HEALTH AND ENVIRONMENTAL RISK ASSESSMENT REPORT

ENGINEER'S HILL
SANTA RITA CORRECTIONAL FACILITY
DUBLIN, CALIFORNIA

ESE PROJECT NO. 6595145

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OCTOBER 19, 1995

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This report has been prepared by Environmental Science & Engineering, Inc. for the exclusive use of the Alameda County General Services Agency as it pertains to their site referred to as Engineer's Hill located at the Santa Rita Correctional Facility in Dublin, California. Our professional services have been performed using that degree of care and skill ordinarily exercised under similar circumstances by other scientists, geologists and engineers practicing in this field. No other warranty, express or implied, is made as to the professional advice in this report.

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October 19, 1995

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TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

EXECUTIVE SUMMARY

A health and environmental risk assessment was performed by Environmental Science & Engineering, Inc. (ESE) for the Alameda County General Services Agency (GSA) site referred to as Engineer's Hill located at the Santa Rita Correctional Facility in Dublin, California. The purpose of the risk assessment was to (1) evaluate the potential health risks posed by petroleum hydrocarbon residue in soil beneath and adjacent to the former underground storage tank (UST) area and (2) evaluate the potential for downward migration of petroleum hydrocarbons to ground water.

At the Engineer's Hill site, a former 1,000-gallon-capacity UST containing diesel fuel was used to fuel a boiler for the heating of local correctional facility residences. The UST was excavated, removed, and disposed of during May of 1992 (ESE, 1992).

On November of 1992, two phases of site assessment were conducted to determine (1) the lateral and vertical extent of petroleum hydrocarbons in soil and (2) whether ground water had been impacted at the site. Results of the assessments indicate that petroleum hydrocarbons have migrated laterally and vertically (approximately 35 and 65 feet, respectively) within a "dipping" sand layer to the west of the former UST area (ESE, 1994a; ESE, 1994b). The further downward migration of petroleum hydrocarbons was apparently prevented by the presence of a confining clay layer found at a depth of 65 feet below ground surface. The clay layer was determined to have a minimum thickness of 15 feet. Ground water was not found in any of the soil borings drilled at the site. The deepest soil boring was drilled to a maximum depth of 81 feet.

Results of the investigations also revealed that the only chemical released by the UST was diesel fuel. Diesel fuel is composed of long chain hydrocarbons (C_{12} to C_{22}). As such, diesel contains only small amounts of benzene, toluene, ethylbenzene and xylenes (BTEX, C_6 to C_8). Diesel components tend to have a low volatility, low water solubility and a strong tendency to adsorb to soil particles and soil organic matter. With this in mind, an exposure assessment was conducted as part of this risk assessment to determine the most likely exposure pathway(s) for diesel at the site. The most likely exposure pathway was found to be oral and dermal contact with impacted soil.* This exposure pathway is considered feasible only if impacted soil is excavated and exposed in the future. Another feasible exposure pathway is human contact with ground water that may become impacted by the petroleum hydrocarbons. Again, in this case, petroleum hydrocarbons now in soil must first migrate through the confining clay layer identified at a depth of 65 feet and known to extend to a depth of more than 81 feet. Ground water must also be found at a depth of at least 81 feet below ground surface. The potential for ground water impact under these extremely conservative conditions is explored in this risk assessment.

The inhalation of diesel vapors that may escape through the soil was not considered to be a complete and significant exposure pathway for the Engineer's Hill site. This conclusion was

* other pathways to be considered: 1) soil-vapor intrusion to buildings
2) soil-vapor/volitization to outside air

based on the low volatility of diesel fuel, its low BTEX content and the presence of the clean soil cap on top of the impacted soil.

Fate-and-transport analysis was performed using SESOIL, a seasonal soil compartment computer modeling program, using naphthalene as an indicator chemical for the soluble diesel components.

Results of the risk assessment indicated that:

- The presence of diesel fuel residue in subsurface soil at the Engineer's Hill site do not represent a health risk to on-site residents. Workers at the site may become in contact with diesel impacted soil only if soils are excavated and exposed in the future. Dermal and oral exposure to excavated soil does not represent a health risk, even if exposure lasts a lifetime.

- Similarly, populations residing outside the area studied are not at risk of becoming in contact with diesel released from the UST at the site.

- Results of the SESOIL simulation indicate that the petroleum hydrocarbons in soil beneath the former UST do not represent a threat to ground water. The SESOIL model predicted that naphthalene in diesel, will be essentially immobile at the site and will migrate at a maximum rate of 0.02 centimeters (0.008 inches) per year.

The calculated environmental risks incorporate a number of conservative assumptions that; when combined, represent a worst-case scenario and result in an overestimation of actual risks. Some of the assumptions made are as follows:

- Petroleum hydrocarbon migration, is assumed to occur at a constant rate for at least 30 years. This assumes that a continuous source of petroleum hydrocarbons will still be present at the site. This is an overly conservative assumption because the UST has been removed and the small mass of residual hydrocarbons will decrease with time.

- The petroleum hydrocarbon concentrations in soil used for modeling were the highest values reported to occur at the site. Concentrations of petroleum hydrocarbons in the soil were assumed to be static even though there is evidence that the concentration of petroleum hydrocarbons in soil decrease with time due to degradation by natural and biological processes.

In this risk assessment, the fate-and-transport model, parameters and toxicity data, as well as assumptions, were used following federal and state regulatory guidelines. These guidelines are meant to protect the public and tend to overestimate potential health risks. As such, this risk assessment provides an estimate of the upper boundary of potential health risks, rather than an accurate representation of true health risks posed by the site. In reality, the actual health risks could be as low as zero.

Based on the findings of this risk assessment, additional remedial action at the former UST site at Engineer's Hill site is not required. The presence of petroleum hydrocarbon residuals under the UST site do not pose an unreasonable risk to human health or to the environment. Therefore, ESE recommends that no further work be performed at the site because any additional remedial action undertaken would not be expected to result in greater protection of public health or the environment.

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1.0 INTRODUCTION

At the request of the Alameda County General Services Agency (GSA), ESE performed a health and environmental risk assessment for their site referred to as Engineer's Hill located at the Santa Rita Correctional Facility in Dublin, California. The objective of the risk assessment was to (1) evaluate the potential health risks posed by petroleum hydrocarbon residue in soil beneath and adjacent to the former UST area and (2) evaluate the potential migration of diesel fuel components down to ground water.

Risk assessment is a multidisciplinary data interpretation tool for evaluating potential threats to human health and the environment resulting from chemical releases. In recent years, risk assessment has been applied extensively to Superfund sites as part of the remedial investigation/feasibility study process. Risk assessments can be used to establish the need for site remediation and/or to establish cleanup criteria. The application of risk assessment to sites impacted by petroleum hydrocarbons can remove some of the ambiguity in the decision-making process and permit prudent, technically sound decisions that protect human health and the environment in a cost-effective manner.

This risk assessment follows the interim final guideline document from the California Environmental Protection Agency (Cal-EPA), formerly the California Department of Health Services, entitled *Scientific and Technical Standards for Hazardous Waste Sites* (Cal-EPA, 1992). This assessment incorporates, to the extent necessary, recent improvements and refinements in the practice of risk assessment. Current regulatory guidance requires risk assessments to be conservative in nature and to overestimate any potential risks. Therefore, actual risks associated with conditions evaluated in this risk assessment are likely to be much lower than those described here.

2.0 BACKGROUND

This section of the risk assessment presents general regional information about the geology and hydrogeology in the vicinity of the site, as well as a summary of the existing environmental data concerning constituents and concentrations beneath the site. All information contained in this section was obtained from prior ESE reports (ESE; 1994a and 1994b).

2.1 REGIONAL GEOLOGY

The site is located within the Coast Ranges geomorphic province (Norris & Webb, 1976) at the northern boundary of the Livermore Valley depression, located midway between the southern part of the San Francisco Bay and the San Joaquin Valley. The Livermore Valley is approximately 13 miles long in an east-west direction and approximately 4 miles wide and is completely surrounded by the hills of the Diablo Range.

The site is situated in the foothills demarcating the northern boundary of the Livermore Valley and the southern boundary of the Tassajara Upland. Unconsolidated fine-grained alluvial fan deposits of Quaternary age occur along the northern side of the Livermore Valley and consist of stratified beds of clay, silt, and sand formed by the deposition from streams draining upland areas composed of sandstone and shale of the Tassajara Formation (State of California Department of Water Resources [CDWR], 1974).

These draping alluvial fan deposits comprise a portion of the Livermore Valley alluvial sediments, also referred to as valley fill materials, which are reported to be greater than 500 feet in thickness (CDWR, 1974). The Livermore Valley fill materials are comprised mostly of younger alluvium overlying the fan deposits. The younger alluvium consists of unconsolidated deposits of interbedded clay, silt, fine sand, and lenses of clayey gravel.

The Livermore Valley is bisected by six major faults or fault groups and at least five other faults of a more local nature (CDWR, 1974). The major faults are the Carnegie, Tesla, Mocho, Livermore, Pleasanton, and Calaveras Faults. The minor faults include the Parks, Verona, and several unnamed faults. The site is located on a downdropped block of land bounded by the Mocho Fault to the north, the Parks Fault to the south, and Pleasanton Fault to the east.

2.2 REGIONAL HYDROGEOLOGY

The water-bearing sediments in the Livermore Valley can be described as multi-layered systems having an unconfined upper aquifer over a sequence of leaky or semiconfined aquifers (CDWR, 1974). Ground water in the valley moves downslope to the logintudinal axis of the valley and then in a generally westerly direction. The central and western portions of the Livermore Valley contain the greatest amount of fill materials and produce the largest quantities of water.

The site is located at the northern boundary of the Camp Sub-basin which covers an area of approximately 2,850 acres (CDWR, 1974). The sub-basin is drained by the Tassajara Creek and the Cottonwood Creek having source areas in the hills near the site and flow across the sub-basin along a southerly course. Unconfined to semiconfined ground water occurs in varying amounts throughout the sub-basin and have a potentiometric surface between 10 to 25 feet below grade. The potentiometric surface has been reported by the CDWR to have a southerly gradient at approximately 70 feet per mile.

Ground water in the Camp Sub-basin occurs in beds of alluvium consisting of sandy clay and sandy gravel which overlie the Tassajara Formation (CDWR, 1974). These water-bearing zones dip gently to the south at an angle of approximately three degrees. Ground water in this sub-basin has been analyzed by the CDWR and is classified as a sodium carbonate water of irrigation Class II quality.

2.3 PRECIPITATION AND WATER USAGE

Alameda County exhibits a Mediterranean type of climate characterized by winter rains and summer dryness (Hickenbottom and Muir, 1988). Winter rains are caused by frontal storms generated in the northern Pacific Ocean and the majority of this rainfall occurs during the months of November through March. The Alameda County Flood Control and Water Conservation District (ACFCWCD) collects rainfall data from at least 67 stations within Alameda County (CDWR, 1974). Two ACFCWCD stations, E50-2525 and E50-6991-06, are located at a distance of approximately three miles to the west and two miles to the southeast of the site, respectively. Based on precipitation data collected over a 100-year study period (1870 to 1970) and over a 9-year study period (1961-1970), the mean annual precipitation is reported to range between 14.27 to 14.58 inches.

All of the agriculture in the Livermore Valley is irrigated with ground water (CDWR, 1974). Ground water is also pumped for municipal and industrial uses. It is estimated that 80 percent of the average total volume of ground water utilized in the Livermore Valley is pumped from the Valley fill alluvial sediments and the remaining 20 percent is pumped from the deeper Tassajara and Livermore Formations.

The CDWR has reported that there are no data available concerning ground water production in the Camp Sub-basin where the site is located.

2.4 SITE DESCRIPTION AND HISTORY

The Engineer's Hill site is located within the Santa Rita Correctional Facility property boundary, approximately two miles northwest of the intersection of California Interstate 580 and Tassajara Road in Dublin, California (Figure 1). The site is owned and managed by the County of Alameda (County). At the site, the County formerly operated one 1,000-gallon-capacity UST containing diesel fuel (Figure 2). The UST was constructed of single-walled carbon-steel and fueled a boiler formerly located adjacent to the UST location. The installation date of the UST is unknown.

UST Removal

Under permit form the HCSA and the Dougherty Regional Fire Authority (DRFA), ESE removed and disposed of the UST on May 18, 1992. Personnel from the Alameda County Health Care Services Agency (HCSA) and the DRFA witnessed UST removal activities and subsequent soil sampling. No fluids were found in the UST prior to removal.

ESE personnel collected one native soil sample form the base of the UST excavation and submitted it to a California-certified laboratory where it was analyzed for total petroleum hydrocarbons as diesel (TPH-D); BTEX; and oil and grease (O&G). The sample was reported to contain TPH-D at a concentration of 190 milligrams per kilogram (mg/kg). No detectable concentrations of BTEX or O&G were reported in the sample. ESE submitted a closure report for the UST site to the GSA and the HCSA on June 25, 1992 (ESE, 1992).

UST Area Overexcavation

ESE supervised the overexcavation of impacted soil at the former UST site on November 8, 1992. The impacted soil was observed to extend to a depth of approximately 22 feet below grade, the limit of reach for the excavation equipment. One sample, collected by ESE from the impacted soil at a depth of 22 feet below grade, was submitted to a California-certified laboratory for analysis. The sample was reported to contain TPH-D at a concentration of 1,400 mg/kg and detectable concentrations of BTEX constituents.

To determine the areal extent of impacted soil, three test pits were excavated to maximum depths of 22 feet below grade at locations approximately 10 to 25 feet east, west, and south of the former UST location. No soil discoloration or petroleum hydrocarbon odors were noted at these locations. Ground water was not found in these excavations, and it was not known whether ground water beneath the site had been impacted. Results of the excavation activities were documented in a report submitted to the GSA and the HCSA on January 7, 1993 (ESE, 1993a). Based on these findings, ESE recommended further site assessment be performed to determine the vertical and lateral extent of petroleum hydrocarbons in the unsaturated zone beneath the site and to determine whether ground water at the site had been impacted.

Site Assessment

On June 29, 1993, ESE submitted a workplan for a site assessment to the HCSA on behalf of the GSA (ESE, 1993b). The site assessment was comprised of drilling and sampling soil in five borings (EH1 through EH5) and collecting one ground water sample from one boring using a Hydropunch® sampler. Boring EH1 was drilled to a total depth of 56 feet, Boring EH2 to 80 feet, and Borings EH3 through EH5 to 61 feet. Results of this assessment indicated that the UST excavation backfill material and formational sediments located beneath the backfill material to an approximate depth of 40 feet below grade are impacted with diesel fuel (ESE, 1994a). In addition, results indicated that the petroleum hydrocarbon plume appears to have migrated toward the west within an apparently dipping coarse-grained sand to silty sand layer. The lack of evidence of ground water saturation in the deepest boring (EH2) to a depth of 80 feet below grade and the presence of a non-impacted, "tight", clay layer of 15 feet minimum thickness beneath the impacted sediments has also suggested that the petroleum hydrocarbon plume has not migrated to ground water beneath the site (ESE, 1994a). Based on these findings, ESE

recommended that an additional site assessment be performed to more accurately define the petroleum hydrocarbon plume toward the west of the UST backfill in the apparently dipping sand layer.

Additional Site Assessment

On April 7, 1994, ESE submitted a workplan for additional site assessment to the HCSA on behalf of the GSA (ESE, 1994b). The additional site assessment was comprised of drilling and sampling soil in three borings (EH6, EH7 and EH8) located west of the UST backfill material (Figure 2). Borings EH6 and EH7 were drilled to a total depth of 81 feet and boring EH8 was drilled to 70 feet. Results of this assessment indicated that petroleum hydrocarbons in soil have migrated both laterally and vertically along the apparently dipping sand bed toward the west (Figure 3). The extent of the petroleum hydrocarbon plume in soil to the west of the UST backfill was estimated at approximately 5 to 25 feet west of boring EH8, based on (1) analytical results of soil samples collected from borings within the plume and (2) field observations of the decreasing thickness of the sand layer in a westerly direction. The continued lack of evidence of ground water saturation to a minimum depth of 81 feet below grade at the site and the presence of the "tight" clay layer of 15 feet minimum thickness beneath the impacted sediments suggests that the petroleum hydrocarbon plume has not migrated to ground water beneath the site (ESE, 1994b).

3.0 CHEMICALS OF POTENTIAL CONCERN

3.1 SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Chemicals of potential concern (COPCs) were selected for the site so that the most prevalent, mobile, persistent and toxic compounds detected at the site (i.e., those chemicals likely to represent the greatest potential threat to human health) could be quantitatively evaluated in the risk assessment. Based on the site history and analytical data, the COPCs for the site appear to be limited to petroleum hydrocarbons present in the soil as a result of a release from the former UST.

The presence of diesel by-products in soil is reported in analytical data as TPH-D. TPH-D is composed of hundreds of cyclic, aromatic, and straight-chain (aliphatic) hydrocarbons that vary in their chemical, physical and toxicological properties. TPH-D consists primarily of middle- to long-chain paraffinic or naphthalenic compounds. In general, long-chain petroleum hydrocarbons are considered to be slightly toxic and relatively nonvolatile and immobile in soil (Sandmeyer, 1981).

The constituents in diesel fuel that are considered to be of primary toxicological concern are polycyclic aromatic hydrocarbons (PAHs) (e.g., naphthalene), and secondarily, BTEX. The only chemicals reported to occur at detectable concentrations in soil samples collected at the site are toluene, ethylbenzene, xylenes (TEX) and TPH-D in soil (Table 1). As expected for a diesel fuel, TEX compounds were detected at very low to nondetectable concentrations. 8270 compounds not sought!

TPH-D levels at the site are useful for determining the extent of contamination, but it is not possible to evaluate the risks associated with TPH-D quantitatively. The term TPH-D represents a large conglomerate of compounds that are not necessarily consistent from site to site; thus, no toxicity criteria are available. The evaluation of risk can only be performed for specific compounds, not for a group of compounds with an unknown toxicity. Consequently, the COPCs selected for further risk assessment are naphthalene as an indicator for TPH-D and TEX. Since the concentration of naphthalene in TPH-D was not directly measured at the site, it is assumed that naphthalene makes up approximately 1.0 percent of the TPH-D mixture.

very conservative...

(other references suggest naphthalene concentrations in diesel closer to 0.13%)

3.2 TOXICITY ASSESSMENT

The toxicological profiles in Appendix A summarize the most recent information concerning the toxicological properties of the COPCs. The toxicological information includes the acute and chronic toxicity potential of the chemical, in addition to carcinogenic, developmental and reproductive adverse effects that can result from short- and long-term exposure to the chemical. For completeness, the acute effects of exposure are included in the toxicological profiles, although such effects are generally associated with industrial and accidental exposure and not with environmental exposures as evaluated in this risk assessment.

The toxicological profiles (Appendix A) also summarize the information relevant to the development of carcinogenic slope factors (SFs) and noncarcinogenic reference doses (RfDs) established by the U.S. Environmental Protection Agency (USEPA) and used in this risk assessment for the characterization of health risks.

4.0 EXPOSURE ASSESSMENT

Exposure assessment is the estimation of the timing (frequency and duration), route and magnitude of exposure to chemicals. These factors determine the total chemical intake of the exposed population. This section defines the nature of the potentially exposed populations at the site, discusses the relevant routes of exposure, and describes the methods used to estimate these exposures.

