

**US EPA Contract No. 68-W9-0024**

# **ARCS II**

**FINAL REPORT**

**ESTIMATION OF SOIL CLEANUP CONCENTRATIONS  
REQUIRED TO PROTECT GROUNDWATER  
AS A SOURCE OF DRINKING WATER**

**Tutu Wells Site  
U.S. Virgin Islands**

**REMEDIAL PLANNING ACTIVITIES AT SELECTED  
UNCONTROLLED HAZARDOUS SUBSTANCE  
DISPOSAL SITES WITHIN EPA REGION II  
(NY, NJ, PR, VI)**

**CDM Federal Programs Corporation**

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**FINAL REPORT**  
**ESTIMATION OF SOIL CLEANUP CONCENTRATIONS**  
**REQUIRED TO PROTECT GROUNDWATER**  
**AS A SOURCE OF DRINKING WATER**  
**Tutu Wells Site**  
**U.S. Virgin Islands**

**EPA ARCS CONTRACT NO: 68-W9-0024**  
**Work Assignment: 073-2P1D**  
**Document Control No.: 7720-073-FR-CGTV**

**July 11, 1995**

**Prepared for**  
**U.S. Environmental Protection Agency**  
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CDM FEDERAL PROGRAMS CORPORATION  
a subsidiary of Camp Dresser & McKee Inc.

July 11, 1995

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PROJECT: EPA ARCS Contract 68-W9-0024  
Work Assignment: 073-2P1D  
Tutu Well Field Site  
St. Thomas, U.S. Virgin Islands

DOC. NO.: 7720-073-EP-CGTT

SUBJECT: Final Report  
Estimation of Soil Cleanup Concentrations Required to Protect  
Groundwater as a Source of Drinking Water  
Tutu Wells Site, U.S. Virgin Islands  
DCN: 7720-073-FR-CGTV

Dear Ms. Devine:

CDM Federal Programs Corporation (CDM Federal) is pleased submit the final report titled "Estimation of Soil Cleanup Concentrations Required to Protect Groundwater" as partial fulfillment of the reporting requirements of ARCS Work Assignment 073, the Tutu Wells Site, St. Thomas, U.S. Virgin Islands. The Final Report incorporates comments received from EPA on our May 9, 1995, Draft Report.

Soil profiles were developed for four properties where soil contamination is believed to be impacting groundwater quality: the Curriculum Center, Texaco Tutu Service Station, Esso Service Station, and O'Henry Dry Cleaners.

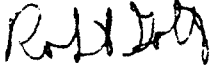
Based on our discussions with EPA, only two volatile organic compounds were modeled: tetrachloroethylene (PCE) and benzene. These indicator compounds were selected to represent the chemical groups of 1) chlorinated VOCs (PCE, TCE, and DCE) and 2) gasoline VOCs benzene, toluene, ethylbenzene and xylenes (BTEX). The model was used to back-calculate allowable soil concentrations that would result in groundwater quality at or below Federal drinking water standards. The cleanup goals were determined assuming that all properties, including the gas stations were unpaved, i.e., that rainwater could infiltrate.

As we have discussed with the EPA RPM, Ms. Caroline Kwan, the model results are very sensitive to the input value for organic carbon content of the soils. Limited site total organic carbon data was available from O'Henry (averaging 0.006 [0.6%]) and the Curriculum Center (averaging about 0.00002 [0.002%]). The Curriculum Center data appeared to be unrealistically low. Therefore the O'Henry data was applied to all sites. This represents a significant uncertainty in the model results. CDM Federal recommends that the soil cleanup goals calculated here be reevaluated if additional site-specific data becomes available and revised if necessary at that time.

If you have any questions concerning this submittal, please call me or Sally Odland at (212) 393-9634.

Sincerely,

CDM FEDERAL PROGRAMS CORPORATION



Robert D. Goltz, P.E.  
ARCS Program Manager

attachment

|     |                             |                               |
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TUT 007 1304

**FINAL REPORT**  
**ESTIMATION OF**  
**SOIL CLEANUP CONCENTRATIONS REQUIRED**  
**TO PROTECT GROUNDWATER AS A SOURCE OF DRINKING WATER**  
**Tutu Wells Site**  
**US Virgin Islands**

This report presents a discussion of the methods used and results of calculations developed to estimate soil cleanup levels beneath selected properties at the Tutu Wells RI/FS site. The soil cleanup levels have been estimated by establishing an acceptable level of residual contamination that, if leached from the soil, will not cause concentrations in groundwater to exceed drinking water standards. Section 1.0 provides an overview of the methods used, including an estimate of infiltration rates and calculations of soil leachate concentrations for each of the four selected real estate properties. Section 2.0 provides a discussion of the soil leaching calculations. Section 3.0 presents the infiltration rate calculations. Section 4.0 present a summary of the results.

## **1.0 INTRODUCTION**

Remediation of the Tutu Wells site includes cleanup of contaminated soils, since contaminated soil can serve as a continuing source of groundwater contamination. Groundwater recharge leaches contaminants from the soil and transports them toward the underlying aquifer. Once contaminants reach the aquifer they mix with groundwater and are transported in the direction of prevailing groundwater flow. This process will continue until natural infiltration leaches out residual contamination from the soil via the process of desorption, and/or the contaminants degrade via volatilization and biodegradation. Soil desorption and transport of residual contamination represent an ongoing source of contamination to the underlying aquifer system. Groundwater remedial systems will have to operate for prolonged periods unless unsaturated zone sources of contamination are remediated.

Because groundwater at the Tutu Wells site is a current or potential source of drinking water, the EPA has determined that the groundwater must be remediated to drinking water standards (MCLs) for all compounds. Due to the long-term risk to groundwater quality posed by leachate from the contaminated soils, the EPA has performed this evaluation of soil leaching and its impacts on groundwater beneath four properties at the Tutu Wells site. The goal of this evaluation is to identify soil contaminant concentrations whose leachate will not cause groundwater concentrations to exceed drinking water MCLs. Allowable soil contaminant concentrations were estimated by using the MCLs in groundwater as a starting point, and then back-calculating soil concentrations based on:

- groundwater flow rates and leachate dilution,
- leachate flow rates and concentration, and
- leachate migration and attenuation in the unsaturated zone.

The properties evaluated in this exercise were:

- the Curriculum Center (LAGA),
- Texaco Tutu Service Station (Texaco),
- Esso Tutu Service Station (Esso), and
- the O'Henry Dry Cleaner (O'Henry) properties.

The soil cleanup evaluations conducted for these properties utilize two programs to estimate contaminant transport rates and concentrations. Water infiltration rates were calculated via the program HELP (Hydrologic Evaluation of Landfill Performance, Version 2.02; EPA, 1988). HELP is a water balance model that uses daily climate data along with soil and vegetative cover parameters to calculate the quantity of rainfall that infiltrates the contaminated unsaturated soil area, migrates vertically through the contaminated unsaturated zone and discharges (recharges) to the underlying groundwater. Average annual recharge rates from the HELP model were used to represent water flow rates through the unsaturated zone, for purposes of estimating soil leaching rates. Recharge rates were estimated for the O'Henry Dry Cleaner site and were applied to each of the other sites evaluated. Details on the HELP modeling runs are provided in Section 2.0.

A second program, the Soil Leaching Model (described in Section 3.0), simulates leaching of individual compounds from a vertical strip of the unsaturated soil at a given site. This program uses the soil properties and a vertical profile of soil contamination at a particular site as inputs. The conceptual basis for the Soil Leaching Model is described in Section 3.1. The soil leaching rate is governed by the soil-water partition coefficient. The program calculates compound desorption between the soil and infiltrating liquid using methods described in Section 3.2. In addition, a biodegradation loss rate was incorporated into the leaching calculations, as described in Section 3.3. Additional assumptions used in the soil leaching model are presented in Section 3.4.

Groundwater concentrations of the compound leached from the unsaturated zone are calculated using an aquifer dilution factor. The dilution factor is based on the volume of leachate entering the aquifer and the volume of water flowing in the aquifer underneath the area contributing leachate. The estimated groundwater dilution factors are discussed in Section 3.5. Estimates of required soil cleanup levels, based on the soil leaching model results, are presented in Section 4.0

## 2.0 INFILTRATION CALCULATIONS

Before the migration of chemicals in the subsurface can be evaluated, the amount of water percolating through the contaminated soil due to precipitation must be evaluated. An infiltration rate for the Tutu Wells site was calculated using the EPA Hydrologic Evaluation of Landfill Performance (HELP) numerical model (Schroeder et al, 1988). An average annual infiltration rate of 2.41 inches/year was calculated for the site. This infiltration rate was based on local and regional climatologic, vegetative and soils data, as described below.

Climatologic data used in the analysis included daily precipitation records from San Juan, Puerto Rico (the nearest station from which data were readily available) from 1972 through 1992, average monthly temperatures from 1961 to 1993 from the Cyril King Airport on St. Thomas (from Table 4-2 of the site

RI report), and solar radiation values from San Juan, Puerto Rico adjusted for St. Thomas. Average annual precipitation used in the model is 48.5 inches, compared to the 47.5 inches reported in the Tutu Wells Site RI report.

The hydrologic properties of the soils were estimated from borehole logs of the top 22 feet (from land surface down to the water table) at the O'Henry property. These logs were adequate to represent deep percolation at the selected real estate properties within the Tutu Wells site. Default soil types and characteristics were selected from the 15 soil types contained in the HELP model, based on lithologic information contained in the borehole logs at the O'Henry site. The HELP model calculations assumed an unpaved surface with a poor grass cover. These are the likely surface conditions for each site during site remediation, even though the two gas stations are currently paved. This assumption is reasonable for future conditions at the site. It is also conservative because it creates a higher infiltration rate due to reduced evapotranspiration losses compared to evapotranspiration from a better vegetation cover. A model-calculated rainfall runoff curve number was used, as was a leaf area index based on the poor grass cover.

The average annual infiltration rate resulting from this simulation, approximately 2.41 inches/year (5 percent of precipitation), was used in all Soil Leaching Model simulations. An average annual rate is appropriate for the leaching evaluations due to the long timeframes involved in the soil leaching. Differences in soil types at the four properties were not considered significant enough to have a large affect on the resulting average annual infiltration rate. The infiltration rate is based on infiltration through a surface area of 2500 ft<sup>2</sup>. This surface area is equivalent to a contaminated zone measuring 50 x 50 ft. Output of the HELP model simulations is included in Appendix A, and includes the soil and climatologic input parameters.

### 3.0 CONTAMINANT MIGRATION THROUGH SOIL

Organic contaminants detected in soils or groundwater at the Tutu Wells site included the chlorinated hydrocarbons tetrachloroethene (PCE), trichloroethene (TCE), trichloroethane (TCA), 1,2-dichloroethene (1,2-DCE), 1,1-dichloroethene, vinyl chloride and the aromatic hydrocarbons benzene, toluene, ethylbenzene and xylene. The EPA has determined that the Curriculum Center, Esso and O'Henry sites are potential sources of chlorinated hydrocarbon contamination to groundwater and that the Curriculum Center, Texaco and Esso sites are potential sources of aromatic hydrocarbon contamination to groundwater. One indicator compound each was selected for the chlorinated and aromatic hydrocarbon compound groups. These compounds (PCE and benzene, respectively) are representative of their compound group, in terms of contaminant fate and transport processes. General characteristics of the indicator compounds are that they:

- represent the most significant contamination relative to the MCLs,
- are relatively more mobile,
- are present at relatively higher concentrations and/or
- were detected more frequently than the other compounds within their respective group.

Given these factors, the indicator compounds "drive" groundwater and soil cleanup levels, such that the

calculated cleanup levels for the selected indicator compounds will be more stringent than cleanup levels for other compounds within the same compound group. Consequently, cleaning up to levels calculated for the indicator compounds will also result in remediation of the non-indicator compounds to levels protective of groundwater as a drinking water source.

PCE was selected as an indicator compound because of its high frequency of detection in site soils and groundwater, because it is a source compound that degrades to TCE, cis-1,2-DCE and vinyl chloride (all of which have been detected in groundwater) and because it has one of the lower MCLs of the chlorinated hydrocarbon compounds. Benzene was selected as an indicator compound because it is a known carcinogen and has the lowest MCL of its group, and because it is the most mobile of the detected aromatic hydrocarbon compounds.

Contaminant leaching from the unsaturated zone was evaluated separately at the sites listed above for the compounds PCE and benzene. Leachate concentrations were determined by estimating soil-water partitioning and compound biodegradation in a sequential mixing cell approach. Development of the soil-water distribution coefficient (Kd) values, biodegradation rates and mixing cell models for each site are discussed in the sections 3.1 through 3.4. Calculation of the resulting compound concentrations in groundwater beneath each site is discussed in section 3.5.

### 3.1 Soil Leaching Model Conceptual Development

The Soil Leaching Model is a set of numerical expressions developed in spreadsheet format to represent contaminant mass transport through the unsaturated zone of a source area. The numerical expressions discretize a vertical profile into layers with representative soil concentrations and properties. Calculations are one-dimensional in the vertical direction, but the results can represent a three-dimensional source area by considering the areal extent of contamination (i.e. a 50 ft. by 50 ft. source area).

The leaching model solves a series of algebraic equations for each soil layer, in a series of iterations. Each iteration represents the movement of one pore volume of water from one model layer into the underlying model layer. Recharge water is the driving force, and it is assumed that all interstitial water (a volume equal to the effective porosity times the layer thickness) is displaced by the downward percolation. At each pore volume, or iteration, the contaminant in soil is partitioned into water as a function of Kd. Water containing the resulting mass of contaminant undergoes biodegradation. The resulting decreased mass is then transferred to the next lower layer. The initial soil layer contains a correspondingly lower contaminant mass at the end of the iteration. The masses in soil and water are converted to concentrations and the process is repeated. It is assumed that water entering the top layer is clean, but that water entering underlying layers may contain contaminants leached from the upper layers.

The concentration in a given cell is calculated via the following equation:

$$C_w = \frac{M_T - M_{bio}}{(\theta + Kd \cdot \rho_b)}$$

where  $C_w$  = water concentration,  $M_T$  = total contaminant mass in the water and solid phases,  $M_{bio}$  = mass loss due to biodegradation in the aqueous phase,  $Kd$  = soil-water distribution coefficient,  $\rho_b$  = soil mass,  $\theta$  = water mass for a unit volume of material. Derivation of the above equation is based on the

derivation presented in Appendix B of Evaluation of Groundwater Extraction Remedies, EPA/540/2-89/054, EPA, September 1989. The above algorithm was computed on a computer spreadsheet to determine discharge concentrations and transport time of contaminants from soil into the groundwater.

PCE and benzene simulations were run separately at the Curriculum Center, Texaco and Esso sites because of the site-specific soil characteristics and the nature of the  $K_d$  values required. The EPA has determined that benzene is not present in unsaturated zone soils beneath the O'Henry site, so only PCE leaching was simulated there. As a result, a total of seven soil leaching models were developed.

The Soil Leaching Model is initially setup by dividing the unsaturated zone into layers corresponding to the major soil types present at each of the simulated properties. A composite soil profile was generated for each property to simulate the soils present beneath the zone where sampling has shown soils to be contaminated. Each soil layer was then subdivided further into layers whose thickness is based on the assumed water content (taken to be effective porosity), such that a unit volume of water is present in all layers throughout the soil leaching model. The total and effective porosity for a given soil were those presented in the HELP model documentation. Layer thicknesses will be the same for a given soil type (with the same effective porosity), but will change between soil types if the water content for a given soil type changes. The model then operates by exchanging equal pore volumes of water from model layer to model layer.

The soil profile was divided into small layers, averaging between about 4 and 10 cm thick, to minimize the effects of numerical dispersion that are inherent to mixing cell methods. Significant numerical dispersion would occur if the soil profile were treated as a single cell; this would lead to a more rapid contaminant transport than if the soil profile was discretized into smaller cells.

Initial soil contaminant concentrations, the  $K_d$  values for PCE or benzene, and the soil mass (dry bulk density, a constant for a given soil type) were also input for each sub-layer. The PCE and benzene initial concentrations input into the model were estimates based on the compound's MCL, the dilution factor for the site, the soil profile and soil  $K_d$  values. The soil concentrations were modified using an iterative process until the resultant leachate concentrations were less than or equal to MCLs for that compound after undergoing aquifer dilution. A printout of the final layer inputs for the soil types, layer thicknesses, effective porosity, soil mass,  $K_d$  values by soil type, and the initial water and soil concentrations for each site and compound simulation are included in Appendix B.

For the scenario where upper soil layers are more contaminated than lower layers, as is suggested by the higher soil  $K_d$  values in the upper soil horizon at each site, the contaminants will slowly propagate through the modeled unsaturated zone at a constant percolation rate. The percolation rate is determined by HELP model water balance simulations. A decreasing trend in contaminant concentrations will result as contaminants eventually leach out of the unsaturated zone and into the aquifer. The concentration leaching from the base of the modeled unsaturated zone is multiplied by the estimated land surface area of the contamination zone at each property to get a total contaminant mass reaching the aquifer. This contaminant mass is then assumed to undergo dilution within the aquifer, as discussed in section 3.5. Additional assumptions and model formulation are presented in the section 3.4.

### 3.2 Estimates of Adsorption-Desorption Rates for PCE and Benzene

The migration rate of chemicals in the subsurface is controlled in part by the rate of adsorption and desorption of the chemicals in soil. The tendency for a chemical to remain adsorbed to soil and to

partition between the liquid and solid phases is described by the distribution coefficient,  $K_d$ . Empirically,  $K_d$  is the ratio between contaminants present in the soil versus the water phases when at equilibrium. Values for  $K_d$  can be calculated from the organic carbon content of the soil matrix using the following equation:

$$K_d = (K_{oc})(f_{oc})$$

where  $K_{oc}$  is the organic carbon partition coefficient (in ml/g) and  $f_{oc}$  is the fraction of total organic carbon (TOC) content of the soil, in grams of organic carbon per gram of soil. TOC values are available from only a few locations at the Tutu Wells site; four TOC results from shallow soil samples collected at the Curriculum Center site are presented in the site RI (values of 8390, 18.4, 15.9, and 15.5 mg/kg; Figure 5-2) and two samples were collected subsequent to the RI from the O'Henry site by EPA (TOC values of 5830 and 6100 mg/kg). Based on the limited TOC sampling, it was assumed that the higher detected values (averaging about 6000 mg/kg) are representative of the shallow soil horizons present at each property. A  $K_{oc}$  constant of 364 ml/g was derived for PCE and 83 for benzene by previous investigators (see "Basics of Pump-and-Treat Ground-Water Remediation Technology, Appendix A; EPA/600/8-90/003; EPA, March 1990).

This commonly used equation to calculate  $K_d$  is valid if the soil total organic carbon ( $f_{oc}$ ) is greater than the critical  $f_{oc}$  level, typically assumed to be 0.001 (equivalent to a TOC of 1000 mg/kg) for benzene and 0.0002 for PCE (McCarty et al, 1981; ES&T Vol 15, p 40-51). Above these fractions of organic carbon, adsorption is dominated by the organic phase rather than the inorganic phase. This condition appears to be true for shallow soils at the Tutu Wells sites, which have calculated  $f_{oc}$  values of approximately 0.006. The resulting  $K_d$  values are 2.184 ml/g for PCE and 0.50 ml/g for benzene. Pending site-specific TOC data, these  $K_d$  values were assumed for the uppermost soil horizon at each site.

