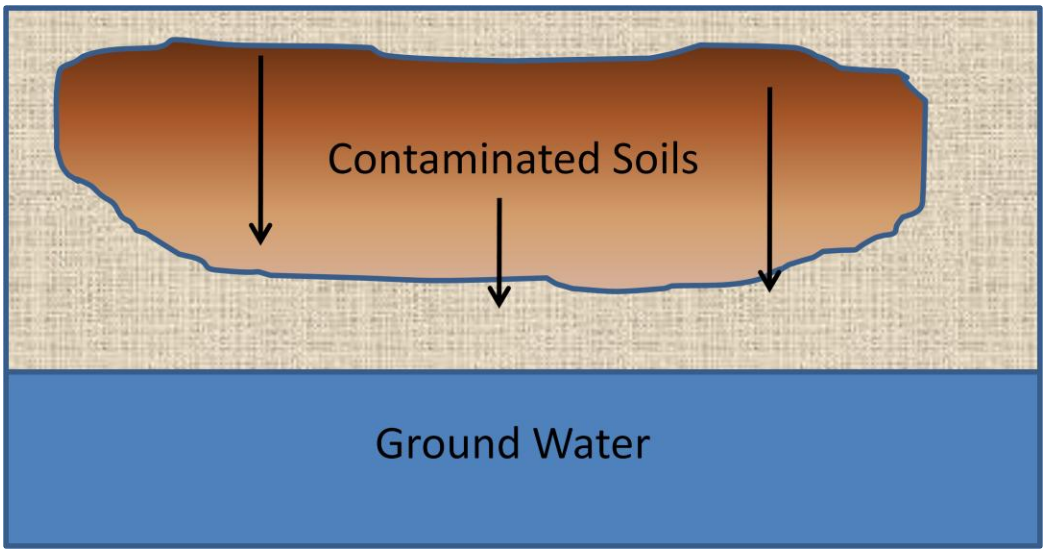
State of Ohio
Environmental Protection Agency

# OHIO EPA
# VOLUNTARY ACTION PROGRAM

# DERIVED LEACH-BASED SOIL VALUES

## APPENDIX TECHNICAL SUPPORT DOCUMENT




**October 2008**

**Governor : Ted Strickland**
**Director : Chris Korleski**

# OHIO EPA

# VOLUNTARY ACTION PROGRAM

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# APPENDIX TECHNICAL SUPPORT DOCUMENT

**3rd Revision October, 2008**

**Ohio Environmental Protection Agency**
**Division of Emergency and Remedial Response**
**Voluntary Action Program**

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**NOTICE OF CORRECTIONS/CHANGES FROM THE FEBRUARY 2002 (Revision 2).**

1. A review of the SESOIL spread sheets revealed an error in the calculation of soil saturation. This error as been corrected. In general, it only impacted the LBSS of hexane. Hexane value was decreased by several orders of magnitude.

2. A review of the spread sheets revealed an error in the Cmax concentrations for the SESOIL runs for tetrachloride for Soil type II. A new leach-based value was selected based on data from Soil Types II and III.

3. Several chemicals of concern unrestricted potable use standard have changed. A new leach-based value was calculated based on the revised UPUS value. This includes naphthalene, n-hexane, methyl ethyl ketone, phenol, zinc. And nickel.

4. Leach-based values were calculated for lead, selenium, thallium and vanadium.

# 1.0 INTRODUCTION TO VOLUNTARY ACTION PROGRAM

One of the unfortunate byproducts of Ohio's industrial heritage is the number of contaminated sites scattered throughout the state. Today, valuable land sits idle because fears of immense liability and cleanup costs scare off potential developers, businesses and banks.

Senate Bill 221 was passed by the Ohio legislature in May of 1994 and signed into law by Governor George Voinovich on June 29, 1994 to remove the legal and environmental barriers that have stalled redevelopment and re-use of these abandoned industrial sites. S.B. 221 created a program, the Voluntary Action Program (VAP), to encourage and recognize voluntary cleanup actions at contaminated properties. The program enables a person to receive a release from further liability from the state after conducting an investigation and cleanup in accordance with specific standards established by Ohio EPA.

Senate Bill 221 became effective on September 28, 1994. It included the following major provisions:

- A process for someone to use to voluntarily clean up a property without agency oversight and receive a "covenant not to sue" from the Director of Ohio EPA

- Requires the Ohio EPA to develop clear, numerical cleanup standards for soils, sediments and water which account for the intended use of the property

- Provisions to ensure cleanups are performed in accordance with established standards. These provisions include an auditing program of participating properties and significant penalties for violating permit agreements, falsifying information or withholding information regarding a voluntary action

- Authorizes the issuance of low-interest loans for clean up activities

- Provides for a 10 year automatic tax abatement on an increase in property value resulting from remediation. It also enables a volunteer to enter into agreements with local governments to abate additional taxes for up to 10 years

- Established a "Property Revitalization Board,@ composed of directors of several state agencies, to serve as clearinghouse for information concerning economic and incentives available to those conducting voluntary cleanup activities; to advise the Director of Ohio EPA on legislative and administrative actions necessary to promote such incentives; and to advise the Director on issuance and denial of variances from standards required under the program