4.1 RECEPTOR POPULATIONS

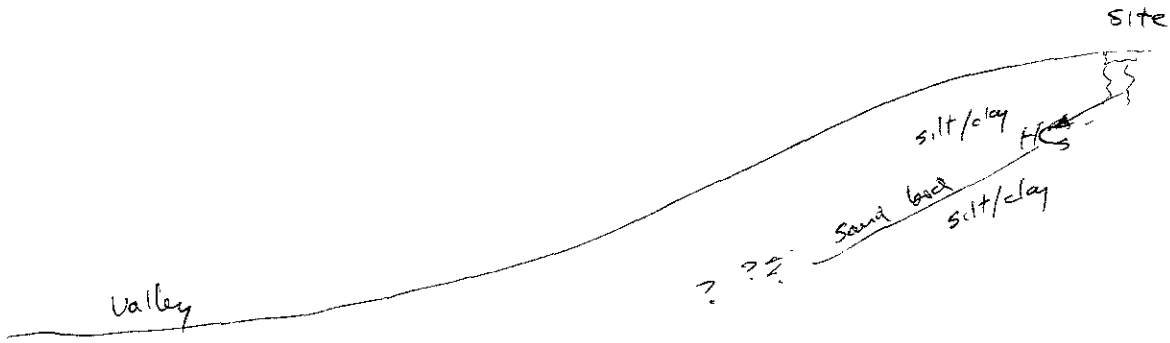
The County plans to maintain ownership of the property. Thus, current and future workers at the site were assumed to be the most likely potentially exposed population.

Off-site human receptors could theoretically be exposed to airborne COPCs, but the exposure of these individuals to COPCs was expected to be significantly less than that of on-site personnel. Therefore, the resultant health risks for off-site receptors were expected to be significantly lower than the potential risks incurred by on-site personnel. Wind dispersion and dilution plus the distance from the facility to off-site residential receptors were anticipated to contribute to considerable dispersion and dilution of any small amounts of vapors emanating from the facility. Therefore, only exposure to on-site personnel were evaluated in this assessment.

4.2 IDENTIFICATION OF EXPOSURE PATHWAYS

A graphical representation of plausible exposure pathways that may occur at the site are presented in Figure 4. Toxicants can be absorbed into a human body through inhalation, ingestion and skin absorption. Oral exposure to COPCs results from consumption of soil-contaminated food or drinking water. Soil particles can contaminate food when soil is disturbed by wind erosion or construction activities. Oral and dermal exposure to impacted soil was considered to be very unlikely given that impacted soil is found at a depth of at least 5 feet below ground. However, impacted soil could potentially be excavated in the future and be exposed to human contact or air erosion. Thus, the dermal and oral contact are considered to be complete exposure pathways.

recharge zone



DTW ?

Volatile components of petroleum hydrocarbons can migrate through the soil and volatilize to the atmosphere. This pathway is not considered to be significant for diesel fuel. Diesel fuel components have low volatility and tend to adsorb to soil particles. In addition, the concentration of volatile compounds in TPH-D at the site are very low (Table 1). Thus, the inhalation exposure pathway is not considered to be a complete exposure pathway.

The site assessment conducted at the site identified a "dipping" soil layer that may have served as a conduit for diesel fuel to migrate in the direction of ground water. The vertical downward migration of petroleum hydrocarbons was apparently halted when the migrating plume intersected a confining clay layer. There is no analytical data that indicates that petroleum hydrocarbons have migrated beyond a depth of 65 feet. However, the potential exists for soluble components of diesel fuel to dissolve in percolating water and impact the underlying ground water. Ground water could then be used as a source of drinking water or for agricultural or industrial uses. Thus, ground water is considered to be a potential receptor of chemicals at the site.

Bear in mind that the soil sand layer dips @ an angle to the west. Hence, although HC are migrating to deeper depths along this bed, the vector is not normal (⊥) to the horizontal plane.

It should be noted that the depth to ground water under the site is unknown. Ground water was not detected in any of the soil borings drilled at the site. The deepest soil boring was drilled to a maximum depth of 81 feet below ground surface. Thus, to be conservative, in this risk assessment it is assumed that ground water is found at a depth of 81 feet, the maximum depth explored. (All drilling occured on the top of a hill - near the former UST, likely an area of recharge.)

4.3 FATE-AND-TRANSPORT CONSIDERATIONS

Chemical, physical and biological processes can affect the fate-and-transport of chemicals in water, soil and air. The extent to which a chemical migrates in the environment is dependent on the physical and chemical properties of the individual chemicals, the physical and chemical properties of the soil, and factors such as temperature, humidity and species-specific characteristics of the biota.

There are three main mechanisms by which chemicals in the environment can migrate: (1) diffusion from an area of high concentration to an area of low concentration, (2) once dissolved in soil moisture, driven downward by gravity and capillary forces, and (3) as a pure-phase

liquid, again driven down by gravity and capillary forces. The rate of migration of a chemical in soil and its preferred pathway of migration will be influenced by the chemical and physical properties of the chemicals and soil, and by meteorological conditions prevalent in the area.

4.4 VADOSE ZONE MIGRATION PATHWAY

Given that petroleum hydrocarbons remain beneath and adjacent to the former UST area, it is necessary to determine if those hydrocarbons -- given their assumed concentrations, soil physical characteristics, weather conditions, etc. -- could potentially migrate down through the vadose zone. Also, it is necessary to estimate, if migration will take place, how long will it take for hydrocarbons to migrate down to ground water and at what concentrations will they reach the (assumed) ground water table.

In an effort to simplify the analysis, two approaches were used to evaluate the risks posed by petroleum hydrocarbon residues to ground water resources. First, the LUFT Manual Leaching Potential Analysis for Diesel (SWRCB, 1989) was used to determine acceptable soil concentrations for TEX compounds. The second approach consisted of using a computer model to simulate the percolation of diesel compounds in the vadose zone. The methods used and the results obtained in each approach are presented in the following sections.

4.4.1 Leaching Potential Analysis Using LUFT Manual

The California LUFT Manual (SWRCB, 1989) presents guidance for investigating leaks from underground fuel storage sites, assessing risk to the environment and in determining acceptable soil cleanup levels. According to the Leaching Potential Analysis for Diesel (LUFT Manual Table 2-2, page 27), the leaching potential analysis can be used to estimate the concentration of TPH-D and BTEX that can be left in place without threatening ground water.

The results of the Leaching Potential Analysis as applied to the Engineer's Hill site is presented in Table 3. According to the LUFT Manual, the maximum TEX concentrations that can be left in place are 0.30 mg/kg toluene, 1.0 mg/kg ethylbenzene and 1.0 mg/kg total xylenes. All the reported TEX concentrations for samples collected at the Engineer's Hill site are less than the acceptable cleanup level calculated by the Leaching Potential Analysis.

4.0 ppm Xylenes in sample Eth-1-15'

4.4.2 Leaching Potential Analysis Using SESOIL

The downward transport of TPH-D from the site was modeled with the SESOIL computer modeling program (Oak Ridge National Laboratory [ORNL], 1993). SESOIL is a seasonal soil compartment model that estimates the rate of vertical chemical transport and transformation in the soil column in terms of mass and concentration distributions among the soil, water and air phases in the unsaturated soil zone. The soil column is defined as a compartment which extends from the soil surface to the capillary fringe and ground water table (Bonazountas and Wagner, 1984).

SESOIL is designed for long-term environmental hydrologic, sediment and pollutant fate simulations. The model is structured around three cycles: (1) the hydrologic cycle which takes into account rainfall, infiltration, soil moisture, surface runoff, exfiltration, evapotranspiration, ground water discharge and capillary rise, (2) the sediment cycle, which is not incorporated here, and (3) the pollutant cycle which takes into account advection, diffusion, volatilization, absorption/desorption, chemical degradation/decay, biological transformation and uptake, hydrolysis, photolysis, oxidation and cation exchange.

Input and output parameters for this model use the metric system. Where necessary for clarity, the English system equivalent is indicated in the summary tables, figures and discussion.

4.4.2.1 Model Input

As stated in previous sections, diesel fuel is composed of hundreds of individual petroleum hydrocarbon compounds. The behavior of each hydrocarbon component is determined by its physical and chemical properties and their particular interactive properties with environmental media. Thus, the migration of TPH-D as a chemical mixture can not be conducted using available models. However, indicator chemicals can be selected from the TPH-D mixture that can represent the behavior of the mixture in the environment. For this simulation, naphthalene was selected as an indicator chemical for TPH-D. Naphthalene was considered to be a good indicator chemical because it is one of the most water soluble and mobile components of TPH-D.

All input parameters used in the SESOIL simulation are presented in Table 3. The following is a description and the rationale for each parameter used.

Input for SESOIL is performed by building five input data files:

- Climate Data
- Soil Data
- Chemical Data
- Application Data

The climate data file consists of twelve monthly climatological inputs. Data from the San Francisco International Airport weather station, which is the closest first-order weather station to the site, was considered representative for the site and incorporated into the models.

The soil data file consists of several parameters which describe soil properties. The physical properties of soil at the site have not been directly measured. In an effort to be conservative, soil properties typical of sandy soil were selected for the site. It should be noted that soils underlying the hydrocarbon plume consist of tight clay soils.

The chemical data file consists of several parameters used to describe the properties of the chemical of concern. For the site, available chemical parameters for naphthalene were obtained from Cal-EPA (Cal-EPA, 1994).

It is known that naphthalene is removed from environmental media by two major processes, volatilization and biodegradation. In order to be conservative, only volatilization was considered in the model. Volatilization is included because the model assumes that there is no cap (asphalt or cement) that prevents the volatilization of chemicals from soil or prevents the percolation of rain down to soil. The exclusion of the biodegradation of chemicals in soil does not directly affect the predicted chemical migration but increases the mass of naphthalene available for volatilization and for leaching to ground water.

The application data file consists of a number of inputs that describe soil-layer-specific data and the chemical application load. The area of application was assumed to be the soil under the site that contains the highest concentration of petroleum hydrocarbons (soil layer 2 from 22 to 65 feet below ground surface). This is consistent with geological conditions at the site as there is a clayey soil layer found at a depth of 65 feet. The application layer was placed on top of two clean soil layers of 8.0 feet each to make a total soil column of 81 feet. The total application

area was again defined by the estimated lateral extent of impacted soil, or 960 square feet (89.19 m^2). The model is one dimensional, that is, it is limited to calculations and predictions within the soil column defined by the input parameters.

The application of naphthalene to soil was modeled as a single event occurring at the beginning of the model run. There is no analytical data for naphthalene at the site. Thus, it was assumed that naphthalene makes up 1.0 percent of the TPH-D mixture. Based on this assumption, the initial naphthalene concentration in the simulation was assumed to be 1.0% of the TPH-D concentration found under the site (17,000 mg/kg TPH-D of soil in sample EH1 at 20 feet), or 170.00 mg/kg naphthalene. The application load was input into the second soil layer modeled (from 22 to 65 feet below ground surface).

4.4.2.2 Model Output

The SESOIL model for the site was run for a 30-year period (Appendix B). From the model run, five separate outputs were obtained:

1. total naphthalene volatilized (in μg/year)
2. naphthalene dissolved in soil moisture (in μg/ml)
3. naphthalene adsorbed to soil (in μg/g)
4. naphthalene in soil vapor (in μg/ml)
5. the total depth of naphthalene migration (in m/year)

For purposes of this assessment, only the rate of naphthalene migration in soil and the potential naphthalene concentrations at the front of the hydrocarbon plume are discussed further. SESOIL printouts (at 5-year intervals) are included in Appendix B. The model printouts present all outputs estimated by the model.

The results of the SESOIL model show that the major driving force for the downward migration of naphthalene is soil moisture. According to SESOIL, naphthalene migrated in the unsaturated zone at a maximum rate of about 0.02 centimeters (0.008 inches) per year. At this rate it will take more than 500 years for naphthalene dissolved in soil moisture to reach the assumed ground water level of 81 feet (Figure 5).

The results of the naphthalene model show that this chemical is essentially immobile at the site. Its vertical rate of migration is not expected to exceed 0.02 cm/year. It can also be concluded that naphthalene, currently in soil, will either volatilize from soil, be biodegraded or adsorb strongly to soil particles.

5.0 RISK CHARACTERIZATION

The exposure assessment identified potential receptors and activities that may result in exposures to the COPCs. The Risk Characterization section of a risk assessment combines the information obtained in the Exposure Assessment section with toxicological information available for each COPC to obtain an estimate of potential health effects. In the exposure assessment section of this risk assessment it was determined that the most likely pathways of human exposure to the COPC were the ingestion and dermal contact with impacted soil and ground water. It was further determined that for exposure to take place, impacted soil would have to be excavated and exposed; and, petroleum hydrocarbons present in soil would have to percolate down to ground water. While the potential for impacted soil is unlikely under future land use conditions, the probability that this will occur cannot be predicted. Thus, to be conservative, it is assumed that on-site workers may become in contact with soil impacted with diesel.

As for ground water, fate and transport modeling conducted in Section 4.4.2 concluded that it is extremely unlikely that TPH-D will impact ground water resources under the site. Therefore, on-site and off-site residents, who utilize ground water, are not at risk from becoming in contact with site related chemicals through their use of ground water. As this is an incomplete pathway, human exposure to ground water will not be further evaluated in this risk assessment.

In an effort to simplify the assessment, the potential risks from exposure to TPH-D impacted soil were not quantified. Instead, the maximum TEX concentrations detected at the site were compared with their respective Preliminary Remediation Goals (PRGs) developed by the USEPA. PRGs are chemical concentrations in environmental media (soil, air, and water), that are protective of humans, including sensitive subpopulations. According to the USEPA, if a site concentration is lower than the PRG (USEPA, 1995), the chemical does not pose a risk to humans even if exposure lasts a lifetime.

The maximum TEX concentrations detected at the site and TEX PRGs for residential and industrial soil are presented in Table 4. As can be seen, the maximum TEX concentrations at the site are at least two orders of magnitude lower than the residential PRGs. These results indicate that exposure to soil impacted by TEX at the site does not represent a risk to on-site and

off-site residents. It should be noted that excavation of and exposure to TPH-D impacted soil is extremely unlikely to occur in the future.

6.0 CONCLUSIONS AND RECOMMENDATIONS

The most likely exposure pathway considered in this risk assessment was dermal and oral exposure to impacted soil. The exposure assumptions and evaluations used in this assessment were conservative in order not to underestimate potential risk. These analyses indicate that the levels of petroleum hydrocarbons present in soil at the site do not represent a risk to on-site residents, to the surrounding community or to the environment. The hydrocarbon concentration now present under the site should dissipate through time as natural fate processes act to attenuate these hydrocarbon residuals.

Another possible chemical migration pathway that was considered possible at the site was percolation of TPH-D related chemicals through the soil column down to deeper aquifers. However, soil under the TPH-D plume appears to be underlain by a clay layer. As stated in Section 2.4, it is believed that this clay layer has acted as a barrier to further hydrocarbon migration under the site. In an effort to understand the potential migration of petroleum hydrocarbons at the site, a fate and transport model was conducted. The model conducted was very conservative. For example it assumed that ground water is found at a depth of 81 feet below ground surface. Results of fate and transport modeling have shown that petroleum hydrocarbons are not likely to reach ground water levels in the foreseeable future.

7.0 UNCERTAINTY ANALYSIS

This risk assessment for the Engineer's Hill site was based on site-specific data, laboratory analysis results, area-specific weather data, and assumed values and conditions. Site-specific data and laboratory results were validated and are supported by quality control and quality assurance documentation. Although professional judgment was used in the selection of each exposure assumption, some argument can be made about the validity of each assumption. The purpose of this section is to provide information concerning the validity of each assumption, including the effect of each assumption on the overall risk, the major data gaps, and the effect of these data gaps on the accuracy or reasonableness of the risk assessment.

It is important to fully specify the assumptions and uncertainties inherent in the risk assessment for two reasons: (1) to place the risk estimates in proper perspective, and (2) to identify key site-related variables and assumptions that contribute most to the conclusions reached in the risk assessment. The focus of this section is also to highlight parameters and site conditions that contribute most to the predicted risks and that can be further studied with a limited investment of resources. Another use of the uncertainty analysis can be to identify areas where a moderate amount of additional data collection might significantly improve the basis for selection of a remedial alternative.

There is always some doubt as to how well an exposure model or its mathematical expression approximates true relationships between environmental media and site-specific conditions. Ideally, one would like to use a fully validated model that accounts for all the known factors involved. At present, however, only simple, partially validated models are available and commonly used.

The uncertainty analysis considerations for all of the assumed parameters and conditions used in this risk assessment are shown in Table 5. The predicted worst-case incremental cancer risk — even with these numerous conservative assumptions — are below the level considered by regulatory agencies to pose a significant health risk.

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TABLES

TABLE 1. ANALYTICAL RESULTS OF SOIL SAMPLES COLLECTED DURING SITE ASSESSMENT

SAMPLE	SAMPLE DEPTH (feet)	TPH-D (mg/kg)	BENZENE (mg/kg)	TOLUENE (mg/kg)	ETHYL-BENZENE (mg/kg)	TOTAL XYLENES (mg/kg)
EH1	5	50	NA	NA	NA	NA
EH1	10	220	NA	NA	NA	NA
EH1	15	3100	0.005	0.005	0.600	4.000
EH1	20	17000	0.005	0.005	0.005	0.530
EH1	25	3900	0.005	0.005	0.005	0.240
EH1	30	66	0.005	0.005	0.005	0.017
EH1	35	27	0.005	0.005	0.005	0.005
EH1	40	1800	0.005	0.005	0.016	0.110
EH1	45	10	0.005	0.005	0.005	0.005
EH1	50	10	NA	NA	NA	NA
EH1	55	10	NA	NA	NA	NA
EH2	10	10	NA	NA	NA	NA
EH2	20	10	NA	NA	NA	NA
EH2	30	10	NA	NA	NA	NA
EH2	40	10	NA	NA	NA	NA
EH2	50	10	NA	NA	NA	NA
EH2	60	10	NA	NA	NA	NA
EH3	10	10	NA	NA	NA	NA
EH3	20	10	NA	NA	NA	NA
EH3	30	10	NA	NA	NA	NA
EH3	40	10	NA	NA	NA	NA
EH3	50	5600	0.005	0.022	0.043	0.300
EH3	60	10	0.005	0.005	0.005	0.005

TABLE 1 (Continued). ANALYTICAL RESULTS OF SOIL SAMPLES COLLECTED DURING SITE ASSESSMENT

SAMPLE	SAMPLE DEPTH (feet)	TPH-D (mg/kg)	BENZENE (mg/kg)	TOLUENE (mg/kg)	ETHYL-BENZENE (mg/kg)	TOTAL XYLENES (mg/kg)
EH4	10	10				
EH4	20	10	NA	NA	NA	NA
EH4	30	10	NA	NA	NA	NA
EH4	40	10	NA	NA	NA	NA
EH4	50	10	NA	NA	NA	NA
EH4	60	10	NA	NA	NA	NA
EH5	10	10	NA	NA	NA	NA
EH5	20	10	NA	NA	NA	NA
EH5	30	10	NA	NA	NA	NA
EH5	40	10	NA	NA	NA	NA
EH5	50	10	NA	NA	NA	NA
EH5	60	10	NA	NA	NA	NA
Analytical Results for Soil Samples Collected During Additional Site Assessment						
EH6	72	10	0.005	0.005	0.005	0.005
EH6	80	10	0.005	0.005	0.005	0.005
EH7	75	10	0.005	0.005	0.005	0.005
EH8	60	590	0.005	0.008	0.020	0.370
EH8	63	3900	0.005	0.030	0.085	0.440
EH8	65	10	0.005	0.005	0.005	0.005

NA = Not Analyzed

TABLE 2. COMPARISON OF MAXIMUM CONCENTRATIONS OF AROMATIC HYDROCARBONS WITH EPA ESTABLISHED PRELIMINARY REMEDIATION GOALS

PARAMETERS	UNITS	CHEMICALS		
		TOLUENE	ETHYL-BENZENE	TOTAL XYLENES
Maximum Concentration at Site *	mg/kg	0.03	0.085	4
PRG Residential **	mg/kg	1,900	690	990
PRG Industrial **	mg/kg	2,800	690	990

* Values taken from Table 1

** Values taken from USEPA, 1995

TABLE 3

Leaching Potential Analysis for Diesel
Using Total Petroleum Hydrocarbons(TPH)
and Benzene, Toluene, Xylene and Ethylbenzene (BTX&E)

The following table was designed to permit estimating the concentrations of TPH and BTX&E that can be left in place without threatening ground water. Three levels of TPH and BTX&E concentrations were derived (from modeling) for sites which fall into catagories of low, medium or high leaching potential. To use the table, find the appropriate description for each of the features. Score each feature using the weighting system shown at the top of each column. Sum the points for each column and total them. Match the total points to the allowable BTX&E and TPH levels.