When the  $f_{oc}$  is below the critical level of 1000 mg/kg, inorganic adsorption must be taken into account. Some of the TOC data collected from the Curriculum Center site suggested that very low organic carbon contents exist in the deeper soil horizons, estimated to be only 300 mg/kg. The following equation has been suggested by McCarty, et al (1981) to account for inorganic adsorption:

$$K_d = (K_{oc})(f_{oc}) + (K_{io})(f_{io})$$

where  $K_{io}$  is the distribution coefficient for the inorganic material and  $f_{io}$  is the fraction of inorganic material in the soil ( $1 - f_{oc}$ ), in grams/gram. McCarty, et al (1981) suggested that  $K_{io}$  can be estimated using the following equation:

$$K_{io} = (SA/200)(K_{ow})^{-16}$$

where  $SA$  is the soil surface area. Using literature values for surface area assuming a clay content of 50 percent and  $K_{ow}$  values for PCE, the  $K_{io}$  value for the volcanic soils is estimated as 0.089 ml/g for PCE and 0.075 ml/g for benzene. The calculated  $K_d$  values are therefore estimated as 0.21 for PCE and 0.10 for benzene in the deeper soil horizons.

The two sets of  $K_d$  values derived from the above analyses were used in the Soil Leaching Model. Soil horizons were developed from the soil boring logs contained in the RI report for each site. The upper soil horizon, ranging from 2 to 8 feet at the sites evaluated, were assigned the higher  $K_d$  values for PCE and benzene, while all deeper soil horizons were assigned the lower  $K_d$  values because of their lower

total organic carbon content.

Use of the  $K_d$  values to simulate compound adsorption and desorption within a soil profile incorporates the simplifying assumptions that adsorption follows a linear Freundlich sorption isotherm and is fully reversible. It is also assumed that the TOC values used to calculate  $K_d$  are representative of site conditions. Additional site-specific soil TOC values could alter the  $K_d$  values, and therefore the soil leaching profiles, for each site.

### 3.3 Estimates of PCE and Benzene Biodegradation

Soil and groundwater data at the Tutu Wells site suggest that biodegradation is occurring in the subsurface. Aerobic biodegradation and volatilization losses probably occur in the upper portion of the unsaturated zone soils throughout the site, which may have contributed to the low compound detections in shallow soils. Site data, however, suggest that anaerobic biodegradation occurs in deeper soils beneath the site. Since less attenuation is possible for contaminants located closer to the water table (due to shorter travel distances and travel times), it was considered more conservative to simulate the biodegradation process which occurs in the deeper portion of the unsaturated zone.

The RI soil sampling results from several of the Esso and O'Henry site soil samples show the presence of 1,2-DCE. Assuming it is not a source compound, experimental data have indicated that 1,2-DCE is only generated in the environment as a result of the anaerobic degradation of PCE and/or TCE. The breakdown or 'daughter' compound 1,2-DCE was detected in soil starting about 2-3 feet below ground surface, so anaerobic conditions may exist below that depth. In addition, cis/trans 1,2-DCE and vinyl chloride, an anaerobic degradation product of DCE, were detected in groundwater in many of the sampling locations, which further supports the existence of anaerobic biodegradation. An anaerobic biodegradation rate was therefore considered representative of biodegradation processes which occur deeper within the unsaturated zone above the water table. Anaerobic rates are much slower than aerobic biodegradation rates, hence this approach is conservative.

A biodegradation loss term reflecting anaerobic biodegradation was added to the Soil Leaching Model to simulate this process. Biodegradation rates were calculated using the longer anaerobic half-lives for PCE and benzene amongst the range of rates provided, as compiled from the Handbook of Environmental Degradation Rates (Howard, et al, 1991; Lewis Publishers). Using the longer half-lives produces less mass loss and is therefore more conservative. The half-lives used are 4.5 years for PCE and 2 years for benzene.

The biodegradation rate was incorporated into the individual cells of the soil leaching model using the following relationship:

$$dC = C_0 - C_0(e^{-\lambda dt})$$

where  $dC$  is the change in aqueous phase (water) concentration due to biodegradation,  $C_0$  is the starting water concentration for that soil layer and timestep,  $-\lambda$  is the rate loss constant based on the anaerobic biodegradation half-life (0.345 calculated for benzene and 0.153 for PCE), and  $dt$  is the simulation timestep. This relationship was added to the Soil Leaching Model for each site and compound evaluated. The biodegradation rate was simulated by incorporating its mass loss for contaminants in the aqueous phase after soil-water sorption had occurred for a given layer and timestep. Soil-water equilibrium

partitioning did not occur within a model layer following the biodegradation mass loss. As a result, some mass imbalance within a model layer occurs. Due to the large anaerobic biodegradation half-lives for PCE and benzene, the mass loss per timestep is small, and so the mass balance error is also very small. The mass balance is corrected in the underlying model layer at each timestep when soil-water partitioning occurs.

The presence of the anaerobic biodegradation breakdown products 1,2-DCE in site soils below three feet and of vinyl chloride in groundwater strongly suggest that anaerobic conditions are prevalent below about the three-foot depth interval at the Tutu site. The presence of an anaerobic zone in the subsurface soils would virtually rule out the existence of an air-exchange process within this zone. Therefore, volatilization of the VOC compounds in the deeper soil interval (greater than three feet) was assumed to be a very minor process and was not included in the model. Since groundwater VOC concentrations are influenced most heavily by leachate fate and transport in the soil zone just above the water table, then not including compound volatilization is also a conservative assumption.

### 3.4 Soil Leaching Model Assumptions

A number of assumptions are implied in the use of the Soil Leaching Model. The following lists the key hydrogeologic and geochemical assumptions of the Soil Leaching Model.

1. A one-dimensional model is an adequate representation of vertical migration of contaminants through soil; thus leachate migration is assumed to be only in the vertical direction.
2. Water flow through the unsaturated zone soil is at steady-state. The flux rate calculated from the HELP model for one of the properties is sufficiently accurate to represent the infiltration rate at all four properties.
3. Soil characteristics (dry weight bulk density, porosity, Kd) within a layer are constant, but can vary between soil types within the profile.
4. Water content within a layer is constant and equal to accepted literature values of effective porosity for the soil type used.
5. Water content in a soil layer is fully mixed and completely replaced during each iteration.
6. The unsaturated zone soil-water system is in chemical equilibrium for the compounds being simulated.
7. Partitioning between the solid and liquid phases is linear, instantaneous, fully reversible and adequately described by the Freundlich Equation with exponent of one, allowing use of the Kd relationship.
8. Biodegradation at the site can be adequately simulated using anaerobic biodegradation half-lives of 4.5 and 2 years for PCE and benzene, respectively.
9. No volatilization, dispersion or other attenuating mechanisms occur during contaminant transport through the unsaturated zone.

10. PCE and benzene represent the most conservative compounds at the site due to their relatively high concentrations, mobility, and/or low MCLs, and are therefore appropriate for use in determining soil cleanup levels for their respective compound groups.

11. Information derived from the Tutu Wells RI report for each property simulated, including soil lithologies, effective porosity and organic carbon content, is reasonably representative of site conditions within the entire unsaturated zone profile for that property.

### 3.5 Groundwater dilution of leachate

It is possible to estimate concentrations of PCE and benzene in groundwater which result from the contaminated leachate entering the groundwater system. The groundwater concentrations are based on an assumption that the leachate undergoes complete vertical mixing within a specified aquifer zone, and that the aquifer contains no background levels of PCE or benzene.

This dilution of leachate by groundwater can be expressed by the following equation:

$$\text{Dilution Factor} = Q_l / (Q_l + Q_g)$$

where  $Q_l$  is the leachate flow entering the aquifer perpendicular to groundwater flow and  $Q_g$  is the existing aquifer flow migrating beneath the leaching zone. The dilution factor is a unitless number that is multiplied by the leachate concentration to yield an equivalent aquifer concentration based on the assumptions of uniform mixing discussed previously. The value for  $Q_l$  was calculated from the HELP model simulations, as the average annual infiltration rate (2.41 inches/year; Appendix A) multiplied by the contaminant source length. The contaminant source length is defined as the distance parallel to groundwater flow over which the soil contamination is assumed to exist. Using soil results maps contained in the Tutu wells RI, the source length ranged from about 20 to 50 feet. The leachate flow,  $Q_l$ , is used on a unit width basis.

The groundwater flow under the contaminated area is calculated from Darcy's Law, as:

$$Q_g = K * I * A$$

where  $K$  = aquifer hydraulic conductivity,  $I$  = aquifer hydraulic gradient, and  $A$  = aquifer area perpendicular to flow. The value for  $K$  ranged from 320 to 3060 feet/year for the four sites, based on information contained in the RI report. The hydraulic gradient,  $I$ , ranged from 0.0083 ft/ft at the Texaco site to 0.073 ft/ft at the O'Henry site based on water level contours presented in the site RI report. The aquifer area  $A$  is the product of the aquifer width perpendicular to flow (taken to be unit width for these evaluations) and the aquifer saturated thickness calculated at the point of compliance (assumed to be the downgradient edge of the zone of contaminated soil), and was taken to be a thickness of 10 feet for each site. A ten foot thickness is the mixing zone depth estimated for the O'Henry site; to be consistent, this mixing zone depth was used for all sites. The leachate flow,  $Q_l$ , is used on a unit width basis, so the aquifer width is also on a unit width. The resulting aquifer area of flow is 10 square feet.

Using the above variables, the aquifer flow,  $Q_g$ , and the dilution factor were calculated for each site. The leachate dilution factor ranged from approximately 0.01 at the Curriculum Center site to approximately 0.04 for the other sites. These dilution factors were used in conjunction with the MCLs for PCE and benzene to determine the maximum leachate concentrations that could enter the aquifer

system before MCLs would be exceeded. Those maximum leachate concentrations were then used to estimate the maximum acceptable soil concentrations for each compound.

#### 4.0 RESULTS

The estimated soil concentrations for PCE and benzene that are protective of groundwater as a drinking water source (groundwater concentrations below drinking water MCLs) are presented in Table 1. As indicated on Table 1, the soil profiles contain two concentrations for each compound at each site, one for shallow soils and one for deeper soils containing lower total organic carbon. These correspond directly to the assumed  $K_d$  values for the soil layers (Appendix B), which were based on the estimated soil TOC values. Higher soil contaminant concentrations can persist in the shallower soil zone because this zone is simulated as having greater TOC and therefore a greater adsorption of contaminants. The higher contaminant sorption allows relatively little compound mass to leach out of the soil. The higher  $K_d$  values in the upper soil zones also cause the contaminants to leach into groundwater for a relatively long time. Appendix C shows the groundwater concentration profiles which result from soil contaminants (distributed as shown in Table 1) leaching into the aquifer. As discussed previously, the soil concentrations were back-calculated and run through the Soil Leaching Model in an iterative manner until the maximum groundwater concentrations were less than the MCL concentration (of 5 ug/l) for both PCE and benzene.

Based on the methods, data sources and assumptions described in Sections 1.0 - 3.0, the maximum estimated allowable soil PCE concentrations in the lower portion of each soil profile are approximately 73 ug/kg at the Curriculum Center site, 29 ug/kg at the Texaco site, 32 ug/kg at the Esso site and 31 ug/kg at the O'Henry site. The maximum estimated allowable soil benzene concentrations in the lower portions of each soil profile are approximately 37 ug/kg at the Curriculum Center site, 13 ug/kg at the Texaco site and 15 ug/kg at the Esso site. The soil concentrations in the upper soil horizon at each site are about a factor of ten higher for PCE and about a factor of five higher for benzene (Table 1). These soil concentration profiles produce maximum groundwater concentrations within the 10-foot aquifer mixing zone of less than 5 ug/l, the MCL for each compound.

The distribution of PCE and benzene concentrations in the unsaturated zone soils is highly influenced by the soil-water partition coefficient ( $K_d$ ) for each compound. As discussed in Section 3.2, the  $K_d$  values are closely related to the soil total organic carbon content. Sensitivity analyses performed on the  $K_d$  values used in the soil leaching models shows a close relationship between  $K_d$  and the resulting contaminant leachate concentrations.

Table 1 shows that the soil concentrations for a given contaminant and soil horizon (upper/lower) are roughly similar for the Texaco, Esso and O'Henry sites. For example, the PCE concentrations in the lower zone at these sites are 29, 32 and 31 ug/kg, respectively. These similarities in PCE are due to the relatively consistent nature of soil lithologies and porosity values used for these sites, even though the soil thickness ranges from about 6 to 20 feet. The compound concentrations at the Curriculum Center site are higher for a given compound and soil horizon largely due to differences in the soil lithology and porosity values. These contrasts suggest the sensitivity of the soil leaching model to soil porosity, and the relative insensitivity of the model to the thickness of a given soil type. Soil leaching simulations run without the biodegradation loss term showed little differences with the current soil concentration profiles for PCE. This was expected due to the low biodegradation rate for PCE. The soil benzene concentrations in the upper soil horizon also showed little change with or without biodegradation, whereas

allowable benzene concentrations in the lower soil horizon roughly doubled when a biodegradation rate loss term was added. The differences in soil benzene concentrations with and without biodegradation loss in the Soil Leaching Model suggests the relative importance of compound sorption and biodegradation. In the upper soil zone the higher  $K_d$  values appear to control compound leaching rates and thus soil adsorption-desorption reactions are the dominant factor in leaching. In the lower soil zone the  $K_d$  values used are small enough that biodegradation losses have a more significant effect.

This evaluation of potential soil cleanup levels was limited by the scarcity of site-specific data on the physical characteristics of the soils from each property. During future source control or predesign investigations, as much site-specific information as possible should be obtained on the parameters that influence leaching of contaminants from the soil. At a minimum, the important parameters include soil total organic carbon content, soil porosity, and compound concentrations.

**Table 1**

**Summary of Soil Cleanup Profiles**

| <b>SITE</b>                         | <b>DEPTH<br/>(ft)</b> | <b>PCE Concentration<br/>(ug/kg)</b> | <b>Benzene Concentration<br/>(ug/kg)</b> |
|-------------------------------------|-----------------------|--------------------------------------|------------------------------------------|
| <b>Curriculum<br/>Center (LAGA)</b> | <b>0 - 2.8</b>        | <b>731</b>                           | <b>150</b>                               |
|                                     | <b>2.8 - 35</b>       | <b>73</b>                            | <b>37</b>                                |
| <b>Texaco</b>                       | <b>0 - 8.7</b>        | <b>290</b>                           | <b>67</b>                                |
|                                     | <b>8.7 - 15</b>       | <b>29</b>                            | <b>13</b>                                |
| <b>ESSO</b>                         | <b>0 - 4</b>          | <b>320</b>                           | <b>74</b>                                |
|                                     | <b>4 - 15</b>         | <b>32</b>                            | <b>15</b>                                |
| <b>O'Henry</b>                      | <b>0 - 1.6</b>        | <b>375</b>                           | <b>—</b>                                 |
|                                     | <b>1.7 - 22</b>       | <b>31</b>                            |                                          |

**APPENDIX A**  
**HELP MODEL**  
**OUTPUT**

TUT 007 1317

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 INFILTRATION CALCULATIONS  
 TUTU WELLS SITE - O'HENRY PROPERTY  
 2-15-95 GNM

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 \*\*\*\*\*  
 POOR GRASS

LAYER 1  
 -----

VERTICAL PERCOLATION LAYER

|                                  |   |                      |
|----------------------------------|---|----------------------|
| THICKNESS                        | = | 24.00 INCHES         |
| POROSITY                         | = | .3980 VOL/VOL        |
| FIELD CAPACITY                   | = | .2443 VOL/VOL        |
| WILTING POINT                    | = | .1361 VOL/VOL        |
| INITIAL SOIL WATER CONTENT       | = | .2443 VOL/VOL        |
| SATURATED HYDRAULIC CONDUCTIVITY | = | .000216000000 CM/SEC |

LAYER 2  
 -----

VERTICAL PERCOLATION LAYER

|                                  |   |                      |
|----------------------------------|---|----------------------|
| THICKNESS                        | = | 108.00 INCHES        |
| POROSITY                         | = | .4530 VOL/VOL        |
| FIELD CAPACITY                   | = | .1901 VOL/VOL        |
| WILTING POINT                    | = | .0848 VOL/VOL        |
| INITIAL SOIL WATER CONTENT       | = | .1901 VOL/VOL        |
| SATURATED HYDRAULIC CONDUCTIVITY | = | .000720000000 CM/SEC |

LAYER 3  
 -----

VERTICAL PERCOLATION LAYER

|                                  |   |                      |
|----------------------------------|---|----------------------|
| THICKNESS                        | = | 132.00 INCHES        |
| POROSITY                         | = | .5010 VOL/VOL        |
| FIELD CAPACITY                   | = | .2837 VOL/VOL        |
| WILTING POINT                    | = | .1353 VOL/VOL        |
| INITIAL SOIL WATER CONTENT       | = | .2837 VOL/VOL        |
| SATURATED HYDRAULIC CONDUCTIVITY | = | .000190000000 CM/SEC |

GENERAL SIMULATION DATA  
 -----

|                          |   |               |
|--------------------------|---|---------------|
| SCS RUNOFF CURVE NUMBER  | = | 89.91         |
| TOTAL AREA OF COVER      | = | 2500. SQ FT   |
| EVAPORATIVE ZONE DEPTH   | = | 16.00 INCHES  |
| UPPER LIMIT VEG. STORAGE | = | 6.3680 INCHES |

INITIAL VEG. STORAGE = 2.1776 INCHES  
 INITIAL SNOW WATER CONTENT = .0000 INCHES  
 INITIAL TOTAL WATER STORAGE IN  
 SOIL AND WASTE LAYERS = 63.8424 INCHES

SOIL WATER CONTENT INITIALIZED BY PROGRAM.