- The Director of Ohio EPA retains complete authority to take action to address an imminent and substantial threat to public health, safety or the environment

## 1.1 ELIGIBILITY

The purpose of the program is not to preempt existing regulatory programs at properties where they have authority. The following properties are not eligible to participate in the Voluntary Action Program:

- Sites precluded by Federal law, including Superfund sites and Resource, Conservation and Recovery Act (RCRA) sites
- Any property subject to closure requirements under Ohio solid waste or hazardous waste laws and regulations
- Any property subject to underground storage tank laws and regulations
- Any property where the Director has initiated an enforcement action for cleanup

## 1.2 THE VOLUNTARY ACTION PROGRAM PROCESS

The Voluntary Action Program (VAP) is intended to enable someone to investigate and clean up a property following specified standards without intensive Agency involvement and have assurance that when the project is completed, it will be acceptable to the state and not liable for further remedial action. Volunteers must use the services of environmental professionals and laboratories certified by the VAP to verify that clean up work has been done properly and that applicable clean up standards have been achieved. Volunteers must use a Certified Professional with whom they have had no affiliation for at least one year prior to entering into a contract to verify that work has been done properly at a voluntary action property.

Certified Professionals play a key role in the program. If, after reviewing the documentation collected to verify that a property is in compliance with acceptable standards, a Certified Professional verifies that the property does comply with those standards, the Certified Professional prepares a No Further Action (NFA) letter. The NFA letter includes a summary of information reviewed by the Certified Professional. At the request of the person who undertook the voluntary action, the Certified Professional submits the NFA letter to the Director of Ohio EPA with a request for a Covenant Not to Sue. When an original and complete NFA letter is submitted to the Director by the Certified Professional who prepared it, the Director will issue a Covenant Not to Sue to the person who undertook the voluntary action. Only the Certified Professional who prepared the NFA letter may submit it to the Director. In addition, laboratory data used in support of a NFA letter must have been provided by a Certified Laboratory.

The Covenant Not To Sue will provide protection to the volunteer from state civil liability for conducting further investigation or remediation to address a release of hazardous substances or petroleum. It does not prevent Federal government or private party actions. If the remedial action uses engineering controls to contain or control a release of hazardous substances, the Covenant Not to Sue will require the volunteer to enter in an operation and maintenance agreement with the Director. The operation and maintenance agreement will include provisions for assuring continued maintenance of the engineering controls, monitoring, and periodic reporting. Assurances for continued maintenance will also include financial assurances.

NFA letters and Covenants Not To Sue may be issued for properties where it is found there is no reason to believe there is contamination or where there is no contamination above applicable standards.

If the initial property assessment, known as the Phase I Property Assessment, reveals there is reason to believe contamination exists on a property, a Phase II Property Assessment must be conducted. The Phase II Property Assessment includes all activities conducted at a property until applicable standards are achieved or until a Covenant Not To Sue is issued with an operation and maintenance agreement that includes a schedule for achieving those applicable standards.

### 1.3 THE AUDITING PROGRAM

Ohio EPA has established a program to ensure that cleanups are done safely and correctly. Ohio EPA has access to all cleanup documents and properties, and will audit at least 25 percent of the properties receiving a covenant not to sue, that have submitted no further action letters to the Agency, to confirm that cleanup standards have been met. The Ohio EPA also may request any documents from certified professionals to verify their qualifications. Criminal penalties exist for violating permit agreements, and falsifying or withholding information regarding voluntary cleanups.

## 2.0 EXISTING METHODOLOGIES

Several different methods exist for determining soil cleanup levels via the leaching pathway. They range from comparatively simple, such as those based on simple analytical models, to in-depth mathematical simulations of contaminant fate and transport in the subsurface. The following sections describe the various methods and computer programs which have been used, or could potentially be used, in the determination of soil cleanup levels protective of human health via a soil to ground water leaching pathway of exposure. This section is not meant to be an exhaustive account of the methods and models available for determining soil cleanup levels. The examples cited here are provided to illustrate the variety of methods and models available for such determinations.

### 2.1 METHODS USED BY VARIOUS STATES

Many states have developed soil cleanup levels for their own programs in the absence of any such cleanup levels developed by the federal government. These states have developed various approaches for establishing deep soil cleanup levels (Zamojski et al. 1992). The approaches vary widely and may result in cleanup levels which differ by as much as an order of magnitude. California's soil cleanup criteria are either based on a "streamlined" risk assessment method called the CalTOX Model, used at sites which are small or have little funding available, or based on an in-depth site-specific risk assessment used at more complicated sites. Michigan has developed a procedure which uses three different methods for arriving at cleanup levels depending upon site-specific factors such as the number of different contaminants at the site, characteristics of the contaminant, and whether regulatory limits for the contaminant exist. Minnesota, New Jersey, and New York all employ the use of a predictive leaching model in determining cleanup levels for specific contaminants and

situations. The Wisconsin Department of Natural Resources has used SESOIL (Seasonal Soil Compartment Model) to serve as the technical basis for developing a scoring system to determine the susceptibility of a particular site to ground water contamination.