SITE FEATURE	SCORE	SCORE 10 PTS IF CONDITION IS MET	SCORE	SCORE 9 PTS IF CONDITION IS MET	SCORE	SCORE 5 PTS IF CONDITION IS MET
Minimum Depth to Ground Water from the Soil Sample (feet)		>100	9	51-100		25-50\1
Fractures in subsurface (applies to foothills or mountain areas)		None	9	Unknown		Present
Average Annual Precipitation (inches)		<10	9	10-25		26-40\2
Man-made conduits which increase vertical migration of leachate	10	None		Unknown		Present
Unique site features: recharge area, coarse soil, nearby wells, etc	10	None		At least one		More than one
COLUMN TOTALS→TOTAL PTS	20	+	27	+	0	= 47
RANGE OF TOTAL POINTS	49pts or more		41 - 48 pts		40pts or less	
MAXIMUM ALLOWABLE B/T/X/E LEVELS (PPM)	1/50/50/50		.3/.3/1/1		NA\3	
MAXIMUM ALLOWABLE TPH LEVELS (PPM)	10000		1000		100	

\1 If depth is greater than 5 ft. but less than 25 ft., score 0 points. If depth is 5 ft. or less, this table should not be used.

\2 If precipitation is over 40 inches, score 0 points.

\3 Levels for BTX&E are not applicable at a TPH concentration of 100ppm

TABLE 4. SESOIL INPUT PARAMETERS

PARAMETER DEFINITION	UNITS	VALUE
SOIL PARAMETERS		
Soil Density	g/cm^3	1.90
Intrinsic Permeability	cm^2	1.00E-10
Disconnectedness Index	unitless	8.00
Porosity	%	30.00
Organic Carbon Content of Upper Soil Layer	%	0.10
Cation Exchange Capacity	milli. eq./100 g dry soil	0
Freundlich Exponent	unitless	1
CHEMICAL PARAMETERS		
Chemical Name		Naphthalene
Solubility	ug/ml	31.70
Diffusion Coefficient in air	cm^2/sec	0.069
Henry's Law Constant	m^3-atm/mole	0.0005
Adsorption Coefficient on Organic Carbon	unitless	1288
Adsorption Coefficient on Soil	unitless	0
Molecular Weight	g/mole	128.2
Valence	+/-	0
Neutral Hydrolysis Constant	/day	0
Base Hydrolysis Constant	l/mole-day	0
Acid Hydrolysis Constant	l/mole-day	0
Degradation Rate in Moisture	/day	0
Degradation Rate on Soil	/day	0
Ligand-Pollutant Stability Constant	unitless	0
No. Moles Ligand/Mole Pollutant	unitless	0
Ligand Molecular Weight	g/mole	0

TABLE 4 (Continued). SESOIL INPUT PARAMETERS

PARAMETER DEFINITION	UNITS	VALUE
APPLICATION PARAMETERS		
Number of Soil Layers	unitless	4
Years to be Simulated	unitless	30
Area	cm^2	891,869
Application Area Latitude	degrees	38
Soil Layer 1 Thickness	cm	671
Soil Layer 2 Thickness	cm	1250
Soil Layer 3 Thickness	cm	274
Soil Layer 4 Thickness	cm	274
Soil Layer Where Chemical is Applied		Second
Initial Chemical Concentration	mg/kg	170.00
pH of soil	unitless	7.00
Liquid Phase Biodegradation Ratio	unitless	1
Soil Phase Biodegradation Ratio	unitless	1
Organic Carbon Content Ratio	unitless	1
Cation Exchange Capacity Ratio	unitless	1
Frenudlich Exponent Ratio	unitless	1
Adsorption Coefficient Ratio	unitless	1

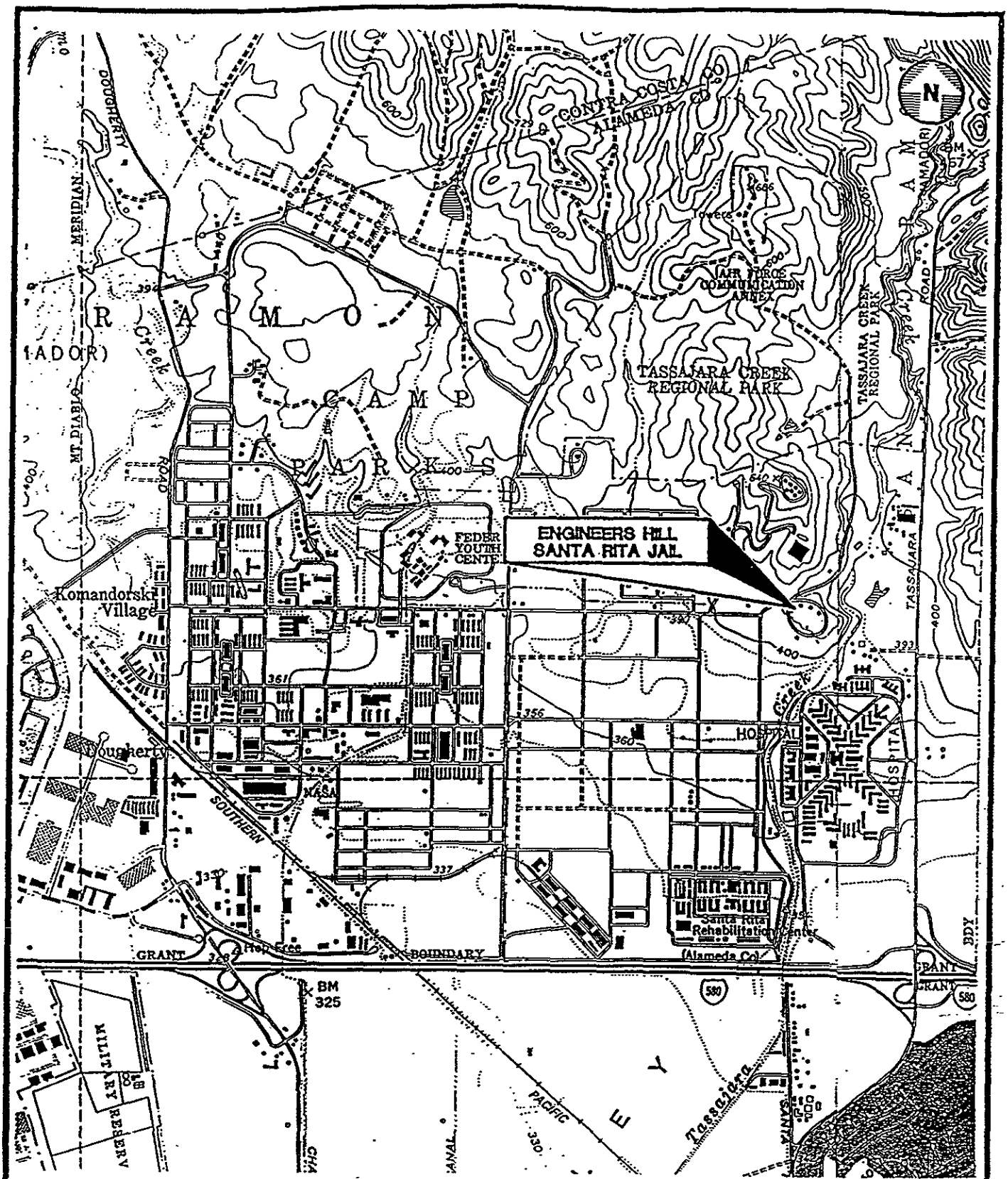
TABLE 5. ASSUMED PARAMETERS FOR RISK ASSESSMENT AND UNCERTAINTY ANALYSIS

EXPOSURE PARAMETER OR SCENARIO	RANGE OF POSSIBLE VALUES	VALUE USED IN RISK ASSESSMENT	RATIONALE FOR ITS USE	DATA GAPS	DIRECTION OF BIAS	EFFECT ON ESTIMATED RISK
Exposure Assessment						
Lateral extent of hydrocarbon impacted soil.	Known to be limited.	Assumed to be to cover an area of approximately 960 square feet.	Based on inferred extent of TPH-D impacted soil.	Exact data can be obtained by collecting additional soil samples.	Unbiased. Lateral extent of TPH-D migration is well defined.	None expected. Soil data available indicates lateral migration of hydrocarbons is limited.
Potential for human contact with TPH-D impacted soil.	No contact under current land use conditions. Contact may occur if impacted soil is excavated and exposed.	TPH-D is assumed to be excavated and exposed in the future. On-site workers are assumed to contact impacted soil.	Assumes "worst-case" exposure conditions.	Future land use is unknown. However, there is no reason to suspect that land use will change in the foreseeable future.	Highly conservative.	Overestimates risk. Risk is not existent if there is no human contact with impacted soil. Contact is not expected to occur if impacted soil is not excavated.
Depth to groundwater.	Actual depth to groundwater at the site is unknown. However, it is known to be deeper than 81 feet.	Depth to groundwater is assumed to be at a depth of 81 feet.	Groundwater was not found in any of the soil borings drilled at the site. Thus, to be conservative, it is assumed that groundwater is just below the deepest soil boring drilled (81 feet).	Additional soil borings could be drilled until groundwater is found.	Conservative.	Overestimates risk. Groundwater at the site is likely to be much deeper than 81 feet.
Groundwater is used by on-site residents as a source of drinking water.	Groundwater beneficial uses can range from domestic use to no beneficial use.	Groundwater used as a source of drinking water.	Assumption is consistent with "Antidegradation" policy of the State of California.	Monitoring wells could be installed at the site and the groundwater yield and quality could be assessed.	Unbiased.	None. Assumption is consistent with State risk assessment guidelines.

TABLE 5. (page 2 of 3)

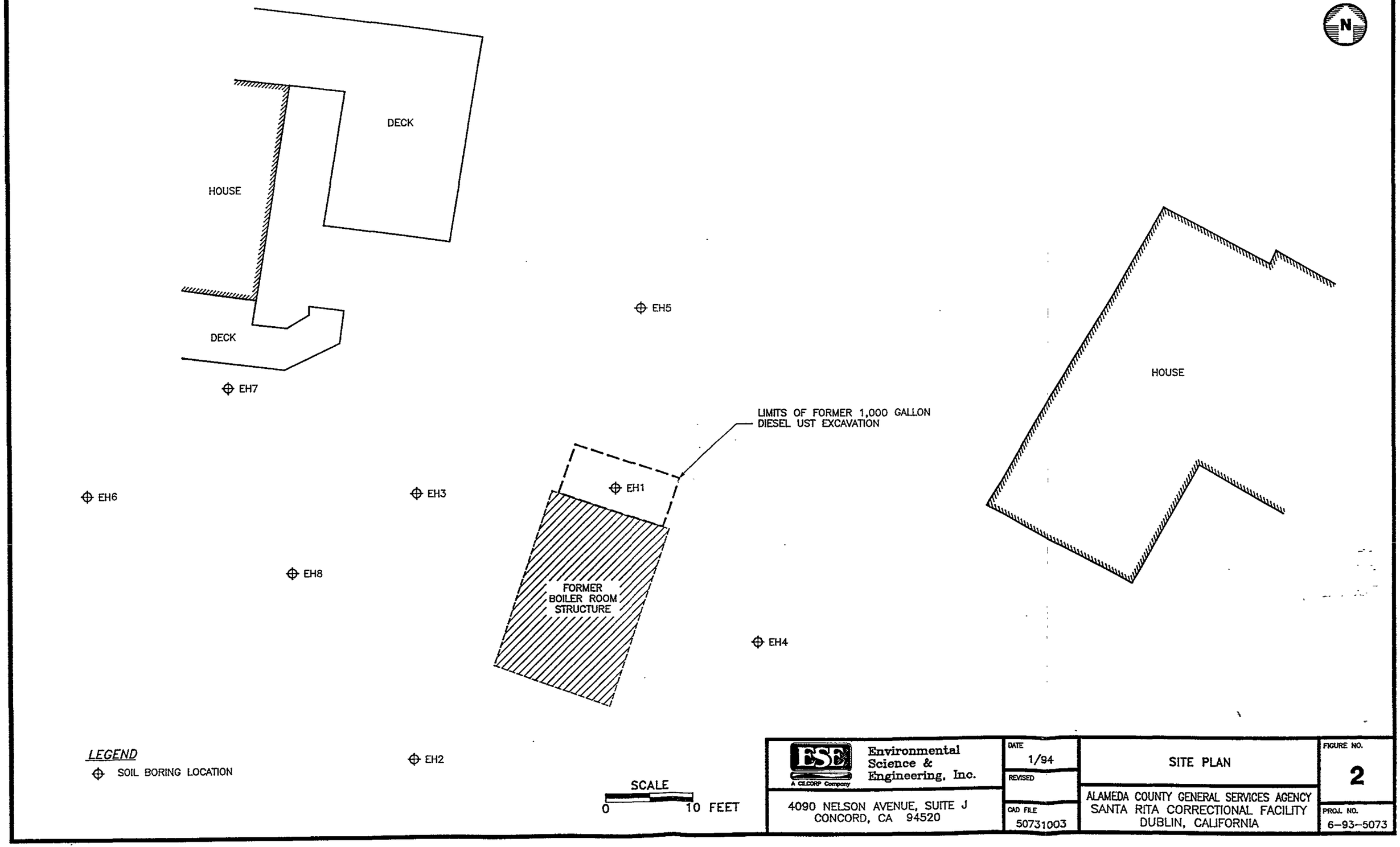
EXPOSURE PARAMETER OR SCENARIO	RANGE OF POSSIBLE VALUES	VALUE USED IN RISK ASSESSMENT	RATIONALE FOR ITS USE	DATA GAPS	DIRECTION OF BIAS	EFFECT ON ESTIMATED RISK
Vadose Zone Modeling (SESOIL)						
Uniform soil column under the site.	Sandy soil to clay.	Uniform clay soil column from 65 to 81 feet.	A clay layer was found under TPH-D plume.	None.	Unbiased.	None. Objective of SESOIL simulation was to see if petroleum hydrocarbons could potentially migrate through the clay soil layer at the site.
Risk Characterization						
Population at risk are on-site employees.	Highly sensitive individuals to healthy, resistant individuals.	Sensitive, adult individuals.	Land use is unlikely to change in the near future.	Cancer slope factors and reference doses are developed to protect sensitive and resistant populations.	Unbiased.	Likely to overestimate risk by a factor of 10 to 100. Unit risk values include a safety factor to account for sensitive populations.
Health risks estimated by comparing exposure point concentrations to USEPA's PRGs.	Health risks can be estimated using USEPA's exposure equations and default exposure parameters.	USEPA Region IX estimated "safe" exposure concentrations through the use of conservative exposure parameters.	Simplification of risk assessment. Exposure point concentrations at the site are so low that it was considered unnecessary to estimate health risks associated with such low chemical exposures.	Chemical exposure can be estimated using appropriate exposure equations and assumptions.	Conservative.	Overestimates risks. PRGs are derived by using conservative exposure parameters that overestimate risks.
Future use of the site.	Residential, commercial, industrial, or vacant.	County correctional facility for the next 30 years.	Surrounding developments are commercial or industrial.	None. The residential scenario could be considered. However, given the location of the site, it is unlikely that the site will be developed for a residence in the near future.	Unbiased.	None.

FIGURES

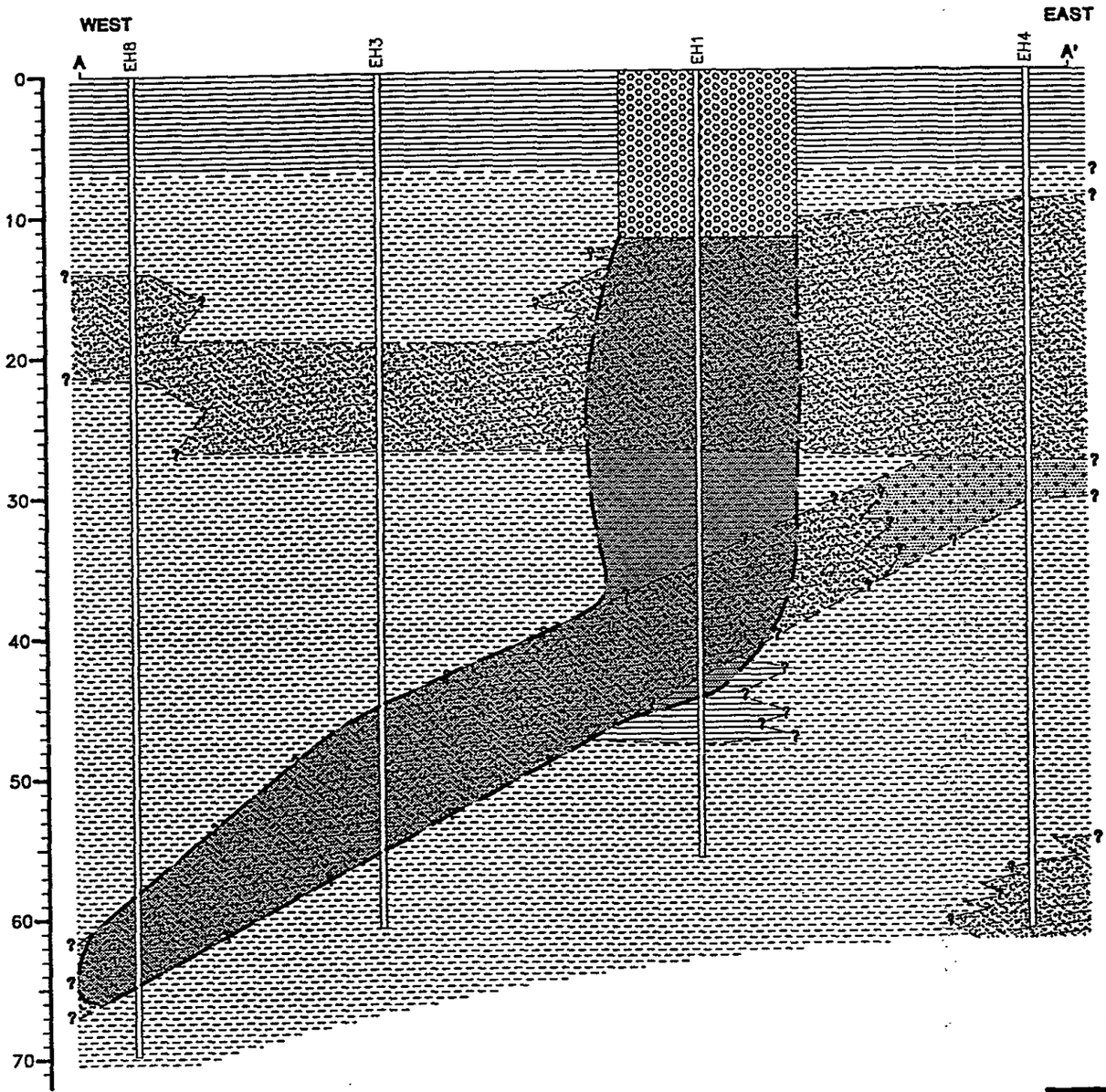


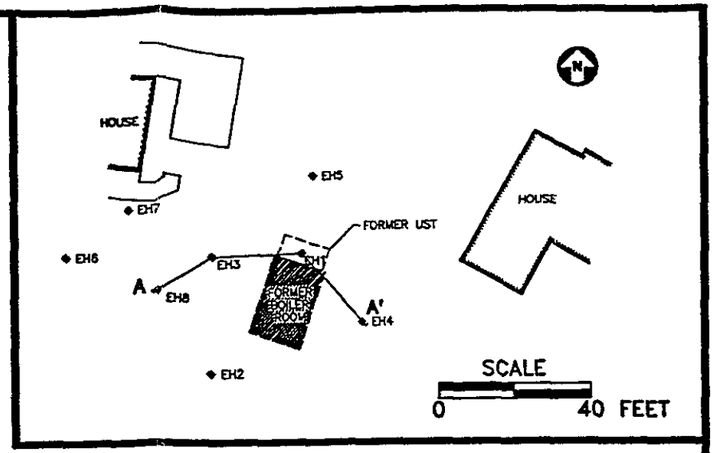
Adapted From USGS 7.5 Minute Dublin and Livermore Topographic Quadrangles (1980)

