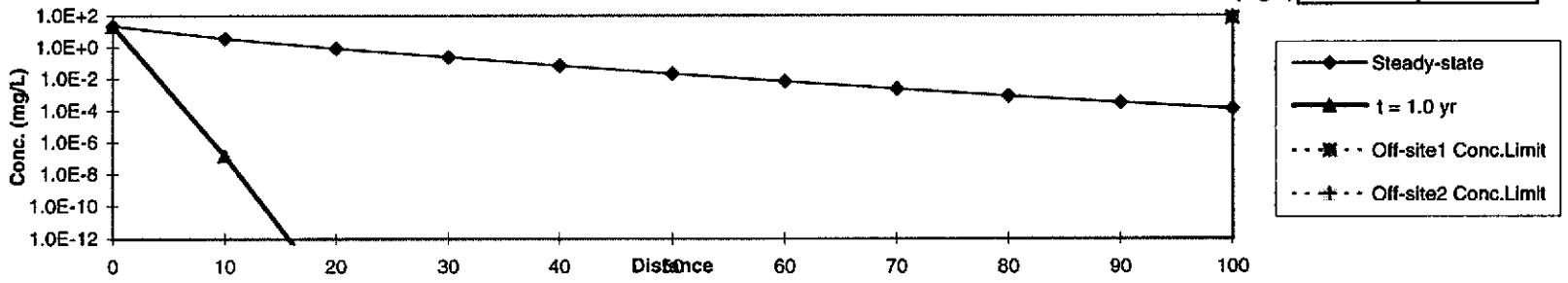
Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	2.2E+1	1.5E-7	1.4E-16	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Steady-state		2.2E+1	3.6E+0	8.4E-1	2.3E-1	6.7E-2	2.0E-2	6.5E-3	2.3E-3	8.3E-4	3.2E-4	1.3E-4

Off-site1 Residential	Off-site2 Commercial
100	100
0.0E+0	0.0E+0
1.3E-4	1.3E-4
7.3E+1	2.0E+2

POE Concentration Limit (mg/L)

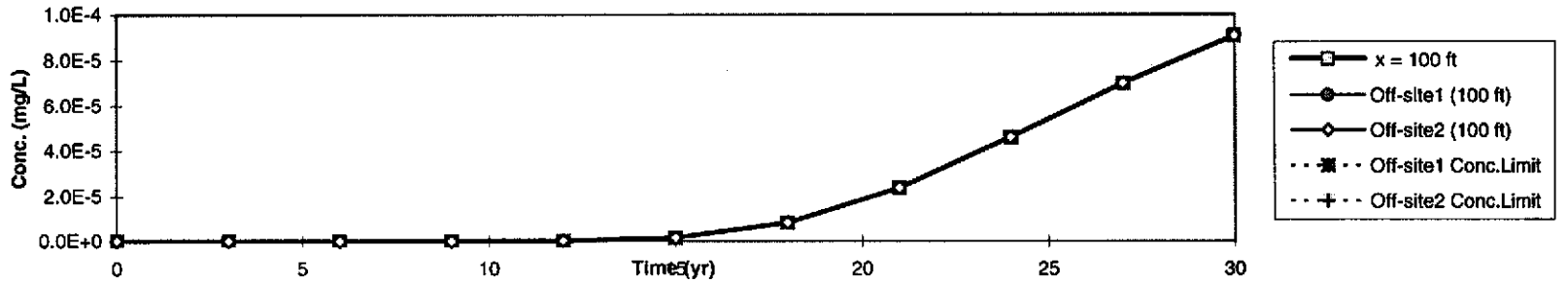


Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	0.0E+0	9.7E-15	5.2E-10	8.9E-8	1.5E-6	8.3E-6	2.4E-5	4.6E-5	7.0E-5	9.1E-5
Off-site1 (100 ft)		0.0E+0	0.0E+0	9.7E-15	5.2E-10	8.9E-8	1.5E-6	8.3E-6	2.4E-5	4.6E-5	7.0E-5	9.1E-5
Off-site2 (100 ft)		0.0E+0	0.0E+0	9.7E-15	5.2E-10	8.9E-8	1.5E-6	8.3E-6	2.4E-5	4.6E-5	7.0E-5	9.1E-5

Time to Reach Conc. Limit (yr)	
Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

Job ID: 971275

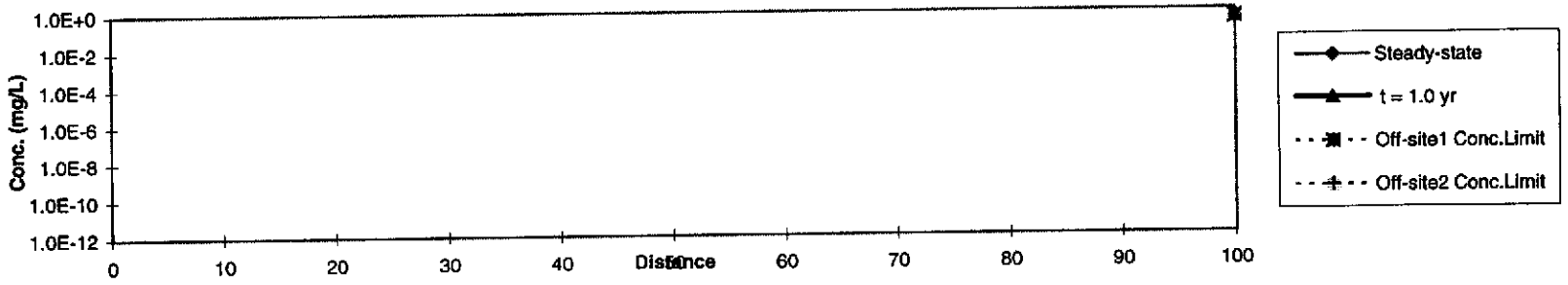
Constiuent: Methyl t-Butyl ether
Source Medium: Affected Soils Leaching to Groundwater
Biodegredation: 1st Order

Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Steady-state		0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0

POE Concentration Limit (mg/L)	Off-site1 Residential	Off-site2 Commercial
	100	100
	0.0E+0	0.0E+0
	0.0E+0	0.0E+0
	3.7E-1	1.0E+0

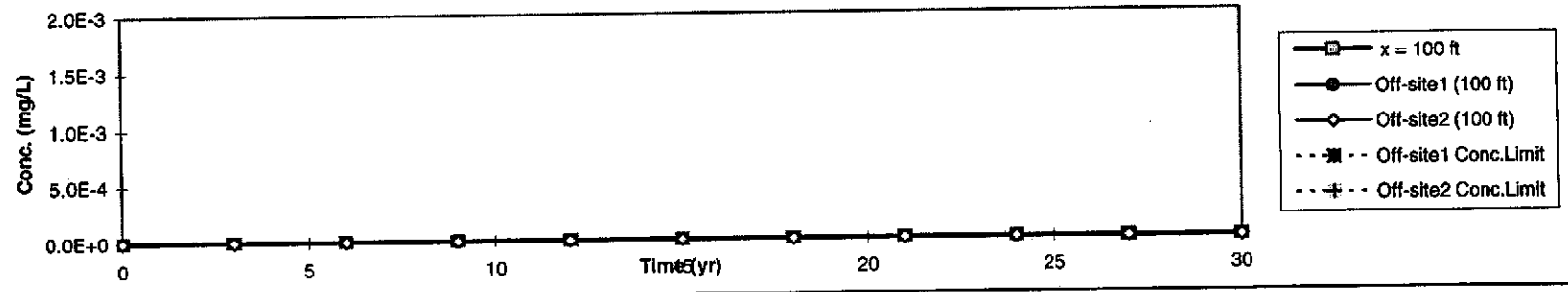


Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Off-site1 (100 ft)		0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Off-site2 (100 ft)		0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0

Time to Reach Conc. Limit (yr)	
Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

Constiuent: Naphthalene
Source Medium: Affected Soils Leaching to Groundwater
Biodegredation: 1st Order

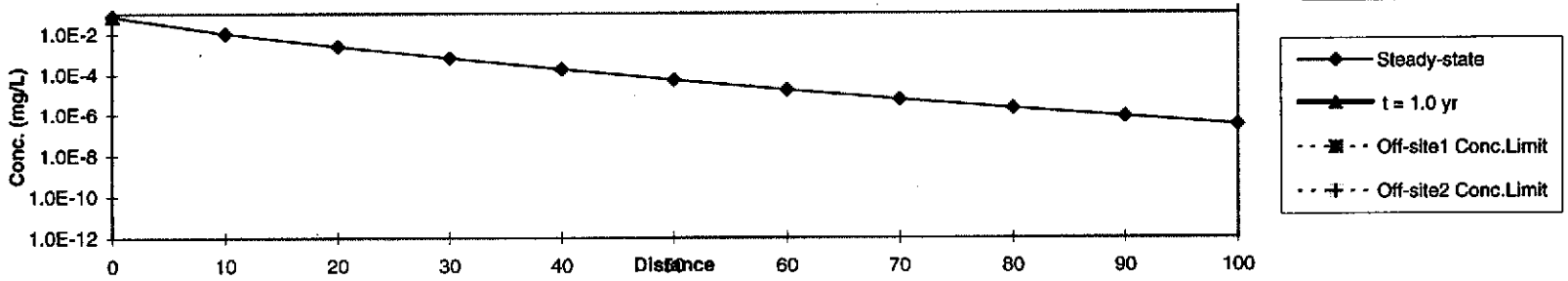
Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	7.2E-2	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Steady-state		7.2E-2	1.1E-2	2.5E-3	6.6E-4	1.8E-4	5.5E-5	1.7E-5	5.9E-6	2.1E-6	8.1E-7	3.3E-7

Off-site1 Residential	Off-site2 Commercial
100	100
0.0E+0	0.0E+0
3.3E-7	3.3E-7
1.5E+1	4.1E+1

POE Concentration Limit (mg/L)

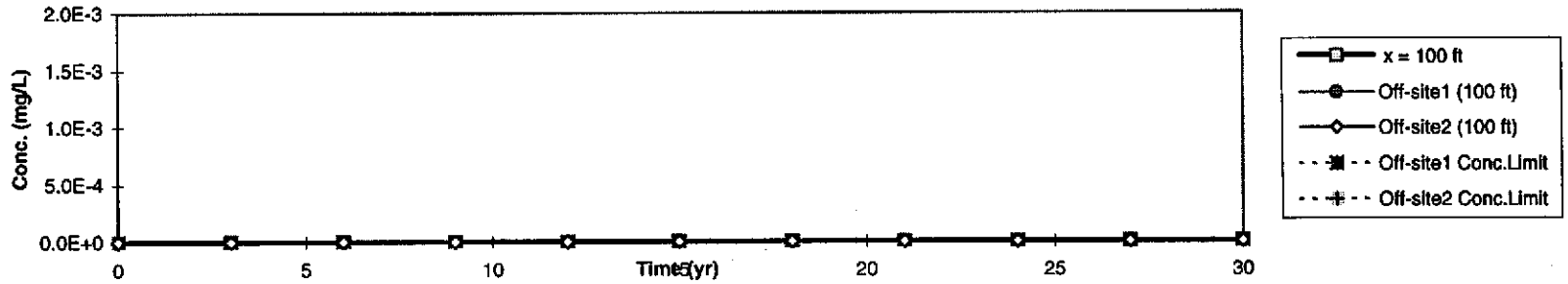


Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Off-site1 (100 ft)		0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0
Off-site2 (100 ft)		0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0

Time to Reach Conc. Limit (yr)	
Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 TRANSIENT DOMENICO ANALYSIS

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

Job ID: 971275

Constiuent: Phenol
Source Medium: Affected Soils Leaching to Groundwater
Biodegredation: 1st Order

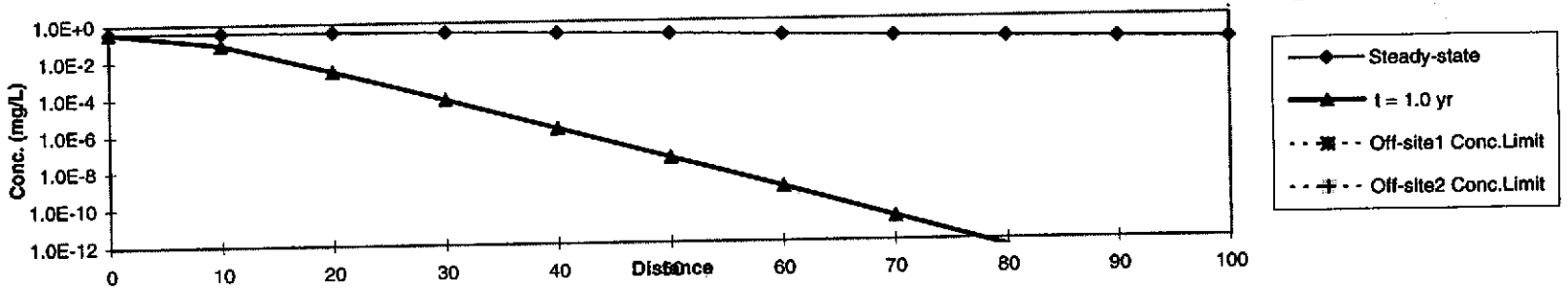
Concentration vs. Distance from Source (for given time)

Time (yr): 1.0

Distance (ft)		0	10	20	30	40	50	60	70	80	90	100
t = 1.0 yr	Conc. (mg/L)	3.8E-1	8.0E-2	2.7E-3	7.1E-5	1.7E-6	3.6E-8	7.9E-10	1.7E-11	3.9E-13	8.7E-15	2.0E-16
Steady-state		3.8E-1	3.6E-1	3.4E-1	3.1E-1	2.5E-1	1.9E-1	1.4E-1	1.1E-1	8.6E-2	6.8E-2	5.4E-2

Off-site1	Off-site2
Residential	Commercial
100	100
2.0E-16	2.0E-16
5.4E-2	5.4E-2
2.2E+1	6.1E+1

POE Concentration Limit (mg/L)