# CLIMATOLOGICAL DATA

USER SPECIFIED RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND  
 SOLAR RADIATION FOR SAN JUAN PUERTO RICO

MAXIMUM LEAF AREA INDEX = 1.00  
 START OF GROWING SEASON (JULIAN DATE) = 0  
 END OF GROWING SEASON (JULIAN DATE) = 367

## NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

| JAN/JUL | FEB/AUG | MAR/SEP | APR/OCT | MAY/NOV | JUN/DEC |
|---------|---------|---------|---------|---------|---------|
| 78.40   | 78.50   | 79.10   | 80.00   | 80.90   | 82.50   |
| 83.30   | 83.30   | 82.70   | 82.10   | 80.80   | 79.10   |

## AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 72 THROUGH 92

|                          | JAN/JUL        | FEB/AUG        | MAR/SEP        | APR/OCT        | MAY/NOV        | JUN/DEC        |
|--------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| PRECIPITATION            |                |                |                |                |                |                |
| TOTALS                   | 2.90<br>2.83   | 2.07<br>4.16   | 2.31<br>6.30   | 2.72<br>6.67   | 5.58<br>6.65   | 2.73<br>3.62   |
| STD. DEVIATIONS          | 1.97<br>1.12   | 1.20<br>1.87   | .89<br>3.76    | 1.64<br>3.55   | 5.93<br>4.81   | 1.92<br>1.90   |
| RUNOFF                   |                |                |                |                |                |                |
| TOTALS                   | .334<br>.052   | .053<br>.405   | .080<br>1.612  | .340<br>1.249  | 1.402<br>1.518 | .274<br>.294   |
| STD. DEVIATIONS          | 1.160<br>.083  | .094<br>.499   | .186<br>2.571  | .670<br>1.799  | 2.456<br>2.108 | .515<br>.431   |
| EVAPOTRANSPIRATION       |                |                |                |                |                |                |
| TOTALS                   | 2.649<br>2.892 | 2.293<br>3.445 | 2.234<br>4.032 | 2.244<br>4.930 | 3.363<br>4.090 | 2.784<br>3.324 |
| STD. DEVIATIONS          | 1.306<br>1.255 | 1.344<br>1.459 | .889<br>1.306  | 1.339<br>.915  | 2.566<br>1.379 | 1.689<br>1.269 |
| PERCOLATION FROM LAYER 3 |                |                |                |                |                |                |
| TOTALS                   | .2071<br>.2081 | .1909<br>.2074 | .2095<br>.1972 | .2004<br>.1996 | .2034<br>.1909 | .1976<br>.2021 |
| STD. DEVIATIONS          | .1418<br>.1420 | .1297<br>.1470 | .1407<br>.1390 | .1301<br>.1369 | .1268<br>.1258 | .1240<br>.1316 |

TUT 007 1319

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 72 THROUGH 92

|                          | (INCHES)         | (CU. FT.) | PERCENT |
|--------------------------|------------------|-----------|---------|
| PRECIPITATION            | 48.53 (13.605)   | 10111.    | 100.00  |
| RUNOFF                   | 7.614 ( 5.361)   | 1586.     | 15.69   |
| EVAPOTRANSPIRATION       | 38.281 ( 7.017)  | 7975.     | 78.87   |
| PERCOLATION FROM LAYER 3 | 2.4143 ( 1.5439) | 503.      | 4.97    |
| CHANGE IN WATER STORAGE  | .226 ( 3.118)    | 47.       | .47     |

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PEAK DAILY VALUES FOR YEARS 72 THROUGH 92

|                                   | (INCHES) | (CU. FT.) |
|-----------------------------------|----------|-----------|
| PRECIPITATION                     | 7.04     | 1466.7    |
| RUNOFF                            | 5.310    | 1106.2    |
| PERCOLATION FROM LAYER 3          | .0214    | 4.5       |
| SNOW WATER                        | .00      | .0        |
| MAXIMUM VEG. SOIL WATER (VOL/VOL) | .3486    |           |
| MINIMUM VEG. SOIL WATER (VOL/VOL) | .1326    |           |

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FINAL WATER STORAGE AT END OF YEAR 92

| LAYER      | (INCHES) | (VOL/VOL) |
|------------|----------|-----------|
| 1          | 5.65     | .2356     |
| 2          | 22.83    | .2114     |
| 3          | 37.29    | .2825     |
| SNOW WATER | .00      |           |

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**APPENDIX B**  
**SOIL LEACHING MODEL**  
**MODEL CONFIGURATIONS**

TJUT 007 1321

747 007 1323

1



[illegible]

[illegible]

|       |        |      |      |      |      |        |      |       |      |       |       |        |
|-------|--------|------|------|------|------|--------|------|-------|------|-------|-------|--------|
| ML-MH | 1060.0 | 73.1 | 33.5 | 1.43 | 0.21 | 111.59 | 0.22 | 33.46 | 0.99 | 32.46 | 73.07 | 111.36 |
| ML-MH | 1064.0 | 73.1 | 33.5 | 1.43 | 0.21 | 111.59 | 0.22 | 33.46 | 0.99 | 32.46 | 73.07 | 111.36 |
| ML-MH | 1068.0 | 73.1 | 33.5 | 1.43 | 0.21 | 111.59 | 0.22 | 33.46 | 0.99 | 32.46 | 73.07 | 111.36 |

TUT 007 1326

Tutu Wells Site - Texaco Property Soil Leaching Calculations - PCE  
G. McCurry 4-21-95

| NUMBER PORE VOLUMES |            | 0.0 TIMESTEP (yrs)=       |                           | 0.1435           |                      |                                         |           |                                   |                           |                                     |                         |                            |  |
|---------------------|------------|---------------------------|---------------------------|------------------|----------------------|-----------------------------------------|-----------|-----------------------------------|---------------------------|-------------------------------------|-------------------------|----------------------------|--|
| NUMBER OF YEARS     |            | 0.0                       |                           |                  |                      |                                         |           |                                   |                           |                                     |                         |                            |  |
| SOIL TYPE (USCS)    | DEPTH (CM) | INITIAL SOIL CONC (ug/kg) | INITIAL WATER CONC (ug/l) | SOIL MASS (g/cc) | WATER CONTENT (g/cc) | TOTAL INIT CONTAMINANT MASS (ug/1000cc) | KD (ml/g) | FINAL WATER CONC W SORPTIO (ug/l) | BIODEGRAD. LOSS (ug/l)*dt | FINAL H2O CON W. SORP & BIOD (ug/l) | FINAL SOIL CONC (ug/kg) | FINAL CONTAM MASS (per cc) |  |
|                     | 0.0        |                           | 0.0                       |                  |                      |                                         |           | 0.0                               |                           | 0.00                                |                         |                            |  |
| CH                  | 8.0        | 290.0                     | 132.8                     | 1.38             | 0.11                 | 414.23                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 413.91                     |  |
| CH                  | 16.0       | 290.0                     | 132.8                     | 1.38             | 0.11                 | 414.23                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 413.91                     |  |
| CH                  | 24.0       | 290.0                     | 132.8                     | 1.38             | 0.11                 | 414.23                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 413.91                     |  |
| CH                  | 32.0       | 290.0                     | 132.8                     | 1.38             | 0.11                 | 414.23                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 413.91                     |  |
| CH                  | 40.0       | 290.0                     | 132.8                     | 1.38             | 0.11                 | 414.23                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 413.91                     |  |
| CH                  | 48.0       | 290.0                     | 132.8                     | 1.38             | 0.11                 | 414.23                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 413.91                     |  |
| CH                  | 56.0       | 290.0                     | 132.8                     | 1.38             | 0.11                 | 414.23                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 413.91                     |  |
| CH                  | 64.0       | 290.0                     | 132.8                     | 1.38             | 0.11                 | 414.23                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 413.91                     |  |
| CH                  | 72.0       | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| CH                  | 80.0       | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| CH                  | 88.0       | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| CH                  | 96.0       | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| CH                  | 104.0      | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| CH                  | 112.0      | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| CH                  | 120.0      | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| CH                  | 128.0      | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| CH                  | 136.0      | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| CH                  | 144.0      | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| CH                  | 152.0      | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| CH                  | 160.0      | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| CH                  | 168.0      | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| CH                  | 176.0      | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| CH                  | 184.0      | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| CH                  | 192.0      | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| CH                  | 200.0      | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| CH                  | 208.0      | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| CH                  | 216.0      | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| CH                  | 224.0      | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| CH                  | 232.0      | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| CH                  | 240.0      | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| CH                  | 248.0      | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| CH                  | 256.0      | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| CH                  | 264.0      | 290.0                     | 132.8                     | 1.33             | 0.11                 | 398.86                                  | 2.18      | 132.8                             | 2.88                      | 129.90                              | 290.00                  | 398.54                     |  |
| ML                  | 268.0      | 29.0                      | 13.3                      | 1.33             | 0.22                 | 41.35                                   | 0.22      | 13.3                              | 0.29                      | 12.99                               | 29.00                   | 41.28                      |  |
| ML                  | 272.0      | 29.0                      | 13.3                      | 1.33             | 0.22                 | 41.35                                   | 0.22      | 13.3                              | 0.29                      | 12.99                               | 29.00                   | 41.28                      |  |
| ML                  | 276.0      | 29.0                      | 13.3                      | 2.65             | 0.22                 | 79.77                                   | 0.22      | 13.3                              | 0.29                      | 12.99                               | 29.00                   | 79.71                      |  |
| ML                  | 280.0      | 29.0                      | 13.3                      | 2.65             | 0.22                 | 79.77                                   | 0.22      | 13.3                              | 0.29                      | 12.99                               | 29.00                   | 79.71                      |  |
| ML                  | 284.0      | 29.0                      | 13.3                      | 2.65             | 0.22                 | 79.77                                   | 0.22      | 13.3                              | 0.29                      | 12.99                               | 29.00                   | 79.71                      |  |
| ML                  | 288.0      | 29.0                      | 13.3                      | 2.65             | 0.22                 | 79.77                                   | 0.22      | 13.3                              | 0.29                      | 12.99                               | 29.00                   | 79.71                      |  |
| ML                  | 292.0      | 29.0                      | 13.3                      | 2.65             | 0.22                 | 79.77                                   | 0.22      | 13.3                              | 0.29                      | 12.99                               | 29.00                   | 79.71                      |  |
| ML                  | 296.0      | 29.0                      | 13.3                      | 2.65             | 0.22                 | 79.77                                   | 0.22      | 13.3                              | 0.29                      | 12.99                               | 29.00                   | 79.71                      |  |
| ML                  | 300.0      | 29.0                      | 13.3                      | 2.65             | 0.22                 | 79.77                                   | 0.22      | 13.3                              | 0.29                      | 12.99                               | 29.00                   | 79.71                      |  |
| ML                  | 304.0      | 29.0                      | 13.3                      | 2.65             | 0.22                 | 79.77                                   | 0.22      | 13.3                              | 0.29                      | 12.99                               | 29.00                   | 79.71                      |  |
| ML                  | 308.0      | 29.0                      | 13.3                      | 2.65             | 0.22                 | 79.77                                   | 0.22      | 13.3                              | 0.29                      | 12.99                               | 29.00                   | 79.71                      |  |
| ML                  | 312.0      | 29.0                      | 13.3                      | 2.65             | 0.22                 | 79.77                                   | 0.22      | 13.3                              | 0.29                      | 12.99                               | 29.00                   | 79.71                      |  |
| ML                  | 316.0      | 29.0                      | 13.3                      | 2.65             | 0.22                 | 79.77                                   | 0.22      | 13.3                              | 0.29                      | 12.99                               | 29.00                   | 79.71                      |  |

TUT 007 1327

[illegible]

Tutu Wells Site - ESSO Property Soil Leaching Calculations - PCE  
G. McCurry 4-23-95

| NUMBER PORE VOLUMES |            | 0.0 TIMESTEP (yrs)        |                           | 0.0660           |                      |                                         |           |                                     |                           |                                       |                         |                            |  |
|---------------------|------------|---------------------------|---------------------------|------------------|----------------------|-----------------------------------------|-----------|-------------------------------------|---------------------------|---------------------------------------|-------------------------|----------------------------|--|
| NUMBER OF YEARS     |            | 0.0 No. weeks =           |                           | 0.00             |                      |                                         |           |                                     |                           |                                       |                         |                            |  |
| SOIL TYPE (USCS)    | DEPTH (CM) | INITIAL SOIL CONC (ug/kg) | INITIAL WATER CONC (ug/l) | SOIL MASS (g/cc) | WATER CONTENT (g/cc) | TOTAL INIT CONTAMINANT MASS (ug/1000cc) | KD (ml/g) | FINAL WATER CONC W. SORPTION (ug/l) | BIODEGRAD. LOSS (ug/l)*dt | FINAL H2O CONC W. SORP & BIODE (ug/l) | FINAL SOIL CONC (ug/kg) | FINAL CONTAM MASS (per cc) |  |
|                     | 0.0        |                           | 0.0                       |                  |                      |                                         |           | 0.0                                 |                           | 0.00                                  |                         |                            |  |
| CL                  | 2.7        | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 5.4        | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 8.1        | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 10.8       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 13.5       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 16.2       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 18.9       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 21.6       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 24.3       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 27.0       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 29.7       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 32.4       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 35.1       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 37.8       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 40.5       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 43.2       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 45.9       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 48.6       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 51.3       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 54.0       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 56.7       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 59.4       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 62.1       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 64.8       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 67.5       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 70.2       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 72.9       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 75.6       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 78.3       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 81.0       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 83.7       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 86.4       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 89.1       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 91.8       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 94.5       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 97.2       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 99.9       | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 102.6      | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 105.3      | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 108.0      | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 110.7      | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 113.4      | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 116.1      | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 118.8      | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| CL                  | 121.5      | 320.0                     | 146.5                     | 1.43             | 0.15                 | 479.90                                  | 2.18      | 146.5                               | 1.47                      | 145.05                                | 320.0                   | 479.68                     |  |
| SM                  | 123.0      | 32.0                      | 14.7                      | 1.46             | 0.27                 | 50.60                                   | 0.22      | 14.7                                | 0.15                      | 14.50                                 | 32.0                    | 50.56                      |  |
| SM                  | 124.5      | 32.0                      | 14.7                      | 1.46             | 0.27                 | 50.60                                   | 0.22      | 14.7                                | 0.15                      | 14.50                                 | 32.0                    | 50.56                      |  |

TUT 007 1329

[illegible]





1353 007 747

Tutu Wells Site - O'Henry Property Soil Leaching Calculations - PCE  
Gordon McCurry 4-15-95

NUMBER PORE VOLUMES 0.0 TIMESTEP (yrs)= 0.3131  
NUMBER OF YEARS 0.0

| SOIL<br>TYPE<br>(USCS) | DEPTH<br>(CM) | INITIAL<br>SOIL CONC<br>(ug/kg) | INITIAL<br>WATER CONC<br>(ug/l) | SOIL<br>MASS<br>(g/cc) | WATER<br>CONTENT<br>(g/cc) | TOTAL INIT<br>CONTAMINANT<br>MASS<br>(ug/1000cc) | KD<br>(ml/g) | FINAL Water<br>CONC w Sorption<br>(ug/l) | BIODEGRAD.<br>LOSS<br>(ug/l)*dt | FINAL H2O CONC<br>W. SORP & BIODE<br>(ug/l) | FINAL<br>SOIL CONC<br>(ug/kg) | FINAL<br>CONTAM<br>MASS<br>(per cc) |
|------------------------|---------------|---------------------------------|---------------------------------|------------------------|----------------------------|--------------------------------------------------|--------------|------------------------------------------|---------------------------------|---------------------------------------------|-------------------------------|-------------------------------------|
|                        | 0.0           |                                 | 0.00                            |                        |                            |                                                  |              | 0.00                                     |                                 | 0.00                                        |                               |                                     |
| SC                     | 8.0           | 375.0                           | 171.70                          | 1.59                   | 0.24                       | 637.46                                           | 2.18         | 171.70                                   | 8.03                            | 163.67                                      | 375.0                         | 635.53                              |
| SC                     | 16.0          | 375.0                           | 171.70                          | 1.59                   | 0.24                       | 637.46                                           | 2.18         | 171.70                                   | 8.03                            | 163.67                                      | 375.0                         | 635.53                              |
| SC                     | 24.0          | 375.0                           | 171.70                          | 1.59                   | 0.24                       | 637.46                                           | 2.18         | 171.70                                   | 8.03                            | 163.67                                      | 375.0                         | 635.53                              |
| SC                     | 32.0          | 375.0                           | 171.70                          | 1.59                   | 0.24                       | 637.46                                           | 2.18         | 171.70                                   | 8.03                            | 163.67                                      | 375.0                         | 635.53                              |
| SC                     | 40.0          | 375.0                           | 171.70                          | 1.59                   | 0.24                       | 637.46                                           | 2.18         | 171.70                                   | 8.03                            | 163.67                                      | 375.0                         | 635.53                              |
| SC                     | 48.0          | 375.0                           | 171.70                          | 1.59                   | 0.24                       | 637.46                                           | 2.18         | 171.70                                   | 8.03                            | 163.67                                      | 375.0                         | 635.53                              |
| SC                     | 56.0          | 31.0                            | 14.19                           | 1.59                   | 0.24                       | 52.70                                            | 2.18         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 52.54                               |
| SC                     | 64.0          | 31.0                            | 14.19                           | 1.59                   | 0.24                       | 52.70                                            | 2.18         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 52.54                               |
| SM                     | 74.0          | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 84.0          | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 94.0          | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 104.0         | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 114.0         | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 124.0         | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 134.0         | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 144.0         | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 154.0         | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 164.0         | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 174.0         | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 184.0         | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 194.0         | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 204.0         | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 214.0         | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 224.0         | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 234.0         | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 244.0         | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 254.0         | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 264.0         | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 274.0         | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 284.0         | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 294.0         | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 304.0         | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 314.0         | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 324.0         | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| SM                     | 334.0         | 31.0                            | 14.19                           | 1.46                   | 0.19                       | 47.88                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 47.75                               |
| ML                     | 341.0         | 31.0                            | 14.19                           | 1.33                   | 0.28                       | 45.05                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 44.86                               |
| ML                     | 348.0         | 31.0                            | 14.19                           | 1.33                   | 0.28                       | 45.05                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 44.86                               |
| ML                     | 355.0         | 31.0                            | 14.19                           | 1.33                   | 0.28                       | 45.05                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 44.86                               |
| ML                     | 362.0         | 31.0                            | 14.19                           | 1.33                   | 0.28                       | 45.05                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 44.86                               |
| ML                     | 369.0         | 31.0                            | 14.19                           | 1.33                   | 0.28                       | 45.05                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 44.86                               |
| ML                     | 376.0         | 31.0                            | 14.19                           | 1.33                   | 0.28                       | 45.05                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 44.86                               |
| ML                     | 383.0         | 31.0                            | 14.19                           | 1.33                   | 0.28                       | 45.05                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 44.86                               |
| ML                     | 390.0         | 31.0                            | 14.19                           | 1.33                   | 0.28                       | 45.05                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 44.86                               |
| ML                     | 397.0         | 31.0                            | 14.19                           | 1.33                   | 0.28                       | 45.05                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 44.86                               |
| ML                     | 404.0         | 31.0                            | 14.19                           | 1.33                   | 0.28                       | 45.05                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 44.86                               |
| ML                     | 411.0         | 31.0                            | 14.19                           | 1.33                   | 0.28                       | 45.05                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 44.86                               |
| ML                     | 418.0         | 31.0                            | 14.19                           | 1.33                   | 0.28                       | 45.05                                            | 0.22         | 14.19                                    | 0.66                            | 13.53                                       | 31.0                          | 44.86                               |

TUT 007 1334

[illegible]

Tutu Wells Site - Curriculum Center Property Soil Leaching Calculations - benzene  
G. McCurry 4-28-86