## 2.2 OVERVIEW OF UNSATURATED ZONE MODELING SOFTWARE

There are numerous models available in the public or proprietary domain which evaluate and predict unsaturated zone flow and leaching of hazardous chemicals through soils to ground water. Each model is unique in terms of its purpose, major hydrological, mathematical, and operational characteristics, input requirements, simulative capabilities, level of documentation, availability, and applicability. These models have five different types of potential use:

- Application to field problems in support of policy making and resource management decisions;
- Analyzing field and laboratory experiments as part of a research program;
- As a basis for new model formulations and software development;
- In education regarding modeling principles and training in the use of models; and
- Verification of, and comparison with, other models.

Most of the unsaturated zone models are used to predict the leaching of contaminants to ground water for the development of soil cleanup levels at contaminated sites. The following sections briefly summarize the vadose zone analytical and numerical models which were evaluated for use in the development of Leach-Based Soil Values for the VAP. These models include VLeach (Vadose Zone Leaching model) (CH2M Hill 1990); CHEMFLO (Chemical Flow model) (U.S. EPA 1989a); RITZ (Regulatory and Investigative Treatment Zone model) (U.S. EPA 1988a); PESTAN (Pesticide Analytical Model) (Ravi & Johnson 1987); and SESOIL (Seasonal Soil Compartment Model) (Bonazountas and Wagner 1984).

### 2.2.1 VLeach (Vadose Zone Leaching Model)

VLeach is a one-dimensional finite difference model designed to simulate the leaching an organic contaminant through the vadose zone. It can be used to model the transport of any non-reactive chemical that displays linear partitioning behavior. VLeach models three main processes in equilibrium: liquid-phase advection, solid-phase sorption, and vapor-phase diffusion. The code can simulate leaching in a number of distinct "polygons" representing the area of contamination during each run. The polygons may differ in soil properties, recharge rate, depth to water, or initial conditions. Each polygon is treated separately, and at the end of the run, an overall area-weighted ground water impact is presented.

Each polygon is represented by a vertical stack of cells, reaching from the land surface to the top of the saturated zone. The VLeach version (version 1.02) evaluated for the use in developing leach-based soil values, is subject to a number of major assumptions:

- The three phases present (liquid, vapor, sorbed) are in a state of linear equilibrium in each cell.

- The moisture content profile within the vadose zone is constant, i.e., the vadose zone is in a steady state with respect to water.

- Liquid-phase dispersion is neglected.

- No "free product" can be present.

- The contaminant is not subject to in-situ biodegradation.

- The vadose zone soil within a particular polygon is completely homogeneous, and behaves as a uniform porous medium, with no preferential pathways to flow.

- Volatilization from the surface is either completely unimpeded or completely restricted.

As indicated earlier, VLeach represents areas of contamination as distinct polygons which may not easily translate to the generic nature of development of leach-based values for the VAP. Hence, this model was disqualified from its possible use to develop Leach-based soil values=.

### 2.2.2 CHEMFLO (Chemical Flow Model)

CHEMFLO is a one-dimensional model to simulate water and chemical movement in unsaturated soils (U.S. EPA 1989a). Water and chemical movement in this model is modeled by the Richards and convection-dispersion equations, respectively (Richards 1931). The equations are solved numerically using finite difference methods. The results of a run for this model can be displayed in the form of graphs of water content, matrix potential, driving force, conductivity, and flux density of water versus distance or time (U.S. EPA 1989a).

The predictions made by this model are quite sensitive to the specified boundary conditions. If the specified ones do not match the actual conditions, large errors may be made. Different boundary conditions for water and chemical movement for "finite" and "semi-infinite" soil columns can be specified in this model.

This model was not considered appropriate for the development of leach-based soil values' because it assumes the soil and chemical properties to be homogenous with depth and ignores partitioning and movement of chemicals in the vapor or gaseous phase. In addition, some of the input parameters utilized by this model could be extremely difficult to measure in the field (e.g., matric potential and orientation of the flow system).

### 2.2.3 RITZ (Regulatory and Investigative Treatment Zone) Model

RITZ was developed primarily to enable decision makers to simulate the movement and fate of hazardous chemicals during land treatment of oily wastes. This model incorporates the influence of oil in the sludge, water movement, volatilization, and degradation upon the transport and fate of a hazardous chemical. It divides the site into two distinct zones; the plow zone and the treatment zone. The sludge or waste material containing oil and pollutant, is

applied to the plow zone. It is assumed to be thoroughly mixed with soil in this zone. The downward movement of pollutant affected by volatilization, degradation, and sorption takes place in the treatment zone (U.S. EPA 1988a).