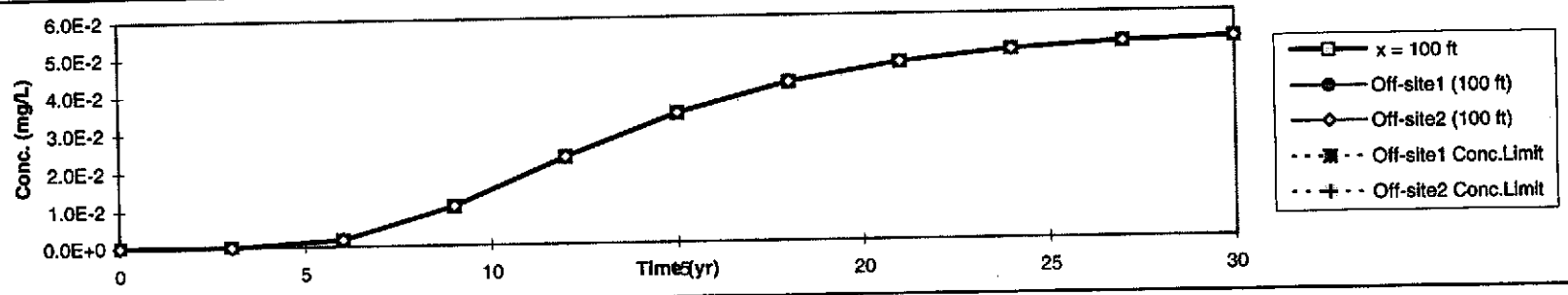
Concentration vs. Time (for given distance from source)

Distance (ft): 100

Time (yr)		0	3	6	9	12	15	18	21	24	27	30
x = 100 ft	Conc. (mg/L)	0.0E+0	5.0E-6	1.7E-3	1.1E-2	2.3E-2	3.4E-2	4.2E-2	4.7E-2	5.0E-2	5.2E-2	5.3E-2
Off-site1 (100 ft)		0.0E+0	5.0E-6	1.7E-3	1.1E-2	2.3E-2	3.4E-2	4.2E-2	4.7E-2	5.0E-2	5.2E-2	5.3E-2
Off-site2 (100 ft)		0.0E+0	5.0E-6	1.7E-3	1.1E-2	2.3E-2	3.4E-2	4.2E-2	4.7E-2	5.0E-2	5.2E-2	5.3E-2

Time to Reach Conc. Limit (yr)

Off-site1	NA
Off-site2	NA



RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ☐ (CHECKED IF PATHWAY IS ACTIVE)

SURFACE SOILS:
VAPOR INHALATION

Constituents of Concern	1) Source Medium: Soil Conc. (mg/kg)	2) NAF Value (m^3/kg) Receptor: On-site (0 ft) Residential	On-site (0 ft) Construction Worker	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial	3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2): On-site (0 ft) Residential	On-site (0 ft) Construction Worker	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial
Benzene	2.5E+0								
Toluene	2.1E+1								
Ethylbenzene	2.0E+1								
Xylene (mixed isomers)	1.3E+2								
Methyl t-Butyl ether	0.0E+0								
Naphthalene	3.4E+0								
Phenol	3.0E-1								

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

SURFACE SOILS:
VAPOR INHALATION (cont'd)

Constituents of Concern	4) Exposure Multiplier (EFxED)/(ATx365) (unitless)				5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4)			
	On-site (0 ft)		Off-site 1 (100 ft)	Off-site 2 (100 ft)	On-site (0 ft)		Off-site 1 (100 ft)	Off-site 2 (100 ft)
	Residential	Construction Worker	Residential	Commercial	Residential	Construction Worker	Residential	Commercial
Benzene								
Toluene								
Ethylbenzene								
Xylene (mixed isomers)								
Methyl t-Butyl ether								
Naphthalene								
Phenol								

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr)

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
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Date Completed: 19-Jul-00
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RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SUBSURFACE SOILS (15 - 25 ft):

VAPOR INHALATION

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/kg) Receptor			3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)		
	Soil Conc. (mg/kg)	On-site (0 ft) Residential	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial	On-site (0 ft) Residential	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial
Benzene	2.5E+0	5.4E+4	1.1E+5	9.4E+4	4.6E-5	2.2E-5	2.7E-5
Toluene	2.1E+1	5.4E+4	1.1E+5	9.4E+4	3.9E-4	1.9E-4	2.2E-4
Ethylbenzene	2.0E+1	8.7E+4	1.8E+5	1.8E+5	2.3E-4	1.1E-4	1.1E-4
Xylene (mixed isomers)	1.3E+2	6.8E+4	1.4E+5	1.4E+5	1.9E-3	9.2E-4	9.2E-4
Methyl t-Butyl ether	0.0E+0	5.4E+4	1.1E+5	1.0E+5	0.0E+0	0.0E+0	0.0E+0
Naphthalene	3.4E+0	9.7E+6	2.0E+7	2.0E+7	3.5E-7	1.7E-7	1.7E-7
Phenol	3.0E-1	5.2E+7	1.1E+8	1.1E+8	5.8E-9	2.8E-9	2.8E-9

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

SUBSURFACE SOILS (15 - 25 ft):

VAPOR INHALATION (cont'd)

Constituents of Concern	4) Exposure Multiplier (EFxED)/(ATx365) (unitless)			5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4)		
	On-site (0 ft) Residential	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial	On-site (0 ft) Residential	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial
Benzene	4.1E-1	4.1E-1	2.4E-1	1.9E-5	9.1E-6	6.5E-6
Toluene	9.6E-1	9.6E-1	6.8E-1	3.7E-4	1.8E-4	1.5E-4
Ethylbenzene	9.6E-1	9.6E-1	6.8E-1	2.2E-4	1.1E-4	7.5E-5
Xylene (mixed isomers)	9.6E-1	9.6E-1	6.8E-1	1.8E-3	8.8E-4	6.3E-4
Methyl t-Butyl ether	9.6E-1	9.6E-1	6.8E-1	0.0E+0	0.0E+0	0.0E+0
Naphthalene	9.6E-1	9.6E-1	6.8E-1	3.3E-7	1.6E-7	1.1E-7
Phenol	9.6E-1	9.6E-1	6.8E-1	5.6E-9	2.7E-9	1.9E-9

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr)

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER: VAPOR INHALATION

Exposure Concentration

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/L) Receptor			3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)		
	Groundwater Conc. (mg/L)	On-site (0 ft) Residential	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial	On-site (0 ft) Residential	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial
Benzene	9.3E+0	8.4E+4	1.7E+5	1.7E+5	1.1E-4	5.3E-5	5.3E-5
Toluene	9.4E+0	7.7E+4	1.6E+5	1.6E+5	1.2E-4	5.8E-5	5.8E-5
Ethylbenzene	2.4E+0	7.1E+4	1.5E+5	1.5E+5	3.4E-5	1.6E-5	1.6E-5
Xylene (mixed isomers)	1.4E+1	8.2E+4	1.7E+5	1.7E+5	1.7E-4	8.2E-5	8.2E-5
Methyl t-Butyl ether	5.7E-1	5.2E+5	1.1E+6	1.1E+6	1.1E-6	5.3E-7	5.3E-7
Naphthalene	5.1E-1	9.9E+5	2.1E+6	2.1E+6	5.2E-7	2.5E-7	2.5E-7
Phenol	0.0E+0	2.6E+8	5.4E+8	5.4E+8	0.0E+0	0.0E+0	0.0E+0

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

GROUNDWATER: VAPOR

INHALATION (cont'd)

Constituents of Concern	4) Exposure Multiplier (EFxED)/(ATx365) (unitless)			5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4)		
	On-site (0 ft) Residential	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial	On-site (0 ft) Residential	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial
Benzene	4.1E-1	4.1E-1	2.4E-1	4.6E-5	2.2E-5	1.3E-5
Toluene	9.6E-1	9.6E-1	6.8E-1	1.2E-4	5.6E-5	4.0E-5
Ethylbenzene	9.6E-1	9.6E-1	6.8E-1	3.2E-5	1.5E-5	1.1E-5
Xylene (mixed Isomers)	9.6E-1	9.6E-1	6.8E-1	1.6E-4	7.8E-5	5.6E-5
Methyl t-Butyl ether	9.6E-1	9.6E-1	6.8E-1	1.1E-6	5.1E-7	3.6E-7
Naphthalene	9.6E-1	9.6E-1	6.8E-1	4.9E-7	2.4E-7	1.7E-7
Phenol	9.6E-1	9.6E-1	6.8E-1	0.0E+0	0.0E+0	0.0E+0

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr)

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

TOTAL PATHWAY EXPOSURE (mg/m^3)

(Sum average expsosure concentrations from soil and groundwater routes.)

Constituents of Concern	On-site (0 ft) Residential	On-site (0 ft) Construction Worker	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial
Benzene	6.5E-5		3.1E-5	2.0E-5
Toluene	4.9E-4		2.3E-4	1.9E-4
Ethylbenzene	2.5E-4		1.2E-4	8.6E-5
Xylene (mixed isomers)	2.0E-3		9.6E-4	6.9E-4
Methyl t-Butyl ether	1.1E-6		5.1E-7	3.6E-7
Naphthalene	8.3E-7		4.0E-7	2.8E-7
Phenol	5.6E-9		2.7E-9	1.9E-9

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

CARCINOGENIC RISK

Constituents of Concern	(1) EPA Carcinogenic Classification	(2) Total Carcinogenic Exposure (mg/m^3)				(3) Inhalation Unit Risk Factor (µg/m^3)^-1	(4) Individual COC Risk (2) x (3) x 1000			
		On-site (0 ft)		Off-site 1 (100 ft)	Off-site 2 (100 ft)		On-site (0 ft)		Off-site 1 (100 ft)	Off-site 2 (100 ft)
		Residential	Construction Worker	Residential	Commercial		Residential	Construction Worker	Residential	Commercial
Benzene	A	6.5E-5		3.1E-5	2.0E-5	8.3E-6	5.4E-7		2.6E-7	1.6E-7
Toluene	D									
Ethylbenzene	D									
Xylene (mixed isomers)	D									
Methyl t-Butyl ether	-									
Naphthalene	D									
Phenol	D									
Total Pathway Carcinogenic Risk =							**5.4E-7**		**2.6E-7**	**1.6E-7**

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

TOXIC EFFECTS

Constituents of Concern	(5) Total Toxicant Exposure (mg/m^3) On-site (0 ft) Residential	(5) Total Toxicant Exposure (mg/m^3) On-site (0 ft) Construction Worker	(5) Total Toxicant Exposure (mg/m^3) Off-site 1 (100 ft) Residential	(5) Total Toxicant Exposure (mg/m^3) Off-site 2 (100 ft) Commercial	(6) Inhalation Reference Conc. (mg/m^3)	(7) Individual COC Hazard Quotient (5) / (6) On-site (0 ft) Residential	(7) Individual COC Hazard Quotient (5) / (6) On-site (0 ft) Construction Worker	(7) Individual COC Hazard Quotient (5) / (6) Off-site 1 (100 ft) Residential	(7) Individual COC Hazard Quotient (5) / (6) Off-site 2 (100 ft) Commercial
Benzene	1.5E-4		7.2E-5	5.5E-5	6.0E-3	2.5E-2		1.2E-2	9.2E-3
Toluene	4.9E-4		2.3E-4	1.9E-4	4.0E-1	1.2E-3		5.9E-4	4.8E-4
Ethylbenzene	2.5E-4		1.2E-4	8.6E-5	1.0E+0	2.5E-4		1.2E-4	8.6E-5
Xylene (mixed isomers)	2.0E-3		9.6E-4	6.9E-4	7.0E+0	2.9E-4		1.4E-4	9.8E-5
Methyl t-Butyl ether	1.1E-6		5.1E-7	3.6E-7	3.0E+0	3.5E-7		1.7E-7	1.2E-7
Naphthalene	8.3E-7		4.0E-7	2.8E-7	1.4E+0	5.9E-7		2.8E-7	2.0E-7
Phenol	5.6E-9		2.7E-9	1.9E-9	2.1E+0	2.6E-9		1.3E-9	9.0E-10
Total Pathway Hazard Index =						**2.7E-2**		**1.3E-2**	**9.8E-3**

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SOILS (15 - 25 ft): VAPOR INTRUSION INTO ON-SITE BUILDINGS

Constituents of Concern	1) Source Medium Soil Conc. (mg/kg)	2) NAF Value (m^3/kg) Receptor Residential	3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2) Residential	4) Exposure Multiplier (EFxED)/(ATx365) (unitless) Residential	5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4) Residential
Benzene	2.5E+0	2.6E+2	9.5E-3	4.1E-1	3.9E-3
Toluene	2.1E+1	5.2E+2	4.0E-2	9.6E-1	3.9E-2
Ethylbenzene	2.0E+1	1.2E+3	1.6E-2	9.6E-1	1.5E-2
Xylene (mixed isomers)	1.3E+2	9.7E+2	1.3E-1	9.6E-1	1.3E-1
Methyl t-Butyl ether	0.0E+0	4.6E+2	0.0E+0	9.6E-1	0.0E+0
Naphthalene	3.4E+0	1.3E+5	2.6E-5	9.6E-1	2.5E-5
Phenol	3.0E-1	6.0E+4	5.0E-6	9.6E-1	4.8E-6

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
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RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER: VAPOR INTRUSION INTO ON-SITE BUILDINGS

Exposure Concentration

Constituents of Concern	1) Source Medium Groundwater Conc. (mg/L)	2) NAF Value (m^3/L) Receptor Residential	3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2) Residential	4) Exposure Multiplier (EFxED)/(ATx365) (unitless) Residential	5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4) Residential
Benzene	9.3E+0	4.5E+2	2.1E-2	4.1E-1	8.6E-3
Toluene	9.4E+0	4.1E+2	2.3E-2	9.6E-1	2.2E-2
Ethylbenzene	2.4E+0	3.7E+2	6.5E-3	9.6E-1	6.2E-3
Xylene (mixed isomers)	1.4E+1	4.3E+2	3.2E-2	9.6E-1	3.1E-2
Methyl t-Butyl ether	5.7E-1	2.9E+3	2.0E-4	9.6E-1	1.9E-4
Naphthalene	5.1E-1	6.9E+3	7.4E-5	9.6E-1	7.1E-5
Phenol	0.0E+0	2.6E+5	0.0E+0	9.6E-1	0.0E+0

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS

Constituents of Concern	TOTAL PATHWAY EXPOSURE (mg/m^3) *(Sum average expsosure concentrations from soil and groundwater routes.)* Residential
Benzene	1.2E-2
Toluene	6.1E-2
Ethylbenzene	2.2E-2
Xylene (mixed isomers)	1.6E-1
Methyl t-Butyl ether	1.9E-4
Naphthalene	9.6E-5
Phenol	4.8E-6

Site Name: Arrow Rentals Date Completed: 19-Jul-00
Site Location: 187 North L Street, Livermore, Calif Job ID: 971275
Completed By: Aquifer Sciences, Inc.