NUMBER PORE VOLUMES 0.0 TIMESTEP (yrs) 0.1370  
NUMBER OF YEARS 0.0

| SOIL TYPE (USCS) | DEPTH (CM) | INITIAL SOIL CONC (ug/kg) | INITIAL WATER CONC (ug/l) | SOIL MASS (g/cc) | WATER CONTENT (g/cc) | TOTAL INIT CONTAMINANT MASS (ug/1000cc) | KD (ml/g) | FINAL WATER CONC (ug/l) | BIODEGRAD. LOSS (ug/l)*dt | FINAL H2O CONC W. SORP & BIOD (ug/l) | FINAL SOIL CONC (ug/kg) | FINAL CONTAM MASS (per cc) |
|------------------|------------|---------------------------|---------------------------|------------------|----------------------|-----------------------------------------|-----------|-------------------------|---------------------------|--------------------------------------|-------------------------|----------------------------|
|                  | 0.0        |                           | 0.0                       |                  |                      |                                         |           | 0.0                     |                           | 0.00                                 |                         |                            |
| SC               | 6.0        | 150.0                     | 300.0                     | 1.59             | 0.14                 | 280.50                                  | 0.50      | 300.0                   | 13.85                     | 286.15                               | 150.0                   | 278.56                     |
| SC               | 12.0       | 150.0                     | 300.0                     | 1.59             | 0.14                 | 280.50                                  | 0.50      | 300.0                   | 13.85                     | 286.15                               | 150.0                   | 278.56                     |
| SC               | 18.0       | 150.0                     | 300.0                     | 1.59             | 0.14                 | 280.50                                  | 0.50      | 300.0                   | 13.85                     | 286.15                               | 150.0                   | 278.56                     |
| SC               | 24.0       | 150.0                     | 300.0                     | 1.59             | 0.14                 | 280.50                                  | 0.50      | 300.0                   | 13.85                     | 286.15                               | 150.0                   | 278.56                     |
| SC               | 30.0       | 150.0                     | 300.0                     | 1.59             | 0.14                 | 280.50                                  | 0.50      | 300.0                   | 13.85                     | 286.15                               | 150.0                   | 278.56                     |
| SC               | 36.0       | 150.0                     | 300.0                     | 1.59             | 0.14                 | 280.50                                  | 0.50      | 300.0                   | 13.85                     | 286.15                               | 150.0                   | 278.56                     |
| SC               | 42.0       | 150.0                     | 300.0                     | 1.59             | 0.14                 | 280.50                                  | 0.50      | 300.0                   | 13.85                     | 286.15                               | 150.0                   | 278.56                     |
| SC               | 48.0       | 150.0                     | 300.0                     | 1.59             | 0.14                 | 280.50                                  | 0.50      | 300.0                   | 13.85                     | 286.15                               | 150.0                   | 278.56                     |
| SC               | 54.0       | 150.0                     | 300.0                     | 1.59             | 0.14                 | 280.50                                  | 0.50      | 300.0                   | 13.85                     | 286.15                               | 150.0                   | 278.56                     |
| SC               | 60.0       | 150.0                     | 300.0                     | 1.59             | 0.14                 | 280.50                                  | 0.50      | 300.0                   | 13.85                     | 286.15                               | 150.0                   | 278.56                     |
| SC               | 66.0       | 150.0                     | 300.0                     | 1.59             | 0.14                 | 280.50                                  | 0.50      | 300.0                   | 13.85                     | 286.15                               | 150.0                   | 278.56                     |
| SC               | 72.0       | 150.0                     | 300.0                     | 1.59             | 0.14                 | 280.50                                  | 0.50      | 300.0                   | 13.85                     | 286.15                               | 150.0                   | 278.56                     |
| SC               | 78.0       | 150.0                     | 300.0                     | 1.59             | 0.14                 | 280.50                                  | 0.50      | 300.0                   | 13.85                     | 286.15                               | 150.0                   | 278.56                     |
| SC               | 84.0       | 150.0                     | 300.0                     | 1.59             | 0.14                 | 280.50                                  | 0.50      | 300.0                   | 13.85                     | 286.15                               | 150.0                   | 278.56                     |
| ML-MH            | 88.0       | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 92.0       | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 96.0       | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 100.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 104.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 108.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 112.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 116.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 120.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 124.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 128.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 132.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 136.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 140.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 144.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 148.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 152.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 156.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 160.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 164.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 168.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 172.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 176.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 180.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 184.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 188.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 192.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 196.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 200.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 204.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 208.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 212.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 216.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 220.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |
| ML-MH            | 224.0      | 37.0                      | 74.0                      | 1.43             | 0.21                 | 68.49                                   | 0.10      | 74.0                    | 3.42                      | 70.58                                | 37.0                    | 67.77                      |

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|       |        |      |      |      |      |       |      |      |      |       |      |       |
|-------|--------|------|------|------|------|-------|------|------|------|-------|------|-------|
| ML-MH | 948.0  | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 952.0  | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 956.0  | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 960.0  | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 964.0  | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 968.0  | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 972.0  | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 976.0  | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 980.0  | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 984.0  | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 988.0  | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 992.0  | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 996.0  | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 1000.0 | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 1004.0 | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 1008.0 | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 1012.0 | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 1016.0 | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 1020.0 | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 1024.0 | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 1028.0 | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 1032.0 | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 1036.0 | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 1040.0 | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 1044.0 | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 1048.0 | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 1052.0 | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 1056.0 | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 1060.0 | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 1064.0 | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |
| ML-MH | 1068.0 | 37.0 | 74.0 | 1.43 | 0.21 | 68.49 | 0.10 | 74.0 | 3.42 | 70.58 | 37.0 | 67.77 |

TUT 007 1340

Tutu Wells Site - Texaco Property Soil Leaching Calculations - Benzene  
G. McCurry 4-21-95

| NUMBER PORE VOLUMES<br>NUMBER OF YEARS |               | 0.0 TIMESTEP (yrs)<br>0.0       |                                 | 0.1435                 |                            |                                                  |              |                                         |                                 |                                            |                               |                                     |  |  |  |
|----------------------------------------|---------------|---------------------------------|---------------------------------|------------------------|----------------------------|--------------------------------------------------|--------------|-----------------------------------------|---------------------------------|--------------------------------------------|-------------------------------|-------------------------------------|--|--|--|
| SOIL<br>TYPE<br>(USCS)                 | DEPTH<br>(CM) | INITIAL<br>SOIL CONC<br>(ug/kg) | INITIAL<br>WATER CONC<br>(ug/l) | SOIL<br>MASS<br>(g/cc) | WATER<br>CONTENT<br>(g/cc) | TOTAL INIT<br>CONTAMINANT<br>MASS<br>(ug/1000cc) | KD<br>(ml/g) | FINAL Water<br>CONC w SORPTIO<br>(ug/l) | BIODEGRAD.<br>LOSS<br>(ug/l)*dt | FINAL H2O CONC<br>W. SORP & BIOD<br>(ug/l) | FINAL<br>SOIL CONC<br>(ug/kg) | FINAL<br>CONTAM<br>MASS<br>(per cc) |  |  |  |
|                                        | 0.0           |                                 | 0.0                             |                        |                            |                                                  |              | 0.0                                     |                                 | 0.0                                        |                               |                                     |  |  |  |
| CH                                     | 8.0           | 67.0                            | 134.0                           | 1.38                   | 0.11                       | 107.07                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 106.75                              |  |  |  |
| CH                                     | 16.0          | 67.0                            | 134.0                           | 1.38                   | 0.11                       | 107.07                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 106.75                              |  |  |  |
| CH                                     | 24.0          | 67.0                            | 134.0                           | 1.38                   | 0.11                       | 107.07                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 106.75                              |  |  |  |
| CH                                     | 32.0          | 67.0                            | 134.0                           | 1.38                   | 0.11                       | 107.07                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 106.75                              |  |  |  |
| CH                                     | 40.0          | 67.0                            | 134.0                           | 1.38                   | 0.11                       | 107.07                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 106.75                              |  |  |  |
| CH                                     | 48.0          | 67.0                            | 134.0                           | 1.38                   | 0.11                       | 107.07                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 106.75                              |  |  |  |
| CH                                     | 56.0          | 67.0                            | 134.0                           | 1.38                   | 0.11                       | 107.07                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 106.75                              |  |  |  |
| CH                                     | 64.0          | 67.0                            | 134.0                           | 1.38                   | 0.11                       | 107.07                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 106.75                              |  |  |  |
| CH                                     | 72.0          | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| CH                                     | 80.0          | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| CH                                     | 88.0          | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| CH                                     | 96.0          | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| CH                                     | 104.0         | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| CH                                     | 112.0         | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| CH                                     | 120.0         | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| CH                                     | 128.0         | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| CH                                     | 136.0         | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| CH                                     | 144.0         | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| CH                                     | 152.0         | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| CH                                     | 160.0         | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| CH                                     | 168.0         | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| CH                                     | 176.0         | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| CH                                     | 184.0         | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| CH                                     | 192.0         | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| CH                                     | 200.0         | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| CH                                     | 208.0         | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| CH                                     | 216.0         | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| CH                                     | 224.0         | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| CH                                     | 232.0         | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| CH                                     | 240.0         | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| CH                                     | 248.0         | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| CH                                     | 256.0         | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| CH                                     | 264.0         | 67.0                            | 134.0                           | 1.33                   | 0.11                       | 103.52                                           | 0.50         | 134.0                                   | 2.91                            | 131.1                                      | 67.0                          | 103.19                              |  |  |  |
| ML                                     | 268.0         | 13.0                            | 26.0                            | 1.33                   | 0.22                       | 22.95                                            | 0.10         | 26.0                                    | 0.56                            | 25.4                                       | 13.0                          | 22.82                               |  |  |  |
| ML                                     | 272.0         | 13.0                            | 26.0                            | 1.33                   | 0.22                       | 22.95                                            | 0.10         | 26.0                                    | 0.56                            | 25.4                                       | 13.0                          | 22.82                               |  |  |  |
| ML                                     | 276.0         | 13.0                            | 26.0                            | 2.65                   | 0.22                       | 40.17                                            | 0.10         | 26.0                                    | 0.56                            | 25.4                                       | 13.0                          | 40.05                               |  |  |  |
| ML                                     | 280.0         | 13.0                            | 26.0                            | 2.65                   | 0.22                       | 40.17                                            | 0.10         | 26.0                                    | 0.56                            | 25.4                                       | 13.0                          | 40.05                               |  |  |  |
| ML                                     | 284.0         | 13.0                            | 26.0                            | 2.65                   | 0.22                       | 40.17                                            | 0.10         | 26.0                                    | 0.56                            | 25.4                                       | 13.0                          | 40.05                               |  |  |  |
| ML                                     | 288.0         | 13.0                            | 26.0                            | 2.65                   | 0.22                       | 40.17                                            | 0.10         | 26.0                                    | 0.56                            | 25.4                                       | 13.0                          | 40.05                               |  |  |  |
| ML                                     | 292.0         | 13.0                            | 26.0                            | 2.65                   | 0.22                       | 40.17                                            | 0.10         | 26.0                                    | 0.56                            | 25.4                                       | 13.0                          | 40.05                               |  |  |  |
| ML                                     | 296.0         | 13.0                            | 26.0                            | 2.65                   | 0.22                       | 40.17                                            | 0.10         | 26.0                                    | 0.56                            | 25.4                                       | 13.0                          | 40.05                               |  |  |  |
| ML                                     | 300.0         | 13.0                            | 26.0                            | 2.65                   | 0.22                       | 40.17                                            | 0.10         | 26.0                                    | 0.56                            | 25.4                                       | 13.0                          | 40.05                               |  |  |  |
| ML                                     | 304.0         | 13.0                            | 26.0                            | 2.65                   | 0.22                       | 40.17                                            | 0.10         | 26.0                                    | 0.56                            | 25.4                                       | 13.0                          | 40.05                               |  |  |  |
| ML                                     | 308.0         | 13.0                            | 26.0                            | 2.65                   | 0.22                       | 40.17                                            | 0.10         | 26.0                                    | 0.56                            | 25.4                                       | 13.0                          | 40.05                               |  |  |  |
| ML                                     | 312.0         | 13.0                            | 26.0                            | 2.65                   | 0.22                       | 40.17                                            | 0.10         | 26.0                                    | 0.56                            | 25.4                                       | 13.0                          | 40.05                               |  |  |  |
| ML                                     | 316.0         | 13.0                            | 26.0                            | 2.65                   | 0.22                       | 40.17                                            | 0.10         | 26.0                                    | 0.56                            | 25.4                                       | 13.0                          | 40.05                               |  |  |  |
| ML                                     | 320.0         | 13.0                            | 26.0                            | 2.65                   | 0.22                       | 40.17                                            | 0.10         | 26.0                                    | 0.56                            | 25.4                                       | 13.0                          | 40.05                               |  |  |  |
| ML                                     | 324.0         | 13.0                            | 26.0                            | 2.65                   | 0.22                       | 40.17                                            | 0.10         | 26.0                                    | 0.56                            | 25.4                                       | 13.0                          | 40.05                               |  |  |  |
| ML                                     | 328.0         | 13.0                            | 26.0                            | 2.65                   | 0.22                       | 40.17                                            | 0.10         | 26.0                                    | 0.56                            | 25.4                                       | 13.0                          | 40.05                               |  |  |  |
| ML                                     | 332.0         | 13.0                            | 26.0                            | 2.65                   | 0.22                       | 40.17                                            | 0.10         | 26.0                                    | 0.56                            | 25.4                                       | 13.0                          | 40.05                               |  |  |  |

TUT 007 1341

TUT 007 1342

Tutu Wells Site - ESSO Property Soil Leaching Calculations - Benzene  
G. McCurry 4-27-95

NUMBER PORE VOLUMES 0.0 TIMESTEP (yrs)= 0.0660  
NUMBER OF YEARS 0.0

| SOIL<br>TYPE<br>(USCS) | DEPTH<br>(CM) | INITIAL<br>SOIL CONC<br>(ug/kg) | INITIAL<br>WATER CONC<br>(ug/l) | SOIL<br>MASS<br>(g/cc) | WATER<br>CONTENT<br>(g/cc) | TOTAL INIT<br>CONTAMINANT<br>MASS<br>(ug/1000cc) | KD<br>(ml/g) | FINAL WATER<br>CONC W. SORPTION<br>(ug/l) | BIODEGRAD.<br>LOSS<br>(ug/l)*dt | FINAL H2O CONC<br>W. SORP & BIODEG<br>(ug/l) | FINAL<br>SOIL CONC<br>(ug/kg) | FINAL<br>CONTAM<br>MASS<br>(per cc) |
|------------------------|---------------|---------------------------------|---------------------------------|------------------------|----------------------------|--------------------------------------------------|--------------|-------------------------------------------|---------------------------------|----------------------------------------------|-------------------------------|-------------------------------------|
|                        | 0.0           |                                 | 0.0                             |                        |                            |                                                  |              | 0.0                                       |                                 | 0.00                                         |                               |                                     |
| CL                     | 2.7           | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 5.4           | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 8.1           | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 10.8          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 13.5          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 16.2          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 18.9          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 21.6          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 24.3          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 27.0          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 29.7          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 32.4          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 35.1          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 37.8          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 40.5          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 43.2          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 45.9          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 48.6          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 51.3          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 54.0          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 56.7          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 59.4          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 62.1          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 64.8          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 67.5          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 70.2          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 72.9          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 75.6          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 78.3          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 81.0          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 83.7          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 86.4          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 89.1          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 91.8          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 94.5          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 97.2          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 99.9          | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 102.6         | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 105.3         | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 108.0         | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 110.7         | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 113.4         | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 116.1         | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 118.8         | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| CL                     | 121.5         | 74.0                            | 148.0                           | 1.43                   | 0.15                       | 128.09                                           | 0.50         | 148.0                                     | 3.33                            | 144.67                                       | 74.0                          | 127.59                              |
| SM                     | 123.0         | 15.0                            | 30.0                            | 1.46                   | 0.27                       | 29.96                                            | 0.10         | 30.0                                      | 0.68                            | 29.32                                        | 15.0                          | 29.78                               |
| SM                     | 124.5         | 15.0                            | 30.0                            | 1.46                   | 0.27                       | 29.96                                            | 0.10         | 30.0                                      | 0.68                            | 29.32                                        | 15.0                          | 29.78                               |

TUT 007 1343

[illegible]

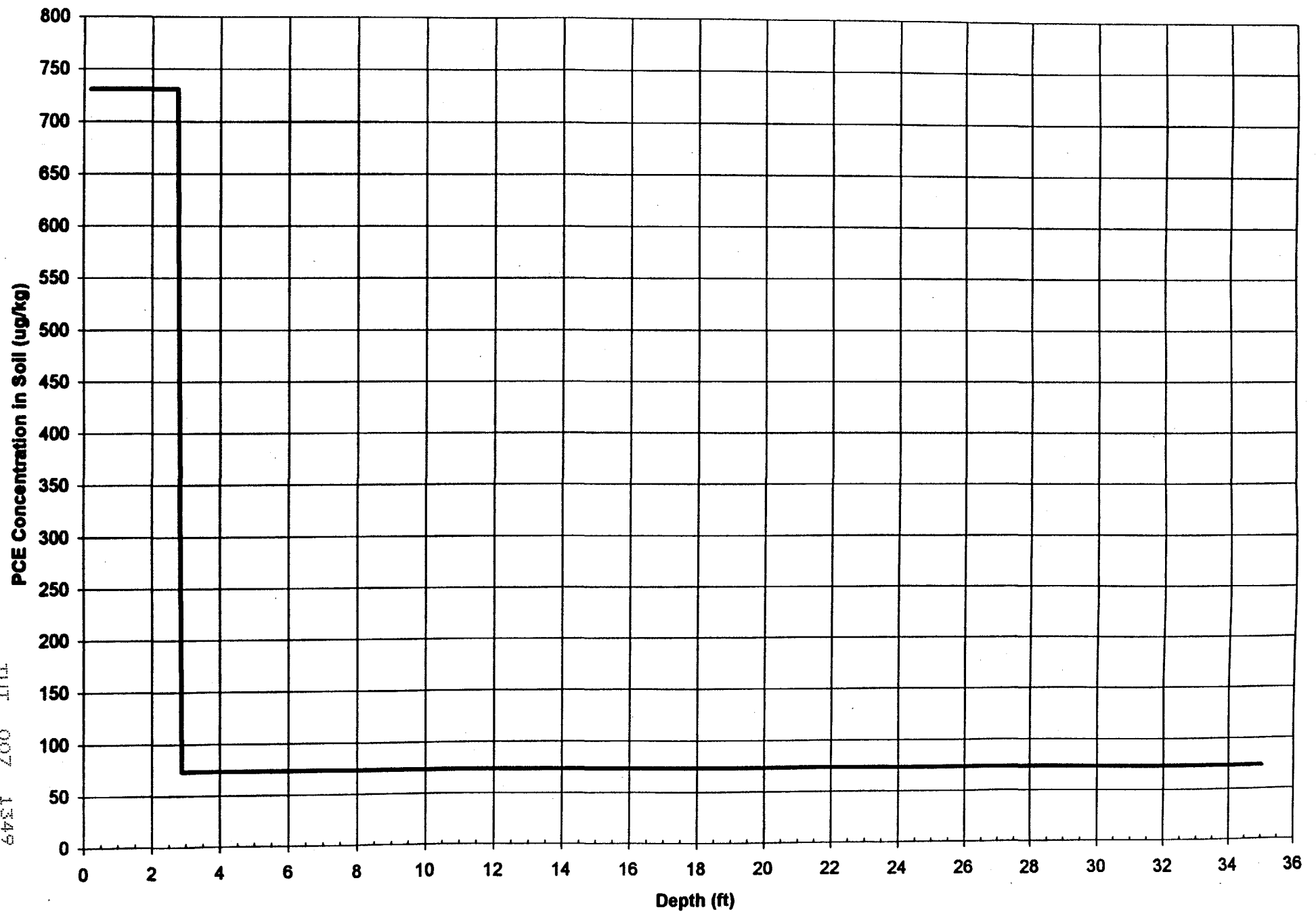
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**APPENDIX C**  
**SOIL LEACHING MODEL**  
**SOIL PROFILES AND GROUND WATER CONCENTRATIONS**