The RITZ model considers the soil properties to be uniform from the soil surface to the bottom of the treatment zone. The only way a user can estimate the impact of non-uniform soils is by comparing results for several simulations covering a wide range of soil properties present at a site, which can be a cumbersome process. It also assumes the flux of water to be uniform throughout time. This assumption is rarely met in the field. Furthermore, hydrodynamic dispersion is neglected. This gives rise to sharp leading and trailing edges in the pollutant slug. Such sharp fronts rarely exist in soils. Hence, the pollutant will likely reach any depth before the time predicted and will remain at that depth longer than that predicted by the model. This model assumes that the waste material is uniformly mixed in the plow zone. The oil in the waste material is assumed to be immobile and only the pollutant moves with the soil water. The users of this model are cautioned to consider the application of this model to the situations where it is most appropriate, i.e., land treatment of oily wastes.

Due to the assumptions made by the model (discussed above) and the fact that it is meant only for applications involving land treatment of oily wastes, this model was considered to be inappropriate for the development of leach-based soil values=.

### 2.2.4 PESTAN (Pesticide Analytical Model)

The PESTAN model is based on a closed-form analytical solution of the advective-dispersive-reactive transport equation (Ravi & Johnson 1987). This model has been used by the U.S. EPA Office of Pesticides Program (OPP) for initial screening assessments to evaluate the potential for ground water contamination through application of pesticides.

The vertical transport of dissolved pollutants through the vadose zone is simulated in PESTAN as a "slug" of contaminated water that migrates through a homogenous soil (Melancon et al. 1986). The concentration of the chemical slug equals the solubility of the pollutant in water, and the thickness of the slug is conceptualized principally as the volume of pore water required to dissolve the total available pollutant mass at the solubility of the pollutant. The total available mass is defined as that mass which exists at the time of recharge to the ground water. When no lapse of time occurs between the application and recharge, the total mass available to the ground water will equal the applied mass. However, when a significant time lapse occurs between the application and recharge events there may be a loss of mass due to solid-phase decay, which begins at the time of application.

The assumption that the leachate concentration equals the solubility results in maximum concentration values and a minimum slug thickness. Moreover, the slug enters the soil at the velocity of the pore water, which is the ratio of the recharge rate to the pore water content. If the recharge rate incorporates losses due to evapotranspiration, then this value will be significantly less than the recharge rate experienced during an actual rainfall event. Hence, this will result in the simulated slug migrating at a much slower rate than under true conditions. Homogeneous soil conditions are assumed in this model. Contaminant partitioning between different phases is assumed to be linear.

This model does not take contaminant losses due to volatilization processes into account. Furthermore, the assumption of leachate concentration being the same as the solubility limit results in pollutant concentration profiles being thinner and at greater concentrations than actually occurring in the vadose zone. Thus, this model was not considered appropriate for the development of Leach-based soil values=.

### 2.2.5 SESOIL (Seasonal Soil Compartment Model)

SESOIL is an acronym for Seasonal Soil compartment model and is a one-dimensional, vertical transport code for the unsaturated soil zone. It is an integrated soil compartment model and is designed to simultaneously model water transport, sediment transport, and pollutant fate. The program was developed for the U.S. EPA's Office of Water and the Office of Toxic Substances (OTS) in 1981 by Arthur D. Little, Inc. (ADL). ADL updated the SESOIL model in 1984 to include a fourth soil layer (the original model included up to three layers) and the soil erosion algorithms (Bonazountas et al. 1982 and Bonazountas & Wagner 1984). A comprehensive evaluation of SESOIL, performed by Watson and Brown (1985), uncovered numerous deficiencies in the model and, subsequently, SESOIL was extensively modified to enhance its capabilities (Hetrick et al. 1989, Hetrick et al. 1986, and Hetrick & Travis 1988). This model was designed to perform "long-term" simulations of chemical transport and transformations in soil.

SESOIL utilizes less soil, chemical, and meteorological values as input than most other similar models. The potential applications of this model include long term leaching studies from waste disposal sites, pesticide and sediment transport on watersheds, studies of hydrologic cycles and water balances of soil compartments, and precalibration runs for other simulation models. The model may also be run to estimate the effect of various site management or design strategies on pollutant distributions and concentrations in the environment.

SESOIL is well recognized and accepted by the scientific community utilizing soil-chemical fate models. It has been extensively validated and shown to work under a number of scenarios. A number of studies have been conducted on this model including sensitivity analysis, comparison with other models, and comparison with field data (Bonazountas et al. 1982; Wagner et al. 1983; Hetrick 1984; Kincaid et al. 1984; Watson and Brown 1985; Hetrick et al. 1986; Melancon et al. 1986; Hetrick et al. 1988; Hetrick et al. 1989; Hetrick et al. 1993).

The SESOIL model estimates pollutant concentrations in the soil profile following introduction via direct application and/or interaction with other media, e.g., deposition from air. The model defines the soil compartment as a soil column extending from the ground surface through the unsaturated zone and to the upper level of the saturated soil zone. Processes simulated in SESOIL are categorized in three cycles: the hydrologic cycle, sediment cycle, and pollutant cycle. Each of the three cycles are separate submodules in the SESOIL code. The hydrologic cycle includes rainfall, surface runoff, infiltration, soil water content, evapotranspiration, and ground water runoff. The sediment cycle includes sediment washload as a result of rainstorms, i.e., soil erosion that results from surface runoff. The pollutant cycle includes convective transport, volatilization, adsorption/desorption, and degradation/decay. A contaminant in SESOIL can partition in up to four phases (dissolved in liquid, adsorbed on soil, diffused air, and pure product).