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAYS ARE ACTIVE)

CARCINOGENIC RISK

Constituents of Concern	(1) EPA Carcinogenic Classification	(2) Total Carcinogenic Exposure (mg/m^3) Residential	(3) Inhalation Unit Risk Factor (µg/m^3)^-1	(4) Individual COC Risk (2) x (3) x 1000 Residential
Benzene	A	1.2E-2	8.3E-6	1.0E-4
Toluene	D			
Ethylbenzene	D			
Xylene (mixed isomers)	D			
Methyl t-Butyl ether	-			
Naphthalene	D			
Phenol	D			

Total Pathway Carcinogenic Risk = **1.0E-4**

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
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RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

Constituents of Concern	(5) Total Toxicant Exposure (mg/m^3) Residential	(6) Inhalation Reference Concentration (mg/m^3)	(7) Individual COC Hazard Quotient (5) / (6) Residential
	TOXIC EFFECTS		
Benzene	2.9E-2	6.0E-3	4.9E+0
Toluene	6.1E-2	4.0E-1	1.5E-1
Ethylbenzene	2.2E-2	1.0E+0	2.2E-2
Xylene (mixed isomers)	1.6E-1	7.0E+0	2.3E-2
Methyl t-Butyl ether	1.9E-4	3.0E+0	6.3E-5
Naphthalene	9.6E-5	1.4E+0	6.9E-5
Phenol	4.8E-6	2.1E+0	2.3E-6

Total Pathway Hazard Index = **5.1E+0**

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SOILS (15 - 25 ft): LEACHING TO GROUNDWATER INGESTION

Constituents of Concern	1) Source Medium	2) NAF Value (L/kg) Receptor			3) Exposure Medium Groundwater: POE Conc. (mg/L) (1)/(2)		
	Soil Conc. (mg/kg)	On-site (0 ft) Residential	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial	On-site (0 ft) Residential	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial
Benzene	2.5E+0	1.5E+0	9.9E+3	9.9E+3	1.6E+0	2.5E-4	2.5E-4
Toluene	2.1E+1	3.3E+0	3.1E+8	3.1E+8	6.3E+0	6.8E-8	6.8E-8
Ethylbenzene	2.0E+1	8.8E+0	1.8E+3	1.8E+3	2.3E+0	1.1E-2	1.1E-2
Xylene (mixed isomers)	1.3E+2	5.8E+0	9.9E+5	9.9E+5	2.2E+1	1.3E-4	1.3E-4
Methyl t-Butyl ether	0.0E+0	4.0E-1	2.0E+2	2.0E+2	0.0E+0	0.0E+0	0.0E+0
Naphthalene	3.4E+0	4.7E+1	1.0E+7	1.0E+7	7.2E-2	3.3E-7	3.3E-7
Phenol	3.0E-1	7.9E-1	5.5E+0	5.5E+0	3.8E-1	5.4E-2	5.4E-2

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

SOILS (15 - 25 ft): LEACHING TO GROUNDWATER INGESTION (cont'd)

Constituents of Concern	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg-day)			5) Average Daily Intake Rate (mg/kg/day) (3) x (4)		
	On-site (0 ft) Residential	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial	On-site (0 ft) Residential	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial
Benzene	1.2E-2	1.2E-2	3.5E-3	1.9E-2	3.0E-6	8.8E-7
Toluene	2.7E-2	2.7E-2	9.8E-3	1.7E-1	1.9E-9	6.7E-10
Ethylbenzene	2.7E-2	2.7E-2	9.8E-3	6.3E-2	3.0E-4	1.1E-4
Xylene (mixed isomers)	2.7E-2	2.7E-2	9.8E-3	6.1E-1	3.6E-6	1.3E-6
Methyl t-Butyl ether	2.7E-2	2.7E-2	9.8E-3	0.0E+0	0.0E+0	0.0E+0
Naphthalene	2.7E-2	2.7E-2	9.8E-3	2.0E-3	9.0E-9	3.2E-9
Phenol	2.7E-2	2.7E-2	9.8E-3	1.0E-2	1.5E-3	5.3E-4

NOTE: AT = Averaging time (days) ED = Exposure duration (yr) IR = Ingestion rate (mg/day)
BW = Body weight (kg) EF = Exposure frequency (days/yr)

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER: INGESTION

	1) Source Medium	2) NAF Value (unitless) Receptor			3) Exposure Medium Groundwater: POE Conc. (mg/L) (1)/(2)		
Constituents of Concern	Groundwater Conc. (mg/L)	On-site (0 ft) Residential	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial	On-site (0 ft) Residential	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial
Benzene	9.3E+0	1.0E+0	6.4E+3	6.4E+3	9.3E+0	1.4E-3	1.4E-3
Toluene	9.4E+0	1.0E+0	9.2E+7	9.2E+7	9.4E+0	1.0E-7	1.0E-7
Ethylbenzene	2.4E+0	1.0E+0	2.1E+2	2.1E+2	2.4E+0	1.2E-2	1.2E-2
Xylene (mixed isomers)	1.4E+1	1.0E+0	1.7E+5	1.7E+5	1.4E+1	8.3E-5	8.3E-5
Methyl t-Butyl ether	5.7E-1	1.0E+0	4.9E+2	4.9E+2	5.7E-1	1.2E-3	1.2E-3
Naphthalene	5.1E-1	1.0E+0	2.2E+5	2.2E+5	5.1E-1	2.3E-6	2.3E-6
Phenol	0.0E+0	1.0E+0	7.0E+0	7.0E+0	0.0E+0	0.0E+0	0.0E+0

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

GROUNDWATER INGESTION (cont'd)

Constituents of Concern	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg/day)			5) Average Daily Intake Rate (mg/kg/day) (3) x (4)		
	On-site (0 ft) Residential	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial	On-site (0 ft) Residential	Off-site 1 (100 ft) Residential	Off-site 2 (100 ft) Commercial
Benzene	1.2E-2	1.2E-2	3.5E-3	1.1E-1	1.7E-5	5.0E-6
Toluene	2.7E-2	2.7E-2	9.8E-3	2.6E-1	2.8E-9	1.0E-9
Ethylbenzene	2.7E-2	2.7E-2	9.8E-3	6.6E-2	3.2E-4	1.1E-4
Xylene (mixed isomers)	2.7E-2	2.7E-2	9.8E-3	3.8E-1	2.3E-6	8.1E-7
Methyl t-Butyl ether	2.7E-2	2.7E-2	9.8E-3	1.6E-2	3.2E-5	1.1E-5
Naphthalene	2.7E-2	2.7E-2	9.8E-3	1.4E-2	6.4E-8	2.3E-8
Phenol	2.7E-2	2.7E-2	9.8E-3	0.0E+0	0.0E+0	0.0E+0

NOTE: AT = Averaging time (days) ED = Exposure duration (yr) IR = Ingestion rate (mg/day)
BW = Body weight (kg) EF = Exposure frequency (days/yr)

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

MAXIMUM PATHWAY INTAKE (mg/kg/day)
(Maximum intake of active pathways soil leaching & groundwater routes.)

Constituents of Concern	On-site (0 ft) Residential	Off-site 1 Residential	Off-site 2 Commercial
Benzene	1.1E-1	1.7E-5	5.0E-6
Toluene	2.6E-1	2.8E-9	1.0E-9
Ethylbenzene	6.6E-2	3.2E-4	1.1E-4
Xylene (mixed isomers)	6.1E-1	3.6E-6	1.3E-6
Methyl t-Butyl ether	1.6E-2	3.2E-5	1.1E-5
Naphthalene	1.4E-2	6.4E-8	2.3E-8
Phenol	1.0E-2	1.5E-3	5.3E-4

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAYS ARE ACTIVE)

CARCINOGENIC RISK

Constituents of Concern	(1) EPA Carcinogenic Classification	(2) Maximum Carcinogenic Intake Rate (mg/kg/day)			(3) Oral Slope Factor (mg/kg-day)^-1	(4) Individual COC Risk (2) x (3)		
		On-site (0 ft) Residential	Off-site 1 Residential	Off-site 2 Commercial		On-site (0 ft) Residential	Off-site 1 Residential	Off-site 2 Commercial
Benzene	A	1.1E-1	1.7E-5	5.0E-6	2.9E-2	3.2E-3	4.9E-7	1.5E-7
Toluene	D							
Ethylbenzene	D							
Xylene (mixed isomers)	D							
Methyl t-Butyl ether	-							
Naphthalene	D							
Phenol	D							
Total Pathway Carcinogenic Risk =						**3.2E-3**	**4.9E-7**	**1.5E-7**

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAYS ARE ACTIVE)

	TOXIC EFFECTS						
	(5) Maximum Toxicant Intake Rate (mg/kg/day)			(6) Oral Reference Dose (mg/kg/day)	(7) Individual COC Hazard Quotient (5) / (6)		
Constituents of Concern	On-site (0 ft) Residential	Off-site 1 Residential	Off-site 2 Commercial		On-site (0 ft) Residential	Off-site 1 Residential	Off-site 2 Commercial
Benzene	2.5E-1	4.0E-5	1.4E-5	3.0E-3	8.5E+1	1.3E-2	4.7E-3
Toluene	2.6E-1	2.8E-9	1.0E-9	2.0E-1	1.3E+0	1.4E-8	5.0E-9
Ethylbenzene	6.6E-2	3.2E-4	1.1E-4	1.0E-1	6.6E-1	3.2E-3	1.1E-3
Xylene (mixed isomers)	6.1E-1	3.6E-6	1.3E-6	2.0E+0	3.1E-1	1.8E-6	6.5E-7
Methyl t-Butyl ether	1.6E-2	3.2E-5	1.1E-5	1.0E-2	1.6E+0	3.2E-3	1.1E-3
Naphthalene	1.4E-2	6.4E-8	2.3E-8	4.0E-1	3.5E-2	1.6E-7	5.7E-8
Phenol	1.0E-2	1.5E-3	5.3E-4	6.0E-1	1.7E-2	2.5E-3	8.8E-4
Total Pathway Hazard Index =					**8.9E+1**	**2.2E-2**	**7.8E-3**

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.

Date Completed: 19-Jul-00
Job ID: 971275

RBCA SITE ASSESSMENT | **Baseline Risk Summary-All Pathways**

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

TIER 2 BASELINE RISK SUMMARY TABLE

EXPOSURE PATHWAY	BASELINE CARCINOGENIC RISK: Individual COC Risk – Maximum Value	Individual COC Risk – Target Risk	Cumulative COC Risk – Total Value	Cumulative COC Risk – Target Risk	Risk Limit(s) Exceeded?	BASELINE TOXIC EFFECTS: Hazard Quotient – Maximum Value	Hazard Quotient – Applicable Limit	Hazard Index – Total Value	Hazard Index – Applicable Limit	Toxicity Limit(s) Exceeded?
OUTDOOR AIR EXPOSURE PATHWAYS										
Complete:	5.4E-7	1.0E-6	5.4E-7	1.0E-5	☐	2.5E-2	1.0E+0	2.7E-2	1.0E+0	☐
INDOOR AIR EXPOSURE PATHWAYS										
Complete:	1.0E-4	1.0E-6	1.0E-4	1.0E-5	■	4.9E+0	1.0E+0	5.1E+0	1.0E+0	■
SOIL EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	☐	NA	NA	NA	NA	☐
GROUNDWATER EXPOSURE PATHWAYS										
Complete:	3.2E-3	1.0E-6	3.2E-3	1.0E-5	■	8.5E+1	1.0E+0	8.9E+1	1.0E+0	■
SURFACE WATER EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	☐	NA	NA	NA	NA	☐
CRITICAL EXPOSURE PATHWAY (Maximum Values From Complete Pathways)										
	3.2E-3	*1.0E-6*	*3.2E-3*	*1.0E-5*	■	*8.5E+1*	*1.0E+0*	*8.9E+1*	*1.0E+0*	■
	Groundwater		*Groundwater*			*Groundwater*		*Groundwater*		

RBCA SITE ASSESSMENT

Chemical-Specific Tier 2 Cleanup Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

Constituent: Benzene **CAS No.: 71-43-2**

Site-Specific Target Level (SSTL) Concentrations

		On-site	Off-site1	Off-site2
Groundwater Ingestion				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	1.1E-1	7.1E+2	>1.8E+3
	TR = 1e-6	2.9E-3	1.9E+1	6.4E+1
Soil Leaching to Groundwater Ingestion				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	1.7E-1	1.1E+3	>1.1E+3
	TR = 1e-6	4.5E-3	2.9E+1	9.8E+1
Surface Soil Ingestion and Dermal Contact				
Receptor Type / Distance (ft)		None	No Off-site Receptors	
$SSTL_{ss}$ (mg/kg)	THQ = 1e+0	NA		
	TR = 1e-6	NA		
Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	6.2E+0	6.2E-3	6.2E-3
	TR = 1e-6	2.9E-1	2.9E-4	2.9E-4
Soil Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	3.4E+2	7.0E+2	5.8E+2
	TR = 1e-6	1.6E+1	3.3E+1	2.8E+1
Groundwater Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	5.2E+2	1.1E+3	1.1E+3
	TR = 1e-6	2.5E+1	5.1E+1	5.1E+1
Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	6.2E+0		
	TR = 1e-6	2.9E-1		
Soil Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$SSTL_s$ (mg/kg)	THQ = 1e+0	1.6E+0		
	TR = 1e-6	7.7E-2		
Groundwater Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	2.8E+0		
	TR = 1e-6	1.3E-1		