Environmental Science & Engineering, Inc. A CELCORP Company	DATE 6/93	PROJ. NO. 6-93-5073	ALAMEDA COUNTY GENERAL SERVICE AGENCY SANTA RITA CORRECTIONAL FACILITY DUBLIN, CALIFORNIA
	DRAWN BY CVS	CAD FILE 50731001	
4090 NELSON AVENUE, SUITE J CONCORD, CA 94520	APPROVED BY	REVISED	FIGURE 1 LOCATION MAP



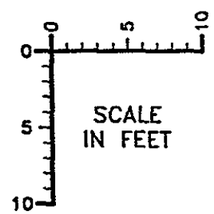
ESE A CILCORP Company — Environmental Science & Engineering, Inc. 4090 NELSON AVENUE, SUITE J CONCORD, CA 94520	DATE 1/94 REVISED CAD FILE 50731003	SITE PLAN ALAMEDA COUNTY GENERAL SERVICES AGENCY SANTA RITA CORRECTIONAL FACILITY DUBLIN, CALIFORNIA	FIGURE NO. 2 PROJ. NO. 6-93-5073



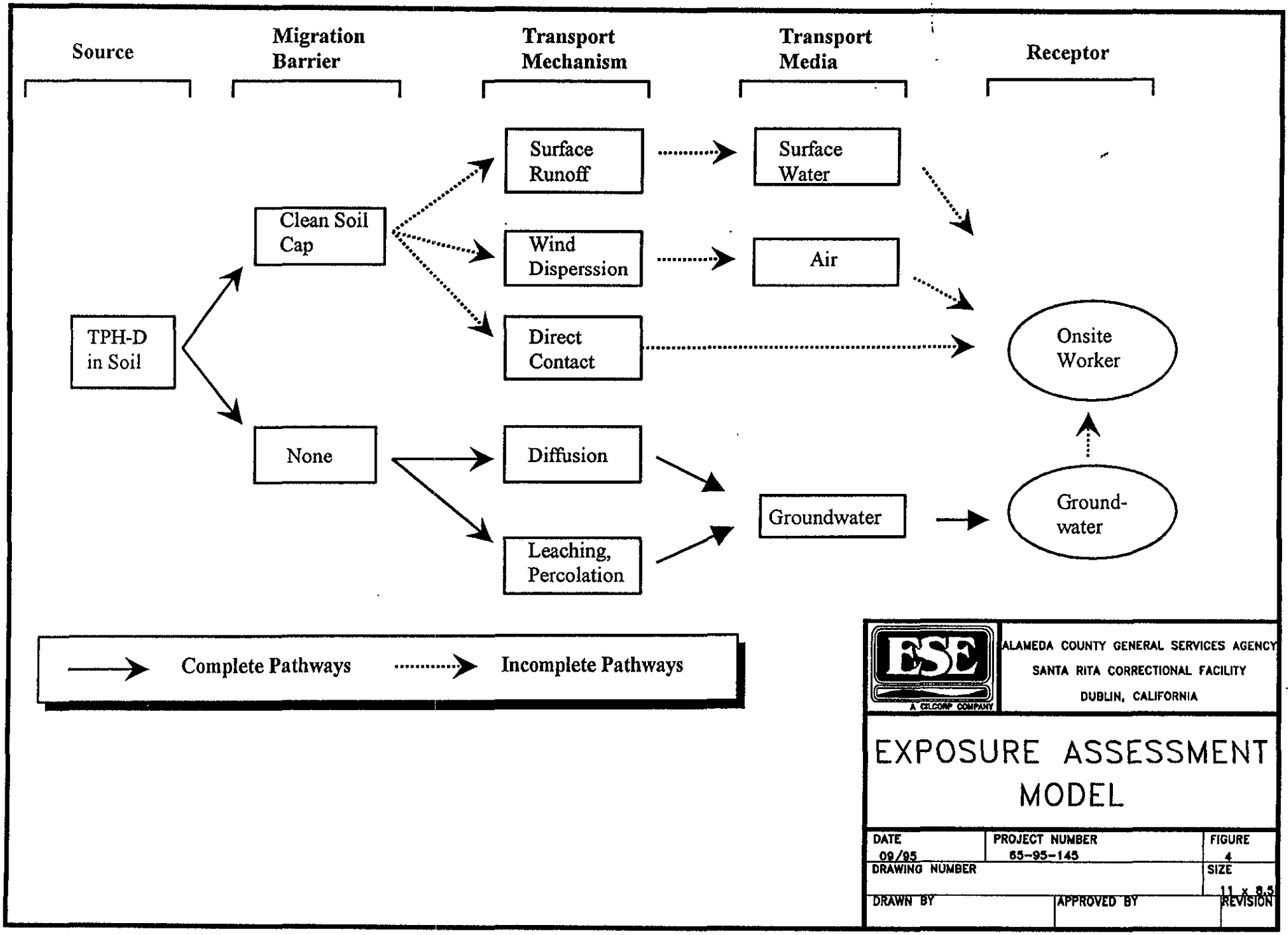


LEGEND

- UST EXCAVATION BACKFILL
- SAND, PEBBLY SAND, SILTY SAND
- SILT, SANDY SILT
- CLAY, SILTY CLAY
- GRAVEL
- ESTIMATED LIMITS OF PLUME OF DIESEL-IMPACTED SOIL IN UNSATURATED ZONE
- EH1 SOIL BORING LOCATION



ESE Environmental Science & Engineering, Inc. (A CALCORP Company) 4090 NELSON AVENUE, SUITE J CONCORD, CA 94520	DATE 2/94 REVISED 5/94 BSM CAD FILE 50731004	EAST-WEST ORIENTED SCHEMATIC CROSS-SECTION ALAMEDA COUNTY GENERAL SERVICES AGENCY SANTA RITA CORRECTIONAL FACILITY DUBLIN, CALIFORNIA	FIGURE NO. 3 PROJ. NO. 6-93-5073


Source
Migration Barrier
Transport Mechanism
Transport Media
Receptor
TPH-D in Soil
Clean Soil Cap
None
Surface Runoff
Wind Disperssion
Direct Contact
Diffusion
Leaching, Percolation
Surface Water
Air
Groundwater
Onsite Worker
Ground-water
Complete Pathways
Incomplete Pathways
ESE
A CELCORP COMPANY
ALAMEDA COUNTY GENERAL SERVICES AGENCY
SANTA RITA CORRECTIONAL FACILITY
DUBLIN, CALIFORNIA
EXPOSURE ASSESSMENT MODEL
DATE
09/95
PROJECT NUMBER
65-95-145
FIGURE
4
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11 x 8.5
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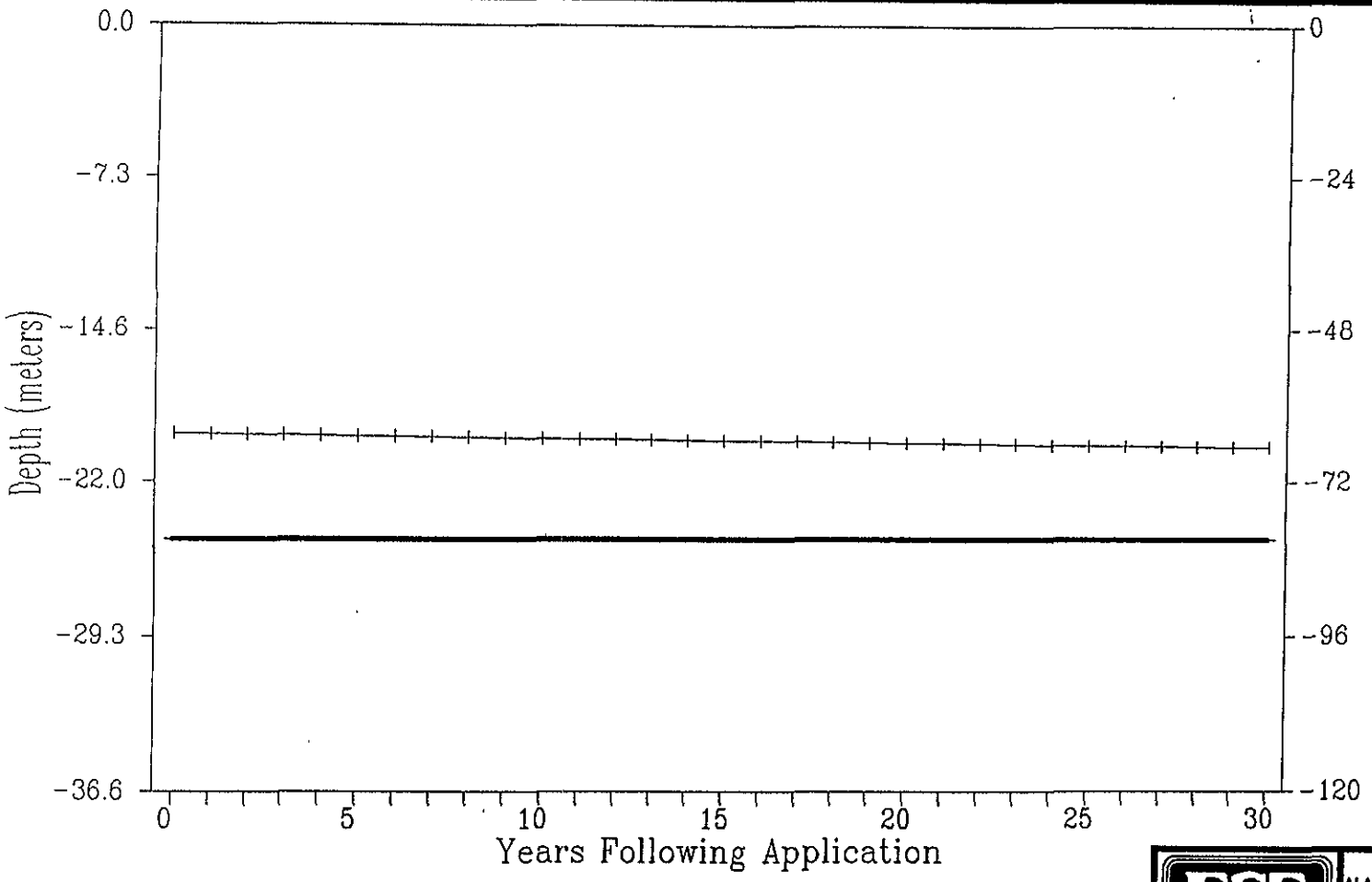
APPROVED BY
REVISION



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A GILCORP COMPANY

ALAMEDA COUNTY GENERAL SERVICES AGENCY
SANTA RITA CORRECTIONAL FACILITY
DUBLIN, CALIFORNIA

SESOIL ESTIMATED NAPHTHALENE MIGRATION IN SOIL

DATE	PROJECT NUMBER	FIGURE
09/95	65-95-145	5
DRAWING NUMBER		SIZE
		11 x 8.5
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APPENDICES

APPENDIX A

TOXICOLOGICAL PROFILES OF CHEMICALS OF CONCERN

TOXICITY PROFILE - ETHYLBENZENE

INTRODUCTION

Ethylbenzene is a colorless liquid with a gasoline-like odor. It occurs naturally as a component of coal tar and petroleum. The industrial manufacture of products such as paints, inks, and insecticides increases its environmental prevalence (ATSDR, 1990). Excessive exposure to ethylbenzene can affect the liver, kidneys, and respiratory, central nervous, and hematopoietic systems. Further details of ethylbenzene toxicity are discussed below.

DEVELOPMENT AND REPRODUCTIVE EFFECTS

No reports of developmental or reproductive toxicity following ethylbenzene exposure in humans were located in the scientific literature reviewed. Rats exposed to ethylbenzene via inhalation have exhibited fetotoxic effects; however, similarly exposed rabbits have not. Conclusive data on the potential reproductive toxicity of ethylbenzene in animals could not be located (ATSDR,1990).

OTHER NONCARCINOGENIC EFFECTS

Acute Exposure

Humans acutely exposed to high concentrations of ethylbenzene via inhalation have exhibited reversible central nervous system effects such as dizziness, and upper respiratory irritation accompanied by chest constriction. Rats and guinea pigs acutely exposed to high concentrations of ethylbenzene via inhalation have exhibited central nervous system depression and diminished muscular coordination. Humans acutely exposed to ethylbenzene vapor have exhibited ocular irritation with profuse lachrymation (ATSDR,1990).

Chronic Exposure

Humans chronically exposed to ethylbenzene via inhalation have exhibited possible hematopoietic effects. These results remain inconclusive; however, rats chronically exposed to ethylbenzene via inhalation have exhibited hematopoietic effects including increased platelet and leukocyte counts. Humans chronically exposed to ethylbenzene via inhalation have not exhibited hepatic effects, but subchronically exposed mice, rats, guinea pigs, and monkeys have exhibited hepatotoxicity (ATSDR,1990). No other confirmed findings of systemic effects of chronic inhalation exposure in humans or animals were located in the literature reviewed. No data on the potential effects of chronic oral exposure in humans were located in the literature reviewed, and data on similarly exposed animals are limited. Rats chronically exposed to ethylbenzene via the oral route have exhibited hepatic and renal toxicity; however, these findings are equivocal due to inadequacies in study design (ATSDR,1990).

The chronic oral reference dose (RfD) of 0.1 mg/kg/day developed by the EPA (1995) is based on the finding of Wolf et al., (1956), who observed liver and kidney toxicity in rats subchronically exposed to ethylbenzene via the oral route. A no observed effect level (NOEL) and a lowest observed effect level (LOEL) of 97.1 mg/kg/day and 291 mg/kg/day, respectively, were identified in the study. The EPA used an uncertainty factor of 1,000 to account for intraspecies and interspecies variability and for extrapolation from subchronic to chronic exposure. The EPA assigned a low confidence level to the ethylbenzene RfD on the basis of low confidence in the study, because only one sex of rats was tested and animals were only subchronically exposed; and low confidence in the data base, which lacked additional oral toxicity data (EPA,1993). The subchronic oral RfD of 1.0 mg/kg/day (EPA,1995) is based on the same study (Wolf et al., 1956).

The inhalation reference concentration (RfC) of 1.00 mg/m^3, developed by the EPA, is equivalent to an inhalation RfD of 0.29 mg/kg/day (EPA,1995). These values were based on the work of Andrew et al. (1981) and Hardin et al. (1981), who evaluated developmental toxicity in rats and rabbits following inhalation exposures to ethylbenzene. On the basis of these studies, a no observed adverse effect level (NOAEL) and a lowest observed adverse effect level (LOAEL) of 434 mg/m^3 and 4,340 mg/m^3, respectively, were determined. The EPA used an uncertainty factor of 300 to account for protection of the most sensitive humans, interspecies conversion, and the lack of any multigeneration reproductive studies and chronic studies. The EPA assigned a low confidence level to the ethylbenzene RfC on the basis of: low confidence in study by Hardin et al. (1981), due to a lack of higher exposure levels, and low confidence in the database (EPA,1995).

CARCINOGENIC EFFECTS

Tests for genotoxicity and mutagenicity of ethylbenzene have been negative. The EPA has assigned ethylbenzene to the weight of evidence Group D (not classifiable as to human carcinogenicity) due to a lack of human and animal studies (EPA,1995). No oral or inhalation slope factors or unit risk have been developed.

REFERENCES

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TOXICITY PROFILE – NAPHTHALENE

INTRODUCTION

Naphthalene, also known as white tar, in a white solid, crystalline flakes, or powder. Its prevalence in the environment is due to both natural and anthropogenic sources. It is a naturally occurring component of crude oil and a natural combustion product produced, for example, by forest fires. Motor vehicle emissions, cigarette smoke, and its use as a chemical intermediate in industrial manufacturing contribute to its prevalence in the environment (ATSDR,1990). Naphthalene can affect the blood, eyes, liver, and kidneys.

DEVELOPMENTAL/REPRODUCTIVE TOXICITY

Exposure of pregnant women to high levels of naphthalene via ingestion has been shown to cause fetal toxicity in the form of neonatal hemolytic anemia (Anziulewicz et al.,1959; Zinkham and Childs,1958). No data on the potential reproductive effects of naphthalene in humans were located in the available scientific literature. Data on the developmental or reproductive effects of naphthalene in animals are limited. Rabbits exposed to naphthalene inutero have developed cataracts and retinal damage (USEPA,1984).

NONCARCINOGENIC EFFECTS

ACUTE TOXICITY

There have been reports of deaths in humans following the intentional ingestion of mothballs, which contain naphthalene. There is also one report of an infant who died after inhaling naphthalene (the diapers had been stored in mothballs). Hepatotoxicity has been observed in humans following acute exposure to naphthalene via inhalation or oral exposure. Nephrotoxicity has been observed following oral exposure, and there is some evidence of minor neurological effects as well. The primary target site of acute naphthalene toxicity is, however, the red blood cell, resulting in hemolytic anemia. Hemolytic responses are common to all reports of poisoning in humans. These effects have also been seen in some animals. Lung damage has been observed in mice following intraperitoneal injections of naphthalene; however, studies of acute inhalation exposure in humans have not demonstrated pulmonary toxicity (ATSDR,1990).

CHRONIC TOXICITY

Data on the potential adverse effects of chronic naphthalene exposure in humans are limited. Exposure to naphthalene at high doses for extended periods can result in hemolytic anemia (USEPA,1984). There are also equivocal occupational data suggesting that cataracts and possibly other ocular damage including retinal hemorrhage and chorioretinitis can result from chronic exposure (USEPA,1984). In animals, repeated oral exposure to high doses has been associated with hepatotoxicity; the effects included increased liver weight and induction of some hepatic enzymes (ATSDR,1990).

The USEPA-reported subchronic and chronic oral reference doses (sRfD and cRfD) are both 4 x 10-2 mg/kg/day (USEPA,1994). These values were based on a National Toxicology Program animal study in which rats orally exposed to naphthalene via gavage for 13 weeks showed a decrease in body weight gain (NTP,1980). A no-observed effect level (NOEL) of 50 mg/kg/day was reported for this study with an uncertainty factor of 10,000 in order to calculate the RfD (USEPA,1994). No further information was available. The USEPA cautions that this RfD is under review and subject to change. No reference concentration/dose is available due to a lack of toxicity data via this route.

CARCINOGENIC EFFECTS

No data on potential carcinogenic effects in humans could be located in the available scientific literature. In animals, the findings are equivocal. Adkins et al. (1986) reported a significant increase in the incidence of pulmonary adenomas in mice that were chronically exposed to high concentrations of naphthalene via inhalation; however, there was no positive dose—response correlation, and other bioassays have reported negative findings. Naphthalene tested mostly negative in a variety of genotoxicity assays (ATSDR,1990). The USEPA has not developed slope factors for naphthalene for the oral or inhalation routes due to a lack of human carcinogenicity data and inadequate animal carcinogenicity data. The USEPA has classified naphthalene as a Group D chemical, not classifiable as to human carcinogenicity (USEPA,1995).

REFERENCES

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TOXICITY PROFILE - TOLUENE

INTRODUCTION

Toluene is a colorless, watery liquid also known as phenyl-methane and toluol. Its environmental prevalence results from both natural and anthropogenic sources, being a naturally occurring substance found in crude oil and in some plants. Toluene is also produced from petroleum refining, as a by-product of styrene production, and from coke-oven operations. These processes, in addition to its use in chemical manufacturing, paints, lacquers and adhesives, and printing and leather tanning processes, have contributed to its presence in the environment (ATSDR,1989). Exposure to high doses of toluene primarily affects the central nervous system. Further details of toluene toxicity are described below.

DEVELOPMENTAL AND REPRODUCTIVE TOXICITY

Developmental studies of humans exposed to toluene have yielded inconclusive results due to confounding with other solvent exposure. No human reproductive studies were located in the literature reviewed. Mice and rabbits exposed to toluene have exhibited renal and skeletal anomalies, retarded skeletal development, and retarded growth in-utero and post partum. However, developmental effects have not been observed in animals exposed via the oral route. Toluene has not been observed to be a reproductive toxicant in animal studies (ATSDR,1989).