Curriculum Center Site  
Soil PCE



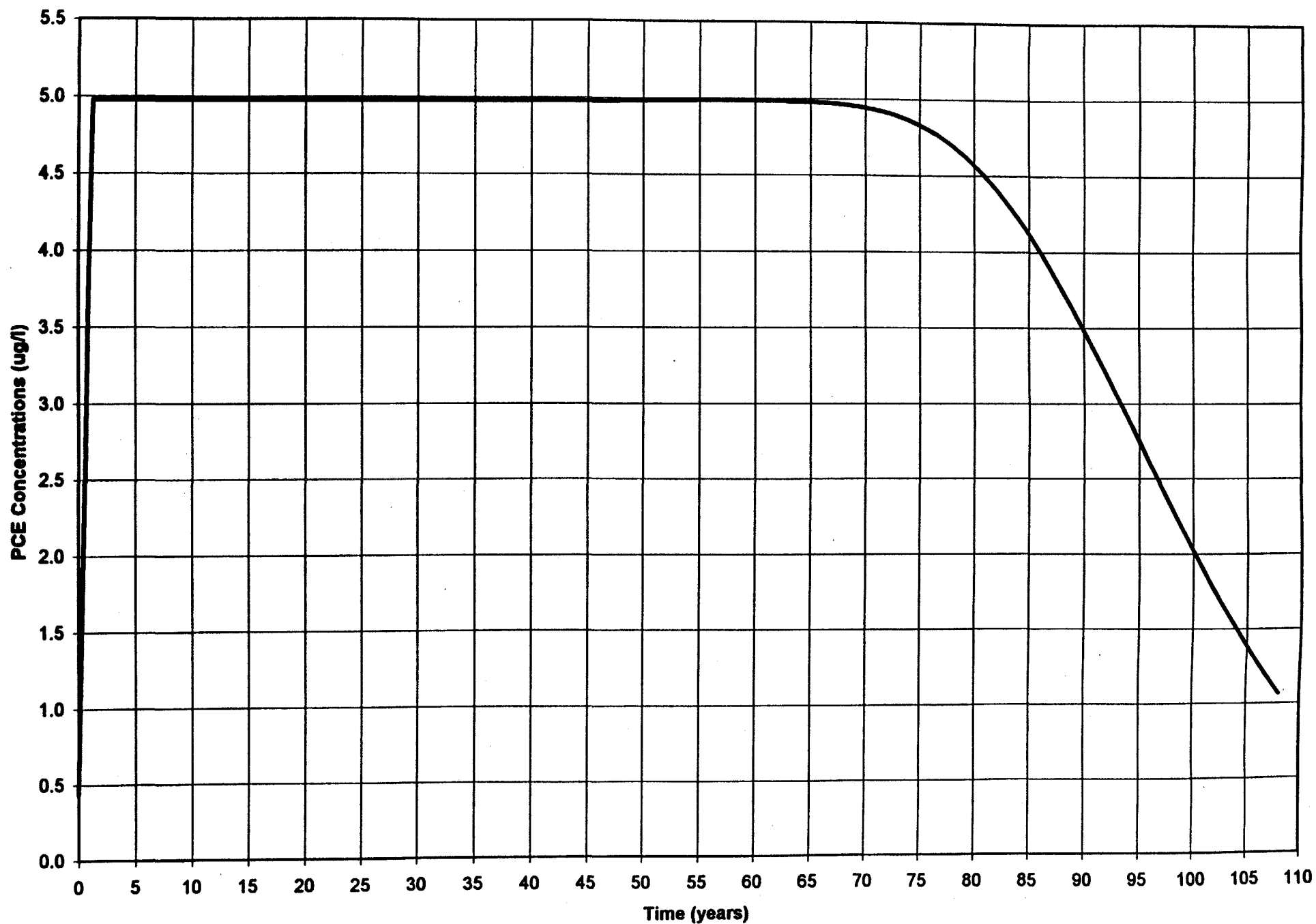
TUT 007 1349

LAGA Site - PCE in Groundwater

| Time (yrs) | Resulting<br>Aquifer Conc. (UG/L)<br>(w. Biodegradation) |
|------------|----------------------------------------------------------|
| 0.0        | 0.44                                                     |
| 1.2        | 4.98                                                     |
| 2.6        | 4.98                                                     |
| 4.0        | 4.98                                                     |
| 5.3        | 4.98                                                     |
| 6.7        | 4.98                                                     |
| 8.1        | 4.98                                                     |
| 9.5        | 4.98                                                     |
| 10.8       | 4.98                                                     |
| 12.2       | 4.98                                                     |
| 13.6       | 4.98                                                     |
| 14.9       | 4.98                                                     |
| 16.3       | 4.98                                                     |
| 17.7       | 4.98                                                     |
| 19.0       | 4.98                                                     |
| 20.4       | 4.98                                                     |
| 21.8       | 4.98                                                     |
| 23.1       | 4.98                                                     |
| 24.5       | 4.98                                                     |
| 25.9       | 4.98                                                     |
| 27.3       | 4.98                                                     |
| 28.6       | 4.98                                                     |
| 30.0       | 4.98                                                     |
| 31.4       | 4.98                                                     |
| 32.7       | 4.98                                                     |
| 34.1       | 4.98                                                     |
| 35.5       | 4.98                                                     |
| 36.8       | 4.98                                                     |
| 38.2       | 4.98                                                     |
| 39.6       | 4.98                                                     |
| 41.0       | 4.98                                                     |
| 42.3       | 4.98                                                     |
| 43.7       | 4.98                                                     |
| 45.1       | 4.98                                                     |
| 46.4       | 4.98                                                     |
| 47.8       | 4.98                                                     |
| 49.2       | 4.98                                                     |
| 50.5       | 4.98                                                     |
| 51.9       | 4.98                                                     |
| 53.3       | 4.98                                                     |
| 54.7       | 4.98                                                     |
| 56.0       | 4.98                                                     |
| 57.4       | 4.98                                                     |
| 58.8       | 4.98                                                     |
| 60.1       | 4.98                                                     |
| 61.5       | 4.98                                                     |

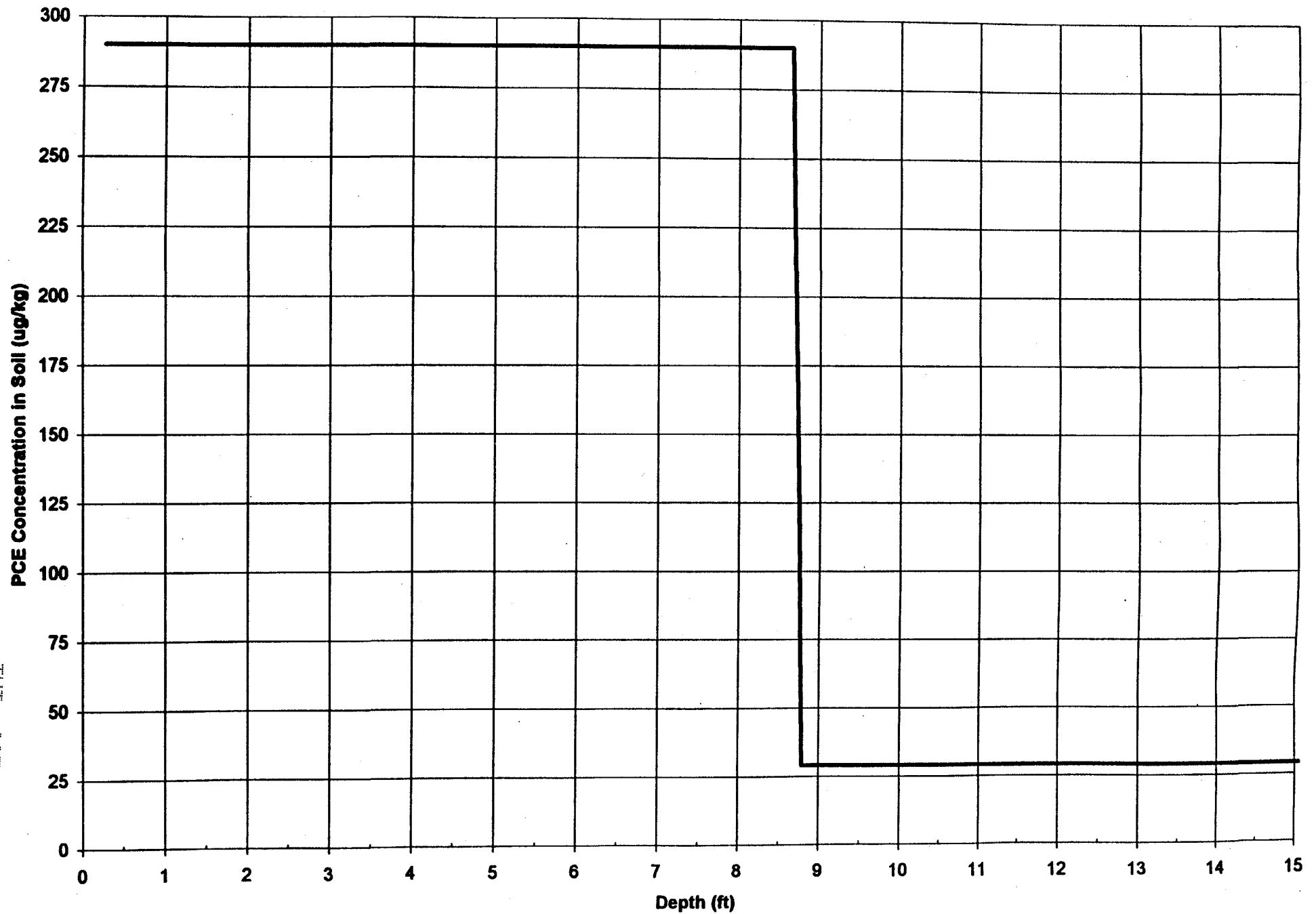
|       |      |
|-------|------|
| 62.9  | 4.98 |
| 64.2  | 4.98 |
| 65.6  | 4.98 |
| 67.0  | 4.97 |
| 68.4  | 4.96 |
| 69.7  | 4.95 |
| 71.1  | 4.93 |
| 72.5  | 4.90 |
| 73.8  | 4.87 |
| 75.2  | 4.83 |
| 76.6  | 4.77 |
| 77.9  | 4.70 |
| 79.3  | 4.62 |
| 80.7  | 4.53 |
| 82.1  | 4.41 |
| 83.4  | 4.29 |
| 84.8  | 4.14 |
| 86.2  | 3.99 |
| 87.5  | 3.82 |
| 88.9  | 3.64 |
| 90.3  | 3.45 |
| 91.6  | 3.25 |
| 93.0  | 3.05 |
| 94.4  | 2.84 |
| 95.7  | 2.64 |
| 97.1  | 2.44 |
| 98.5  | 2.24 |
| 99.9  | 2.04 |
| 101.2 | 1.85 |
| 102.6 | 1.68 |
| 104.0 | 1.51 |
| 105.3 | 1.35 |
| 106.7 | 1.20 |
| 108.1 | 1.06 |

Ground Water Concentrations  
Curriculum Center Site



TUT 007 1352

TEXACO Service Station Site  
Soil PCE



TUT 007 1353

Texaco Site - PCE in Groundwater

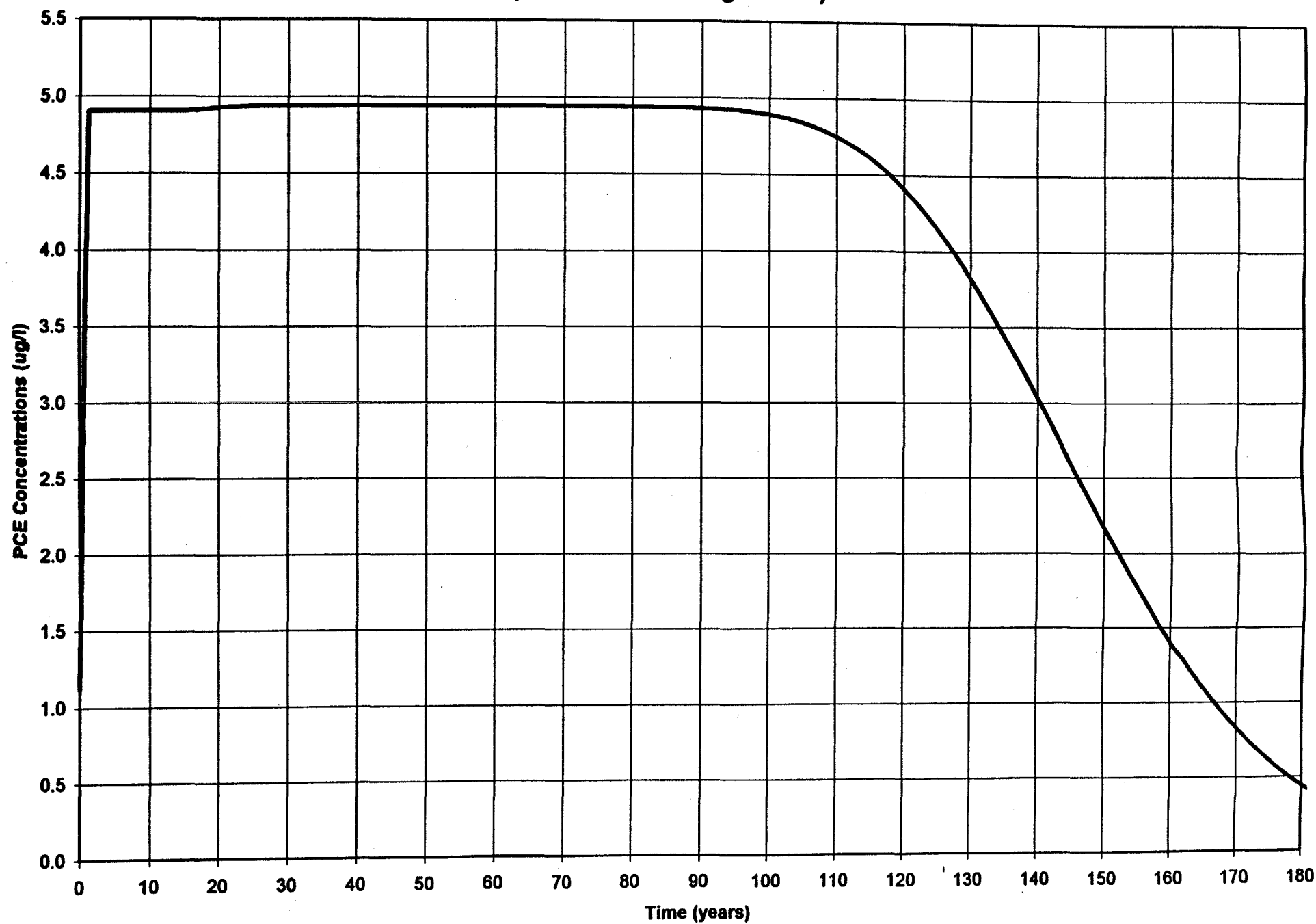
| Time (yrs) | Resulting<br>Aquifer Conc. (UG/L)<br>(w. Biodegradation) |
|------------|----------------------------------------------------------|
|------------|----------------------------------------------------------|

|      |      |
|------|------|
| 0.0  | 1.12 |
| 1.3  | 4.90 |
| 2.7  | 4.90 |
| 4.2  | 4.90 |
| 5.6  | 4.90 |
| 7.0  | 4.90 |
| 8.5  | 4.90 |
| 9.9  | 4.90 |
| 11.3 | 4.90 |
| 12.8 | 4.90 |
| 14.2 | 4.91 |
| 15.6 | 4.91 |
| 17.1 | 4.91 |
| 18.5 | 4.92 |
| 19.9 | 4.92 |
| 21.4 | 4.93 |
| 22.8 | 4.93 |
| 24.3 | 4.94 |
| 25.7 | 4.94 |
| 27.1 | 4.94 |
| 28.6 | 4.94 |
| 30.0 | 4.94 |
| 31.4 | 4.94 |
| 32.9 | 4.94 |
| 34.3 | 4.94 |
| 35.7 | 4.94 |
| 37.2 | 4.94 |
| 38.6 | 4.94 |
| 40.0 | 4.94 |
| 41.5 | 4.94 |
| 42.9 | 4.94 |
| 44.3 | 4.94 |
| 45.8 | 4.94 |
| 47.2 | 4.94 |
| 48.6 | 4.94 |
| 50.1 | 4.94 |
| 51.5 | 4.94 |
| 53.0 | 4.94 |
| 54.4 | 4.94 |
| 55.8 | 4.94 |
| 57.3 | 4.94 |
| 58.7 | 4.94 |
| 60.1 | 4.94 |
| 61.6 | 4.94 |
| 63.0 | 4.94 |
| 64.4 | 4.94 |