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VF_{ss}	(kg-soil/L-air)	NC	NC	NA
VF_{samb}	(kg-soil/L-air)	1.9E-5	2.2E-5	NA
VF_{wamb}	(L-wat/L-air)	1.2E-5	1.2E-5	NA
VF_{ssap}	(kg-soil/L-air)	3.8E-3	NA	NA
VF_{wsap}	(L-wat/L-air)	2.2E-3	NA	NA
LF	(kg-soil/L-wat)	All exposures: 6.5E-1		NA

	Units	On-Site	Off-Site1	Off-Site2
Lateral Transport Factors				
DAFgw	(-)	1.0E+0	6.4E+3	6.4E+3
DAFs/gw	(-)	1.0E+0	6.4E+3	6.4E+3

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	7.8E+1	PS
Sol	(mg/L)	1.8E+3	PS
P_{vap}	(mmHg)	9.5E+1	PS
H_{atm}	(atm-m^3/mol)	5.6E-3	PS
pK_a	(log[mol/mol])	-	-
pK_b	(log[mol/mol])	-	-
$log(K_{oc})$	(log[L/kg])	1.8E+0	PS
D_{air}	(cm^2/sec)	8.8E-2	PS
D_{wat}	(cm^2/sec)	9.8E-6	PS
Toxicity Data			
Wt of Evd.		A	
SF_o	(1/[mg/kg/day])	2.9E-2	PS
SF_d	(1/[mg/kg/day])	3.0E-2	TX
URF_i	(1/[$\mu g/m^3$])	8.3E-6	PS
RfD_o	(mg/kg/day)	3.0E-3	R
RfD_d	(mg/kg/day)	-	-
RfC_i	(mg/m^3)	6.0E-3	R
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-1	D
K_p	(cm/hr)	2.1E-2	
tau_d	(hr/event)	2.6E-1	
t_{crit}	(hr)	6.3E-1	
B	(-)	1.3E-2	
Regulatory Standards			
MCL	(mg/L)	5.0E-3	*
TWA	(mg/m^3)	3.3E+0	PS
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	2.0E-3	S
ADL_s	(mg/kg)	5.0E-3	S
$t_{1/2,sat}$	(d)	7.2E+2	H
$t_{1/2,unsat}$	(d)	7.2E+2	H

* MCL ref = 52 FR 25690

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	2.3E-1
K_{sw}	(L-wat/kg-soil)	1.5E+0
C_{sat}	(mg/kg-soil)	1.1E+3
$C_{sat,vap}$	($\mu g/m^3$-air)	4.0E+5
$D_{eff,s}$	(cm^2/sec)	3.2E-3
$D_{eff,crk}$	(cm^2/sec)	5.9E-4
$D_{eff,cap}$	(cm^2/sec)	2.7E-5
$D_{eff,ws}$	(cm^2/sec)	1.8E-3
R_{sat}	(-)	4.9E+0
R_{unsat}	(-)	1.4E+1
Z	(cm/event)	7.3E-2

Notes: 1) NA = Not applicable; NC = Not calculated.

2) Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT

Chemical-Specific Tier 2 Cleanup Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

Constituent: Toluene **CAS No.: 108-88-3**

Site-Specific Target Level (SSTL) Concentrations

		On-site	Off-site1	Off-site2
Groundwater Ingestion				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	7.3E+0	>5.2E+2	>5.2E+2
	TR = 1e-6	NC	NC	NC
Soil Leaching to Groundwater Ingestion				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	2.4E+1	>7.3E+2	>7.3E+2
	TR = 1e-6	NC	NC	NC
Surface Soil Ingestion and Dermal Contact				
Receptor Type / Distance (ft)		None	No Off-site Receptors	
$SSTL_{ss}$ (mg/kg)	THQ = 1e+0	NA		
	TR = 1e-6	NA		
Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	4.2E+2	4.2E-1	4.2E-1
	TR = 1e-6	NC	NC	NC
Soil Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	>7.3E+2	>7.3E+2	>7.3E+2
	TR = 1e-6	NC	NC	NC
Groundwater Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	>5.2E+2	>5.2E+2	>5.2E+2
	TR = 1e-6	NC	NC	NC
Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	4.2E+2		
	TR = 1e-6	NC		
Soil Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$SSTL_s$ (mg/kg)	THQ = 1e+0	2.2E+2		
	TR = 1e-6	NC		
Groundwater Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	1.7E+2		
	TR = 1e-6	NC		

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	9.2E+1	5
Sol	(mg/L)	5.2E+2	29
P_{vap}	(mmHg)	3.0E+1	4
H_{atm}	(atm-m^3/mol)	6.3E-3	A
pK_a	(log[mol/mol])	-	-
pK_b	(log[mol/mol])	-	-
log(K_{oc})	(log[L/kg])	2.1E+0	A
D_{air}	(cm^2/sec)	8.5E-2	A
D_{wat}	(cm^2/sec)	9.4E-6	A
Toxicity Data			
Wt of Evd.		D	
SF_o	(1/[mg/kg/day])	-	-
SF_d	(1/[mg/kg/day])	-	-
URF_i	(1/[$\mu g/m^3$])	-	-
RfD_o	(mg/kg/day)	2.0E-1	A,R
RfD_d	(mg/kg/day)	1.6E-1	TX
RfC_i	(mg/m^3)	4.0E-1	A,R
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-1	D
K_p	(cm/hr)	4.5E-2	
tau_d	(hr/event)	3.2E-1	
t_{crit}	(hr)	7.7E-1	
B	(-)	5.4E-2	
Regulatory Standards			
MCL	(mg/L)	1.0E+0	*
TWA	(mg/m^3)	1.5E+2	ACGIH
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	2.0E-3	S
ADL_s	(mg/kg)	5.0E-3	S
$t_{1/2,sat}$	(d)	2.8E+1	H
$t_{1/2,unsat}$	(d)	2.8E+1	H

* MCL ref = 56 FR 3526 (30 Jan 91)

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VF_{ss}	(kg-soil/L-air)	NC	NC	NA
VF_{samb}	(kg-soil/L-air)	1.9E-5	2.2E-5	NA
VF_{wamb}	(L-wat/L-air)	1.3E-5	1.3E-5	NA
VF_{ssap}	(kg-soil/L-air)	1.9E-3	NA	NA
VF_{wsap}	(L-wat/L-air)	2.4E-3	NA	NA
LF	(kg-soil/L-wat)	All exposures: 3.0E-1		NA

	Units	On-Site	Off-Site1	Off-Site2
Lateral Transport Factors				
DAFgw	(-)	1.0E+0	9.2E+7	9.2E+7
DAFs/gw	(-)	1.0E+0	9.2E+7	9.2E+7

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	2.6E-1
K_{sw}	(L-wat/kg-soil)	7.1E-1
C_{sat}	(mg/kg-soil)	7.3E+2
$C_{sat,vap}$	($\mu g/m^3$-air)	1.5E+5
$D_{eff,s}$	(cm^2/sec)	3.1E-3
$D_{eff,crk}$	(cm^2/sec)	5.7E-4
$D_{eff,cap}$	(cm^2/sec)	2.5E-5
$D_{eff,ws}$	(cm^2/sec)	1.8E-3
R_{sat}	(-)	9.9E+0
R_{unsat}	(-)	3.1E+1
Z	(cm/event)	1.6E-1

Notes: 1) NA = Not applicable; NC = Not calculated.
2) Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT | **Chemical-Specific Tier 2 Cleanup Summary**

Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, California | Date Completed: 19-Jul-00 |

Constituent: Ethylbenzene **CAS No.: 100-41-4**

Site-Specific Target Level (SSTL) Concentrations

		On-site	Off-site1	Off-site2
Groundwater Ingestion				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	3.7E+0	>1.7E+2	>1.7E+2
	TR = 1e-6	NC	NC	NC
Soil Leaching to Groundwater Ingestion				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	3.2E+1	>6.2E+2	>6.2E+2
	TR = 1e-6	NC	NC	NC
Surface Soil Ingestion and Dermal Contact				
Receptor Type / Distance (ft)		None	No Off-site Receptors	
$SSTL_{ss}$ (mg/kg)	THQ = 1e+0	NA		
	TR = 1e-6	NA		
Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	1.0E+3	1.0E+0	1.0E+0
	TR = 1e-6	NC	NC	NC
Soil Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_c$ (mg/kg)	THQ = 1e+0	>6.2E+2	>6.2E+2	>6.2E+2
	TR = 1e-6	NC	NC	NC
Groundwater Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	>1.7E+2	>1.7E+2	>1.7E+2
	TR = 1e-6	NC	NC	NC
Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	1.0E+3		
	TR = 1e-6	NC		
Soil Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$SSTL_s$ (mg/kg)	THQ = 1e+0	>6.2E+2		
	TR = 1e-6	NC		
Groundwater Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	>1.7E+2		
	TR = 1e-6	NC		

Chemical Parameters

		Units	Value	Reference
Physical Properties				
MW		(g/mol)	1.1E+2	PS
Sol		(mg/L)	1.7E+2	PS
P_{vap}		(mmHg)	1.0E+1	PS
H_{atm}		(atm-m^3/mol)	7.9E-3	PS
pK_a		(log[mol/mol])	-	-
pK_b		(log[mol/mol])	-	-
$\log(K_{oc})$		(log[L/kg])	2.6E+0	PS
D_{air}		(cm^2/sec)	7.5E-2	PS
D_{wat}		(cm^2/sec)	7.8E-6	PS
Toxicity Data				
Wt of Evd.			D	
SF_o		(1/[mg/kg/day])	-	-
SF_d		(1/[mg/kg/day])	-	-
URF_i		(1/[$\mu g/m^3$])	-	-
RfD_o		(mg/kg/day)	1.0E-1	PS
RfD_d		(mg/kg/day)	9.7E-2	TX
RfC_i		(mg/m^3)	1.0E+0	PS
Dermal Exposure Parameters				
RAF_d		(mg/mg)	5.0E-1	D
K_p		(cm/hr)	7.4E-2	
tau_d		(hr/event)	3.9E-1	
t_{crit}		(hr)	1.3E+0	
B		(-)	1.4E-1	
Regulatory Standards				
MCL		(mg/L)	7.0E-1	*
TWA		(mg/m^3)	4.4E+2	PS
AQL		(mg/L)	-	-
Miscellaneous Parameters				
ADL_{gw}		(mg/L)	2.0E-3	S
ADL_s		(mg/kg)	5.0E-3	S
$t_{1/2,sat}$		(d)	2.3E+2	H
$t_{1/2,unsat}$		(d)	2.3E+2	H

* MCL ref = 56 FR 3526 (30 Jan 91)

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VF_{ss}	(kg-soil/L-air)	NC	NC	NA
VF_{ssmb}	(kg-soil/L-air)	1.1E-5	1.1E-5	NA
VF_{wamb}	(L-wat/L-air)	1.4E-5	1.4E-5	NA
VF_{sesp}	(kg-soil/L-air)	8.0E-4	NA	NA
VF_{wesp}	(L-wat/L-air)	2.7E-3	NA	NA
LF	(kg-soil/L-wat)	All exposures: 1.1E-1		NA

	Units	On-Site	Off-Site1	Off-Site2
Lateral Transport Factors				
DAFgw	(-)	1.0E+0	2.1E+2	2.1E+2
DAFs/gw	(-)	1.0E+0	2.1E+2	2.1E+2

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	3.2E-1
K_{sw}	(L-wat/kg-soil)	2.7E-1
C_{sat}	(mg/kg-soil)	6.2E+2
$C_{sat,vap}$	($\mu g/m^3$-air)	5.8E+4
$D_{eff,s}$	(cm^2/sec)	2.8E-3
$D_{eff,crk}$	(cm^2/sec)	5.0E-4
$D_{eff,cap}$	(cm^2/sec)	2.1E-5
$D_{eff,ws}$	(cm^2/sec)	1.5E-3
R_{sat}	(-)	2.5E+1
R_{unsat}	(-)	8.1E+1
Z	(cm/event)	2.7E-1

Notes: 1) NA = Not applicable; NC = Not calculated.

2) Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT

Chemical-Specific Tier 2 Cleanup Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

Constituent: Xylene (mixed isomers) **CAS No.: 1330-20-7**

Site-Specific Target Level (SSTL) Concentrations

		On-site	Off-site1	Off-site2
Groundwater Ingestion				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	7.3E+1	>2.0E+2	>2.0E+2
	TR = 1e-6	NC	NC	NC
Soil Leaching to Groundwater Ingestion				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	4.3E+2	>4.9E+2	>4.9E+2
	TR = 1e-6	NC	NC	NC
Surface Soil Ingestion and Dermal Contact				
Receptor Type / Distance (ft)		None	No Off-site Receptors	
$SSTL_{ss}$ (mg/kg)	THQ = 1e+0	NA		
	TR = 1e-6	NA		
Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	7.3E+3	7.3E+0	7.3E+0
	TR = 1e-6	NC	NC	NC
Soil Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	>4.9E+2	>4.9E+2	>4.9E+2
	TR = 1e-6	NC	NC	NC
Groundwater Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	>2.0E+2	>2.0E+2	>2.0E+2
	TR = 1e-6	NC	NC	NC
Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	7.3E+3		
	TR = 1e-6	NC		
Soil Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$SSTL_s$ (mg/kg)	THQ = 1e+0	>4.9E+2		
	TR = 1e-6	NC		
Groundwater Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	>2.0E+2		
	TR = 1e-6	NC		

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	1.1E+2	5
Sol	(mg/L)	2.0E+2	5
P_{vap}	(mmHg)	7.0E+0	4
H_{atm}	(atm-m^3/mol)	7.0E-3	A
pK_a	(log[mol/mol])	-	-
pK_b	(log[mol/mol])	-	-
$\log(K_{oc})$	(log[L/kg])	2.4E+0	A
D_{air}	(cm^2/sec)	7.2E-2	A
D_{wat}	(cm^2/sec)	8.5E-6	A
Toxicity Data			
Wt of Evd.		D	
SF_o	(1/[mg/kg/day])	-	-
SF_d	(1/[mg/kg/day])	-	-
URF_i	(1/[$\mu g/m^3$])	-	-
RfD_o	(mg/kg/day)	2.0E+0	A,R
RfD_d	(mg/kg/day)	1.8E+0	TX
RfC_i	(mg/m^3)	7.0E+0	A
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-1	D
K_p	(cm/hr)	8.0E-2	
tau_d	(hr/event)	3.9E-1	
t_{crit}	(hr)	1.4E+0	
B	(-)	1.6E-1	
Regulatory Standards			
MCL	(mg/L)	1.0E+1	*
TWA	(mg/m^3)	4.3E+2	ACGIH
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	5.0E-3	S
ADL_s	(mg/kg)	5.0E-3	S
$t_{1/2,sat}$	(d)	3.6E+2	H
$t_{1/2,unsat}$	(d)	3.6E+2	H

* MCL ref = 56 FR 3526 (30 Jan 91)

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VF_{ss}	(kg-soil/L-air)	NC	NC	NA
VF_{samb}	(kg-soil/L-air)	1.5E-5	1.5E-5	NA
VF_{wamb}	(L-wat/L-air)	1.2E-5	1.2E-5	NA
VF_{sesp}	(kg-soil/L-air)	1.0E-3	NA	NA
VF_{wesp}	(L-wat/L-air)	2.3E-3	NA	NA
LF	(kg-soil/L-wat)	All exposures: 1.7E-1		NA

	Units	On-Site	Off-Site1	Off-Site2
Lateral Transport Factors				
DAFgw	(-)	1.0E+0	1.7E+5	1.7E+5
DAFs/gw	(-)	1.0E+0	1.7E+5	1.7E+5

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	2.9E-1
K_{sw}	(L-wat/kg-soil)	4.1E-1
C_{sat}	(mg/kg-soil)	4.9E+2
$C_{sat,vap}$	($\mu g/m^3$-air)	4.0E+4
$D_{eff,a}$	(cm^2/sec)	2.6E-3
$D_{eff,crk}$	(cm^2/sec)	4.8E-4
$D_{eff,cap}$	(cm^2/sec)	2.1E-5
$D_{eff,ws}$	(cm^2/sec)	1.5E-3
R_{sat}	(-)	1.7E+1
R_{unsat}	(-)	5.4E+1
Z	(cm/event)	2.9E-1

Notes: 1) NA = Not applicable; NC = Not calculated.
2) Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT | **Chemical-Specific Tier 2 Cleanup Summary**

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

Constituent: Methyl t-Butyl ether **CAS No.: 1634-04-4**

Site-Specific Target Level (SSTL) Concentrations

		On-site	Off-site1	Off-site2
Groundwater Ingestion				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	3.7E-1	1.8E+2	5.1E+2
	TR = 1e-6	NC	NC	NC
Soil Leaching to Groundwater Ingestion				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	1.4E-1	7.1E+1	2.0E+2
	TR = 1e-6	NC	NC	NC
Surface Soil Ingestion and Dermal Contact				
Receptor Type / Distance (ft)		None	No Off-site Receptors	
$SSTL_{ss}$ (mg/kg)	THQ = 1e+0	NA		
	TR = 1e-6	NA		
Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	3.1E+3	3.1E+0	3.1E+0
	TR = 1e-6	NC	NC	NC
Soil Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	>8.0E+3	>8.0E+3	>8.0E+3
	TR = 1e-6	NC	NC	NC
Groundwater Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	>4.8E+4	>4.8E+4	>4.8E+4
	TR = 1e-6	NC	NC	NC
Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	3.1E+3		
	TR = 1e-6	NC		
Soil Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$SSTL_s$ (mg/kg)	THQ = 1e+0	1.4E+3		
	TR = 1e-6	NC		
Groundwater Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	9.1E+3		
	TR = 1e-6	NC		

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VF_{ss}	(kg-soil/L-air)	NC	NC	NA
VF_{samb}	(kg-soil/L-air)	1.9E-5	2.0E-5	NA
VF_{wamb}	(L-wat/L-air)	1.9E-6	1.9E-6	NA
VF_{sesp}	(kg-soil/L-air)	2.2E-3	NA	NA
VF_{wesp}	(L-wat/L-air)	3.4E-4	NA	NA
LF	(kg-soil/L-wat)	All exposures: 2.5E+0		NA

	Units	On-Site	Off-Site1	Off-Site2
Lateral Transport Factors				
DAFgw	(-)	1.0E+0	4.9E+2	4.9E+2
DAFs/gw	(-)	1.0E+0	4.9E+2	4.9E+2

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	8.8E+1	5
Sol	(mg/L)	4.8E+4	A
P_{vap}	(mmHg)	2.5E+2	-
H_{atm}	(atm-m^3/mol)	5.8E-4	-
pK_a	(log[mol/mol])	-	-
pK_b	(log[mol/mol])	-	-
$\log(K_{oc})$	(log[L/kg])	1.1E+0	A
D_{air}	(cm^2/sec)	7.9E-2	6
D_{wat}	(cm^2/sec)	9.4E-5	7
Toxicity Data			
Wt of Evd.		-	
SF_o	(1/[mg/kg/day])	-	-
SF_d	(1/[mg/kg/day])	-	-
URF_i	(1/[$\mu g/m^3$])	-	-
RfD_o	(mg/kg/day)	1.0E-2	31
RfD_d	(mg/kg/day)	8.0E-3	TX
RfC_i	(mg/m^3)	3.0E+0	R
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-1	-
K_p	(cm/hr)	-	
tau_d	(hr/event)	-	
t_{crit}	(hr)	-	
B	(-)	-	
Regulatory Standards			
MCL	(mg/L)	-	*
TWA	(mg/m^3)	6.0E+1	NIOSH
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	-	-
ADL_s	(mg/kg)	-	-
$t_{1/2,sat}$	(d)	3.6E+2	H
$t_{1/2,unsat}$	(d)	1.8E+2	H

* MCL ref = -

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	2.4E-2
K_{sw}	(L-wat/kg-soil)	6.0E+0
C_{sat}	(mg/kg-soil)	8.0E+3
$C_{sat,vap}$	($\mu g/m^3$-air)	1.2E+6
$D_{eff,a}$	(cm^2/sec)	3.0E-3
$D_{eff,crk}$	(cm^2/sec)	8.7E-4
$D_{eff,cap}$	(cm^2/sec)	5.1E-4
$D_{eff,ws}$	(cm^2/sec)	2.9E-3
R_{sat}	(-)	1.8E+0
R_{unsat}	(-)	3.7E+0
Z	(cm/event)	-

Notes: 1) NA = Not applicable; NC = Not calculated.
2) Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT | **Chemical-Specific Tier 2 Cleanup Summary**

Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, California | Date Completed: 19-Jul-00 |

Constituent: Naphthalene **CAS No.: 91-20-3**

Site-Specific Target Level (SSTL) Concentrations

		On-site	Off-site1	Off-site2
Groundwater Ingestion				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	1.5E+1	>3.1E+1	>3.1E+1
	TR = 1e-6	NC	NC	NC
Soil Leaching to Groundwater Ingestion				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	>6.2E+2	>6.2E+2	>6.2E+2
	TR = 1e-6	NC	NC	NC
Surface Soil Ingestion and Dermal Contact				
Receptor Type / Distance (ft)		None	No Off-site Receptors	
$SSTL_{ss}$ (mg/kg)	THQ = 1e+0	NA		
	TR = 1e-6	NA		
Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	1.5E+3	1.5E+0	1.5E+0
	TR = 1e-6	NC	NC	NC
Soil Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	>6.2E+2	>6.2E+2	>6.2E+2
	TR = 1e-6	NC	NC	NC
Groundwater Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	>3.1E+1	>3.1E+1	>3.1E+1
	TR = 1e-6	NC	NC	NC
Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	1.5E+3		
	TR = 1e-6	NC		
Soil Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$SSTL_s$ (mg/kg)	THQ = 1e+0	>6.2E+2		
	TR = 1e-6	NC		
Groundwater Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	>3.1E+1		
	TR = 1e-6	NC		

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	1.3E+2	PS
Sol	(mg/L)	3.1E+1	PS
P_{vap}	(mmHg)	2.3E-1	PS
H_{atm}	(atm-m^3/mol)	4.8E-4	PS
pK_a	(log[mol/mol])	-	-
pK_b	(log[mol/mol])	-	-
$\log(K_{oc})$	(log[L/kg])	3.3E+0	PS
D_{air}	(cm^2/sec)	5.9E-2	PS
D_{wat}	(cm^2/sec)	7.5E-6	PS
Toxicity Data			
Wt of Evd.		D	
SF_o	(1/[mg/kg/day])	-	-
SF_d	(1/[mg/kg/day])	-	-
URF_i	(1/[$\mu g/m^3$])	-	-
RfD_o	(mg/kg/day)	4.0E-1	PS
RfD_d	(mg/kg/day)	3.6E-1	TX
RfC_i	(mg/m^3)	1.4E+0	PS
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-2	D
K_p	(cm/hr)	6.9E-2	
tau_d	(hr/event)	5.3E-1	
t_{crit}	(hr)	2.2E+0	
B	(-)	2.0E-1	
Regulatory Standards			
MCL	(mg/L)	-	*
TWA	(mg/m^3)	5.0E+1	PS
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	1.0E-2	32
ADL_s	(mg/kg)	1.0E-2	32
$t_{1/2,sat}$	(d)	2.6E+2	H
$t_{1/2,unsat}$	(d)	2.6E+2	H

* MCL ref = -

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VF_{ss}	(kg-soil/L-air)	NC	NC	NA
VF_{samb}	(kg-soil/L-air)	1.0E-7	1.0E-7	NA
VF_{wamb}	(L-wat/L-air)	1.0E-6	1.0E-6	NA
VF_{sesp}	(kg-soil/L-air)	7.7E-6	NA	NA
VF_{wesp}	(L-wat/L-air)	1.5E-4	NA	NA
LF	(kg-soil/L-wat)	All exposures: 2.1E-2		NA

	Units	On-Site	Off-Site1	Off-Site2
Lateral Transport Factors				
DAFgw	(-)	1.0E+0	2.2E+5	2.2E+5
DAFs/gw	(-)	1.0E+0	2.2E+5	2.2E+5

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	2.0E-2
K_{sw}	(L-wat/kg-soil)	5.0E-2
C_{sat}	(mg/kg-soil)	6.2E+2
$C_{sat,vap}$	($\mu g/m^3$-air)	1.6E+3
$D_{eff,s}$	(cm^2/sec)	2.2E-3
$D_{eff,crk}$	(cm^2/sec)	4.3E-4
$D_{eff,cap}$	(cm^2/sec)	6.2E-5
$D_{eff,ws}$	(cm^2/sec)	1.8E-3
R_{sat}	(-)	1.3E+2
R_{unsat}	(-)	4.4E+2
Z	(cm/event)	2.7E-1

Notes: 1) NA = Not applicable; NC = Not calculated.

2) Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT

Chemical-Specific Tier 2 Cleanup Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California
Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00
Job ID: 971275

Constituent: Phenol **CAS No.: 108-95-2**

Site-Specific Target Level (SSTL) Concentrations

		On-site	Off-site1	Off-site2
Groundwater Ingestion				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	2.2E+1	1.5E+2	4.3E+2
	TR = 1e-6	NC	NC	NC
Soil Leaching to Groundwater Ingestion				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	1.7E+1	1.2E+2	3.4E+2
	TR = 1e-6	NC	NC	NC
Surface Soil Ingestion and Dermal Contact				
Receptor Type / Distance (ft)		None	No Off-site Receptors	
$SSTL_{ss}$ (mg/kg)	THQ = 1e+0	NA		
	TR = 1e-6	NA		
Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	>1.7E+3	2.2E+0	2.2E+0
	TR = 1e-6	NC	NC	NC
Soil Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_s$ (mg/kg)	THQ = 1e+0	>2.8E+4	>2.8E+4	>2.8E+4
	TR = 1e-6	NC	NC	NC
Groundwater Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	Residential / 100	Commercial / 100
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	>8.3E+4	>8.3E+4	>8.3E+4
	TR = 1e-6	NC	NC	NC
Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	>1.7E+3		
	TR = 1e-6	NC		
Soil Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$SSTL_s$ (mg/kg)	THQ = 1e+0	>2.8E+4		
	TR = 1e-6	NC		
Groundwater Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	>8.3E+4		
	TR = 1e-6	NC		

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	9.4E+1	PS
Sol	(mg/L)	8.3E+4	PS
P_{vap}	(mmHg)	3.4E-1	PS
H_{atm}	(atm-m^3/mol)	4.0E-7	PS
pK_a	(log[mol/mol])	1.0E+1	PS
pK_b	(log[mol/mol])	-	PS
$\log(K_{oc})$	(log[L/kg])	1.5E+0	PS
D_{air}	(cm^2/sec)	8.2E-2	PS
D_{wat}	(cm^2/sec)	9.1E-6	PS
Toxicity Data			
Wt of Evd.		D	
SF_o	(1/[mg/kg/day])	-	-
SF_d	(1/[mg/kg/day])	-	-
URF_i	(1/[$\mu g/m^3$])	-	-
RfD_o	(mg/kg/day)	6.0E-1	PS
RfD_d	(mg/kg/day)	5.4E-1	TX
RfC_i	(mg/m^3)	2.1E+0	PS
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-1	D
K_p	(cm/hr)	5.5E-3	
tau_d	(hr/event)	3.3E-1	
t_{crit}	(hr)	7.9E-1	
B	(-)	2.9E-3	
Regulatory Standards			
MCL	(mg/L)	-	*
TWA	(mg/m^3)	1.9E+1	PS
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	1.0E-2	32
ADL_s	(mg/kg)	6.6E-1	32
$t_{1/2,sat}$	(d)	1.0E+1	H
$t_{1/2,unsat}$	(d)	1.0E+1	H