OTHER NONCARCINOGENIC EFFECTS

Acute Toxicity

Concern over excessive exposure to toluene has been based primarily on acute effects on the central nervous system. Humans acutely exposed to toluene via inhalation have exhibited euphoria and lightheadedness followed by narcosis, which is characterized by impaired intellectual, psychomotor, and neuromuscular function. An increased duration of exposure leads to central nervous system depression which can result in death. In humans who died from acute toluene exposure (primarily solvent abusers), central nervous system depression, cardiac arrhythmias, asphyxia, and hepatic and renal failure have been reported to be the cause of death (ATSDR,1989). Data on potential effects from acute oral exposure to toluene in humans and animals were not located in the available literature reviewed.

Chronic Toxicity

Chronic inhalation exposure to toluene in humans has also been associated primarily with central nervous system effects including reversible impairment of neuromuscular function. Permanent cerebral and cerebellar damage have occasionally been reported in longtime solvent abusers, with effects including ataxia, tremors, and impairment of speech, vision, and hearing. These findings

may have been confounded by exposure to other chemicals. Few other effects have been observed in humans exposed chronically via inhalation; respiratory irritation, reversible decreases in leucocyte counts and possible renal effects have been documented. Rats and mice chronically exposed to toluene via inhalation have exhibited hematopoietic effects (decreased leucocytes, reduced hematocrit and increased hemoglobin) and hepatic effects (changes in liver weight but no histopathological changes). The liver and kidney are not considered to be major target organs in humans or animals (ATSDR,1989). Data on chronic oral exposure in humans were not located in the literature reviewed. The limited animal data indicate that chronic oral exposure affects the central nervous system in mice (behavioral deficits) but has no effects on the liver, kidney, or blood in rats (ATSDR,1989).

The chronic oral reference dose (RfD) developed by the EPA for toluene is 0.2 mg/kg/day (EPA,1995), on the basis of a study by the National Toxicology Program in which rats were exposed to toluene via gavage for 13 weeks (NTP,1989). This study identified a no observed adverse effect level (NOAEL) of 223 mg/kg/day, and a lowest observed adverse effect level (LOAEL) of 446 mg/kg/day for significant changes in liver and kidney weights. An uncertainty factor of 1,000 was utilized to account for inter- and intraspecies extrapolation, subchronic to chronic extrapolation, and limited reproductive and developmental toxicity data. The EPA assigned a medium confidence level to the oral RfD on the basis of high confidence in the study and medium confidence in the supportive database, because of the lack of chronic and reproductive studies (EPA,1995). The subchronic oral RfD developed by the EPA (1993) for toluene is 2.0 mg/kg/day and is based on the same study (NTP, 1989).

The chronic inhalation reference concentration (RfC) developed by the EPA for toluene is 0.4 mg/m^3, which EPA converts to an inhalation RfD of 0.114 mg/kg/day. The RfD and RfC are based on an occupational study by Foo et al. (1990), which reported neurological effects (impaired neurobehavioral function) and documented a LOAEL of 119 mg/m^3; no NOAEL was determined. The uncertainty factor utilized to calculate the RfC was 300, to account for intraspecies variability, the use of a LOAEL rather than a NOAEL, and deficiencies in the database. The EPA assigned a medium confidence level to the RfC on the basis of medium confidence in the principal study, due to the paucity of exposure information and lack of a NOAEL; and medium confidence in the database, because of a lack of long-term human data (EPA,1995). The subchronic inhalation RfD developed by the EPA for toluene is 5.71 mg/kg/day (converted from an RfC of 2 mg/m^3) and is based on an acute human inhalation study by Andersen et al. (1983). The NOAEL for toluene documented by this study was 40 ppm and the critical effects observed were central nervous system effects and irritation of the eyes and nose. An uncertainty factor of 100 was applied to account for sensitive subpopulations and extrapolation from acute to subchronic exposure; no confidence level was reported (EPA,1993).

CARCINOGENIC EFFECTS

The EPA has assigned toluene to the weight-of-evidence Group D (not classifiable as to human carcinogenicity on the basis of inadequate or no evidence of carcinogenicity). There are no human data and animal carcinogenicity data are inadequate. In several studies, the rate and incidence of cancer in animals exposed to toluene were not significantly different than those for control animals. In addition, the majority of genotoxicity assays for toluene did not give positive results. No carcinogenic slope factors have been developed for toluene (EPA,1995).

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TOXICITY PROFILE - MIXED XYLENES

INTRODUCTION

Mixed xylenes consist of ortho(o-), para(p-), and meta(m-) xylene isomers; however, the toxicity of the different xylene isomers is essentially equivalent. Because of this, the following discussion applies to the mixture as well as the individual isomers. Xylenes are naturally occurring substances that are also introduced into the environment by anthropogenic sources. Petroleum, coal tar, plants, and combustion products are natural sources of xylenes. Anthropogenic sources of xylenes include gasoline and diesel engine emissions, solvents, rubber and cement, pesticidal sprays, and industrial manufacture of plastics and organic chemicals. Exposure to xylenes can affect the central nervous system, gastrointestinal tract, blood, liver, and kidneys. Further details of xylene toxicity are presented below.

DEVELOPMENTAL AND REPRODUCTIVE TOXICITY

Data on potential developmental and reproductive effects of xylenes in humans are limited. Inhalation exposure of rats and mice resulted in increased fetal death, decreased fetal weight, delayed skeletal development, and skeletal anomalies. Oral exposure of rats and mice to xylenes has been associated with cleft palate and decreased fetal weight. Increased spontaneous abortions have been observed in the wives of occupationally exposed men but these results are inconclusive due to inadequacies in study design. No reproductive effects have been observed in rats exposed to xylenes via the oral route (ATSDR,1990).

OTHER NONCARCINOGENIC EFFECTS

Acute Toxicity

Humans acutely exposed to xylenes via inhalation may exhibit upper respiratory irritation and dyspnea, gastrointestinal effects (nausea, vomiting, gastric discomfort), and neurological effects (impaired short-term memory and reaction time, dizziness, confusion, labored breathing, incoordination, coma, and seizures). However, the neurological effects were observed in a study where subjects were exposed to other solvents in addition to xylenes. There has been one reported human fatality after acute inhalation exposure; the autopsy findings included severe lung congestion and edema with focal hemorrhage. There have been reported fatalities in humans who acutely ingested large quantities of xylenes, and one clinical report of a coma in a similar case. Rats acutely exposed to xylenes via ingestion have exhibited hepatic effects (increased liver weight and biochemical changes) (ATSDR,1990).

Chronic Toxicity

Humans chronically exposed to xylenes via inhalation have exhibited cardiovascular effects including heart palpitations, chest pain, and abnormal ECG findings. Findings of hepatic damage in humans chronically exposed via inhalation are inconclusive; however, rats similarly exposed have exhibited hepatic effects including increased hepatic weight and metabolic changes. Renal effects in humans occupationally exposed to xylenes via inhalation include increased blood urea. These findings are inconclusive, however, because of confounding exposures to other solvents. Humans exposed chronically via inhalation have exhibited neurological effects similar to those seen in acute exposure. No conclusive data on potential adverse effects following chronic ingestion of xylenes by humans were located in the literature reviewed. Rats subchronically exposed via the oral route exhibited hepatic changes (increased liver weight, biochemical changes) and renal changes (increased renal weight, histopathological changes), and chronic oral exposure of rats resulted in neurological changes (hyperactivity) (ATSDR,1990).

The chronic oral reference dose (RfD) developed by the EPA for mixed xylenes is 2.0 mg/kg/day (EPA,1995). This value is based on a National Toxicology Program (NTP,1986) study in which rats and mice were exposed to mixed xylenes via gavage for 103 weeks. An adjusted NOAEL of 179 mg/kg/day was determined. Critical effects included hyperactivity, decreased body weight, and increased mortality (in males). An uncertainty factor of 100 was utilized combining factors of 10 for species-to-species extrapolation and 10 to protect sensitive individuals (EPA,1995). The EPA assigned a medium confidence level to the oral RfD on the basis of the following: the principal study was assigned a medium confidence level because clinical chemistry, blood enzymes, and urinalysis tests were not performed although other aspects of study design were adequate; and the database was assigned a medium confidence level because a lowest observed adverse effect level (LOAEL) for chronic oral exposure has not been defined (EPA, 1995). Chronic oral RfDs of 2.0 mg/kg/day have been derived for both o- and m-xylenes on the basis of the same NTP (1986) study; no chronic oral RfD is available for p-xylene (EPA,1993). The subchronic oral RfD for mixed xylenes as well as m- and o-xylene is 4.0 mg/kg/day (EPA,1993), based on the same NTP (1986) study, in which rats were exposed via gavage for 13 weeks. No subchronic oral RfD was available for p-xylene. The inhalation RfD for mixed xylenes has been withdrawn by EPA for review and is not currently available. No inhalation RfDs are currently available for individual isomers.

CARCINOGENIC EFFECTS

The EPA has assigned xylenes to the weight of evidence Group D (not classifiable as to human carcinogenicity on the basis of no or inadequate evidence). There are no human carcinogenicity data and animal data were considered inadequate. The NTP (1986) study in which rats and mice were administered mixed xylenes via gavage for 103 weeks reported no significant changes in the incidence of neoplastic lesions in either rats or mice that could be considered related to the mixed xylene treatment. Other animal studies of carcinogenicity have reported negative or inconclusive results, and both human and animal tests for mutagenicity and genotoxicity have been negative. No slope factors or unit risks have been developed (EPA,1995).

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APPENDIX B

SESOIL PRINT-OUT

1

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*****************************************************************************************************
*****                                                                                           *****
***** SESOIL-84 :  SEASONAL CYCLES OF WATER, SEDIMENT, AND POLLUTANTS IN SOIL ENVIRONMENTS      *****
*****                                                                                           *****
***** DEVELOPERS:  M. BONAZOUNTAS,ARTHUR D. LITTLE INC.  ,(617)864-5770,X5871                  *****
*****              J. WAGNER     ,DIS/ADLPIPE, INC.      ,(617)492-1991,X5820                 *****
*****                                                                                           *****
***** MODIFIED EXTENSIVELY BY:                                                                 *****
***** D.M. HETRICK                                                                             *****
***** OAK RIDGE NATIONAL LABORATORY                                                            *****
***** (615) 576-7556                                                                           *****
***** VERSION   :  OCTOBER, 1993                                                               *****
*****                                                                                           *****
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****** MONTHLY SESOIL MODEL OPERATION ******
MONTHLY SITE SPECIFIC SIMULATION

RUN: 1

REGION	: (1)	SAN FRANCISCO WSO AP
SOIL TYPE	: (1)	Sandy Soil
COMPOUND	: (1)	Naphthalene (DTSC, 1994)
WASHLOAD DATA	: (0)	
APPLICATION AREA	: (1)	Engineer's Hill Application Data

GENERAL INPUT PARAMETERS

-- SOIL INPUT PARAMETERS --

SOIL DENSITY (G/CM**3):	1.90
INTRINSIC PERMEABILITY (CM**2):	.100E-11
DISCONNECTEDNESS INDEX (-):	8.00
POROSITY (-):	.300
ORGANIC CARBON CONTENT (%):	.100
CATION EXCHANGE CAPACITY (MILLI EQ./100G DRY SOIL):	.000E+00
FREUNDLICH EXPONENT (-):	1.00

1

-- CHEMICAL INPUT PARAMETERS --

SOLUBILITY (UG/ML):	31.7
DIFFUSION COEFFICIENT IN AIR (CM**2/SEC):	.690E-01
HENRYS LAW CONSTANT (M**3-ATM/MOLE):	.500E-03
ADSORPTION COEFFICIENT ON ORGANIC CARBON(KOC):	.129E+04
ADSORPTION COEFFICIENT ON SOIL (K):	.000E+00
MOLECULAR WEIGHT (G/MOL):	128.
VALENCE (-):	.000E+00
NEUTRAL HYDROLYSIS CONSTANT (/DAY):	.000E+00
BASE HYDROLYSIS CONSTANT (L/MOL-DAY):	.000E+00

ACID HYDROLYSIS CONSTANT (L/MOL-DAY):	.000E+00
DEGRADATION RATE IN MOISTURE (/DAY):	.000E+00
DEGRADATION RATE ON SOIL (/DAY):	.000E+00
LIGAND-POLLUTANT STABILITY CONSTANT (-):	.000E+00
NO. MOLES LIGAND/MOLE POLLUTANT (-):	.000E+00
LIGAND MOLECULAR WEIGHT (G/MOL):	.000E+00

-- APPLICATION INPUT PARAMETERS --

NUMBER OF SOIL LAYERS:	4			
YEARS TO BE SIMULATED:	30			
AREA (CM**2):	0.892E+06			
APPLICATION AREA LATITUDE (DEG.):	38.0			
SPILL (1) OR STEADY APPLICATION (0):	1			
MODIFIED SUMMERS MODEL USED (1) OR NOT (0) FOR GWR. CONC.:	0			
INITIAL CHEMICAL CONCENTRATIONS GIVEN (1) OR NOT GIVEN (0)	0			
DEPTHS (CM):	0.67E+03	0.12E+04	0.27E+03	0.27E+03
NUMBER OF SUBLAYERS/LAYER	1	1	1	1
PH (CM):	7.0	7.0	7.0	7.0
INTRINSIC PERMEABILITIES (CM**2):	0.00E+00	0.00E+00	0.00E+00	0.00E+00
KDEL RATIOS (-):	1.0	1.0	1.0	
KDES RATIOS (-):	1.0	1.0	1.0	
OC RATIOS (-):	1.0	1.0	1.0	
CEC RATIOS (-):	1.0	1.0	1.0	
FRN RATIOS(-):	1.0	1.0	1.0	
ADS RATIOS(-):	1.0	1.0	1.0	

1

YEAR - 1 MONTHLY INPUT PARAMETERS

-- CLIMATIC INPUT PARAMETERS --

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
TEMP. (DEG C)	16.000	12.390	9.560	8.830	10.330	11.280	12.940	14.940	17.110	18.670	18.670	18.500
CLOUD CVR (FRAC.)	0.400	0.500	0.600	0.600	0.550	0.550	0.500	0.450	0.300	0.300	0.300	0.300
REL. HUM.(FRAC.)	0.650	0.700	0.800	0.800	0.750	0.750	0.700	0.700	0.700	0.600	0.650	0.650
ALBEDO (-)	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160
EVAPOT. (CM/DAY)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PRECIP. (CM)	2.720	6.450	9.300	12.240	8.250	7.620	3.870	0.770	0.250	0.070	0.110	0.550
M.TIME RAIN(DAYS)	0.320	0.510	0.690	0.790	0.570	0.580	0.500	0.190	0.100	0.021	0.039	0.120
M. STORM NO. (-)	1.530	4.140	5.080	5.510	5.000	5.030	3.110	0.770	0.230	0.090	0.110	0.470
M. SEASON (DAYS)	30.400	30.400	30.400	30.400	30.400	30.400	30.400	30.400	30.400	30.400	30.400	30.400

-- POLLUTANT INPUT PARAMETERS --

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
POL. INP-1 (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TRNSFORMD-1 (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SINKS-1 (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
LIG.INPUT-1 (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
VOLATILIZATION MULT.-1	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
SURFACE RUNOFF MULT.	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
POL. IN RAIN (FRAC-SL)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01

POL. INP-2 (UG/CM**2)	4.10E+05	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TRNSFORMD-2 (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SINKS-2 (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
LIG.INPUT-2 (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
VOLATILIZATION MULT.-2	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
POL. INP-3 (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TRNSFORMD-3 (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SINKS-3 (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
LIG.INPUT-3 (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
VOLATILIZATION MULT.-3	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
POL. INP-L (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TRNSFORMD-L (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SINKS-L (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
LIG.INPUT-L (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
VOLATILIZATION MULT.-L	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

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YEAR - 2 MONTHLY INPUT PARAMETERS

-- CLIMATIC INPUT PARAMETERS ARE SAME AS LAST YEAR

-- POLLUTANT INPUT PARAMETERS --

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
POL. INP-1 (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TRNSFORMD-1 (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SINKS-1 (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
LIG.INPUT-1 (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
VOLATILIZATION MULT.-1	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
SURFACE RUNOFF MULT.	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
POL. IN RAIN (FRAC-SL)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
POL. INP-2 (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TRNSFORMD-2 (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SINKS-2 (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
LIG.INPUT-2 (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
VOLATILIZATION MULT.-2	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
POL. INP-3 (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TRNSFORMD-3 (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SINKS-3 (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
LIG.INPUT-3 (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
VOLATILIZATION MULT.-3	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
POL. INP-L (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TRNSFORMD-L (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SINKS-L (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
LIG.INPUT-L (UG/CM**2)	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
VOLATILIZATION MULT.-L	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00

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YEAR - 3 MONTHLY INPUT PARAMETERS

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-- CLIMATIC INPUT PARAMETERS ARE SAME AS LAST YEAR

-- POLLUTANT INPUT PARAMETERS ARE SAME AS LAST YEAR
1
YEAR -  5    MONTHLY INPUT PARAMETERS
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-- CLIMATIC INPUT PARAMETERS ARE SAME AS LAST YEAR

-- POLLUTANT INPUT PARAMETERS ARE SAME AS LAST YEAR
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YEAR - 10    MONTHLY INPUT PARAMETERS
=========    ========================

-- CLIMATIC INPUT PARAMETERS ARE SAME AS LAST YEAR

-- POLLUTANT INPUT PARAMETERS ARE SAME AS LAST YEAR
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YEAR - 15    MONTHLY INPUT PARAMETERS
=========    ========================

-- CLIMATIC INPUT PARAMETERS ARE SAME AS LAST YEAR

-- POLLUTANT INPUT PARAMETERS ARE SAME AS LAST YEAR
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YEAR - 20    MONTHLY INPUT PARAMETERS
=========    ========================

-- CLIMATIC INPUT PARAMETERS ARE SAME AS LAST YEAR

-- POLLUTANT INPUT PARAMETERS ARE SAME AS LAST YEAR
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YEAR - 25    MONTHLY INPUT PARAMETERS
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-- CLIMATIC INPUT PARAMETERS ARE SAME AS LAST YEAR

-- POLLUTANT INPUT PARAMETERS ARE SAME AS LAST YEAR
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YEAR - 30    MONTHLY INPUT PARAMETERS
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-- CLIMATIC INPUT PARAMETERS ARE SAME AS LAST YEAR

-- POLLUTANT INPUT PARAMETERS ARE SAME AS LAST YEAR
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YEAR -  1    MONTHLY RESULTS (OUTPUT)
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-- HYDROLOGIC CYCLE COMPONENTS --

                OCT      NOV      DEC      JAN      FEB      MAR      APR      MAY      JUN      JUL      AUG      SEP
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MOIS. IN L1 (%)	17.102	17.402	18.002	18.602	18.782	18.902	18.512	18.302	18.182	17.822	18.332	18.152
MOIS. BELOW L1 (%)	17.102	17.402	18.002	18.602	18.782	18.902	18.812	18.602	18.482	18.422	18.332	18.152
PRECIPATION (CM)	2.728	6.581	9.222	12.346	8.252	7.596	3.862	0.846	0.404	0.154	0.263	0.658
NET INFILT. (CM)	0.541	1.795	2.318	2.586	2.014	2.046	1.220	0.215	0.068	0.015	0.027	0.115
EVAPOTRANS. (CM)	0.792	1.239	1.141	1.406	1.700	1.856	1.417	0.698	0.384	0.229	0.278	0.552
MOIS. RETEN (CM)	-0.185	0.617	1.235	1.235	0.370	0.247	-0.112	-0.395	-0.226	-0.097	-0.185	-0.370
SUR. RUNOFF (CM)	2.188	4.786	6.904	9.760	6.238	5.550	2.642	0.631	0.336	0.139	0.237	0.543
GRW. RUNOFF (CM)	-0.066	-0.061	-0.057	-0.055	-0.057	-0.057	-0.060	-0.063	-0.064	-0.066	-0.066	-0.066
YIELD (CM)	2.122	4.725	6.847	9.705	6.181	5.493	2.582	0.569	0.272	0.073	0.171	0.477
PAU/MPA (GZU)	1.003	1.020	0.992	1.009	1.000	0.997	0.998	1.099	1.616	2.202	2.393	1.197
PA/MPA (GZ)	1.003	1.020	0.992	1.009	1.000	0.997	1.037	1.253	2.276	10.315	2.393	1.197