Data requirements for SESOIL are not extensive, utilizing a minimum of soil and chemical parameters and monthly or seasonal meteorological values as input. Output of the SESOIL model includes pollutant concentrations at various soil depths and pollutant loss from the unsaturated soil zone in terms of surface runoff, percolation to ground water, volatilization, and degradation. SESOIL has the advantages of faster computer run times than more complex unsaturated zone models.

One of the attributes of SESOIL which makes it particularly attractive for a soil leaching study is its compartmental nature. The entire soil column can be broken down into 4 major layers each consisting of 10 sublayers each. This compartmental characteristic allows for user-specified tailoring of the model. Soil and chemical properties which vary with depth in the unsaturated zone can be specified using "layer" ratios in SESOIL. The advantage of having up to 40 sublayers lies in the increased resolution of the pollutant fate module due to smaller compartment size at the expense of increased computer run time (Watson & Brown 1985). This compartmental nature also allows a user to input a pollutant concentration distribution for the soil column as might be detected.

## 3.0 SELECTION OF THE MATHEMATICAL MODEL

For the development of generic Leach-based soil values=, it has been determined that a mathematical simulation of the processes involved in contaminant transport through the vadose zone is needed. This model will be used to obtain contaminant concentrations in the soil which will serve as generic soil cleanup levels to protect the underlying ground water via leaching pathway. Table 1 illustrates the abilities of various models discussed in Section 2.2 to take into account the effects of various processes involved in contaminant transport in the vadose zone. Criteria used in the selection of the vadose zone contaminant transport model included suitability of the model for the intended use, technical and scientific validity of the model, reliability of the model, user friendliness of the model, and the model's ability to be applied efficiently. Based on these criteria and the abilities and attributes of the various contaminant transport software evaluated, SESOIL (Microsoft Windows-based RISKPRO version 2.5, available through General Sciences Corp.) was chosen as the modeling tool for use in the soil leaching study for the VAP.

The SESOIL model can consider all of the following processes: adsorption, volatilization, degradation and decay, convective transport, and metal complexation. SESOIL is an one-dimensional vertical unsaturated code. Any dispersion occurring due to saturation (i.e., perched water) in the unsaturated zone is neglected, leading to conservatism in the model. This conservatism occurs due to the availability of a higher contaminant mass threatening the ground water in the SESOIL model simulation. Output of the SESOIL model includes pollutant concentrations at various soil depths and pollutant loss from the unsaturated soil zone in terms of percolation to ground water, volatilization, and degradation. This information can be used to obtain contaminant concentrations in the vadose soil which will be protective of underlying ground water at or below the established ground water quality standard.

**Table 1**
**Comparison of Vadose Zone Models**

| Process ---------- Model | Adsorption | Volatilization | Biological Degradation | Convective Transport | Metal Complexation | Dispersion |
|---|---|---|---|---|---|---|
| SESOIL | X | X | X | X | X | |
| VLeach | X | X | | X | | |
| CHEMFLO | X | | | X | | X |
| RITZ | X | X | X | X | | |
| PESTAN | X | | X | X | | T |

SESOIL is not intended to be used in situations where there is great variability or heterogeneity in the vertical direction in the vadose zone. This is true because the hydrologic cycle computes average soil water content for the entire soil column for each month. The pollutant cycle, however, can take into account different permeabilities for each layer in computing the water velocity flux at the layer boundaries.

The attributes of SESOIL which made it particularly attractive and suitable for the vadose zone soil leaching study to establish generic Leach-based soil values= are reiterated below:

- SESOIL has been extensively validated and shown to work under a number of scenarios. It has also been used for similar applications in other parts of the country and is capable of providing the information required from this study (Bonazountas et al. 1982; Wagner et al. 1983; Hetrick 1984; Kincaid et al. 1984; Watson and Brown 1985; Hetrick et al. 1986; Melancon et al. 1986; Hetrick et al. 1988; Hetrick et al. 1989; Hetrick et al. 1993).

- SESOIL has the advantage of fewer input requirements and faster run times than more complex unsaturated zone models, while still maintaining considerable resolution of the pollutant front in both time and space.

- Documentation of SESOIL is readily available including numerous publications on the subject and a user's guide recently developed by Hetrick and Scott (1993b).

- The model can be divided into as few as 2 layers and as many as 4 layers. This compartmental nature of the model allows for user-specified tailoring to suit a particular site.

- SESOIL is a one-dimensional soil compartment model that considers adsorption, volatilization, degradation/decay, convective transport, and metal complexation processes. At the same time, the input data requirements are not extensive, making it easier to use than more complex models.

## 3.1 DESCRIPTION OF THE SESOIL MODEL

As mentioned in Section 2.2.5, SESOIL is a one-dimensional soil compartment model used to simultaneously simulate water transport, sediment transport and pollutant fate in the unsaturated zone. The model bases its computations on time steps of one day and provides the user with monthly or annual output values.