* MCL ref = -

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VF_{ss}	(kg-soil/L-air)	NC	NC	NA
VF_{samb}	(kg-soil/L-air)	1.9E-8	1.9E-8	NA
VF_{wamb}	(L-wat/L-air)	3.9E-9	3.9E-9	NA
VF_{sesp}	(kg-soil/L-air)	1.7E-5	NA	NA
VF_{wesp}	(L-wat/L-air)	3.9E-6	NA	NA
LF	(kg-soil/L-wat)	All exposures: 1.3E+0		NA

	Units	On-Site	Off-Site1	Off-Site2
Lateral Transport Factors				
DAFgw	(-)	1.0E+0	7.0E+0	7.0E+0
DAFs/gw	(-)	1.0E+0	7.0E+0	7.0E+0

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	1.6E-5
K_{sw}	(L-wat/kg-soil)	3.0E+0
C_{sat}	(mg/kg-soil)	2.8E+4
$C_{sat,vap}$	($\mu g/m^3$-air)	1.7E+3
$D_{eff,s}$	(cm^2/sec)	8.3E-3
$D_{eff,crk}$	(cm^2/sec)	4.8E-2
$D_{eff,cap}$	(cm^2/sec)	7.0E-2
$D_{eff,we}$	(cm^2/sec)	8.4E-3
R_{sat}	(-)	2.9E+0
R_{unsat}	(-)	7.4E+0
Z	(cm/event)	2.0E-2

Notes: 1) NA = Not applicable; NC = Not calculated.
2) Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT

Chemical-Specific Tier 2 Cleanup Summary

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

Definitions

Site-Specific Target Level Concentrations	
SSTLgw	Site-specific target level for groundwater (mg/L)
SSTLs	Site-specific target level for soil (mg/kg)
RBELair	Risk-based exposure limit for air (µg/m3)
THQ	Target hazard quotient
TR	Target risk

Cross-Media Transfer Factors	
VF_{ss}	Volatilization factor, surface soil to outdoor air (kg-soil/L-air)
VF_{samb}	Volatilization factor, subsurface soil to outdoor air (kg-soil/L-air)
VF_{wamb}	Volatilization factor, groundwater to outdoor air (L-wat/L-air)
VF_{ssap}	Volatilization factor, subsurface soil to indoor air (kg-soil/L-air)
VF_{wsap}	Volatilization factor, groundwater to indoor air (L-wat/L-air)
LF	Leaching factor, soil to groundwater (kg-soil/L-wat)

Cross-Media Transfer Factors	
DAF_{gw}	Dilution-attenuation factor, groundwater (-)
DAF_{sgw}	Dilution-attenuation factor, soil leaching to groundwater (-)

Physical Properties	
MW	Molecular weight (g/mol)
Sol	Aqueous solubility limit (mg/L)
P_{vap}	Vapor pressure (mmHg)
H_{atm}	Henry's Law constant (atm-m^3/mol)
pK_a	Acid ionization constant (log[mol/mol])
pK_b	Base ionization constant (log[mol/mol])
K_{oc}	Organic carbon/Water partition coeffiecient (L/kg)
K_d	Soil/Water distribution coeffient (L/kg)
D_{air}	Molecular diffusion coeffient in air (cm^2/sec)
D_{wat}	Molecular diffusion coeffient in water (cm^2/sec)

Toxicity Data	
Wt of Evd.	Weight of evidence
SF_o	Oral slope factor for carcinogens (1/[mg/kg/day])
SF_d	Dermal slope factor for carcinogens (1/[mg/kg/day])
URF_i	Inhalation unit risk facor for carcinogens (1/[µg/m^3])
RfD_o	Oral reference dose (mg/kg/day)
RfD_d	Dermal reference dose (mg/kg/day)
RfC_i	Inhalation reference concentration (mg/m^3)

Dermal Exposure Parameters	
RAF_d	Dermal relative absorption factor (mg/mg)
K_p	Dermal permeability coeff. (cm/hr)
tau_d	Lag time for dermal exposure (hr/event)
t_{crit}	Critical exposure time (hr)
B	Relative contribution of permeability coeff. (-)

Regulatory Standards	
MCL	Maximum contaminant level for drinking water protection (mg/L)
TWA	Time-weighted average workplace air criterion (mg/m^3)
AQL	Aquatic life protection criterion (mg/L)

Miscellaneous Parameters	
ADL_{gw}	Analytical detection limit in groundwater (mg/L)
ADL_s	Analytical detection limit in soil (mg/kg)
$t_{1/2,sat}$	Half life, saturated zone (d)
$t_{1/2,unsat}$	Half life, unsaturated zone (d)

Derived Parameters	
H	Dimensionless Henry's Law contant (L-wat/L-air)
K_{sw}	Soil to pore-water partitioning factor (L-wat/kg-soil)
C_{sat}	Saturated residual conc. in vadose zone soils (mg/kg-soil)
$C_{sat,vap}$	Saturated concentration in vapors (mg/m3-air)
$D_{eff,s}$	Effective diffusion coeff. in vadose zone soils (cm^2/sec)
$D_{eff,crk}$	Effective diffusion coeff. in foundation cracks (cm^2/sec)
$D_{eff,cap}$	Effective diffusion coeff. in capillary zone (cm^2/sec)
$D_{eff,ws}$	Effective diffusion coeff., water table to ground surface (cm^2/sec)
R_{sat}	Retardation factor, saturated zone (-)
R_{unsat}	Retardation factor, unsaturated zone (-)
Z	Water to skin dermal absorption factor (cm/event)

Chemical Parameter References

PS	Standard Provisional Guide for Risk-Based Corrective Action, ASTM PS 104-98.
A	Emergency Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites,
D	USEPA, Dermal Exposure Assessment: Principles and Applications, OHD, EPA/600/8-91/011B.
H	Howard, Handbook of Environmental Degradation Rates, Lewis Publishers, Chelsea, MI, 1989
R	EPA Region III Risk Based Concentration Table, EPA Region 3, March 7, 1995.
S	USEPA, Test Methods for Evaluating Solid Waste, SW-846, Third Edition, OSWER, November 1986.
T	TPH Criteria Working Group, 1996.
TX	TNRCC Risk-Based Corrective Action for Leaking Storage Tank Sites, January 1994.
3	based on Kow from (2) and DiToro, D. M., 1985:"A Particle Interaction Model of Reversible Organic Chemical Sorption", Chemosphere, 14(10), 1505-1538. log(Koc) = 0.00028 + 0.983 log(Kow)
4	USEPA, 1989: Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF) - USEPA, OAQPS, Air Emission Models, (EPA-450/3-87-026).
5	Verschueren, Karel, 1983: Handbook of Environmental data on organic Chemicals, Second Ed., (Van nostrand Reinhold Company Inc., New York), ISBN: 0-442-28802-6.
6	Calculated diffusivity using the method of Fuller, Schettler, and Giddings from (9).
7	Calculated diffusivity using the method of Hayduk and Laudie and the reference from (9).
8	Calculated using Kenaga ang Goring Kow/solubility regression equation reference (9) and Kow data from (2), log(S, mg/l) = -0.922 log(Kow) + 4.184
9	Handbook of Chemical Property Estimation Methods, 1982, W.J. Lyman, (McGraw-Hill, New York), ISBN -0-07-039175-0.
10	Calculated from (Pw/Patm)/(solubility/mol wt).
11	Back calculated from solubility, Note (8) and (3).
12	Aldrich Chemical Catalog, 1991.
13	Calculated using Modified Watson Correlation from (9) and normal boiling point.
14	USEPA, 1979: Water Related Environmental Fate of 129 Priority Pollutants, Vol.1, USEPA, OWQPS,(EPA-4404-79-029a).
15	The Agrochemicals Handbook, (The Royal Society of Chemistry, The University, Nottingham, England), ISBN 0-85186-406-6.
16	Vapor pressure specified at elevated temperature, adjustments to 25C using methods presented by (9).
17	Wauchope, R. D., T. M. Butler, A. G. Hornsby, P. W. M. Augustijn-Beckers, and J.P. Burt, 1992: "The SCS/ARS/CES Pesticide Properties Database for Environmental Decision Making", Reviews of Environmental Contamination and Toxicology, vol 123, 1-155.
18	Farm Chemicals Handbook 91, C. Sine, ed., (Meister Publishing Company, Willoughby, Ohio).
19	Structure and Nomenclature Search System, (Version 7.007.03) December, 1992.
20	From Syracuse Research Corporation Calculated Value from pcchem-pcgems, 1988, ref no. 255435 in Enirofate database, Accession no. 105543.
23	NIOSH, 1990: Pocket Guide to Chemical Hazards, (U. S. Dept. of Health & Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health).
24	Buchter, B. et al., 1989: Correlation of Freundlich Kd and N retention Parameters with Soils and Elements, Soil Science, 148, 370-379.
25	USEPA, 1993: Air/Superfund National Technical Guidance Study series: Estimation of Air Impacts for Thermal Desorption Units Used at Superfund Sites, US Environmental Protection Agency, Office of Air Quality Planning and Standards, EPA-451/R-93-005.
26	NTIS Accession No. PB93-215630, April 1993.
27	Based on salt solubilities in Table 3-120, R. H. Perry and D. W. Green, " Perry's Chemical Engineering Handbook" Sixth Edition, (McGraw-Hill, New York), 1973.
28	Based on salt solubilities in Table of Physical Constants for Inorganic Compounds, Weast, R. C., CRC Handbook of Chemistry and Physics, 67th edition, (CRC Press, Inc., Boca Raton), 1987.
29	Montgomery and Welkom, "Groundwater Chemicals Desk Reference", Lewis Publishers, Chelsea, MI, 1990.
30	USEPA, 1996: Soil Screening Guidance: Technical Background Doc., (EPA/540/R-95/128)
31	TNRCC Risk Reduction Rule Implementation, July 23, 1998. (update to Reference "TX")
32	USEPA, Method 8270C, Revision 3, "Semivolatile Organic Compounds by GC/MS", December 1996.
33	40 CFR 131.36, July 1, 1997
34	40 CFR 141.23, July 1, 1997
35	USEPA, Manual for the Certification of Laboratories Analyzing Drinking Water, EPA 815-B-97-001, March 1997
36	Calculated using Chiou et al. equation reported in (9); S (µmol/L) from (15).
37	Calculated using Chiou et al. equation reported in (9); S (µmol/L) from (23).
38	Calculated using Chiou et al. equation reported in (9); S (µmol/L) from (4).

RBCA SITE ASSESSMENT

Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, California | Date Completed: 19-Jul-00

SOIL (15 - 25 ft) SSTL VALUES

Target Risk (Class A & B) 1.0E-6
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - First Order (One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways ("X" if Complete)

			X	Soil Leaching to Groundwater Ingestion			X	Soil Vol. to Indoor Air	X	Soil Volatilization to Outdoor Air				Surface Soil Inhalation, Ingestion,Dermal Contact		Applicable SSTL	SSTL Exceeded ?	Required CRF
CONSTITUENTS OF CONCERN		Representative Concentration		On-site (0 ft)	Off-site 1 (100 ft)	Off-site 2 (100 ft)		On-site (0 ft)		On-site (0 ft)		Off-site 1 (100 ft)	Off-site 2 (100 ft)	On-site (0 ft)				Only if "yes" left
CAS No.	Name	(mg/kg)		Residential	Residential	Commercial		Residential		Residential	Construction Worker	Residential	Commercial	None	Construction Worker	(mg/kg)	"■" if yes	
71-43-2	Benzene	2.5E+0		4.5E-3	2.9E+1	9.8E+1		[illegible]		1.6E+1	NA	3.3E+1	2.8E+1	NA	NA	4.5E-3	■	5.5E+2
108-88-3	Toluene	2.1E+1		2.4E+1	>7.3E+2	>7.3E+2		[illegible]		>7.3E+2	NA	>7.3E+2	>7.3E+2	NA	NA	2.4E+1	□	<1
100-41-4	Ethylbenzene	2.0E+1		3.2E+1	>6.2E+2	>6.2E+2		>6.2E+2		>6.2E+2	NA	>6.2E+2	>6.2E+2	NA	NA	3.2E+1	□	<1
1330-20-7	Xylene (mixed isomers)	1.3E+2		4.3E+2	>4.9E+2	>4.9E+2		>4.9E+2		>4.9E+2	NA	>4.9E+2	>4.9E+2	NA	NA	4.3E+2	□	<1
1634-04-4	Methyl t-Butyl ether	0.0E+0		1.4E-1	7.1E+1	2.0E+2		1.4E+3		>8.0E+3	NA	>8.0E+3	>8.0E+3	NA	NA	1.4E-1	□	<1
91-20-3	Naphthalene	3.4E+0		>6.2E+2	>6.2E+2	>6.2E+2		>6.2E+2		>6.2E+2	NA	>6.2E+2	>6.2E+2	NA	NA	>6.2E+2	□	NA
108-95-2	Phenol	3.0E-1		1.7E+1	1.2E+2	3.4E+2		>2.8E+4		>2.8E+4	NA	>2.8E+4	>2.8E+4	NA	NA	1.7E+1	□	<1

">" indicates risk-based target concentration greater than constituent residual saturation value. NA = Not applicable. NC = Not calculated.