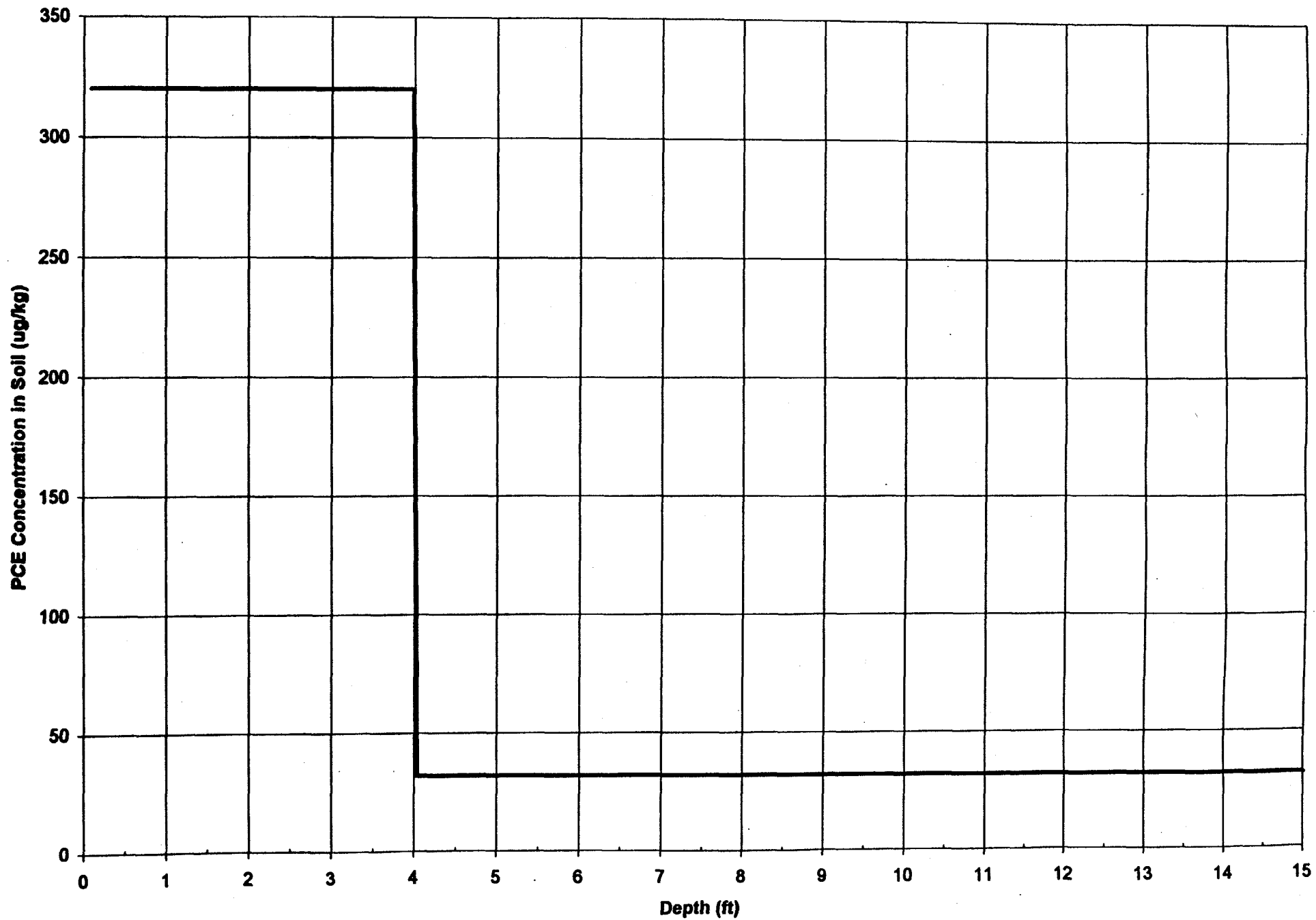
|       |      |
|-------|------|
| 65.9  | 4.94 |
| 67.3  | 4.94 |
| 68.7  | 4.94 |
| 70.2  | 4.94 |
| 71.6  | 4.94 |
| 73.0  | 4.94 |
| 74.5  | 4.94 |
| 75.9  | 4.94 |
| 77.3  | 4.94 |
| 78.8  | 4.94 |
| 80.2  | 4.94 |
| 81.7  | 4.94 |
| 83.1  | 4.94 |
| 84.5  | 4.94 |
| 86.0  | 4.94 |
| 87.4  | 4.94 |
| 88.8  | 4.93 |
| 90.3  | 4.93 |
| 91.7  | 4.93 |
| 93.1  | 4.93 |
| 94.6  | 4.92 |
| 96.0  | 4.91 |
| 97.4  | 4.91 |
| 98.9  | 4.90 |
| 100.3 | 4.89 |
| 101.7 | 4.88 |
| 103.2 | 4.86 |
| 104.6 | 4.84 |
| 106.0 | 4.82 |
| 107.5 | 4.80 |
| 108.9 | 4.77 |
| 110.4 | 4.74 |
| 111.8 | 4.71 |
| 113.2 | 4.67 |
| 114.7 | 4.62 |
| 116.1 | 4.57 |
| 117.5 | 4.52 |
| 119.0 | 4.46 |
| 120.4 | 4.40 |
| 121.8 | 4.33 |
| 123.3 | 4.25 |
| 124.7 | 4.17 |
| 126.1 | 4.08 |
| 127.6 | 3.99 |
| 129.0 | 3.90 |
| 130.4 | 3.79 |
| 131.9 | 3.69 |
| 133.3 | 3.58 |
| 134.7 | 3.47 |
| 136.2 | 3.35 |
| 137.6 | 3.23 |
| 139.1 | 3.11 |

|       |      |
|-------|------|
| 140.5 | 2.99 |
| 141.9 | 2.87 |
| 143.4 | 2.74 |
| 144.8 | 2.62 |
| 146.2 | 2.50 |
| 147.7 | 2.37 |
| 149.1 | 2.25 |
| 150.5 | 2.13 |
| 152.0 | 2.01 |
| 153.4 | 1.90 |
| 154.8 | 1.78 |
| 156.3 | 1.67 |
| 157.7 | 1.57 |
| 159.1 | 1.46 |
| 160.6 | 1.37 |
| 162.0 | 1.29 |
| 163.4 | 1.20 |
| 164.9 | 1.11 |
| 166.3 | 1.03 |
| 167.8 | 0.95 |
| 169.2 | 0.87 |
| 170.6 | 0.80 |
| 172.1 | 0.74 |
| 173.5 | 0.67 |
| 174.9 | 0.62 |
| 176.4 | 0.56 |
| 177.8 | 0.51 |
| 179.2 | 0.46 |
| 180.7 | 0.42 |
| 182.1 | 0.38 |

**Ground Water Concentrations  
TEXACO Site  
(w. Anaerobic Biodegradation)**



ESSO Service Station Site  
Soil PCE Profile 1



TUT 007 1358

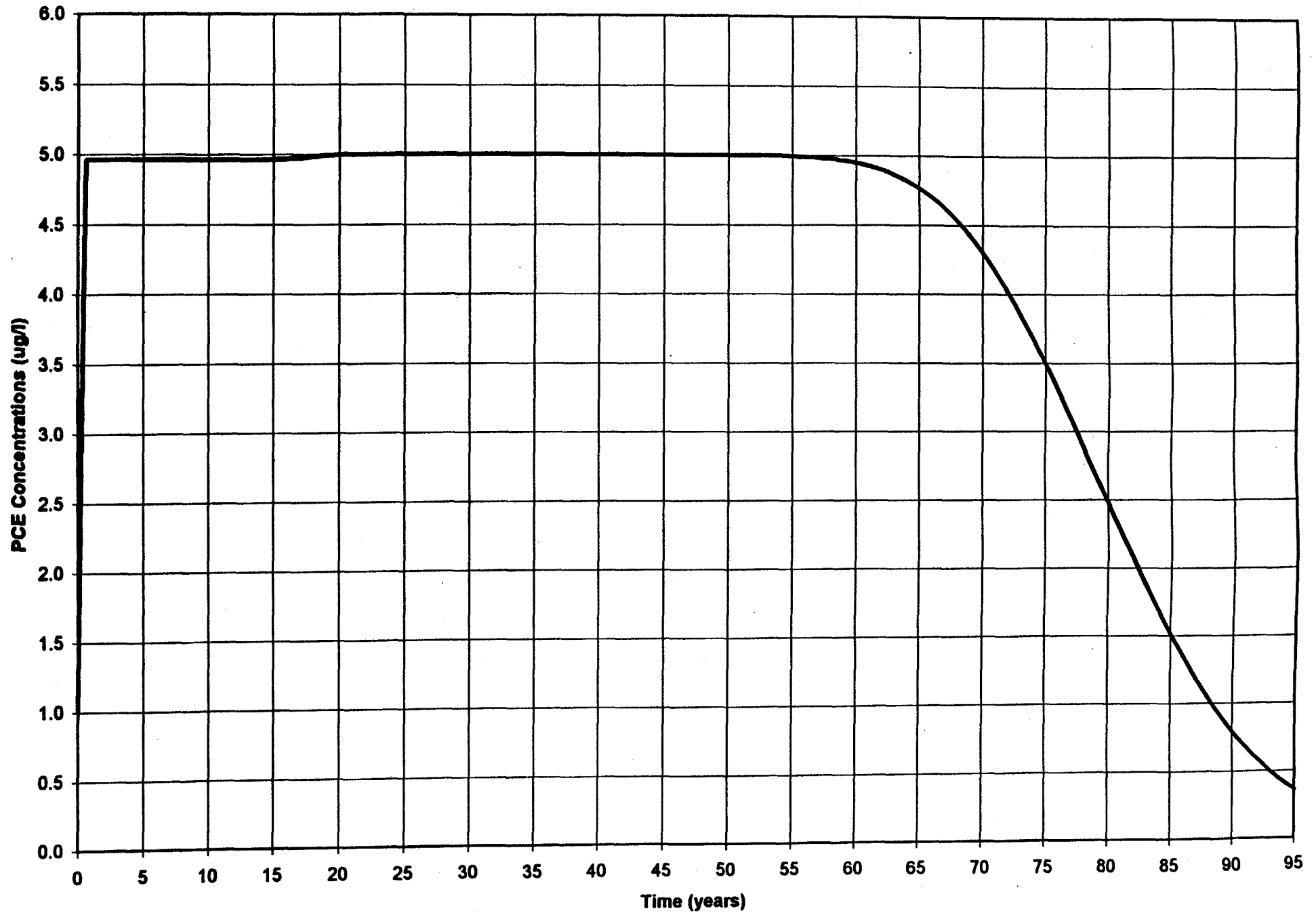
# ESSO Site - PCE in Ground Water

| Time (yrs) | Resulting<br>Aquifer Conc. (UG/L)<br>(w. Biodegradation) |
|------------|----------------------------------------------------------|
| 0.0        | 1.01                                                     |
| 0.6        | 4.96                                                     |
| 1.3        | 4.96                                                     |
| 1.9        | 4.96                                                     |
| 2.6        | 4.96                                                     |
| 3.2        | 4.96                                                     |
| 3.9        | 4.96                                                     |
| 4.6        | 4.96                                                     |
| 5.2        | 4.96                                                     |
| 5.9        | 4.96                                                     |
| 6.5        | 4.96                                                     |
| 7.2        | 4.96                                                     |
| 7.9        | 4.96                                                     |
| 8.5        | 4.96                                                     |
| 9.2        | 4.96                                                     |
| 9.8        | 4.96                                                     |
| 10.5       | 4.96                                                     |
| 11.2       | 4.96                                                     |
| 11.8       | 4.96                                                     |
| 12.5       | 4.96                                                     |
| 13.1       | 4.96                                                     |
| 13.8       | 4.96                                                     |
| 14.5       | 4.96                                                     |
| 15.1       | 4.96                                                     |
| 15.8       | 4.97                                                     |
| 16.4       | 4.97                                                     |
| 17.1       | 4.98                                                     |
| 17.8       | 4.98                                                     |
| 18.4       | 4.99                                                     |
| 19.1       | 4.99                                                     |
| 19.7       | 5.00                                                     |
| 20.4       | 5.00                                                     |
| 21.1       | 5.00                                                     |
| 21.7       | 5.00                                                     |
| 22.4       | 5.00                                                     |
| 23.0       | 5.00                                                     |
| 23.7       | 5.00                                                     |
| 24.4       | 5.00                                                     |
| 25.0       | 5.00                                                     |
| 25.7       | 5.00                                                     |
| 26.4       | 5.00                                                     |
| 27.0       | 5.00                                                     |
| 27.7       | 5.00                                                     |
| 28.3       | 5.00                                                     |
| 29.0       | 5.00                                                     |
| 29.7       | 5.00                                                     |

|      |      |
|------|------|
| 30.3 | 5.00 |
| 31.0 | 5.00 |
| 31.6 | 5.00 |
| 32.3 | 5.00 |
| 33.0 | 5.00 |
| 33.6 | 5.00 |
| 34.3 | 5.00 |
| 34.9 | 5.00 |
| 35.6 | 5.00 |
| 36.3 | 5.00 |
| 36.9 | 5.00 |
| 37.6 | 5.00 |
| 38.2 | 5.00 |
| 38.9 | 5.00 |
| 39.6 | 5.00 |
| 40.2 | 5.00 |
| 40.9 | 5.00 |
| 41.5 | 5.00 |
| 42.2 | 5.00 |
| 42.9 | 5.00 |
| 43.5 | 5.00 |
| 44.2 | 5.00 |
| 44.8 | 5.00 |
| 45.5 | 5.00 |
| 46.2 | 5.00 |
| 46.8 | 5.00 |
| 47.5 | 5.00 |
| 48.1 | 5.00 |
| 48.8 | 5.00 |
| 49.5 | 5.00 |
| 50.1 | 5.00 |
| 50.8 | 5.00 |
| 51.4 | 5.00 |
| 52.1 | 5.00 |
| 52.8 | 5.00 |
| 53.4 | 5.00 |
| 54.1 | 5.00 |
| 54.8 | 5.00 |
| 55.4 | 4.99 |
| 56.1 | 4.99 |
| 56.7 | 4.99 |
| 57.4 | 4.98 |
| 58.1 | 4.98 |
| 58.7 | 4.97 |
| 59.4 | 4.96 |
| 60.0 | 4.95 |
| 60.7 | 4.94 |
| 61.4 | 4.92 |
| 62.0 | 4.90 |
| 62.7 | 4.88 |
| 63.3 | 4.85 |
| 64.0 | 4.82 |

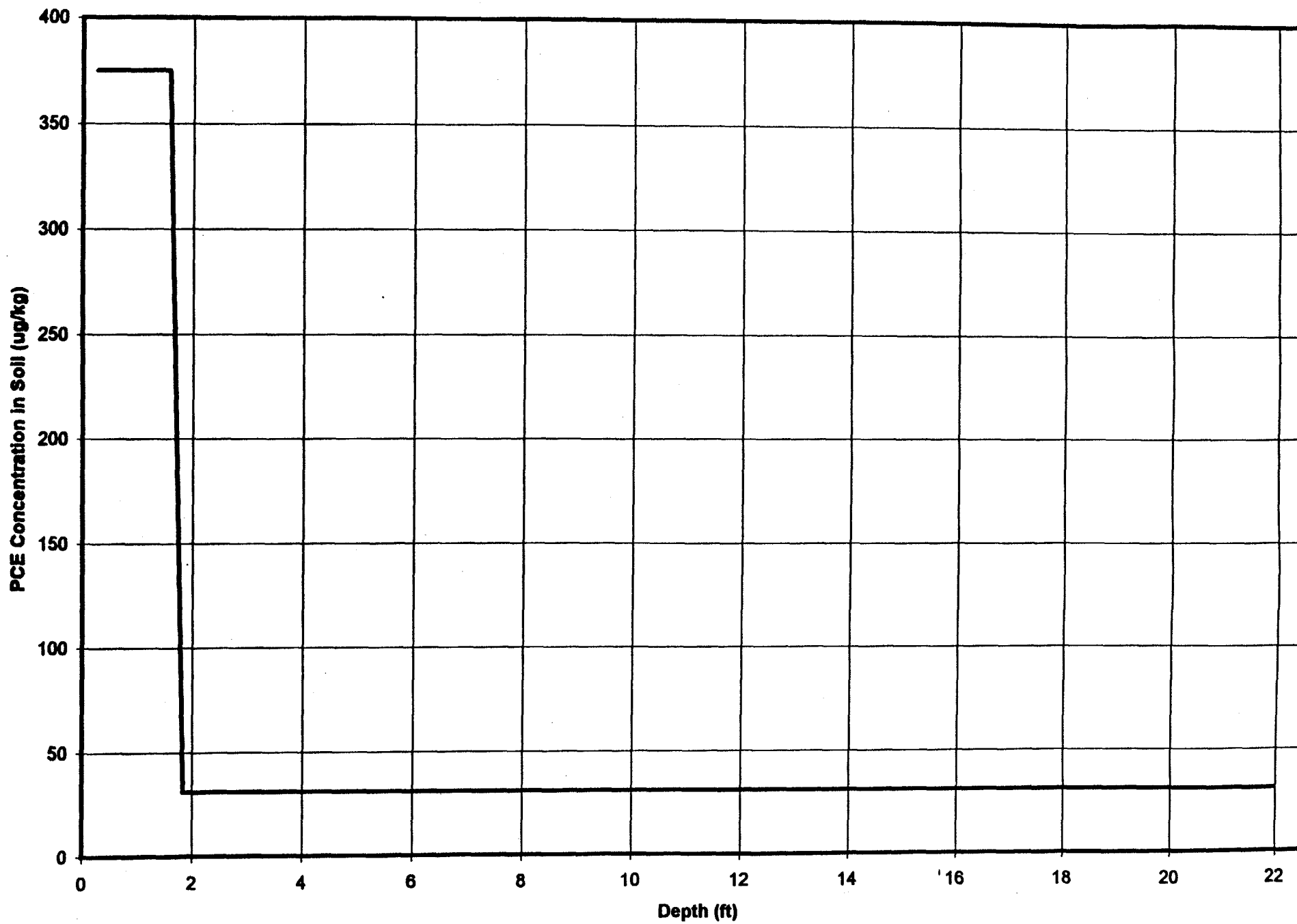
|      |      |
|------|------|
| 64.7 | 4.79 |
| 65.3 | 4.75 |
| 66.0 | 4.70 |
| 66.6 | 4.65 |
| 67.3 | 4.60 |
| 68.0 | 4.54 |
| 68.6 | 4.47 |
| 69.3 | 4.39 |
| 69.9 | 4.31 |
| 70.6 | 4.23 |
| 71.3 | 4.13 |
| 71.9 | 4.03 |
| 72.6 | 3.93 |
| 73.2 | 3.82 |
| 73.9 | 3.70 |
| 74.6 | 3.58 |
| 75.2 | 3.46 |
| 75.9 | 3.33 |
| 76.5 | 3.20 |
| 77.2 | 3.06 |
| 77.9 | 2.93 |
| 78.5 | 2.79 |
| 79.2 | 2.65 |
| 79.8 | 2.52 |
| 80.5 | 2.38 |
| 81.2 | 2.25 |
| 81.8 | 2.11 |
| 82.5 | 1.98 |
| 83.1 | 1.85 |
| 83.8 | 1.73 |
| 84.5 | 1.61 |
| 85.1 | 1.50 |
| 85.8 | 1.39 |
| 86.5 | 1.28 |
| 87.1 | 1.18 |
| 87.8 | 1.08 |
| 88.4 | 0.99 |
| 89.1 | 0.91 |
| 89.8 | 0.83 |
| 90.4 | 0.75 |
| 91.1 | 0.68 |
| 91.7 | 0.62 |
| 92.4 | 0.56 |
| 93.1 | 0.50 |
| 93.7 | 0.45 |
| 94.4 | 0.40 |
| 95.0 | 0.36 |