The soil column in SESOIL can be divided into as few as 2 layers and as many as 4 layers, with 4 layers being the default. Each layer can then be divided into 10 sublayers of equal thickness. By defining up to 40 sublayers, movement of the contaminant front through the soil column can be better modeled.

The SESOIL code is divided into three separate but inter-related submodules or cycles: the hydrologic cycle, the sediment cycle, and the pollutant cycle. The hydrologic cycle includes rainfall, surface runoff, infiltration, soil water content, evapotranspiration, and ground water recharge. The sediment cycle includes sediment washload as a result of rainstorms, i.e., soil erosion that results from surface runoff. The pollutant cycle includes convective transport, volatilization, adsorption/desorption, and degradation/decay.

The following sections describe the general principles and equations used in cycles. For a more detailed description of these cycles and of the SESOIL model in general, refer to Hetrick and Scott (1993b), Bonazountas and Wagner (1984), and General Science Corporation (GSC), (1995).

### 3.1.1 Hydrologic Cycle

The hydrologic cycle in SESOIL is based on the water balance dynamics theory of Eagleson (1978) and determines the movement of moisture within the soil column. The hydrologic cycle is one-dimensional, considering only vertical movement and based on the following water balance equations:

$$P - E - MR = S + G = Y$$

and

$$I = P - S$$

Where:

P = precipitation,
E = evapotranspiration,
MR = moisture retention,
S = surface runoff,
I = infiltration,
Y = yield, and
G = ground water runoff or recharge (includes term for capillary rise).

All of the parameters in the above equations are expected or mean annual values and are expressed in centimeters. The above equations are written in terms of soil moisture content. Their solutions are obtained by iterating on soil moisture until the calculated value for precipitation is within 1.0% of the measured value for precipitation.

In the hydrologic cycle, the soil compartment is defined as a soil column which extends from the ground surface through the unsaturated zone to the upper surface of the saturated soil zone. The entire soil compartment is represented as a single layer and the soil water content is presented as an average value for the entire unsaturated zone. Also, the permeability used in the hydrologic cycle is a depth-weighted average of the permeabilities specified for the individual layers. This average value for permeability is computed according to the following formula:

$$K_z = \frac{d}{\sum \frac{d_i}{k_i}}$$

Where:

$K_z$=vertically averaged permeability ($cm^2$),
$K_i$ = permeability for layer I ($cm^2$),
d = depth from ground surface to the water table (cm), and
$d_i$ = thickness of layer I (cm).

### 3.1.2 Sediment Washload Cycle

The sediment cycle of SESOIL computes the removal of sorbed chemicals on eroded sediments and is optional. It is a function of surface runoff, impact of raindrops, vegetation, surface roughness, and infiltration capacity. The sediment washload employs algorithms from other models.

The sediment washload cycle was not used to develop the leaching values for the VAP since the values are being developed for both surface and buried contaminated soils. If the sediment cycle is not used, the SESOIL model assumes that none of the contaminant is removed from the soil column through erosion. The result is, more of the contaminant is available in the soil column for transport through the unsaturated zone to the ground water.

### 3.1.3 Pollutant Fate Cycle

The processes controlling the fate and transport of the pollutant are selectively applied and combined in the pollutant fate cycle depending on user-specified chemical and application data. These processes are depicted in the following mass balance equation:

$$O(t - 1) + I(t) = T(t) + R(t) + M(t)$$

Where:

O(t-1) = amount of pollutant originally in the soil compartment at time t-1 ($\mu g/cm^2$),
I(t) = amount of pollutant entering the soil compartment during a time step ($\mu g/cm^2$),
T(t) = amount of pollutant transformed within the soil compartment during time step ($\mu g/cm^2$),
R(t) = amount of pollutant remaining in the soil compartment at time t ($\mu g/cm^2$), and
M(t) = amount of pollutant migrating out of the soil compartment during the time step ($\mu g/cm^2$).

The pollutant fate cycle calculates the contaminant concentration in the soil air, the soil water, and the soil solids within the soil layers and the movement of the contaminant between the soil layers. The three phases are assumed to be in equilibrium at all times. If the concentration in one phase is known, the concentrations in the other phases can be calculated from the equations listed below. The pollutant fate cycle in SESOIL iterates on the soil water concentration to solve these equations.

For soil air concentration, a modified version of Henry's Law is used:

$$C_{sa} = \frac{CH}{R(T+273)}$$

where:

$C_{sa}$ = pollutant concentration in soil air ($\mu g/ml$),
C = pollutant concentration in soil water ($\mu g/ml$),
H = Henry's Law constant ($m^3 \cdot atm/mol$),
R = gas constant ($8.2 \times 10^{-5}$ $m^3 \cdot atm/mol \cdot K$), and
T = soil temperature (ºC).