RBCA SITE ASSESSMENT

Site Name: Arrow Rentals
Site Location: 187 North L Street, Livermore, California

Completed By: Aquifer Sciences, Inc.
Date Completed: 19-Jul-00

Job ID: 971275

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-6
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - First Order (One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways ("X" If Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	X Groundwater Ingestion			X GW Vol. to Indoor Air	X Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 ft)	Off-site 1 (100 ft)	Off-site 2 (100 ft)	On-site (0 ft)	On-site (0 ft)	Off-site 1 (100 ft)	Off-site 2 (100 ft)			Only if "yes" left
CAS No.	Name	(mg/L)	Residential	Residential	Commercial	Residential	Residential	Residential	Commercial	(mg/L)	"■" if yes	
71-43-2	Benzene	9.3E+0	2.9E-3	1.9E+1	6.4E+1	1.9E-1	2.5E+1	5.1E+1	5.1E+1	2.9E-3	■	3.2E+3
108-88-3	Toluene	9.4E+0	7.3E+0	>5.2E+2	>5.2E+2	1.7E+2	>5.2E+2	>5.2E+2	>5.2E+2	7.3E+0	■	1.3E+0
100-41-4	Ethylbenzene	2.4E+0	3.7E+0	>1.7E+2	>1.7E+2	>1.7E+2	>1.7E+2	>1.7E+2	>1.7E+2	3.7E+0	□	<1
1330-20-7	Xylene (mixed isomers)	1.4E+1	7.3E+1	>2.0E+2	>2.0E+2	>2.0E+2	>2.0E+2	>2.0E+2	>2.0E+2	7.3E+1	□	<1
1634-04-4	Methyl t-Butyl ether	5.7E-1	3.7E-1	1.8E+2	5.1E+2	9.1E+3	>4.8E+4	>4.8E+4	>4.8E+4	3.7E-1	■	1.6E+0
91-20-3	Naphthalene	5.1E-1	1.5E+1	>3.1E+1	>3.1E+1	>3.1E+1	>3.1E+1	>3.1E+1	>3.1E+1	1.5E+1	□	<1
108-95-2	Phenol	0.0E+0	2.2E+1	1.5E+2	4.3E+2	>8.3E+4	>8.3E+4	>8.3E+4	>8.3E+4	2.2E+1	□	<1

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

RBCA SITE ASSESSMENT | **Cumulative Risk Worksheet**

Site Name: Arrow Rentals
Completed By: Aquifer Sciences, Inc.
Job ID: 971275

Site Location: 187 North L Street, Livermore, California
Date Completed: 19-Jul-00

CUMULATIVE RISK WORKSHEET

CONSTITUENTS OF CONCERN		Representative Concentration		Proposed CRF		Resultant Target Concentration	
CAS No.	Name	Soil (mg/kg)	Groundwater (mg/L)	Soil	GW	Soil (mg/kg)	Groundwater (mg/L)
71-43-2	Benzene	2.5E+0	9.3E+0	1.0E+0	1.0E+0	2.5E+0	9.3E+0
108-88-3	Toluene	2.1E+1	9.4E+0	1.0E+0	1.0E+0	2.1E+1	9.4E+0
100-41-4	Ethylbenzene	2.0E+1	2.4E+0	1.0E+0	1.0E+0	2.0E+1	2.4E+0
1330-20-7	Xylene (mixed isomers)	1.3E+2	1.4E+1	1.0E+0	1.0E+0	1.3E+2	1.4E+1
1634-04-4	Methyl t-Butyl ether	0.0E+0	5.7E-1	1.0E+0	1.0E+0	0.0E+0	5.7E-1
91-20-3	Naphthalene	3.4E+0	5.1E-1	1.0E+0	1.0E+0	3.4E+0	5.1E-1
108-95-2	Phenol	3.0E-1	0.0E+0	1.0E+0	1.0E+0	3.0E-1	0.0E+0

Cumulative Values:

RBCA SITE ASSESSMENT | **Cumulative Risk Worksheet**

Site Name: Arrow Rentals | Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, Californ | Site Location: 187 North L Street, Livermore, Californi | Date Completed: 19-Jul-00

CUMULATIVE RISK WORKSHEET

Cumulative Target Risk: 1.0E-5 Target Hazard Index: 1.0E+0

ON-SITE RECEPTORS

CONSTITUENTS OF CONCERN		Outdoor Air Exposure: Residential Target Risk: 1.0E-6 / 1.0E-5		Indoor Air Exposure: Residential Target Risk: 1.0E-6 / 1.0E-5		Soil Exposure: None Target Risk: 1.0E-6 / 1.0E-5		Groundwater Exposure: Residential Target Risk: 1.0E-6 / 1.0E-5	
		Target HQ: 1.0E+0		Target HQ: 1.0E+0		Target HQ: 1.0E+0		Target HQ: 1.0E+0	
CAS No.	Name	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient
71-43-2	Benzene	5.4E-7	2.5E-2	1.0E-4	4.9E+0			3.2E-3	8.5E+1
108-88-3	Toluene		1.2E-3		1.5E-1				1.3E+0
100-41-4	Ethylbenzene		2.5E-4		2.2E-2				6.6E-1
1330-20-7	Xylene (mixed isomers)		2.9E-4		2.3E-2				3.1E-1
1634-04-4	Methyl t-Butyl ether		3.5E-7		6.3E-5				1.6E+0
91-20-3	Naphthalene		5.9E-7		6.9E-5				3.5E-2
108-95-2	Phenol		2.6E-9		2.3E-6				1.7E-2
Cumulative Values:		**5.4E-7**	**2.7E-2**	**1.0E-4** ■	**5.1E+0** ■	**0.0E+0**	**0.0E+0**	**3.2E-3** ■	**8.9E+1** ■

■ Indicates risk level exceeding target risk

RBCA SITE ASSESSMENT | **Cumulative Risk Worksheet**

Site Name: Arrow Rentals | Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, Califor | Site Location: 187 North L Street, Livermore, California | Date Completed: 19-Jul-00

CUMULATIVE RISK WORKSHEET

Cumulative Target Risk: 1.0E-5 Target Hazard Index: 1.0E+0

Groundwater DAF Option: Domenico - First Order

OFF-SITE RECEPTORS

CONSTITUENTS OF CONCERN		Outdoor Air Exposure:				Groundwater Exposure:			
		Residential (100 ft) Target Risk: 1.0E-6 / 1.0E-5	Residential (100 ft) Target HQ: 1.0E+0	Commercial (100 ft) Target Risk: 1.0E-6 / 1.0E-5	Commercial (100 ft) Target HQ: 1.0E+0	Residential (100 ft) Target Risk: 1.0E-6 / 1.0E-5	Residential (100 ft) Target HQ: 1.0E+0	Commercial (100 ft) Target Risk: 1.0E-6 / 1.0E-5	Commercial (100 ft) Target HQ: 1.0E+0
CAS No.	Name	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient
71-43-2	Benzene	2.6E-7	1.2E-2	1.6E-7	9.2E-3	4.9E-7	1.3E-2	1.5E-7	4.7E-3
108-88-3	Toluene		5.9E-4		4.8E-4		1.4E-8		5.0E-9
100-41-4	Ethylbenzene		1.2E-4		8.6E-5		3.2E-3		1.1E-3
1330-20-7	Xylene (mixed isomers)		1.4E-4		9.8E-5		1.8E-6		6.5E-7
1634-04-4	Methyl t-Butyl ether		1.7E-7		1.2E-7		3.2E-3		1.1E-3
91-20-3	Naphthalene		2.8E-7		2.0E-7		1.6E-7		5.7E-8
108-95-2	Phenol		1.3E-9		9.0E-10		2.5E-3		8.8E-4
	Cumulative Values:	**2.6E-7**	**1.3E-2**	**1.6E-7**	**9.8E-3**	**4.9E-7**	**2.2E-2**	**1.5E-7**	**7.8E-3**

■ indicates risk level exceeding target risk

APPENDIX H

REMEDIATION GOALS - ONSITE COMMERCIAL SCENARIO

RBCA SITE ASSESSMENT | **Cumulative Risk Worksheet**

Site Name: Arrow Rentals
Completed By: Aquifer Sciences, Inc.
Job ID: 971275
Site Location: 187 North L Street, Livermore, California
Date Completed: 19-Jul-00

CUMULATIVE RISK WORKSHEET

CONSTITUENTS OF CONCERN		Representative Concentration		Proposed CRF		Resultant Target Concentration	
CAS No.	Name	Soil (mg/kg)	Groundwater (mg/L)	Soil	GW	Soil (mg/kg)	Groundwater (mg/L)
71-43-2	Benzene	2.5E+0	9.3E+0	2.5E+1	1.2E+2	1.0E-1	7.5E-2
108-88-3	Toluene	2.1E+1	9.4E+0	3.0E+0	2.4E+0	7.0E+0	4.0E+0
100-41-4	Ethylbenzene	2.0E+1	2.4E+0	2.0E+0	1.6E+0	1.0E+1	1.5E+0
1330-20-7	Xylene (mixed isomers)	1.3E+2	1.4E+1	1.3E+0	1.6E+0	1.0E+2	9.0E+0
1634-04-4	Methyl t-Butyl ether	0.0E+0	5.7E-1	<1	2.9E+0	0.0E+0	2.0E-1
91-20-3	Naphthalene	3.4E+0	5.1E-1	<1	<1	3.4E+0	5.1E-1
108-95-2	Phenol	3.0E-1	0.0E+0	<1	<1	3.0E-1	0.0E+0

Cumulative Values:

RBCA SITE ASSESSMENT | **Cumulative Risk Worksheet**

Site Name: Arrow Rentals | Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, Californ | Site Location: 187 North L Street, Livermore, Californi | Date Completed: 19-Jul-00

CUMULATIVE RISK WORKSHEET

Cumulative Target Risk: 1.0E-5 Target Hazard Index: 1.0E+0

ON-SITE RECEPTORS

CONSTITUENTS OF CONCERN		Outdoor Air Exposure: Commercial		Indoor Air Exposure: Commercial		Soil Exposure: None		Groundwater Exposure: Commercial	
		Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0
CAS No.	Name	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient
71-43-2	Benzene	6.3E-9	3.6E-4	9.0E-7	5.1E-2			7.6E-6	2.4E-1
108-88-3	Toluene		3.6E-4		3.2E-2				2.0E-1
100-41-4	Ethylbenzene		9.3E-5		6.7E-3				1.5E-1
1330-20-7	Xylene (mixed isomers)		1.6E-4		9.9E-3				8.4E-2
1634-04-4	Methyl t-Butyl ether		8.9E-8		1.3E-5				2.0E-1
91-20-3	Naphthalene		4.2E-7		4.0E-5				1.2E-2
108-95-2	Phenol		1.9E-9		1.3E-6				6.2E-3
Cumulative Values:		**6.3E-9**	**9.6E-4**	**9.0E-7**	**1.0E-1**	**0.0E+0**	**0.0E+0**	**7.6E-6**	**8.9E-1**

■ indicates risk level exceeding target risk

RBCA SITE ASSESSMENT | **Cumulative Risk Worksheet**

Site Name: Arrow Rentals | Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, Californ | Site Location: 187 North L Street, Livermore, Californi | Date Completed: 19-Jul-00 | *3 OF 3*

CUMULATIVE RISK WORKSHEET

Cumulative Target Risk: 1.0E-5 | Target Hazard Index: 1.0E+0

Groundwater DAF Option: Domenico - First Order

OFF-SITE RECEPTORS

CONSTITUENTS OF CONCERN		Outdoor Air Exposure:				Groundwater Exposure:			
		Residential (100 ft)		Commercial (100 ft)		Residential (100 ft)		Commercial (100 ft)	
		Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0
CAS No.	Name	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient
71-43-2	Benzene	4.5E-9	2.1E-4	3.0E-9	1.7E-4	4.0E-9	1.1E-4	1.2E-9	3.8E-5
108-88-3	Toluene		2.1E-4		1.7E-4		5.9E-9		2.1E-9
100-41-4	Ethylbenzene		6.2E-5		4.5E-5		2.0E-3		7.1E-4
1330-20-7	Xylene (mixed isomers)		1.0E-4		7.4E-5		1.4E-6		5.0E-7
1634-04-4	Methyl t-Butyl ether		5.9E-8		4.2E-8		1.1E-3		4.0E-4
91-20-3	Naphthalene		2.8E-7		2.0E-7		1.6E-7		5.7E-8
108-95-2	Phenol		1.3E-9		9.0E-10		2.5E-3		8.8E-4
Cumulative Values:		**4.5E-9**	**5.9E-4**	**3.0E-9**	**4.6E-4**	**4.0E-9**	**5.7E-3**	**1.2E-9**	**2.0E-3**

■ indicates risk level exceeding target risk

APPENDIX I

REMEDIATION GOALS - ONSITE RESIDENTIAL SCENARIO

RBCA SITE ASSESSMENT | **Cumulative Risk Worksheet**

Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, California | Date Completed: 19-Jul-00 | *1 OF 3*

CUMULATIVE RISK WORKSHEET

CONSTITUENTS OF CONCERN		Representative Concentration		Proposed CRF		Resultant Target Concentration	
CAS No.	Name	Soil (mg/kg)	Groundwater (mg/L)	Soil	GW	Soil (mg/kg)	Groundwater (mg/L)
71-43-2	Benzene	2.5E+0	9.3E+0	6.3E+1	9.3E+2	4.0E-2	1.0E-2
108-88-3	Toluene	2.1E+1	9.4E+0	1.0E+1	9.4E+0	2.1E+0	1.0E+0
100-41-4	Ethylbenzene	2.0E+1	2.4E+0	5.0E+0	4.8E+0	4.0E+0	5.0E-1
1330-20-7	Xylene (mixed isomers)	1.3E+2	1.4E+1	5.0E+0	2.0E+0	2.6E+1	7.0E+0
1634-04-4	Methyl t-Butyl ether	0.0E+0	5.7E-1	NA	5.7E+0	0.0E+0	1.0E-1
91-20-3	Naphthalene	3.4E+0	5.1E-1	<1	<1	3.4E+0	5.1E-1
108-95-2	Phenol	3.0E-1	0.0E+0	<1	<1	3.0E-1	0.0E+0

Cumulative Values:

RBCA SITE ASSESSMENT | **Cumulative Risk Worksheet**

Site Name: Arrow Rentals | Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, Californ | Site Location: 187 North L Street, Livermore, Californi | Date Completed: 19-Jul-00