1 -- POLLUTANT MASS INPUT TO COLUMN (UG) - INCLUDES INITIAL POLLUTANT CONCENTRATIONS --

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
PRECIP.	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD UPPER	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD ZONE 2	3.657E+11	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD ZONE 3	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD LOWER	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
TOTAL INPUT	3.657E+11	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01

0 -- POLLUTANT MASS DISTRIBUTION IN COLUMN (UG) -- NOTE: IF COMPONENT IS ZERO EACH MONTH, IT IS NOT PRINTED

UPPER SOIL ZONE:

SUBLAYER 1

VOLATILIZED	1.499E+01	4.906E+01	6.930E+01	7.865E+01	9.094E+01	1.028E+02	1.302E+02	1.555E+02	1.792E+02	2.177E+02	2.075E+02	2.395E+02
IN SOIL MOI	5.707E+04	1.215E+05	1.818E+05	2.368E+05	2.858E+05	3.329E+05	3.714E+05	4.145E+05	4.601E+05	4.991E+05	5.624E+05	6.094E+05
ADS ON SOIL	8.166E+05	1.709E+06	2.471E+06	3.115E+06	3.724E+06	4.310E+06	4.910E+06	5.542E+06	6.192E+06	6.853E+06	7.508E+06	8.215E+06
IN SOIL AIR	9.023E+02	1.868E+03	2.599E+03	3.144E+03	3.687E+03	4.211E+03	4.883E+03	5.572E+03	6.239E+03	7.035E+03	7.384E+03	8.209E+03

SOIL ZONE 2:

SUBLAYER 1

DIFFUSED UP	9.087E+05	9.567E+05	8.213E+05	6.993E+05	6.608E+05	6.362E+05	6.425E+05	6.786E+05	6.972E+05	7.014E+05	7.197E+05	7.577E+05
IN SOIL MOI	6.045E+09	6.151E+09	6.363E+09	6.575E+09	6.639E+09	6.681E+09	6.649E+09	6.575E+09	6.533E+09	6.511E+09	6.480E+09	6.416E+09
ADS ON SOIL	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10
IN SOIL AIR	9.557E+07	9.455E+07	9.097E+07	8.730E+07	8.562E+07	8.452E+07	8.377E+07	8.472E+07	8.495E+07	8.442E+07	8.508E+07	8.643E+07
PURE PHASE	2.731E+11	2.730E+11	2.728E+11	2.726E+11	2.725E+11	2.725E+11	2.725E+11	2.726E+11	2.726E+11	2.726E+11	2.727E+11	2.727E+11

SOIL ZONE 3:

SUBLAYER 1

LOWER SOIL ZONE:

SUBLAYER 1

-- POLLUTANT CONCENTRATIONS (UG/ML) OR (UG/G) -- NOTE: IF CONCENTRATIONS ARE ZERO FOR EACH MONTH, THEY ARE NOT PRINTED --

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UPPER SOIL ZONE:

SUBLAYER 1

MOISTURE	5.575E-04	1.167E-03	1.687E-03	2.127E-03	2.543E-03	2.942E-03	3.352E-03	3.784E-03	4.227E-03	4.679E-03	5.126E-03	5.609E-03
%SOLUBILITY	1.759E-03	3.680E-03	5.322E-03	6.709E-03	8.021E-03	9.282E-03	1.057E-02	1.194E-02	1.334E-02	1.476E-02	1.617E-02	1.769E-02
ADSORBED	7.180E-04	1.503E-03	2.173E-03	2.739E-03	3.275E-03	3.790E-03	4.318E-03	4.874E-03	5.445E-03	6.026E-03	6.602E-03	7.224E-03
SOIL AIR	1.169E-05	2.477E-05	3.619E-05	4.609E-05	5.491E-05	6.340E-05	7.101E-05	7.958E-05	8.821E-05	9.652E-05	1.057E-04	1.158E-04

SOIL ZONE 2:

SUBLAYER 1

MOISTURE	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01
%SOLUBILITY	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02
ADSORBED	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01
SOIL AIR	6.646E-01	6.731E-01	6.800E-01	6.869E-01	6.845E-01	6.830E-01	6.715E-01	6.667E-01	6.615E-01	6.540E-01	6.540E-01	6.543E-01
PURE PHASE	2.449E+02	2.448E+02	2.446E+02	2.444E+02	2.444E+02	2.444E+02	2.444E+02	2.444E+02	2.445E+02	2.445E+02	2.445E+02	2.446E+02

SOIL ZONE 3:

LOWER SOIL ZONE:

POL DEP CM	1.296E+03	1.296E+03	1.297E+03	1.297E+03	1.298E+03	1.298E+03	1.298E+03	1.298E+03	1.298E+03	1.298E+03	1.298E+03	1.298E+03

1 YEAR - 1 ANNUAL SUMMARY REPORT

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-- TOTAL INPUTS (UG) --

UPPER SOIL ZONE	0.000E-01
SOIL ZONE 2	3.657E+11
SOIL ZONE 3	0.000E-01
LOWER SOIL ZONE	0.000E-01

-- HYDROLOGIC CYCLE COMPONENTS --

AVERAGE SOIL MOISTURE ZONE 1 (%)	18.175
AVERAGE SOIL MOISTURE BELOW ZONE 1 (%)	18.300
TOTAL PRECIPITATION (CM)	52.914
TOTAL INFILTRATION (CM)	12.959
TOTAL EVAPOTRANSPIRATION (CM)	11.693
TOTAL SURFACE RUNOFF (CM)	39.955
TOTAL GRW RUNOFF (CM)	-0.738
TOTAL MOISTURE RETENTION (CM)	2.132
TOTAL YIELD (CM)	39.217

0 -- POLLUTANT MASS DISTRIBUTION IN COLUMN (UG) -- NOTE: IF COMPONENT IS ZERO EACH MONTH, IT IS NOT PRINTED

FOR FINAL MASS IN SOIL MOI., ADS. ON SOIL, SOIL AIR, IMMOBIL CEC, COMPLEXED, AND PURE PHASE FOR EACH SUBLAYER, SEE ABOVE (MONTH SEP)

UPPER SOIL ZONE:

SUBLAYER 1

TOTAL VOLATILIZED 1.535E+03

SOIL ZONE 2:

SUBLAYER 1

TOTAL DIFFUSED (UP) 8.880E+06

SOIL ZONE 3:

SUBLAYER 1

LOWER SOIL ZONE:

SUBLAYER 1

1 -- AVERAGE POLLUTANT CONCENTRATIONS -- NOTE: ONLY NON-ZERO VALUES ARE PRINTED --

UPPER SOIL ZONE:

SUBLAYER 1

SOIL MOISTURE (UG/ML)	3.150E-03
ADSORBED SOIL (UG/G)	4.057E-03
SOIL AIR (UG/ML)	6.616E-05

SOIL ZONE 2:

SUBLAYER 1

SOIL MOISTURE (UG/ML)	3.170E+01
ADSORBED SOIL (UG/G)	4.083E+01
SOIL AIR (UG/ML)	6.695E-01
PURE PHASE (UG/ML)	2.445E+02

SOIL ZONE 3:

LOWER SOIL ZONE:

MAX. POLL. DEPTH (M) 1.298E+01

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YEAR - 5 MONTHLY RESULTS (OUTPUT)

-- HYDROLOGIC CYCLE COMPONENTS --

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP

MOIS. IN L1 (%)	17.702	18.182	18.722	19.232	19.322	19.352	18.902	18.662	18.812	18.722	18.332	18.152
MOIS. BELOW L1 (%)	18.002	18.182	18.722	19.232	19.322	19.352	19.202	18.962	18.812	18.722	18.632	18.452
PRECIPATION (CM)	2.787	6.554	9.394	12.408	8.363	7.634	3.871	0.807	0.351	0.211	0.164	0.685
NET INFILT. (CM)	0.531	1.707	2.258	2.482	1.966	1.995	1.195	0.200	0.056	0.019	0.017	0.120
EVAPOTRANS. (CM)	0.882	1.396	1.203	1.487	1.836	1.989	1.512	0.743	0.429	0.269	0.278	0.552
MOIS. RETEN (CM)	-0.261	0.370	1.111	1.049	0.185	0.062	-0.233	-0.455	-0.309	-0.185	-0.170	-0.341
SUR. RUNOFF (CM)	2.256	4.848	7.136	9.926	6.397	5.639	2.676	0.607	0.295	0.192	0.147	0.565
GRW. RUNOFF (CM)	-0.065	-0.060	-0.056	-0.054	-0.055	-0.056	-0.059	-0.062	-0.064	-0.065	-0.065	-0.066
YIELD (CM)	2.192	4.787	7.080	9.872	6.341	5.583	2.617	0.545	0.231	0.127	0.082	0.500
PAU/MPA (GZU)	1.025	1.016	1.010	1.014	1.014	1.002	1.000	1.048	1.405	3.013	1.488	1.246
PA/MPA (GZ)	1.097	1.016	1.010	1.014	1.014	1.002	1.041	1.206	1.405	3.013	3.908	1.545

1 -- POLLUTANT MASS INPUT TO COLUMN (UG) --

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
PRECIP.	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD UPPER	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD ZONE 2	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD ZONE 3	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD LOWER	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
TOTAL INPUT	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01

0 -- POLLUTANT MASS DISTRIBUTION IN COLUMN (UG) -- NOTE: IF COMPONENT IS ZERO EACH MONTH, IT IS NOT PRINTED

UPPER SOIL ZONE:

SUBLAYER 1

VOLATILIZED	1.046E+03	9.480E+02	8.350E+02	7.343E+02	7.224E+02	7.248E+02	8.319E+02	9.020E+02	8.700E+02	8.989E+02	1.026E+03	1.100E+03
IN SOIL MOI	2.189E+06	2.296E+06	2.404E+06	2.505E+06	2.554E+06	2.596E+06	2.579E+06	2.591E+06	2.655E+06	2.689E+06	2.682E+06	2.705E+06
ADS ON SOIL	3.026E+07	3.090E+07	3.143E+07	3.187E+07	3.235E+07	3.283E+07	3.339E+07	3.398E+07	3.454E+07	3.515E+07	3.581E+07	3.647E+07
IN SOIL AIR	3.188E+04	3.168E+04	3.107E+04	3.039E+04	3.048E+04	3.078E+04	3.208E+04	3.311E+04	3.295E+04	3.342E+04	3.522E+04	3.644E+04

SOIL ZONE 2:

SUBLAYER 1

DIFFUSED UP	8.022E+05	7.726E+05	6.678E+05	5.782E+05	5.603E+05	5.538E+05	5.705E+05	6.094E+05	6.325E+05	6.422E+05	6.594E+05	6.952E+05
IN SOIL MOI	6.363E+09	6.427E+09	6.617E+09	6.798E+09	6.829E+09	6.840E+09	6.787E+09	6.702E+09	6.649E+09	6.617E+09	6.586E+09	6.522E+09
ADS ON SOIL	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10
IN SOIL AIR	8.890E+07	8.870E+07	8.551E+07	8.248E+07	8.150E+07	8.109E+07	8.085E+07	8.205E+07	8.251E+07	8.223E+07	8.289E+07	8.424E+07
PURE PHASE	2.728E+11	2.727E+11	2.725E+11	2.723E+11	2.723E+11	2.723E+11	2.723E+11	2.724E+11	2.725E+11	2.725E+11	2.725E+11	2.726E+11

SOIL ZONE 3:

SUBLAYER 1

LOWER SOIL ZONE:

SUBLAYER 1

-- POLLUTANT CONCENTRATIONS (UG/ML) OR (UG/G) -- NOTE: IF CONCENTRATIONS ARE ZERO FOR EACH MONTH, THEY ARE NOT PRINTED --

UPPER SOIL ZONE:

SUBLAYER 1

MOISTURE	2.066E-02	2.109E-02	2.146E-02	2.176E-02	2.209E-02	2.241E-02	2.280E-02	2.320E-02	2.358E-02	2.400E-02	2.445E-02	2.490E-02
%SOLUBILITY	6.516E-02	6.654E-02	6.768E-02	6.864E-02	6.967E-02	7.070E-02	7.192E-02	7.318E-02	7.440E-02	7.570E-02	7.712E-02	7.855E-02
ADSORBED	2.661E-02	2.717E-02	2.764E-02	2.803E-02	2.845E-02	2.887E-02	2.936E-02	2.988E-02	3.038E-02	3.091E-02	3.149E-02	3.207E-02
SOIL AIR	4.331E-04	4.479E-04	4.602E-04	4.715E-04	4.769E-04	4.829E-04	4.830E-04	4.879E-04	4.921E-04	4.950E-04	5.043E-04	5.139E-04

SOIL ZONE 2:

SUBLAYER 1

MOISTURE	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01
%SOLUBILITY	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02
ADSORBED	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01
SOIL AIR	6.646E-01	6.731E-01	6.800E-01	6.869E-01	6.845E-01	6.830E-01	6.715E-01	6.667E-01	6.615E-01	6.540E-01	6.540E-01	6.543E-01
PURE PHASE	2.446E+02	2.446E+02	2.444E+02	2.442E+02	2.442E+02	2.442E+02	2.443E+02	2.443E+02	2.444E+02	2.444E+02	2.444E+02	2.445E+02

SOIL ZONE 3:

LOWER SOIL ZONE:

POL DEP CM	1.305E+03	1.305E+03	1.305E+03	1.306E+03	1.306E+03	1.307E+03	1.307E+03	1.307E+03	1.307E+03	1.307E+03	1.307E+03	1.307E+03

1 YEAR - 5 ANNUAL SUMMARY REPORT

-- TOTAL INPUTS (UG) --

UPPER SOIL ZONE	0.000E-01
SOIL ZONE 2	0.000E-01
SOIL ZONE 3	0.000E-01
LOWER SOIL ZONE	0.000E-01

-- HYDROLOGIC CYCLE COMPONENTS --

AVERAGE SOIL MOISTURE ZONE 1 (%)	18.675
AVERAGE SOIL MOISTURE BELOW ZONE 1 (%)	18.800
TOTAL PRECIPITATION (CM)	53.229
TOTAL INFILTRATION (CM)	12.545
TOTAL EVAPOTRANSPIRATION (CM)	12.575
TOTAL SURFACE RUNOFF (CM)	40.683
TOTAL GRW RUNOFF (CM)	-0.726
TOTAL MOISTURE RETENTION (CM)	0.824
TOTAL YIELD (CM)	39.957

0 -- POLLUTANT MASS DISTRIBUTION IN COLUMN (UG) -- NOTE: IF COMPONENT IS ZERO EACH MONTH, IT IS NOT PRINTED

FOR FINAL MASS IN SOIL MOI., ADS. ON SOIL, SOIL AIR, IMMOBIL CEC, COMPLEXED, AND PURE PHASE FOR EACH SUBLAYER, SEE ABOVE (MONTH SEP)

UPPER SOIL ZONE:

SUBLAYER 1

TOTAL VOLATILIZED 1.064E+04

SOIL ZONE 2:

SUBLAYER 1

TOTAL DIFFUSED (UP) 7.744E+06

SOIL ZONE 3:

SUBLAYER 1

LOWER SOIL ZONE:

SUBLAYER 1

1 -- AVERAGE POLLUTANT CONCENTRATIONS -- NOTE: ONLY NON-ZERO VALUES ARE PRINTED --

UPPER SOIL ZONE:

SUBLAYER 1

SOIL MOISTURE (UG/ML)	2.270E-02
ADSORBED SOIL (UG/G)	2.924E-02
SOIL AIR (UG/ML)	4.791E-04

SOIL ZONE 2:

SUBLAYER 1

SOIL MOISTURE (UG/ML)	3.170E+01
ADSORBED SOIL (UG/G)	4.083E+01
SOIL AIR (UG/ML)	6.695E-01
PURE PHASE (UG/ML)	2.444E+02

SOIL ZONE 3:

LOWER SOIL ZONE:

MAX. POLL. DEPTH (M) 1.307E+01

1

YEAR - 10 MONTHLY RESULTS (OUTPUT)

-- HYDROLOGIC CYCLE COMPONENTS --

OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP

MOIS. IN L1 (%)	17.702	18.182	18.722	19.232	19.322	19.352	18.902	18.662	18.812	18.722	18.332	18.152
MOIS. BELOW L1 (%)	18.002	18.182	18.722	19.232	19.322	19.352	19.202	18.962	18.812	18.722	18.632	18.452
PRECIPATION (CM)	2.787	6.554	9.394	12.408	8.363	7.634	3.871	0.807	0.351	0.211	0.164	0.685
NET INFILT. (CM)	0.531	1.707	2.258	2.482	1.966	1.995	1.195	0.200	0.056	0.019	0.017	0.120
EVAPOTRANS. (CM)	0.882	1.396	1.203	1.487	1.836	1.989	1.512	0.743	0.429	0.269	0.278	0.552
MOIS. RETEN (CM)	-0.261	0.370	1.111	1.049	0.185	0.062	-0.233	-0.455	-0.309	-0.185	-0.170	-0.341
SUR. RUNOFF (CM)	2.256	4.848	7.136	9.926	6.397	5.639	2.676	0.607	0.295	0.192	0.147	0.565
GRW. RUNOFF (CM)	-0.065	-0.060	-0.056	-0.054	-0.055	-0.056	-0.059	-0.062	-0.064	-0.065	-0.065	-0.066
YIELD (CM)	2.192	4.787	7.080	9.872	6.341	5.583	2.617	0.545	0.231	0.127	0.082	0.500
PAU/MPA (GZU)	1.025	1.016	1.010	1.014	1.014	1.002	1.000	1.048	1.405	3.013	1.488	1.246
PA/MPA (GZ)	1.097	1.016	1.010	1.014	1.014	1.002	1.041	1.206	1.405	3.013	3.908	1.545

1 -- POLLUTANT MASS INPUT TO COLUMN (UG) --

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
PRECIP.	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD UPPER	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD ZONE 2	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD ZONE 3	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD LOWER	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
TOTAL INPUT	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01

0 -- POLLUTANT MASS DISTRIBUTION IN COLUMN (UG) -- NOTE: IF COMPONENT IS ZERO EACH MONTH, IT IS NOT PRINTED

UPPER SOIL ZONE:

SUBLAYER 1

VOLATILIZED	2.256E+03	2.019E+03	1.758E+03	1.531E+03	1.493E+03	1.486E+03	1.692E+03	1.819E+03	1.740E+03	1.783E+03	2.017E+03	2.144E+03
IN SOIL MOI	4.691E+06	4.859E+06	5.036E+06	5.200E+06	5.259E+06	5.302E+06	5.226E+06	5.206E+06	5.289E+06	5.311E+06	5.253E+06	5.252E+06
ADS ON SOIL	6.485E+07	6.540E+07	6.583E+07	6.616E+07	6.660E+07	6.705E+07	6.765E+07	6.827E+07	6.881E+07	6.942E+07	7.013E+07	7.081E+07
IN SOIL AIR	6.832E+04	6.706E+04	6.507E+04	6.309E+04	6.276E+04	6.286E+04	6.499E+04	6.652E+04	6.564E+04	6.600E+04	6.898E+04	7.076E+04

SOIL ZONE 2:

SUBLAYER 1

DIFFUSED UP	8.016E+05	7.721E+05	6.673E+05	5.778E+05	5.599E+05	5.534E+05	5.701E+05	6.090E+05	6.320E+05	6.417E+05	6.590E+05	6.947E+05
IN SOIL MOI	6.363E+09	6.427E+09	6.617E+09	6.798E+09	6.829E+09	6.840E+09	6.787E+09	6.702E+09	6.649E+09	6.617E+09	6.586E+09	6.522E+09
ADS ON SOIL	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10
IN SOIL AIR	8.890E+07	8.870E+07	8.551E+07	8.248E+07	8.150E+07	8.109E+07	8.085E+07	8.205E+07	8.251E+07	8.223E+07	8.289E+07	8.424E+07
PURE PHASE	2.727E+11	2.727E+11	2.725E+11	2.723E+11	2.723E+11	2.723E+11	2.723E+11	2.724E+11	2.725E+11	2.725E+11	2.725E+11	2.726E+11