**Ground Water Concentrations  
ESSO Site  
(w. Anaerobic Biodegradation)**



TUT 007 1362

O'Henry Site  
Soil PCE Concentrations



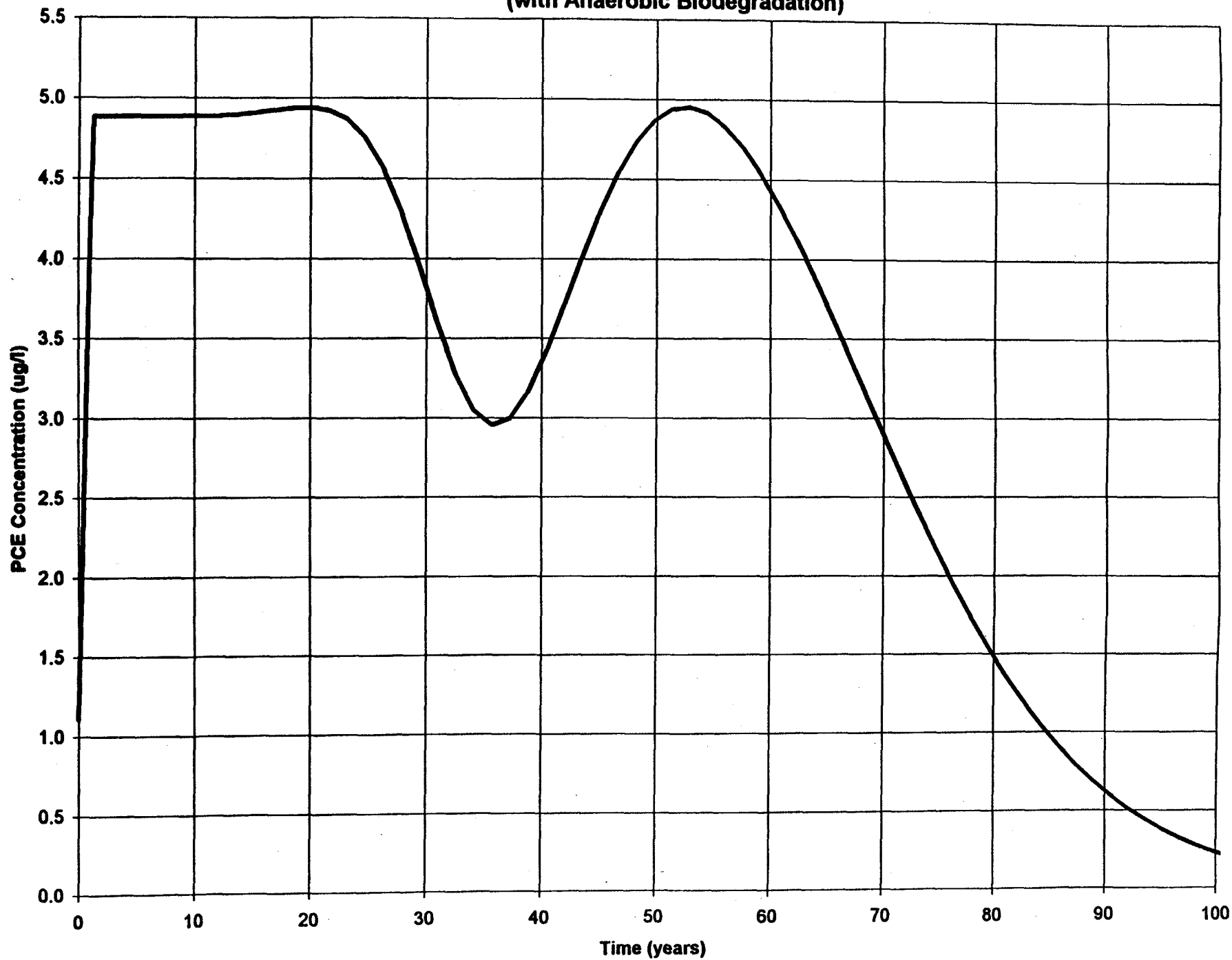
TUT 007 1363

# O'Henry Site - PCE Groundwater Concentrations

| Time (yrs) | Resulting<br>Aquifer Conc. (UG/L)<br>(w. biodegradation) |
|------------|----------------------------------------------------------|
| 0.00       | 1.11                                                     |
| 1.25       | 4.89                                                     |
| 2.82       | 4.89                                                     |
| 4.38       | 4.89                                                     |
| 5.95       | 4.89                                                     |
| 7.51       | 4.89                                                     |
| 9.08       | 4.89                                                     |
| 10.65      | 4.89                                                     |
| 12.21      | 4.89                                                     |
| 13.78      | 4.90                                                     |
| 15.34      | 4.91                                                     |
| 16.91      | 4.92                                                     |
| 18.47      | 4.94                                                     |
| 20.04      | 4.94                                                     |
| 21.60      | 4.92                                                     |
| 23.17      | 4.87                                                     |
| 24.73      | 4.76                                                     |
| 26.30      | 4.57                                                     |
| 27.87      | 4.29                                                     |
| 29.43      | 3.95                                                     |
| 31.00      | 3.59                                                     |
| 32.56      | 3.27                                                     |
| 34.13      | 3.05                                                     |
| 35.69      | 2.95                                                     |
| 37.26      | 3.00                                                     |
| 38.82      | 3.16                                                     |
| 40.39      | 3.41                                                     |
| 41.95      | 3.71                                                     |
| 43.52      | 4.02                                                     |
| 45.09      | 4.30                                                     |
| 46.65      | 4.55                                                     |
| 48.22      | 4.74                                                     |
| 49.78      | 4.87                                                     |
| 51.35      | 4.94                                                     |
| 52.91      | 4.95                                                     |
| 54.48      | 4.91                                                     |
| 56.04      | 4.83                                                     |
| 57.61      | 4.70                                                     |
| 59.17      | 4.54                                                     |
| 60.74      | 4.34                                                     |
| 62.31      | 4.13                                                     |
| 63.87      | 3.89                                                     |
| 65.44      | 3.64                                                     |
| 67.00      | 3.39                                                     |
| 68.57      | 3.13                                                     |
| 70.13      | 2.88                                                     |

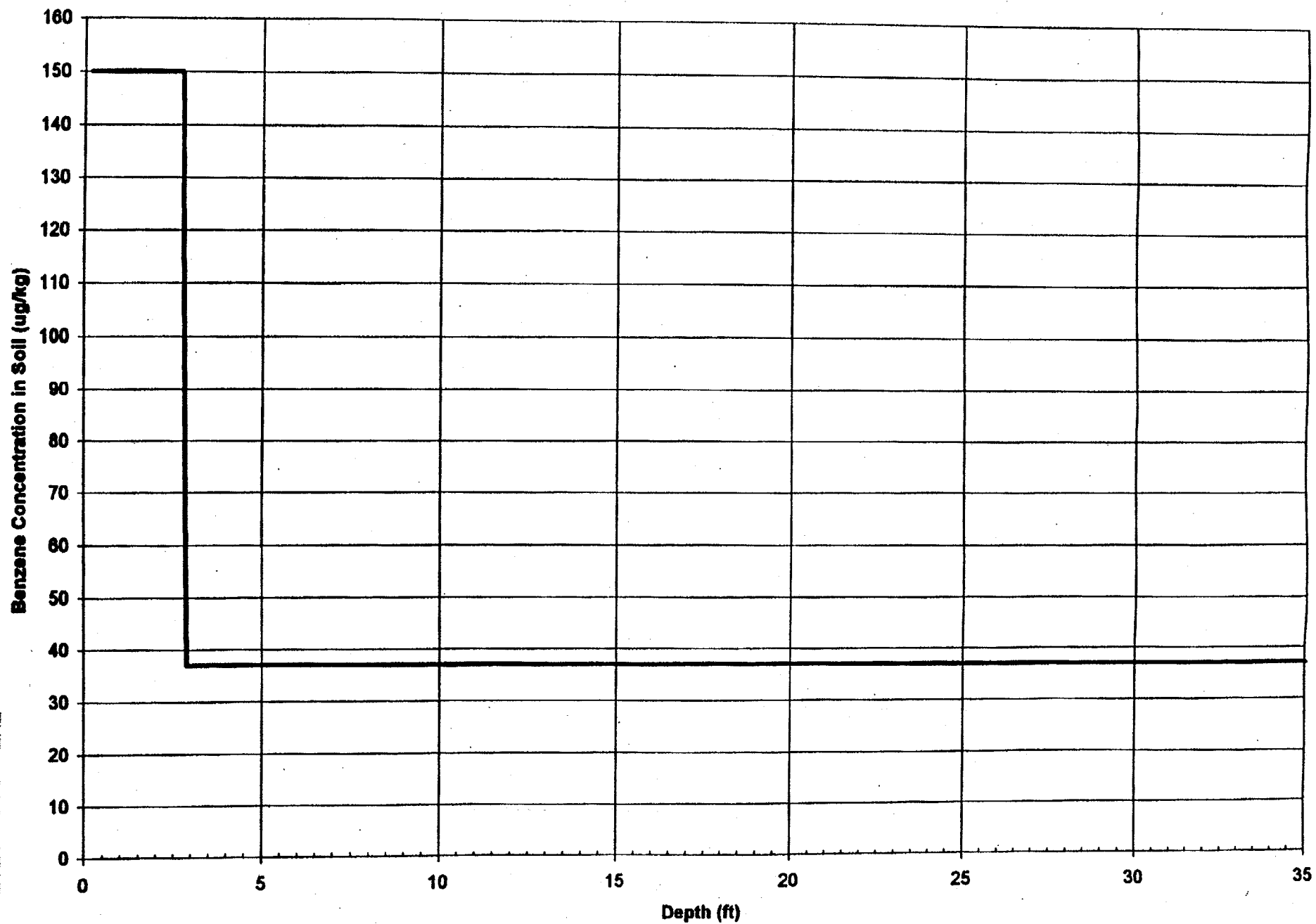
|        |      |
|--------|------|
| 71.70  | 2.63 |
| 73.26  | 2.39 |
| 74.83  | 2.16 |
| 76.40  | 1.94 |
| 77.96  | 1.73 |
| 79.53  | 1.54 |
| 81.09  | 1.36 |
| 82.66  | 1.20 |
| 84.22  | 1.05 |
| 85.79  | 0.92 |
| 87.35  | 0.80 |
| 88.92  | 0.69 |
| 90.48  | 0.60 |
| 92.05  | 0.51 |
| 93.62  | 0.44 |
| 95.18  | 0.38 |
| 96.75  | 0.32 |
| 98.31  | 0.27 |
| 99.88  | 0.23 |
| 101.44 | 0.19 |

**Ground Water Concentrations  
O'Henry Site  
(with Anaerobic Biodegradation)**



99ST 007 1366 TWT

Curriculum Center Site  
Soil Benzene



TUT 007 1367

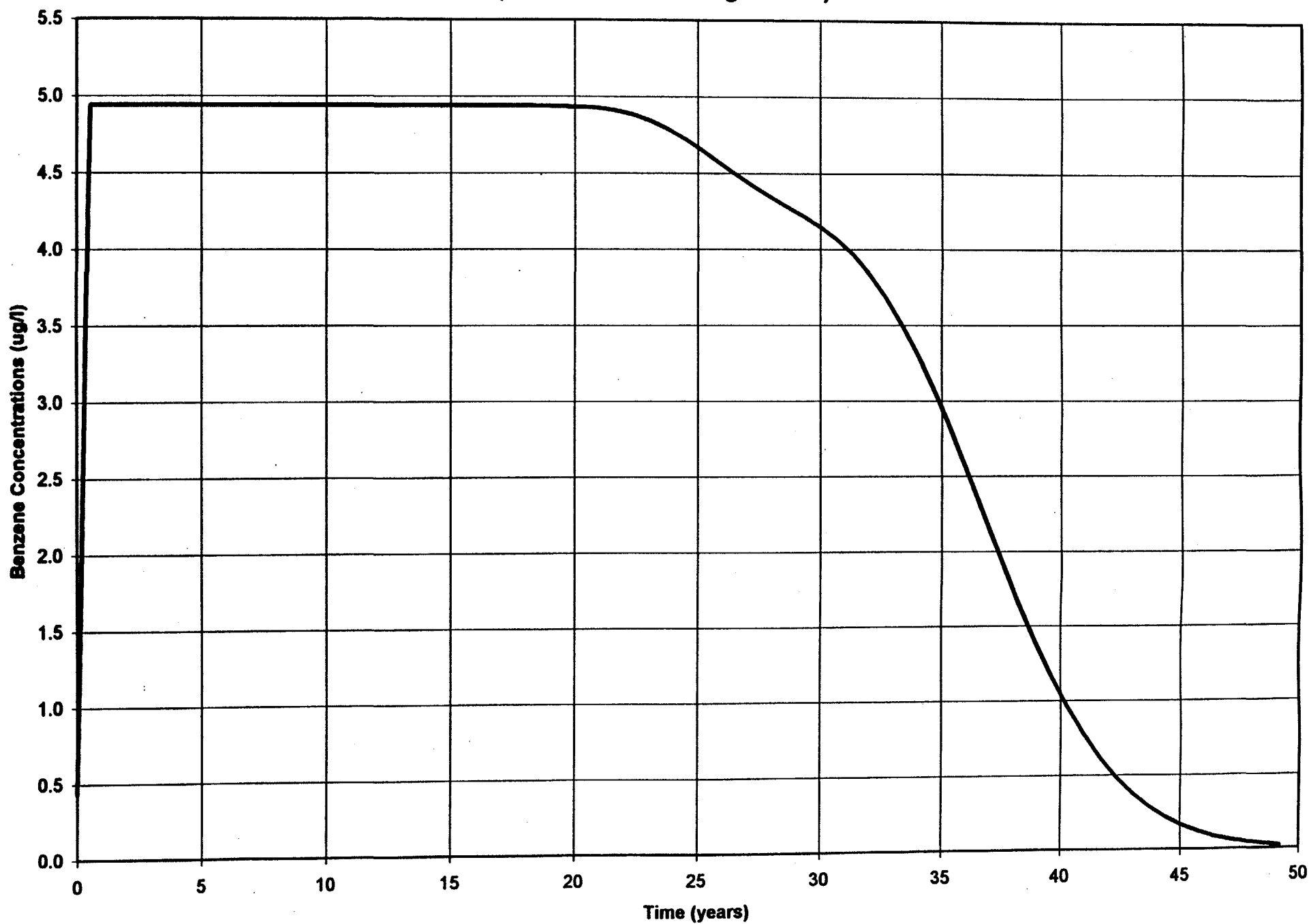
LAGA Site - Benzene in Ground Water

| Time (yrs) | Aquifer Conc. (UG/L)<br>(w biodegradation) |
|------------|--------------------------------------------|
|------------|--------------------------------------------|

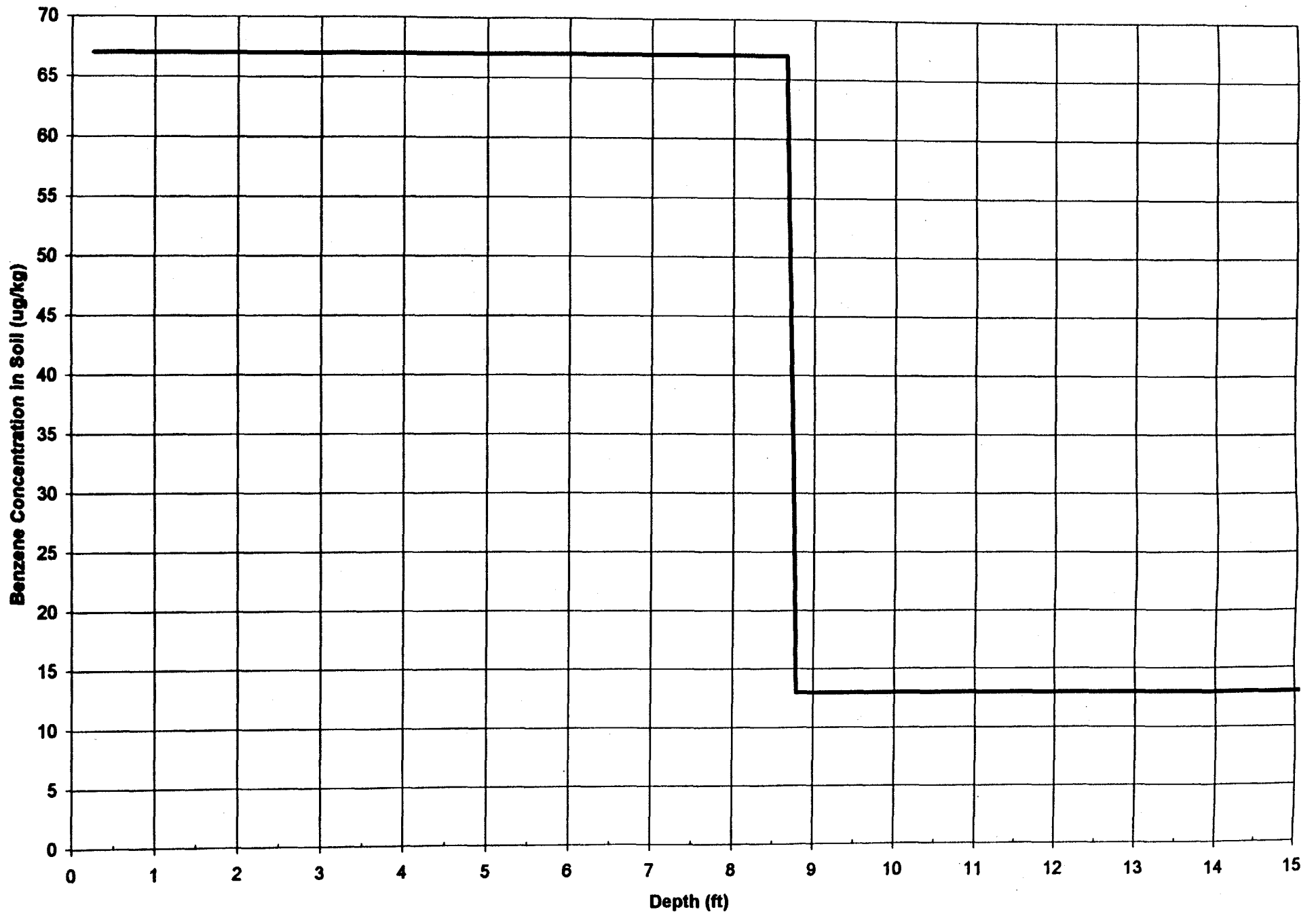
|      |      |
|------|------|
| 0.0  | 0.44 |
| 0.5  | 4.94 |
| 1.2  | 4.94 |
| 1.9  | 4.94 |
| 2.6  | 4.94 |
| 3.3  | 4.94 |
| 4.0  | 4.94 |
| 4.7  | 4.94 |
| 5.3  | 4.94 |
| 6.0  | 4.94 |
| 6.7  | 4.94 |
| 7.4  | 4.94 |
| 8.1  | 4.94 |
| 8.8  | 4.94 |
| 9.5  | 4.94 |
| 10.1 | 4.94 |
| 10.8 | 4.94 |
| 11.5 | 4.94 |
| 12.2 | 4.94 |
| 12.9 | 4.94 |
| 13.6 | 4.94 |
| 14.2 | 4.94 |
| 14.9 | 4.94 |
| 15.6 | 4.94 |
| 16.3 | 4.94 |
| 17.0 | 4.94 |
| 17.7 | 4.94 |
| 18.4 | 4.94 |
| 19.0 | 4.94 |
| 19.7 | 4.94 |
| 20.4 | 4.93 |
| 21.1 | 4.92 |
| 21.8 | 4.90 |
| 22.5 | 4.88 |
| 23.1 | 4.84 |
| 23.8 | 4.79 |
| 24.5 | 4.72 |
| 25.2 | 4.65 |
| 25.9 | 4.57 |
| 26.6 | 4.49 |
| 27.3 | 4.42 |
| 27.9 | 4.35 |
| 28.6 | 4.28 |
| 29.3 | 4.22 |
| 30.0 | 4.15 |
| 30.7 | 4.07 |
| 31.4 | 3.96 |
| 32.1 | 3.84 |
| 32.7 | 3.68 |
| 33.4 | 3.50 |
| 34.1 | 3.28 |
| 34.8 | 3.04 |

|      |      |
|------|------|
| 35.5 | 2.77 |
| 36.2 | 2.50 |
| 36.8 | 2.21 |
| 37.5 | 1.93 |
| 38.2 | 1.66 |
| 38.9 | 1.41 |
| 39.6 | 1.17 |
| 40.3 | 0.96 |
| 41.0 | 0.78 |
| 41.6 | 0.62 |
| 42.3 | 0.49 |
| 43.0 | 0.38 |
| 43.7 | 0.29 |
| 44.4 | 0.22 |
| 45.1 | 0.16 |
| 45.8 | 0.12 |
| 46.4 | 0.09 |
| 47.1 | 0.06 |
| 47.8 | 0.04 |
| 48.5 | 0.03 |
| 49.2 | 0.02 |
| 49.9 | 0.01 |
| 50.5 | 0.01 |