CUMULATIVE RISK WORKSHEET

Cumulative Target Risk: 1.0E-5 Target Hazard Index: 1.0E+0

ON-SITE RECEPTORS

CONSTITUENTS OF CONCERN		Outdoor Air Exposure: Residential Target Risk: 1.0E-6 / 1.0E-5	Outdoor Air Exposure: Residential Target HQ: 1.0E+0	Indoor Air Exposure: Residential Target Risk: 1.0E-6 / 1.0E-5	Indoor Air Exposure: Residential Target HQ: 1.0E+0	Soil Exposure: None Target Risk: 1.0E-6 / 1.0E-5	Soil Exposure: None Target HQ: 1.0E+0	Groundwater Exposure: Residential Target Risk: 1.0E-6 / 1.0E-5	Groundwater Exposure: Residential Target HQ: 1.0E+0
CAS No.	Name	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient
71-43-2	Benzene	2.9E-9	1.4E-4	5.9E-7	2.8E-2			8.9E-6	2.4E-1
108-88-3	Toluene		1.2E-4		1.5E-2				1.4E-1
100-41-4	Ethylbenzene		5.1E-5		4.4E-3				1.4E-1
1330-20-7	Xylene (mixed isomers)		6.4E-5		5.9E-3				9.6E-2
1634-04-4	Methyl t-Butyl ether		6.2E-8		1.1E-5				2.7E-1
91-20-3	Naphthalene		5.9E-7		6.9E-5				3.5E-2
108-95-2	Phenol		2.6E-9		2.3E-6				1.7E-2
	Cumulative Values:	**2.9E-9**	**3.8E-4**	**5.9E-7**	**5.4E-2**	**0.0E+0**	**0.0E+0**	**8.9E-6**	**9.3E-1**

■ indicates risk level exceeding target risk

RBCA SITE ASSESSMENT | **Cumulative Risk Worksheet**

Site Name: Arrow Rentals | Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, Californ | Site Location: 187 North L Street, Livermore, California | Date Completed: 19-Jul-00

CUMULATIVE RISK WORKSHEET

Cumulative Target Risk: 1.0E-5 | Target Hazard Index: 1.0E+0

Groundwater DAF Option: Domenico - First Order

OFF-SITE RECEPTORS

CONSTITUENTS OF CONCERN		Outdoor Air Exposure:				Groundwater Exposure:			
		Residential (100 ft) Target Risk: 1.0E-6 / 1.0E-5	Residential (100 ft) Target HQ: 1.0E+0	Commercial (100 ft) Target Risk: 1.0E-6 / 1.0E-5	Commercial (100 ft) Target HQ: 1.0E+0	Residential (100 ft) Target Risk: 1.0E-6 / 1.0E-5	Residential (100 ft) Target HQ: 1.0E+0	Commercial (100 ft) Target Risk: 1.0E-6 / 1.0E-5	Commercial (100 ft) Target HQ: 1.0E+0
CAS No.	Name	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient
71-43-2	Benzene	1.4E-9	6.6E-5	9.8E-10	5.5E-5	1.4E-9	3.7E-5	4.1E-10	1.3E-5
108-88-3	Toluene		5.9E-5		4.9E-5		1.5E-9		5.3E-10
100-41-4	Ethylbenzene		2.4E-5		1.7E-5		6.6E-4		2.4E-4
1330-20-7	Xylene (mixed isomers)		3.1E-5		2.2E-5		5.7E-7		2.0E-7
1634-04-4	Methyl t-Butyl ether		3.0E-8		2.1E-8		5.5E-4		2.0E-4
91-20-3	Naphthalene		2.8E-7		2.0E-7		1.6E-7		5.7E-8
108-95-2	Phenol		1.3E-9		9.0E-10		2.5E-3		8.8E-4
Cumulative Values:		**1.4E-9**	**1.8E-4**	**9.8E-10**	**1.4E-4**	**1.4E-9**	**3.7E-3**	**4.1E-10**	**1.3E-3**

■ indicates risk level exceeding target risk

APPENDIX J

REMEDIATION GOALS WITH DEED RESTRICTION ON GROUNDWATER - ONSITE COMMERCIAL SCENARIO

RBCA SITE ASSESSMENT | Cumulative Risk Worksheet

Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, California | Date Completed: 19-Jul-00 |

CUMULATIVE RISK WORKSHEET

CONSTITUENTS OF CONCERN		Representative Concentration		Proposed CRF		Resultant Target Concentration	
CAS No.	Name	Soil (mg/kg)	Groundwater (mg/L)	Soil	GW	Soil (mg/kg)	Groundwater (mg/L)
71-43-2	Benzene	2.5E+0	9.3E+0	1.0E+0	1.0E+0	2.5E+0	9.3E+0
108-88-3	Toluene	2.1E+1	9.4E+0	1.0E+0	1.0E+0	2.1E+1	9.4E+0
100-41-4	Ethylbenzene	2.0E+1	2.4E+0	1.0E+0	1.0E+0	2.0E+1	2.4E+0
1330-20-7	Xylene (mixed isomers)	1.3E+2	1.4E+1	1.0E+0	1.0E+0	1.3E+2	1.4E+1
1634-04-4	Methyl t-Butyl ether	0.0E+0	5.7E-1	1.0E+0	1.0E+0	0.0E+0	5.7E-1
91-20-3	Naphthalene	3.4E+0	5.1E-1	1.0E+0	1.0E+0	3.4E+0	5.1E-1
108-95-2	Phenol	3.0E-1	0.0E+0	1.0E+0	1.0E+0	3.0E-1	0.0E+0

Cumulative Values:

RBCA SITE ASSESSMENT | **Cumulative Risk Worksheet**

Site Name: Arrow Rentals | Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, Californ | Site Location: 187 North L Street, Livermore, Californi | Date Completed: 19-Jul-00 | *2 OF 3*

CUMULATIVE RISK WORKSHEET

Cumulative Target Risk: 1.0E-5 Target Hazard Index: 1.0E+0

ON-SITE RECEPTORS

CONSTITUENTS OF CONCERN		Outdoor Air Exposure: Commercial		Indoor Air Exposure: Commercial		Soil Exposure: None		Groundwater Exposure: Commercial	
		Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0
CAS No.	Name	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient
71-43-2	Benzene	3.4E-7	1.9E-2	5.0E-5	2.8E+0			9.4E-4	3.0E+1
108-88-3	Toluene		1.0E-3		8.8E-2				4.6E-1
100-41-4	Ethylbenzene		1.8E-4		1.3E-2				2.3E-1
1330-20-7	Xylene (mixed isomers)		2.0E-4		1.3E-2				1.1E-1
1634-04-4	Methyl t-Butyl ether		2.5E-7		3.6E-5				5.6E-1
91-20-3	Naphthalene		4.2E-7		4.0E-5				1.2E-2
108-95-2	Phenol		1.9E-9		1.3E-6				6.2E-3
Cumulative Values:		3.4E-7	2.1E-2	5.0E-5 ■	2.9E+0 ■	0.0E+0	0.0E+0	9.4E-4 ■	3.2E+1 ■

■ Indicates risk level exceeding target risk

$< 1 \times 10^{-6}$ < 1.0 as determined through the Gribi soil vapor data and RBSLs

Pathway eliminated through deed restriction on groundwater use.

RBCA SITE ASSESSMENT | **Cumulative Risk Worksheet**

Site Name: Arrow Rentals | Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, Californ | Site Location: 187 North L Street, Livermore, California | Date Completed: 19-Jul-00 | *3 OF 3*

CUMULATIVE RISK WORKSHEET

Cumulative Target Risk: 1.0E-5 Target Hazard Index: 1.0E+0

Groundwater DAF Option: Domenico - First Order

OFF-SITE RECEPTORS

CONSTITUENTS OF CONCERN		Outdoor Air Exposure:				Groundwater Exposure:			
		Residential (100 ft)		Commercial (100 ft)		Residential (100 ft)		Commercial (100 ft)	
		Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0
CAS No.	Name	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient
71-43-2	Benzene	2.6E-7	1.2E-2	1.6E-7	9.2E-3	4.9E-7	1.3E-2	1.5E-7	4.7E-3
108-88-3	Toluene		5.9E-4		4.8E-4		1.4E-8		5.0E-9
100-41-4	Ethylbenzene		1.2E-4		8.6E-5		3.2E-3		1.1E-3
1330-20-7	Xylene (mixed isomers)		1.4E-4		9.8E-5		1.8E-6		6.5E-7
1634-04-4	Methyl t-Butyl ether		1.7E-7		1.2E-7		3.2E-3		1.1E-3
91-20-3	Naphthalene		2.8E-7		2.0E-7		1.6E-7		5.7E-8
108-95-2	Phenol		1.3E-9		9.0E-10		2.5E-3		8.8E-4
	Cumulative Values:	2.6E-7	1.3E-2	1.6E-7	9.8E-3	4.9E-7	2.2E-2	1.5E-7	7.8E-3

■ Indicates risk level exceeding target risk

APPENDIX K

REMEDIATION GOALS WITH DEED RESTRICTION ON GROUNDWATER - ONSITE RESIDENTIAL SCENARIO

RBCA SITE ASSESSMENT | **Cumulative Risk Worksheet**

Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, California | Date Completed: 19-Jul-00

CUMULATIVE RISK WORKSHEET

CONSTITUENTS OF CONCERN		Representative Concentration		Proposed CRF		Resultant Target Concentration	
CAS No.	Name	Soil (mg/kg)	Groundwater (mg/L)	Soil	GW	Soil (mg/kg)	Groundwater (mg/L)
71-43-2	Benzene	2.5E+0	9.3E+0	1.0E+0	1.0E+0	2.5E+0	9.3E+0
108-88-3	Toluene	2.1E+1	9.4E+0	1.0E+0	1.0E+0	2.1E+1	9.4E+0
100-41-4	Ethylbenzene	2.0E+1	2.4E+0	1.0E+0	1.0E+0	2.0E+1	2.4E+0
1330-20-7	Xylene (mixed isomers)	1.3E+2	1.4E+1	1.0E+0	1.0E+0	1.3E+2	1.4E+1
1634-04-4	Methyl t-Butyl ether	0.0E+0	5.7E-1	1.0E+0	1.0E+0	0.0E+0	5.7E-1
91-20-3	Naphthalene	3.4E+0	5.1E-1	1.0E+0	1.0E+0	3.4E+0	5.1E-1
108-95-2	Phenol	3.0E-1	0.0E+0	1.0E+0	1.0E+0	3.0E-1	0.0E+0

Cumulative Values:

RBCA SITE ASSESSMENT | **Cumulative Risk Worksheet**

Site Name: Arrow Rentals | Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, Californ | Site Location: 187 North L Street, Livermore, Californi | Date Completed: 19-Jul-00 | *2 OF 3*

CUMULATIVE RISK WORKSHEET

Cumulative Target Risk: 1.0E-5 Target Hazard Index: 1.0E+0

ON-SITE RECEPTORS

CONSTITUENTS OF CONCERN		Outdoor Air Exposure: Residential Target Risk: 1.0E-6 / 1.0E-5		Indoor Air Exposure: Residential Target Risk: 1.0E-6 / 1.0E-5		Soil Exposure: None Target Risk: 1.0E-6 / 1.0E-5		Groundwater Exposure: Residential Target Risk: 1.0E-6 / 1.0E-5	
		Target HQ: 1.0E+0		Target HQ: 1.0E+0		Target HQ: 1.0E+0		Target HQ: 1.0E+0	
CAS No.	Name	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient
71-43-2	Benzene	5.4E-7	2.5E-2	1.0E-4	4.9E+0			3.2E-3	8.5E+1
108-88-3	Toluene		1.2E-3		1.5E-1				1.3E+0
100-41-4	Ethylbenzene		2.5E-4		2.2E-2				6.6E-1
1330-20-7	Xylene (mixed isomers)		2.9E-4		2.3E-2				3.1E-1
1634-04-4	Methyl t-Butyl ether		3.5E-7		6.3E-5				1.6E+0
91-20-3	Naphthalene		5.9E-7		6.9E-5				3.5E-2
108-95-2	Phenol		2.6E-9		2.3E-6				1.7E-2
Cumulative Values:		5.4E-7	2.7E-2	1.0E-4 ■	5.1E+0 ■	0.0E+0	0.0E+0	3.2E-3 ■	8.9E+1 ■

■ indicates risk level exceeding target risk

$< 1 \times 10^{-6}$ < 1.0

as determined through the Gribi soil vapor data and RBSLs

Pathway eliminated through deed restriction on groundwater use.

RBCA SITE ASSESSMENT | **Cumulative Risk Worksheet**

Site Name: Arrow Rentals | Site Name: Arrow Rentals | Completed By: Aquifer Sciences, Inc. | Job ID: 971275

Site Location: 187 North L Street, Livermore, Californi | Site Location: 187 North L Street, Livermore, California | Date Completed: 19-Jul-00

CUMULATIVE RISK WORKSHEET

Cumulative Target Risk: 1.0E-5 Target Hazard Index: 1.0E+0

Groundwater DAF Option: Domenico - First Order

OFF-SITE RECEPTORS

CONSTITUENTS OF CONCERN		Outdoor Air Exposure:				Groundwater Exposure:			
		Residential (100 ft) Target Risk: 1.0E-6 / 1.0E-5	Residential (100 ft) Target HQ: 1.0E+0	Commercial (100 ft) Target Risk: 1.0E-6 / 1.0E-5	Commercial (100 ft) Target HQ: 1.0E+0	Residential (100 ft) Target Risk: 1.0E-6 / 1.0E-5	Residential (100 ft) Target HQ: 1.0E+0	Commercial (100 ft) Target Risk: 1.0E-6 / 1.0E-5	Commercial (100 ft) Target HQ: 1.0E+0
CAS No.	Name	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient
71-43-2	Benzene	2.6E-7	1.2E-2	1.6E-7	9.2E-3	4.9E-7	1.3E-2	1.5E-7	4.7E-3
108-88-3	Toluene		5.9E-4		4.8E-4		1.4E-8		5.0E-9
100-41-4	Ethylbenzene		1.2E-4		8.6E-5		3.2E-3		1.1E-3
1330-20-7	Xylene (mixed isomers)		1.4E-4		9.8E-5		1.8E-6		6.5E-7
1634-04-4	Methyl t-Butyl ether		1.7E-7		1.2E-7		3.2E-3		1.1E-3
91-20-3	Naphthalene		2.8E-7		2.0E-7		1.6E-7		5.7E-8
108-95-2	Phenol		1.3E-9		9.0E-10		2.5E-3		8.8E-4
Cumulative Values:		2.6E-7	1.3E-2	1.6E-7	9.8E-3	4.9E-7	2.2E-2	1.5E-7	7.8E-3

■ indicates risk level exceeding target risk