SOIL ZONE 3:

SUBLAYER 1

LOWER SOIL ZONE:

SUBLAYER 1

-- POLLUTANT CONCENTRATIONS (UG/ML) OR (UG/G) -- NOTE: IF CONCENTRATIONS ARE ZERO FOR EACH MONTH, THEY ARE NOT PRINTED --

UPPER SOIL ZONE:

SUBLAYER 1

MOISTURE	4.427E-02	4.465E-02	4.494E-02	4.517E-02	4.547E-02	4.578E-02	4.619E-02	4.661E-02	4.698E-02	4.740E-02	4.788E-02	4.834E-02
%SOLUBILITY	1.397E-01	1.409E-01	1.418E-01	1.425E-01	1.434E-01	1.444E-01	1.457E-01	1.470E-01	1.482E-01	1.495E-01	1.510E-01	1.525E-01
ADSORBED	5.702E-02	5.751E-02	5.788E-02	5.818E-02	5.857E-02	5.896E-02	5.949E-02	6.003E-02	6.051E-02	6.105E-02	6.167E-02	6.227E-02
SOIL AIR	9.282E-04	9.481E-04	9.640E-04	9.789E-04	9.820E-04	9.863E-04	9.785E-04	9.802E-04	9.802E-04	9.777E-04	9.877E-04	9.978E-04

SOIL ZONE 2:

SUBLAYER 1

MOISTURE	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01
%SOLUBILITY	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02
ADSORBED	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01
SOIL AIR	6.646E-01	6.731E-01	6.800E-01	6.869E-01	6.845E-01	6.830E-01	6.715E-01	6.667E-01	6.615E-01	6.540E-01	6.540E-01	6.543E-01
PURE PHASE	2.446E+02	2.446E+02	2.444E+02	2.442E+02	2.442E+02	2.442E+02	2.442E+02	2.443E+02	2.444E+02	2.444E+02	2.444E+02	2.445E+02

SOIL ZONE 3:

LOWER SOIL ZONE:

POL DEP CM	1.315E+03	1.316E+03	1.316E+03	1.317E+03	1.317E+03	1.317E+03	1.317E+03	1.318E+03	1.318E+03	1.318E+03	1.318E+03	1.318E+03

1 YEAR - 10 ANNUAL SUMMARY REPORT

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-- TOTAL INPUTS (UG) --

UPPER SOIL ZONE	0.000E-01
SOIL ZONE 2	0.000E-01
SOIL ZONE 3	0.000E-01
LOWER SOIL ZONE	0.000E-01

-- HYDROLOGIC CYCLE COMPONENTS --

AVERAGE SOIL MOISTURE ZONE 1 (%)	18.675
AVERAGE SOIL MOISTURE BELOW ZONE 1 (%)	18.800
TOTAL PRECIPITATION (CM)	53.229
TOTAL INFILTRATION (CM)	12.545
TOTAL EVAPOTRANSPIRATION (CM)	12.575
TOTAL SURFACE RUNOFF (CM)	40.683
TOTAL GRW RUNOFF (CM)	-0.726
TOTAL MOISTURE RETENTION (CM)	0.824
TOTAL YIELD (CM)	39.957

0 -- POLLUTANT MASS DISTRIBUTION IN COLUMN (UG) -- NOTE: IF COMPONENT IS ZERO EACH MONTH, IT IS NOT PRINTED

FOR FINAL MASS IN SOIL MOI., ADS. ON SOIL, SOIL AIR, IMMOBIL CEC, COMPLEXED, AND PURE PHASE FOR EACH SUBLAYER, SEE ABOVE (MONTH SEP)

UPPER SOIL ZONE:

SUBLAYER 1

TOTAL VOLATILIZED 2.174E+04

SOIL ZONE 2:

SUBLAYER 1

TOTAL DIFFUSED (UP) 7.739E+06

SOIL ZONE 3:

SUBLAYER 1

LOWER SOIL ZONE:

SUBLAYER 1

1 -- AVERAGE POLLUTANT CONCENTRATIONS -- NOTE: ONLY NON-ZERO VALUES ARE PRINTED --

UPPER SOIL ZONE:

SUBLAYER 1

SOIL MOISTURE (UG/ML)	4.614E-02
ADSORBED SOIL (UG/G)	5.943E-02
SOIL AIR (UG/ML)	9.741E-04

SOIL ZONE 2:

SUBLAYER 1

SOIL MOISTURE (UG/ML)	3.170E+01
ADSORBED SOIL (UG/G)	4.083E+01
SOIL AIR (UG/ML)	6.695E-01
PURE PHASE (UG/ML)	2.444E+02

SOIL ZONE 3:

LOWER SOIL ZONE:

MAX. POLL. DEPTH (M) 1.318E+01

1

YEAR - 15 MONTHLY RESULTS (OUTPUT)

-- HYDROLOGIC CYCLE COMPONENTS --

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP

MOIS. IN L1 (%)	17.702	18.182	18.722	19.232	19.322	19.352	18.902	18.662	18.812	18.722	18.332	18.152
MOIS. BELOW L1 (%)	18.002	18.182	18.722	19.232	19.322	19.352	19.202	18.962	18.812	18.722	18.632	18.452
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NET INFILT. (CM)	0.531	1.707	2.258	2.482	1.966	1.995	1.195	0.200	0.056	0.019	0.017	0.120
EVAPOTRANS. (CM)	0.882	1.396	1.203	1.487	1.836	1.989	1.512	0.743	0.429	0.269	0.278	0.552
MOIS. RETEN (CM)	-0.261	0.370	1.111	1.049	0.185	0.062	-0.233	-0.455	-0.309	-0.185	-0.170	-0.341
SUR. RUNOFF (CM)	2.256	4.848	7.136	9.926	6.397	5.639	2.676	0.607	0.295	0.192	0.147	0.565
GRW. RUNOFF (CM)	-0.065	-0.060	-0.056	-0.054	-0.055	-0.056	-0.059	-0.062	-0.064	-0.065	-0.065	-0.066
YIELD (CM)	2.192	4.787	7.080	9.872	6.341	5.583	2.617	0.545	0.231	0.127	0.082	0.500
PAU/MPA (GZU)	1.025	1.016	1.010	1.014	1.014	1.002	1.000	1.048	1.405	3.013	1.488	1.246
PA/MPA (GZ)	1.097	1.016	1.010	1.014	1.014	1.002	1.041	1.206	1.405	3.013	3.908	1.545

1 -- POLLUTANT MASS INPUT TO COLUMN (UG) --

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
PRECIP.	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD UPPER	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD ZONE 2	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD ZONE 3	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD LOWER	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
TOTAL INPUT	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01

0 -- POLLUTANT MASS DISTRIBUTION IN COLUMN (UG) -- NOTE: IF COMPONENT IS ZERO EACH MONTH, IT IS NOT PRINTED

UPPER SOIL ZONE:

SUBLAYER 1

VOLATILIZED	3.431E+03	3.059E+03	2.654E+03	2.305E+03	2.242E+03	2.225E+03	2.527E+03	2.710E+03	2.585E+03	2.641E+03	2.979E+03	3.158E+03
IN SOIL MOI	7.121E+06	7.349E+06	7.592E+06	7.818E+06	7.886E+06	7.931E+06	7.796E+06	7.746E+06	7.848E+06	7.858E+06	7.750E+06	7.726E+06
ADS ON SOIL	9.845E+07	9.891E+07	9.924E+07	9.948E+07	9.988E+07	1.003E+08	1.009E+08	1.016E+08	1.021E+08	1.027E+08	1.035E+08	1.042E+08
IN SOIL AIR	1.037E+05	1.014E+05	9.810E+04	9.485E+04	9.411E+04	9.402E+04	9.696E+04	9.896E+04	9.739E+04	9.765E+04	1.018E+05	1.041E+05

SOIL ZONE 2:

SUBLAYER 1

DIFFUSED UP	8.011E+05	7.715E+05	6.668E+05	5.774E+05	5.595E+05	5.530E+05	5.697E+05	6.085E+05	6.315E+05	6.413E+05	6.585E+05	6.942E+05
IN SOIL MOI	6.363E+09	6.427E+09	6.617E+09	6.798E+09	6.829E+09	6.840E+09	6.787E+09	6.702E+09	6.649E+09	6.617E+09	6.586E+09	6.522E+09
ADS ON SOIL	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10
IN SOIL AIR	8.890E+07	8.870E+07	8.551E+07	8.248E+07	8.150E+07	8.109E+07	8.085E+07	8.205E+07	8.251E+07	8.223E+07	8.289E+07	8.424E+07
PURE PHASE	2.727E+11	2.727E+11	2.725E+11	2.723E+11	2.723E+11	2.723E+11	2.723E+11	2.724E+11	2.724E+11	2.725E+11	2.725E+11	2.726E+11

SOIL ZONE 3:

SUBLAYER 1

LOWER SOIL ZONE:

SUBLAYER 1

-- POLLUTANT CONCENTRATIONS (UG/ML) OR (UG/G) -- NOTE: IF CONCENTRATIONS ARE ZERO FOR EACH MONTH, THEY ARE NOT PRINTED --

UPPER SOIL ZONE:

SUBLAYER 1

MOISTURE	6.721E-02	6.753E-02	6.775E-02	6.792E-02	6.819E-02	6.847E-02	6.891E-02	6.934E-02	6.970E-02	7.012E-02	7.064E-02	7.111E-02
%SOLUBILITY	2.120E-01	2.130E-01	2.137E-01	2.142E-01	2.151E-01	2.160E-01	2.174E-01	2.187E-01	2.199E-01	2.212E-01	2.228E-01	2.243E-01
ADSORBED	8.657E-02	8.698E-02	8.726E-02	8.748E-02	8.783E-02	8.819E-02	8.875E-02	8.931E-02	8.977E-02	9.032E-02	9.098E-02	9.159E-02
SOIL AIR	1.409E-03	1.434E-03	1.453E-03	1.472E-03	1.472E-03	1.475E-03	1.460E-03	1.458E-03	1.454E-03	1.447E-03	1.457E-03	1.468E-03

SOIL ZONE 2:

SUBLAYER 1

MOISTURE	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01
%SOLUBILITY	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02
ADSORBED	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01
SOIL AIR	6.646E-01	6.731E-01	6.800E-01	6.869E-01	6.845E-01	6.830E-01	6.715E-01	6.667E-01	6.615E-01	6.540E-01	6.540E-01	6.543E-01
PURE PHASE	2.446E+02	2.445E+02	2.444E+02	2.442E+02	2.442E+02	2.442E+02	2.442E+02	2.443E+02	2.443E+02	2.444E+02	2.444E+02	2.445E+02

SOIL ZONE 3:

LOWER SOIL ZONE:

POL DEP CM	1.326E+03	1.326E+03	1.327E+03	1.327E+03	1.328E+03	1.328E+03	1.328E+03	1.328E+03	1.328E+03	1.328E+03	1.328E+03	1.328E+03

1 YEAR - 15 ANNUAL SUMMARY REPORT

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-- TOTAL INPUTS (UG) --

UPPER SOIL ZONE	0.000E-01
SOIL ZONE 2	0.000E-01
SOIL ZONE 3	0.000E-01
LOWER SOIL ZONE	0.000E-01

-- HYDROLOGIC CYCLE COMPONENTS --

AVERAGE SOIL MOISTURE ZONE 1 (%)	18.675
AVERAGE SOIL MOISTURE BELOW ZONE 1 (%)	18.800
TOTAL PRECIPITATION (CM)	53.229
TOTAL INFILTRATION (CM)	12.545
TOTAL EVAPOTRANSPIRATION (CM)	12.575
TOTAL SURFACE RUNOFF (CM)	40.683
TOTAL GRW RUNOFF (CM)	-0.726
TOTAL MOISTURE RETENTION (CM)	0.824
TOTAL YIELD (CM)	39.957

0 -- POLLUTANT MASS DISTRIBUTION IN COLUMN (UG) -- NOTE: IF COMPONENT IS ZERO EACH MONTH, IT IS NOT PRINTED

FOR FINAL MASS IN SOIL MOI., ADS. ON SOIL, SOIL AIR, IMMOBIL CEC, COMPLEXED, AND PURE PHASE FOR EACH SUBLAYER, SEE ABOVE (MONTH SEP)

UPPER SOIL ZONE:

SUBLAYER 1

TOTAL VOLATILIZED 3.252E+04

SOIL ZONE 2:

SUBLAYER 1

TOTAL DIFFUSED (UP) 7.733E+06

SOIL ZONE 3:

SUBLAYER 1

LOWER SOIL ZONE:

SUBLAYER 1

1 -- AVERAGE POLLUTANT CONCENTRATIONS -- NOTE: ONLY NON-ZERO VALUES ARE PRINTED --

UPPER SOIL ZONE:

SUBLAYER 1

SOIL MOISTURE (UG/ML) 6.891E-02
ADSORBED SOIL (UG/G) 8.875E-02
SOIL AIR (UG/ML) 1.455E-03

SOIL ZONE 2:

SUBLAYER 1

SOIL MOISTURE (UG/ML) 3.170E+01
ADSORBED SOIL (UG/G) 4.083E+01
SOIL AIR (UG/ML) 6.695E-01
PURE PHASE (UG/ML) 2.444E+02

SOIL ZONE 3:

LOWER SOIL ZONE:

MAX. POLL. DEPTH (M) 1.328E+01

1

YEAR - 20 MONTHLY RESULTS (OUTPUT)

-- HYDROLOGIC CYCLE COMPONENTS --

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MOIS. IN L1 (%)	17.702	18.182	18.722	19.232	19.322	19.352	18.902	18.662	18.812	18.722	18.332	18.152

MOIS. BELOW L1 (%)	18.002	18.182	18.722	19.232	19.322	19.352	19.202	18.962	18.812	18.722	18.632	18.452
PRECIPATION (CM)	2.787	6.554	9.394	12.408	8.363	7.634	3.871	0.807	0.351	0.211	0.164	0.685
NET INFILT. (CM)	0.531	1.707	2.258	2.482	1.966	1.995	1.195	0.200	0.056	0.019	0.017	0.120
EVAPOTRANS. (CM)	0.882	1.396	1.203	1.487	1.836	1.989	1.512	0.743	0.429	0.269	0.278	0.552
MOIS. RETEN (CM)	-0.261	0.370	1.111	1.049	0.185	0.062	-0.233	-0.455	-0.309	-0.185	-0.170	-0.341
SUR. RUNOFF (CM)	2.256	4.848	7.136	9.926	6.397	5.639	2.676	0.607	0.295	0.192	0.147	0.565
GRW. RUNOFF (CM)	-0.065	-0.060	-0.056	-0.054	-0.055	-0.056	-0.059	-0.062	-0.064	-0.065	-0.065	-0.066
YIELD (CM)	2.192	4.787	7.080	9.872	6.341	5.583	2.617	0.545	0.231	0.127	0.082	0.500
PAU/MPA (GZU)	1.025	1.016	1.010	1.014	1.014	1.002	1.000	1.048	1.405	3.013	1.488	1.246
PA/MPA (GZ)	1.097	1.016	1.010	1.014	1.014	1.002	1.041	1.206	1.405	3.013	3.908	1.545

1 -- POLLUTANT MASS INPUT TO COLUMN (UG) --

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
PRECIP.	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD UPPER	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD ZONE 2	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD ZONE 3	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD LOWER	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
TOTAL INPUT	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01

0 -- POLLUTANT MASS DISTRIBUTION IN COLUMN (UG) -- NOTE: IF COMPONENT IS ZERO EACH MONTH, IT IS NOT PRINTED

UPPER SOIL ZONE:

SUBLAYER 1

VOLATILIZED	4.572E+03	4.068E+03	3.524E+03	3.056E+03	2.969E+03	2.943E+03	3.338E+03	3.576E+03	3.406E+03	3.475E+03	3.914E+03	4.143E+03
IN SOIL MOI	9.481E+06	9.767E+06	1.007E+07	1.036E+07	1.044E+07	1.048E+07	1.029E+07	1.021E+07	1.033E+07	1.033E+07	1.018E+07	1.013E+07
ADS ON SOIL	1.311E+08	1.315E+08	1.317E+08	1.318E+08	1.322E+08	1.326E+08	1.332E+08	1.339E+08	1.344E+08	1.350E+08	1.358E+08	1.366E+08
IN SOIL AIR	1.381E+05	1.348E+05	1.302E+05	1.257E+05	1.245E+05	1.243E+05	1.280E+05	1.305E+05	1.282E+05	1.284E+05	1.336E+05	1.364E+05

SOIL ZONE 2:

SUBLAYER 1

DIFFUSED UP	8.005E+05	7.710E+05	6.664E+05	5.770E+05	5.591E+05	5.526E+05	5.693E+05	6.081E+05	6.311E+05	6.408E+05	6.580E+05	6.937E+05
IN SOIL MOI	6.363E+09	6.427E+09	6.617E+09	6.798E+09	6.829E+09	6.840E+09	6.787E+09	6.702E+09	6.649E+09	6.617E+09	6.586E+09	6.522E+09
ADS ON SOIL	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10
IN SOIL AIR	8.890E+07	8.870E+07	8.551E+07	8.248E+07	8.150E+07	8.109E+07	8.085E+07	8.205E+07	8.251E+07	8.223E+07	8.289E+07	8.424E+07
PURE PHASE	2.727E+11	2.727E+11	2.725E+11	2.723E+11	2.723E+11	2.722E+11	2.723E+11	2.724E+11	2.724E+11	2.725E+11	2.725E+11	2.726E+11

SOIL ZONE 3:

SUBLAYER 1

LOWER SOIL ZONE:

SUBLAYER 1

-- POLLUTANT CONCENTRATIONS (UG/ML) OR (UG/G) -- NOTE: IF CONCENTRATIONS ARE ZERO FOR EACH MONTH, THEY ARE NOT PRINTED --

UPPER SOIL ZONE:

SUBLAYER 1

MOISTURE	8.948E-02	8.974E-02	8.990E-02	9.000E-02	9.024E-02	9.050E-02	9.097E-02	9.142E-02	9.176E-02	9.219E-02	9.274E-02	9.323E-02
%SOLUBILITY	2.823E-01	2.831E-01	2.836E-01	2.839E-01	2.847E-01	2.855E-01	2.870E-01	2.884E-01	2.895E-01	2.908E-01	2.925E-01	2.941E-01
ADSORBED	1.153E-01	1.156E-01	1.158E-01	1.159E-01	1.162E-01	1.166E-01	1.172E-01	1.177E-01	1.182E-01	1.187E-01	1.194E-01	1.201E-01
SOIL AIR	1.876E-03	1.906E-03	1.928E-03	1.950E-03	1.949E-03	1.950E-03	1.927E-03	1.923E-03	1.915E-03	1.902E-03	1.913E-03	1.924E-03

SOIL ZONE 2:

SUBLAYER 1

MOISTURE	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01
%SOLUBILITY	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02
ADSORBED	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01
SOIL AIR	6.646E-01	6.731E-01	6.800E-01	6.869E-01	6.845E-01	6.830E-01	6.715E-01	6.667E-01	6.615E-01	6.540E-01	6.540E-01	6.543E-01
PURE PHASE	2.446E+02	2.445E+02	2.444E+02	2.442E+02	2.442E+02	2.442E+02	2.442E+02	2.443E+02	2.443E+02	2.444E+02	2.444E+02	2.444E+02

SOIL ZONE 3:

LOWER SOIL ZONE:

POL DEP CM	1.337E+03	1.337E+03	1.338E+03	1.338E+03	1.338E+03	1.339E+03	1.339E+03	1.339E+03	1.339E+03	1.339E+03	1.339E+03	1.339E+03