The concentration adsorbed to the soil is calculated using the Freundlich isotherm:

$$S = K_d C^{1/n}$$

where:

S = pollutant adsorbed concentration ($\mu g/g$),
$K_d$ = pollutant partitioning coefficient ($\mu g/g$)/($\mu g/ml$),
C = pollutant concentration in soil water ($\mu g/ml$), and
n = Freundlich exponent.

The total contaminant concentration in the soil is calculated by:

$$C_o = f_a \times C_{sa} + \Theta \times C + \rho_b \times S$$

Where:

$C_o$ = total pollutant concentration ($\mu g/cm^3$),
$f_a$ = f- $\Theta$, air-filled porosity (ml/ml),
f = soil porosity (ml/ml),
$\Theta$ = soil water content (ml/ml), and
$\rho_b$ = soil bulk density ($g/cm^3$).

In the event that the dissolved concentration exceeds the aqueous solubility of the pollutant, the dissolved concentration is assumed to equal the aqueous solubility. That is, if during solution of the mass balance equation for any one layer, the dissolved concentration exceeds the solubility of the chemical, the iteration is stopped for that time step and the solubility is used as the dissolved concentration. The adsorbed and soil-air concentrations are calculated using the chemical partitioning equations. To maintain mass balance, the remaining pollutant is assumed to remain in pure phase. Transport of the pure phase is not considered, but the mass of the chemical in the pure phase is used as input to that same layer in the next time step. Simulation continues until the pure phase eventually disappears. The pure phase capability was not part of the original model and was added by Hentrick et al. (1989).

In SESOIL, each soil layer (sublayer) has a set volume and the total soil volume is treated as a series of interconnected layers. Each layer (sublayer) has its own mass balance equation and can receive and release pollutant to and from adjacent layers (sublayers). Again, the individual fate processes that compose the SESOIL mass balance equations (e.g., volatilization, biodegradation) are functions of the pollutant concentrations in the soil water of each zone and a variety of first-order rate constants, partitioning coefficients, and other constants. SESOIL calculates the water velocity flux for each layer using the infiltration rate and ground water recharge rate computed by the hydrologic cycle, and the depths and permeabilities input by the user. Slight to moderate changes in soil permeability between adjacent layers may be incorporated into the input value for each of the four major soil layers. While the hydrologic cycle uses the weighted mean average of layer permeabilities, the pollutant fate cycle does take into account the separate permeability for each layer in computing the water velocity flux at the layer boundaries.

## 4.0 SESOIL INPUT DATA REQUIREMENTS

The input parameters for SESOIL can be divided into four major data types. These are:

- Climatic Data
- Soil Data
- Chemical Data
- Application Data

The specific input requirements are listed in Table 2 by the data type category. Depending on the user's needs and preferences, some of the data requirements as illustrated in Table 2 may not apply. The major input requirements are discussed in this section.

### 4.1 CLIMATIC DATA

The climatic data required by SESOIL consists of an array of mean monthly air temperature, mean monthly cloud cover fraction, average monthly relative humidity, average monthly shortwave albedo, average daily evapotranspiration, monthly precipitation, mean number of storm events per month, mean duration of rainfall, and mean length of rainy season.

All of the above mentioned climatic parameters are used for the estimation of evapotranspiration rates. If the actual monthly evapotranspiration rates are known and entered separately, then the calculation to compute evapotranspiration rates is not performed. The climatic data along with soil properties provide the necessary input for the execution of hydrologic cycle in SESOIL.

### 4.2 SOIL DATA

The soil data required by SESOIL describe the physical characteristics of the subsurface soil. The parameters include soil bulk density, intrinsic permeability of the unsaturated zone, soil disconnectedness index, soil porosity, organic carbon content, cation exchange capacity, and Freundlich exponent.

**Dry soil bulk density** is defined as the mass of dry soil divided by the total volume (volume of solids plus volume of voids). An average for the entire soil column (i.e., for the unsaturated zone) is used in SESOIL.

Hydraulic Conductivity (K) is a coefficient of proportionality describing the rate at which water can move through a porous medium. Hydraulic conductivity can range over several orders of magnitude. **Intrinsic permeability** (k) is similar to K in that it pertains to the relative ease with which a porous medium can transmit a liquid. It is independent of the nature of the fluid and is related to the saturated hydraulic conductivity as follows:

$$k = K \times \frac{\mu}{\rho \times g}$$

Where:

k = intrinsic permeability, $cm^2$;
K = hydraulic conductivity, cm/sec;
$\mu$ = dynamic viscosity, g/cm-sec;
$\rho$ = density of the fluid, $g/cm^3$; and
g = acceleration of gravity $cm/sec^2$.

Assuming water at 20EC ($\mu$ = 0.01 g/cm-sec, $\rho$ = 0.99821 $g/cm^3$, and g = 980 $cm/sec^2$), intrinsic permeability and hydraulic conductivity are related as:

intrinsic permeability ($cm^2$) = hydraulic conductivity (cm/sec) $\times 10^{-5}$ (cm-s).