**Benzene Ground Water Concentrations  
Curriculum Center Site  
(with Anaerobic Biodegradation)**



TEXACO Service Station Site  
Soil Benzene



TUT 007 1371

Texaco- Benzene in GW

Texaco Site - Benzene in Ground Water

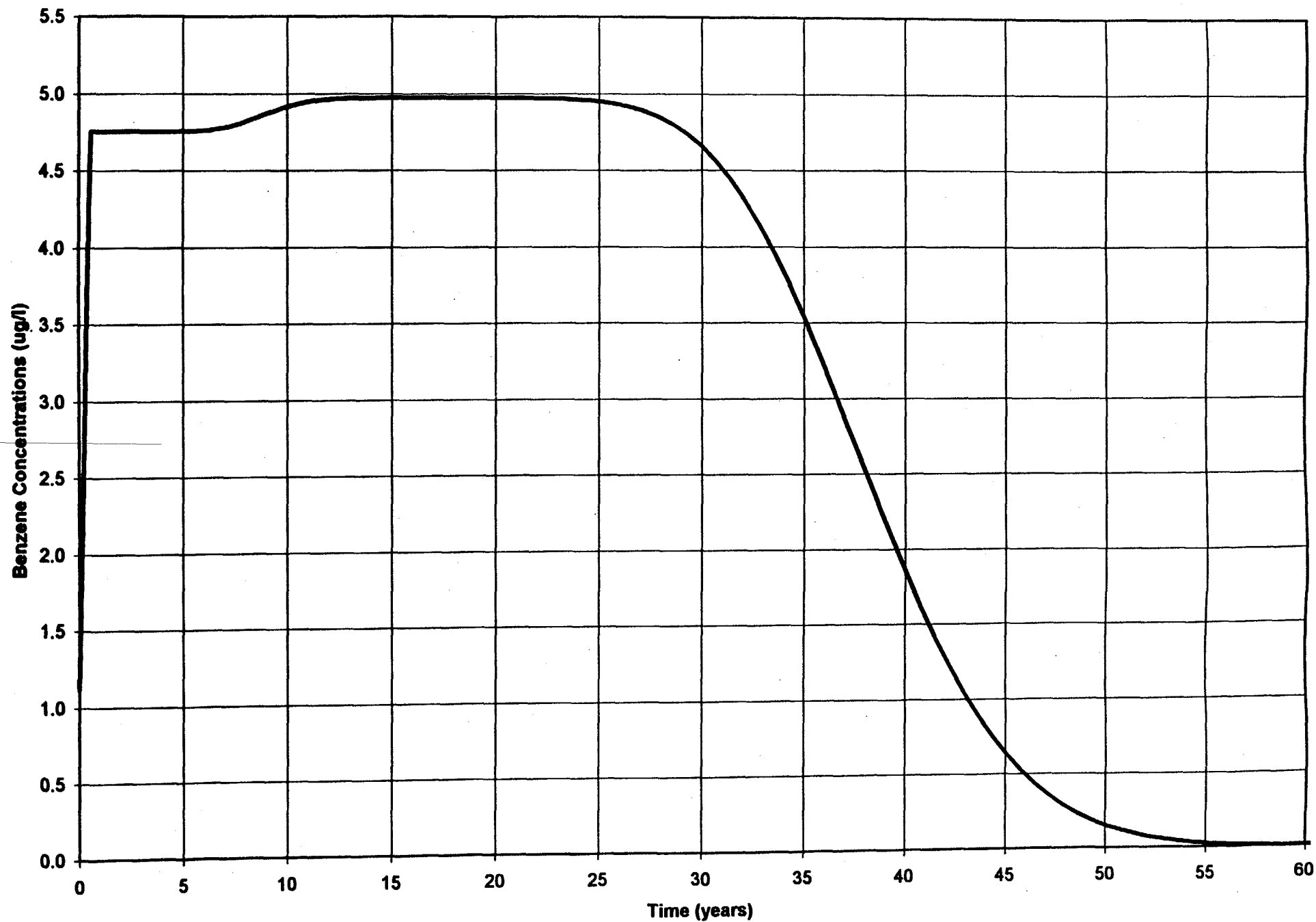
| Time (Yrs) | Resulting<br>Aquifer Conc. (UG/L)<br>(w. biodegradation) |
|------------|----------------------------------------------------------|
|------------|----------------------------------------------------------|

|       |      |
|-------|------|
| 0.00  | 1.12 |
| 0.57  | 4.76 |
| 1.29  | 4.76 |
| 2.01  | 4.76 |
| 2.73  | 4.76 |
| 3.44  | 4.76 |
| 4.16  | 4.76 |
| 4.88  | 4.76 |
| 5.60  | 4.76 |
| 6.31  | 4.77 |
| 7.03  | 4.78 |
| 7.75  | 4.81 |
| 8.47  | 4.84 |
| 9.18  | 4.88 |
| 9.90  | 4.91 |
| 10.62 | 4.94 |
| 11.34 | 4.95 |
| 12.05 | 4.96 |
| 12.77 | 4.97 |
| 13.49 | 4.97 |
| 14.21 | 4.97 |
| 14.92 | 4.97 |
| 15.64 | 4.97 |
| 16.36 | 4.97 |
| 17.08 | 4.97 |
| 17.79 | 4.97 |
| 18.51 | 4.97 |
| 19.23 | 4.97 |
| 19.95 | 4.97 |
| 20.66 | 4.97 |
| 21.38 | 4.97 |
| 22.10 | 4.97 |
| 22.82 | 4.97 |
| 23.53 | 4.96 |
| 24.25 | 4.96 |
| 24.97 | 4.95 |
| 25.69 | 4.94 |
| 26.40 | 4.92 |
| 27.12 | 4.89 |
| 27.84 | 4.86 |
| 28.56 | 4.81 |
| 29.27 | 4.74 |
| 29.99 | 4.66 |
| 30.71 | 4.56 |
| 31.43 | 4.44 |
| 32.14 | 4.30 |
| 32.86 | 4.14 |
| 33.58 | 3.96 |
| 34.30 | 3.75 |

Texaco- Benzene in GW

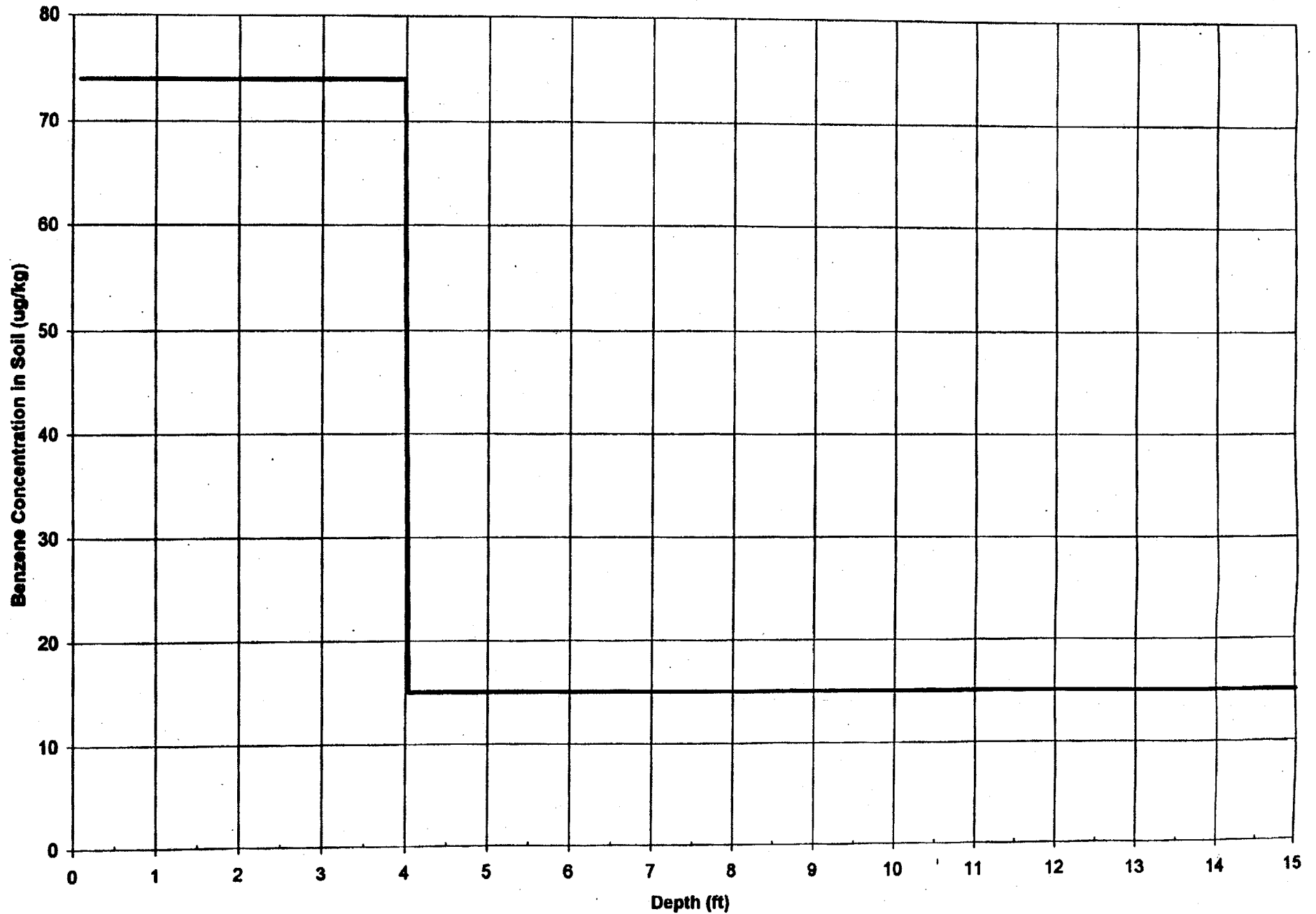
|       |      |
|-------|------|
| 35.01 | 3.54 |
| 35.73 | 3.31 |
| 36.45 | 3.07 |
| 37.17 | 2.82 |
| 37.88 | 2.57 |
| 38.60 | 2.32 |
| 39.32 | 2.08 |
| 40.04 | 1.85 |
| 40.75 | 1.63 |
| 41.47 | 1.42 |
| 42.19 | 1.23 |
| 42.91 | 1.06 |
| 43.62 | 0.90 |
| 44.34 | 0.76 |
| 45.06 | 0.64 |
| 45.78 | 0.53 |
| 46.49 | 0.44 |
| 47.21 | 0.36 |
| 47.93 | 0.29 |
| 48.65 | 0.23 |
| 49.36 | 0.19 |
| 50.08 | 0.15 |
| 50.80 | 0.12 |
| 51.52 | 0.09 |
| 52.23 | 0.07 |
| 52.95 | 0.05 |
| 53.67 | 0.04 |
| 54.39 | 0.03 |
| 55.10 | 0.02 |
| 55.82 | 0.02 |
| 56.54 | 0.01 |
| 57.26 | 0.01 |
| 57.97 | 0.01 |
| 58.69 | 0.01 |
| 59.41 | 0.00 |
| 60.13 | 0.00 |

**Benzene Ground Water Concentrations  
TEXACO Site  
(with Anaerobic Biodegradation)**



TUT 007 1374

ESSO Service Station Site  
Soil Benzene Profile



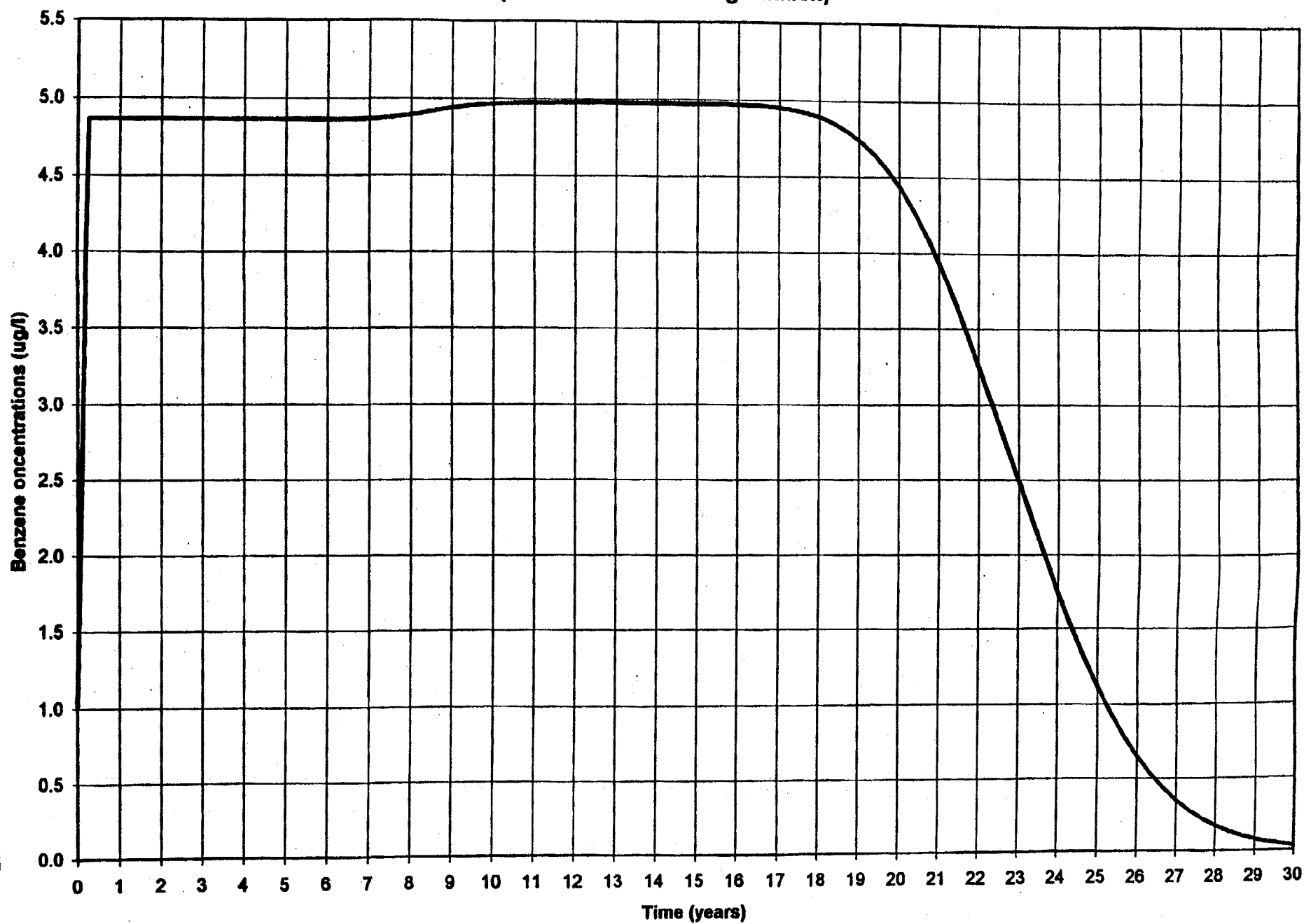
TUT 007 1375

ESSO Site - Benzene in Ground water

| Time (yrs) | Aquifer Conc. (UG/L)<br>(w. biodegradation) |
|------------|---------------------------------------------|
| 0.00       | 1.02                                        |
| 0.26       | 4.86                                        |
| 0.59       | 4.86                                        |
| 0.92       | 4.86                                        |
| 1.25       | 4.86                                        |
| 1.59       | 4.86                                        |
| 1.92       | 4.86                                        |
| 2.25       | 4.86                                        |
| 2.58       | 4.86                                        |
| 2.91       | 4.86                                        |
| 3.24       | 4.86                                        |
| 3.57       | 4.86                                        |
| 3.90       | 4.86                                        |
| 4.23       | 4.86                                        |
| 4.56       | 4.86                                        |
| 4.89       | 4.86                                        |
| 5.22       | 4.86                                        |
| 5.55       | 4.86                                        |
| 5.88       | 4.86                                        |
| 6.21       | 4.86                                        |
| 6.54       | 4.86                                        |
| 6.87       | 4.87                                        |
| 7.20       | 4.87                                        |
| 7.53       | 4.88                                        |
| 7.86       | 4.89                                        |
| 8.19       | 4.90                                        |
| 8.52       | 4.92                                        |
| 8.85       | 4.93                                        |
| 9.18       | 4.95                                        |
| 9.51       | 4.96                                        |
| 9.84       | 4.96                                        |
| 10.17      | 4.97                                        |
| 10.50      | 4.97                                        |
| 10.83      | 4.97                                        |
| 11.16      | 4.97                                        |
| 11.49      | 4.97                                        |
| 11.82      | 4.97                                        |
| 12.15      | 4.97                                        |
| 12.48      | 4.97                                        |
| 12.81      | 4.97                                        |
| 13.14      | 4.97                                        |
| 13.47      | 4.97                                        |
| 13.80      | 4.97                                        |
| 14.13      | 4.97                                        |
| 14.46      | 4.97                                        |
| 14.79      | 4.97                                        |
| 15.12      | 4.97                                        |
| 15.45      | 4.97                                        |
| 15.78      | 4.97                                        |
| 16.11      | 4.97                                        |
| 16.44      | 4.96                                        |

|       |      |
|-------|------|
| 16.78 | 4.96 |
| 17.11 | 4.95 |
| 17.44 | 4.93 |
| 17.77 | 4.91 |
| 18.10 | 4.89 |
| 18.43 | 4.85 |
| 18.76 | 4.79 |
| 19.09 | 4.73 |
| 19.42 | 4.64 |
| 19.75 | 4.54 |
| 20.08 | 4.41 |
| 20.41 | 4.26 |
| 20.74 | 4.09 |
| 21.07 | 3.90 |
| 21.40 | 3.69 |
| 21.73 | 3.46 |
| 22.06 | 3.22 |
| 22.39 | 2.97 |
| 22.72 | 2.71 |
| 23.05 | 2.46 |
| 23.38 | 2.20 |
| 23.71 | 1.96 |
| 24.04 | 1.72 |
| 24.37 | 1.50 |
| 24.70 | 1.29 |
| 25.03 | 1.10 |
| 25.36 | 0.93 |
| 25.69 | 0.78 |
| 26.02 | 0.65 |
| 26.35 | 0.53 |
| 26.68 | 0.43 |
| 27.01 | 0.35 |
| 27.34 | 0.28 |
| 27.67 | 0.22 |
| 28.00 | 0.17 |
| 28.33 | 0.13 |
| 28.66 | 0.10 |
| 28.99 | 0.08 |
| 29.32 | 0.06 |
| 29.65 | 0.05 |
| 29.98 | 0.03 |

**Benzene Ground Water Concentrations  
ESSO Site  
(with Anaerobic Biodegradation)**



TUT 007 1378