1 YEAR - 20 ANNUAL SUMMARY REPORT

-- TOTAL INPUTS (UG) --

UPPER SOIL ZONE	0.000E-01
SOIL ZONE 2	0.000E-01
SOIL ZONE 3	0.000E-01
LOWER SOIL ZONE	0.000E-01

-- HYDROLOGIC CYCLE COMPONENTS --

AVERAGE SOIL MOISTURE ZONE 1 (%)	18.675
AVERAGE SOIL MOISTURE BELOW ZONE 1 (%)	18.800
TOTAL PRECIPITATION (CM)	53.229
TOTAL INFILTRATION (CM)	12.545
TOTAL EVAPOTRANSPIRATION (CM)	12.575
TOTAL SURFACE RUNOFF (CM)	40.683
TOTAL GRW RUNOFF (CM)	-0.726
TOTAL MOISTURE RETENTION (CM)	0.824
TOTAL YIELD (CM)	39.957

0 -- POLLUTANT MASS DISTRIBUTION IN COLUMN (UG) -- NOTE: IF COMPONENT IS ZERO EACH MONTH, IT IS NOT PRINTED

FOR FINAL MASS IN SOIL MOI., ADS. ON SOIL, SOIL AIR, IMMOBIL CEC, COMPLEXED, AND PURE PHASE FOR EACH SUBLAYER, SEE ABOVE (MONTH SEP)

UPPER SOIL ZONE:

SUBLAYER 1

TOTAL VOLATILIZED 4.298E+04

SOIL ZONE 2:

SUBLAYER 1

TOTAL DIFFUSED (UP) 7.728E+06

SOIL ZONE 3:

SUBLAYER 1

LOWER SOIL ZONE:

SUBLAYER 1

1 -- AVERAGE POLLUTANT CONCENTRATIONS -- NOTE: ONLY NON-ZERO VALUES ARE PRINTED --

UPPER SOIL ZONE:

SUBLAYER 1

SOIL MOISTURE (UG/ML)	9.101E-02
ADSORBED SOIL (UG/G)	1.172E-01
SOIL AIR (UG/ML)	1.922E-03

SOIL ZONE 2:

SUBLAYER 1

SOIL MOISTURE (UG/ML)	3.170E+01
ADSORBED SOIL (UG/G)	4.083E+01
SOIL AIR (UG/ML)	6.695E-01
PURE PHASE (UG/ML)	2.443E+02

SOIL ZONE 3:

LOWER SOIL ZONE:

MAX. POLL. DEPTH (M) 1.339E+01

1

YEAR - 25 MONTHLY RESULTS (OUTPUT)

-- HYDROLOGIC CYCLE COMPONENTS --

OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP

MOIS. IN L1 (%)	17.702	18.182	18.722	19.232	19.322	19.352	18.902	18.662	18.812	18.722	18.332	18.152
MOIS. BELOW L1 (%)	18.002	18.182	18.722	19.232	19.322	19.352	19.202	18.962	18.812	18.722	18.632	18.452
PRECIPATION (CM)	2.787	6.554	9.394	12.408	8.363	7.634	3.871	0.807	0.351	0.211	0.164	0.685
NET INFILT. (CM)	0.531	1.707	2.258	2.482	1.966	1.995	1.195	0.200	0.056	0.019	0.017	0.120
EVAPOTRANS. (CM)	0.882	1.396	1.203	1.487	1.836	1.989	1.512	0.743	0.429	0.269	0.278	0.552
MOIS. RETEN (CM)	-0.261	0.370	1.111	1.049	0.185	0.062	-0.233	-0.455	-0.309	-0.185	-0.170	-0.341
SUR. RUNOFF (CM)	2.256	4.848	7.136	9.926	6.397	5.639	2.676	0.607	0.295	0.192	0.147	0.565
GRW. RUNOFF (CM)	-0.065	-0.060	-0.056	-0.054	-0.055	-0.056	-0.059	-0.062	-0.064	-0.065	-0.065	-0.066
YIELD (CM)	2.192	4.787	7.080	9.872	6.341	5.583	2.617	0.545	0.231	0.127	0.082	0.500
PAU/MPA (GZU)	1.025	1.016	1.010	1.014	1.014	1.002	1.000	1.048	1.405	3.013	1.488	1.246
PA/MPA (GZ)	1.097	1.016	1.010	1.014	1.014	1.002	1.041	1.206	1.405	3.013	3.908	1.545

1 -- POLLUTANT MASS INPUT TO COLUMN (UG) --

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
PRECIP.	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD UPPER	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD ZONE 2	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD ZONE 3	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD LOWER	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
TOTAL INPUT	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01

0 -- POLLUTANT MASS DISTRIBUTION IN COLUMN (UG) -- NOTE: IF COMPONENT IS ZERO EACH MONTH, IT IS NOT PRINTED

UPPER SOIL ZONE:

SUBLAYER 1

VOLATILIZED	5.662E+03	5.032E+03	4.354E+03	3.772E+03	3.662E+03	3.627E+03	4.110E+03	4.399E+03	4.186E+03	4.267E+03	4.803E+03	5.078E+03
IN SOIL MOI	1.173E+07	1.207E+07	1.244E+07	1.278E+07	1.287E+07	1.291E+07	1.267E+07	1.256E+07	1.269E+07	1.268E+07	1.248E+07	1.241E+07
ADS ON SOIL	1.622E+08	1.625E+08	1.626E+08	1.627E+08	1.630E+08	1.633E+08	1.640E+08	1.647E+08	1.651E+08	1.658E+08	1.666E+08	1.673E+08
IN SOIL AIR	1.709E+05	1.666E+05	1.607E+05	1.551E+05	1.535E+05	1.531E+05	1.575E+05	1.604E+05	1.575E+05	1.576E+05	1.638E+05	1.672E+05

SOIL ZONE 2:

SUBLAYER 1

DIFFUSED UP	8.000E+05	7.704E+05	6.659E+05	5.766E+05	5.587E+05	5.523E+05	5.689E+05	6.077E+05	6.307E+05	6.404E+05	6.576E+05	6.933E+05
IN SOIL MOI	6.363E+09	6.427E+09	6.617E+09	6.798E+09	6.829E+09	6.840E+09	6.787E+09	6.702E+09	6.649E+09	6.617E+09	6.586E+09	6.522E+09
ADS ON SOIL	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10
IN SOIL AIR	8.890E+07	8.870E+07	8.551E+07	8.248E+07	8.150E+07	8.109E+07	8.085E+07	8.205E+07	8.251E+07	8.223E+07	8.289E+07	8.424E+07
PURE PHASE	2.727E+11	2.726E+11	2.725E+11	2.723E+11	2.722E+11	2.722E+11	2.723E+11	2.724E+11	2.724E+11	2.725E+11	2.725E+11	2.725E+11

SOIL ZONE 3:

SUBLAYER 1

LOWER SOIL ZONE:

SUBLAYER 1

-- POLLUTANT CONCENTRATIONS (UG/ML) OR (UG/G) -- NOTE: IF CONCENTRATIONS ARE ZERO FOR EACH MONTH, THEY ARE NOT PRINTED --

UPPER SOIL ZONE:

SUBLAYER 1

MOISTURE	1.107E-01	1.109E-01	1.110E-01	1.110E-01	1.113E-01	1.115E-01	1.120E-01	1.124E-01	1.127E-01	1.132E-01	1.137E-01	1.142E-01
%SOLUBILITY	3.494E-01	3.500E-01	3.502E-01	3.503E-01	3.510E-01	3.517E-01	3.532E-01	3.546E-01	3.557E-01	3.570E-01	3.588E-01	3.603E-01
ADSORBED	1.426E-01	1.429E-01	1.430E-01	1.430E-01	1.433E-01	1.436E-01	1.442E-01	1.448E-01	1.452E-01	1.458E-01	1.465E-01	1.471E-01
SOIL AIR	2.322E-03	2.356E-03	2.381E-03	2.406E-03	2.402E-03	2.402E-03	2.372E-03	2.364E-03	2.353E-03	2.335E-03	2.346E-03	2.357E-03

SOIL ZONE 2:

SUBLAYER 1

MOISTURE	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01
%SOLUBILITY	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02
ADSORBED	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01
SOIL AIR	6.646E-01	6.731E-01	6.800E-01	6.869E-01	6.845E-01	6.830E-01	6.715E-01	6.667E-01	6.615E-01	6.540E-01	6.540E-01	6.543E-01
PURE PHASE	2.446E+02	2.445E+02	2.444E+02	2.442E+02	2.442E+02	2.442E+02	2.442E+02	2.443E+02	2.443E+02	2.444E+02	2.444E+02	2.444E+02

SOIL ZONE 3:

LOWER SOIL ZONE:

POL DEP CM	1.348E+03	1.348E+03	1.348E+03	1.349E+03	1.349E+03	1.349E+03	1.350E+03	1.350E+03	1.350E+03	1.350E+03	1.350E+03	1.350E+03

1 YEAR - 25 ANNUAL SUMMARY REPORT

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-- TOTAL INPUTS (UG) --

UPPER SOIL ZONE	0.000E-01
SOIL ZONE 2	0.000E-01
SOIL ZONE 3	0.000E-01
LOWER SOIL ZONE	0.000E-01

-- HYDROLOGIC CYCLE COMPONENTS --

AVERAGE SOIL MOISTURE ZONE 1 (%)	18.675
AVERAGE SOIL MOISTURE BELOW ZONE 1 (%)	18.800
TOTAL PRECIPITATION (CM)	53.229
TOTAL INFILTRATION (CM)	12.545
TOTAL EVAPOTRANSPIRATION (CM)	12.575
TOTAL SURFACE RUNOFF (CM)	40.683
TOTAL GRW RUNOFF (CM)	-0.726
TOTAL MOISTURE RETENTION (CM)	0.824
TOTAL YIELD (CM)	39.957

0 -- POLLUTANT MASS DISTRIBUTION IN COLUMN (UG) -- NOTE: IF COMPONENT IS ZERO EACH MONTH, IT IS NOT PRINTED

FOR FINAL MASS IN SOIL MOI., ADS. ON SOIL, SOIL AIR, IMMOBIL CEC, COMPLEXED, AND PURE PHASE FOR EACH SUBLAYER, SEE ABOVE (MONTH SEP)

UPPER SOIL ZONE:

SUBLAYER 1

TOTAL VOLATILIZED 5.295E+04

SOIL ZONE 2:

SUBLAYER 1

TOTAL DIFFUSED (UP) 7.722E+06

SOIL ZONE 3:

SUBLAYER 1

LOWER SOIL ZONE:

SUBLAYER 1

1 -- AVERAGE POLLUTANT CONCENTRATIONS -- NOTE: ONLY NON-ZERO VALUES ARE PRINTED --

UPPER SOIL ZONE:

SUBLAYER 1

SOIL MOISTURE (UG/ML)	1.121E-01
ADSORBED SOIL (UG/G)	1.443E-01
SOIL AIR (UG/ML)	2.366E-03

SOIL ZONE 2:

SUBLAYER 1

SOIL MOISTURE (UG/ML)	3.170E+01
ADSORBED SOIL (UG/G)	4.083E+01
SOIL AIR (UG/ML)	6.695E-01
PURE PHASE (UG/ML)	2.443E+02

SOIL ZONE 3:

LOWER SOIL ZONE:

MAX. POLL. DEPTH (M)	1.350E+01

1

YEAR - 30 MONTHLY RESULTS (OUTPUT)

-- HYDROLOGIC CYCLE COMPONENTS --

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MOIS. IN L1 (%)	17.702	18.182	18.722	19.232	19.322	19.352	18.902	18.662	18.812	18.722	18.332	18.152
MOIS. BELOW L1 (%)	18.002	18.182	18.722	19.232	19.322	19.352	19.202	18.962	18.812	18.722	18.632	18.452
PRECIPATION (CM)	2.787	6.554	9.394	12.408	8.363	7.634	3.871	0.807	0.351	0.211	0.164	0.685
NET INFILT. (CM)	0.531	1.707	2.258	2.482	1.966	1.995	1.195	0.200	0.056	0.019	0.017	0.120
EVAPOTRANS. (CM)	0.882	1.396	1.203	1.487	1.836	1.989	1.512	0.743	0.429	0.269	0.278	0.552
MOIS. RETEN (CM)	-0.261	0.370	1.111	1.049	0.185	0.062	-0.233	-0.455	-0.309	-0.185	-0.170	-0.341
SUR. RUNOFF (CM)	2.256	4.848	7.136	9.926	6.397	5.639	2.676	0.607	0.295	0.192	0.147	0.565
GRW. RUNOFF (CM)	-0.065	-0.060	-0.056	-0.054	-0.055	-0.056	-0.059	-0.062	-0.064	-0.065	-0.065	-0.066
YIELD (CM)	2.192	4.787	7.080	9.872	6.341	5.583	2.617	0.545	0.231	0.127	0.082	0.500
PAU/MPA (GZU)	1.025	1.016	1.010	1.014	1.014	1.002	1.000	1.048	1.405	3.013	1.488	1.246
PA/MPA (GZ)	1.097	1.016	1.010	1.014	1.014	1.002	1.041	1.206	1.405	3.013	3.908	1.545

1 -- POLLUTANT MASS INPUT TO COLUMN (UG) --

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
PRECIP.	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD UPPER	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD ZONE 2	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD ZONE 3	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
LOAD LOWER	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
TOTAL INPUT	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01

0 -- POLLUTANT MASS DISTRIBUTION IN COLUMN (UG) -- NOTE: IF COMPONENT IS ZERO EACH MONTH, IT IS NOT PRINTED

UPPER SOIL ZONE:

SUBLAYER 1

VOLATILIZED	6.702E+03	5.953E+03	5.147E+03	4.456E+03	4.324E+03	4.281E+03	4.849E+03	5.187E+03	4.933E+03	5.025E+03	5.653E+03	5.974E+03
IN SOIL MOI	1.389E+07	1.428E+07	1.470E+07	1.510E+07	1.519E+07	1.524E+07	1.494E+07	1.480E+07	1.495E+07	1.493E+07	1.468E+07	1.460E+07
ADS ON SOIL	1.920E+08	1.922E+08	1.922E+08	1.921E+08	1.924E+08	1.927E+08	1.934E+08	1.941E+08	1.945E+08	1.952E+08	1.960E+08	1.968E+08
IN SOIL AIR	2.022E+05	1.970E+05	1.900E+05	1.832E+05	1.813E+05	1.807E+05	1.858E+05	1.891E+05	1.856E+05	1.855E+05	1.928E+05	1.966E+05

SOIL ZONE 2:

SUBLAYER 1

DIFFUSED UP	7.994E+05	7.699E+05	6.655E+05	5.762E+05	5.584E+05	5.519E+05	5.685E+05	6.073E+05	6.303E+05	6.400E+05	6.572E+05	6.928E+05
IN SOIL MOI	6.363E+09	6.427E+09	6.617E+09	6.798E+09	6.829E+09	6.840E+09	6.787E+09	6.702E+09	6.649E+09	6.617E+09	6.586E+09	6.522E+09
ADS ON SOIL	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10	8.650E+10
IN SOIL AIR	8.890E+07	8.870E+07	8.551E+07	8.248E+07	8.150E+07	8.109E+07	8.085E+07	8.205E+07	8.251E+07	8.223E+07	8.289E+07	8.424E+07
PURE PHASE	2.727E+11	2.726E+11	2.724E+11	2.723E+11	2.722E+11	2.722E+11	2.723E+11	2.724E+11	2.724E+11	2.724E+11	2.725E+11	2.725E+11

SOIL ZONE 3:

SUBLAYER 1

LOWER SOIL ZONE:

SUBLAYER 1

-- POLLUTANT CONCENTRATIONS (UG/ML) OR (UG/G) -- NOTE: IF CONCENTRATIONS ARE ZERO FOR EACH MONTH, THEY ARE NOT PRINTED --

UPPER SOIL ZONE:

SUBLAYER 1

MOISTURE	1.311E-01	1.312E-01	1.312E-01	1.312E-01	1.314E-01	1.316E-01	1.320E-01	1.325E-01	1.328E-01	1.332E-01	1.338E-01	1.343E-01
%SOLUBILITY	4.134E-01	4.139E-01	4.139E-01	4.138E-01	4.144E-01	4.150E-01	4.165E-01	4.181E-01	4.190E-01	4.203E-01	4.222E-01	4.238E-01
ADSORBED	1.688E-01	1.690E-01	1.690E-01	1.689E-01	1.692E-01	1.694E-01	1.701E-01	1.707E-01	1.711E-01	1.716E-01	1.724E-01	1.730E-01
SOIL AIR	2.748E-03	2.786E-03	2.814E-03	2.842E-03	2.837E-03	2.835E-03	2.797E-03	2.787E-03	2.771E-03	2.749E-03	2.761E-03	2.773E-03

SOIL ZONE 2:

SUBLAYER 1

MOISTURE	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01
%SOLUBILITY	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02	1.000E+02
ADSORBED	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01	4.083E+01
SOIL AIR	6.646E-01	6.731E-01	6.800E-01	6.869E-01	6.845E-01	6.830E-01	6.715E-01	6.667E-01	6.615E-01	6.540E-01	6.540E-01	6.543E-01
PURE PHASE	2.446E+02	2.445E+02	2.443E+02	2.442E+02	2.442E+02	2.441E+02	2.442E+02	2.443E+02	2.443E+02	2.443E+02	2.444E+02	2.444E+02

SOIL ZONE 3:

LOWER SOIL ZONE:

POL DEP CM	1.358E+03	1.359E+03	1.359E+03	1.360E+03	1.360E+03	1.360E+03	1.360E+03	1.360E+03	1.360E+03	1.360E+03	1.360E+03	1.360E+03

1 YEAR - 30 ANNUAL SUMMARY REPORT

-- TOTAL INPUTS (UG) --

UPPER SOIL ZONE	0.000E-01
SOIL ZONE 2	0.000E-01
SOIL ZONE 3	0.000E-01
LOWER SOIL ZONE	0.000E-01

-- HYDROLOGIC CYCLE COMPONENTS --

AVERAGE SOIL MOISTURE ZONE 1 (%)	18.675
AVERAGE SOIL MOISTURE BELOW ZONE 1 (%)	18.800
TOTAL PRECIPITATION (CM)	53.229
TOTAL INFILTRATION (CM)	12.545
TOTAL EVAPOTRANSPIRATION (CM)	12.575
TOTAL SURFACE RUNOFF (CM)	40.683
TOTAL GRW RUNOFF (CM)	-0.726
TOTAL MOISTURE RETENTION (CM)	0.824
TOTAL YIELD (CM)	39.957

0 -- POLLUTANT MASS DISTRIBUTION IN COLUMN (UG) -- NOTE: IF COMPONENT IS ZERO EACH MONTH, IT IS NOT PRINTED

FOR FINAL MASS IN SOIL MOI., ADS. ON SOIL, SOIL AIR, IMMOBIL CEC, COMPLEXED, AND PURE PHASE FOR EACH SUBLAYER, SEE ABOVE (MONTH SEP)

UPPER SOIL ZONE:

SUBLAYER 1

TOTAL VOLATILIZED 6.249E+04

SOIL ZONE 2:

SUBLAYER 1

TOTAL DIFFUSED (UP) 7.717E+06

SOIL ZONE 3:

SUBLAYER 1

LOWER SOIL ZONE:

SUBLAYER 1

1 -- AVERAGE POLLUTANT CONCENTRATIONS -- NOTE: ONLY NON-ZERO VALUES ARE PRINTED --

UPPER SOIL ZONE:

SUBLAYER 1

SOIL MOISTURE (UG/ML)	1.322E-01
ADSORBED SOIL (UG/G)	1.703E-01
SOIL AIR (UG/ML)	2.792E-03

SOIL ZONE 2:

SUBLAYER 1

SOIL MOISTURE (UG/ML)	3.170E+01
ADSORBED SOIL (UG/G)	4.083E+01
SOIL AIR (UG/ML)	6.695E-01
PURE PHASE (UG/ML)	2.443E+02

SOIL ZONE 3:

LOWER SOIL ZONE:

MAX. POLL. DEPTH (M)	1.360E+01

**********EXECUTION COMPLETED**********