Intrinsic permeability is represented in the model as a weighted estimate of the overall geological or geotechnical flow characteristics of materials encountered in the vadose zone. Permeabilities can be entered in SESOIL as a value for the entire vadose zone or as separate values corresponding to different layers. If layers are assigned different permeabilities, SESOIL computes a depth-weighted average using the equation presented in section 3.1.1 prior to execution of the hydrologic cycle.

**Soil disconnectedness index** is a parameter that relates the soil hydraulic conductivity to the moisture content. This index replaces the moisture retention curves (or characteristic curves) used by other unsaturated zone leaching models. SESOIL users' guide (Hetrick and Scott, 1993b) defines this parameter to be the exponent relating the "wetting" and "drying" time-dependent conductivity of soil to its saturated conductivity. The two conductivities are related as:

$$K(S) = K(1)S^c$$

where:

K(S) = hydraulic conductivity at S (cm/sec),
S = percent saturation,
K(1) = saturated hydraulic conductivity (cm/sec), and
c = soil disconnectedness index.

This "one" variable approach in SESOIL simplifies the data estimation process and reduces computational time. Default values range from 3.7 for sand to 12.0 for fine clay. Hetrick et al. (1986) calibrated this parameter for four different soil types ranging from sandy loam to clay. The calibrated values fell within the default range specified in the SESOIL User's Guide (GSC, 1995).

**Porosity** describes the ratio or voids to the total volume of soil or rock. Effective porosity is the amount of interconnected pore space available for transmitting fluids. "Effective porosity" is a SESOIL term which does not correlate with effective porosity as reported in the literature and as understood by the scientific and technical community. The air void space calculated in SESOIL is the difference of porosity input and soil moisture content. This indicates that the

porosity parameter in SESOIL is “total” and not “effective.” The porosity of the unsaturated zone in the SESOIL model is represented by an overall estimate of the entire soil column.

**Organic carbon content** can be specified by the user as one value for the entire soil column or as separate values corresponding to different layers. Organic carbon content in the vadose zone determines the amount of contaminant adsorbed onto the soil particles during leaching. The organic carbon content can vary considerably over space. Measured values from contaminated soil or aquifer material are not significantly affected unless total organic carbon is at least 0.1%.

SESOIL includes two partitioning processes for movements of pollutants from soil moisture or soil air to soil solids: **sorption** or **cation exchange**. Either option can be used in SESOIL to approximate adsorption

Sorption is the adhesion of pollutant molecules or ions to mineral surfaces and organic matter. It can be modeled in SESOIL by entering either a sorption coefficient ($K_d$) value or an organic carbon-water partitioning coefficient ($K_{oc}$). SESOIL employs the Freundlich equation (see section 3.1.2) to model soil sorption process. This equation correlates adsorbed concentrations with the dissolved concentration of the pollutant, by means of an adsorption coefficient and the Freundlich exponent. Values for the Freundlich exponent can be found in the literature. They generally range between 0.7 and 1.1, although values can be found as low as 0.3 and as high as 1.7. In the absence of field or measured data, a value of 1.0 (linear equilibrium partitioning) is recommended since no estimation techniques for this parameter have yet been developed (Hetrick and Scott 1993b).

Cation-exchange is a measure of the mineral soil’s ability to exchange ions with surface charges on clay particles. It is generally a reversible process, but is treated in SESOIL as irreversible. In SESOIL, cation exchange is assumed to take precedence over all other soil processes in competition for the pollutant cation.

**Table 2**
**Input Data Accepted by SESOIL**

| SOIL DATA | CHEMICAL DATA |
|---|---|
| Description of Soil Type<br>Soil Bulk Density<br>Soil Intrinsic Permeability (Unsaturated Zone)<br>Soil Disconnectedness Index<br>Soil Porosity<br>Organic Carbon Content of the Soil<br>Cation Exchange Capacity of the Soil<br>Freundlich Exponent<br><br>CLIMATE DATA<br><br>Average Monthly Temperature<br>Average Monthly Fraction of Cloud Cover<br>Average Monthly Relative Humidity<br>Average Monthly Shortwave Albedo<br>Average Daily Evapotranspiration<br>Monthly Precipitation Depth<br>Mean Time of Rainfall<br>Mean Number of Storm Events/Month<br>Mean Length of Rainy Season | Description of the Compound<br>Solubility in Water<br>Diffusion Coefficient in Air<br>Henry's Law Constant<br>Adsorption Coefficient on Organic Carbon<br>Adsorption Coefficient of the Soil<br>Molecular Weight of the Compound<br>Valence of the Compound<br>Neutral Hydrolysis Constant<br>Base Catalyzed Hydrolysis Constant<br>Acid Catalyzed Hydrolysis Constant<br>Biodegradation Rate in the Liquid Phase<br>Biodegradation Rate in the Solid phase<br>Stability Constant of the Ligand Complex<br>Moles of Ligand/Mole Complexed<br>Molecular Weight of Ligand |
| APPLICATION DATA<br><br>Number of Soil Layers<br>Number of Years of Data included in the Data Set<br>Surface Area of the Compartment<br>Depth of Each Layer (Unsaturated Zone)<br>pH of Each Layer<br>Intrinsic Permeability of Each Layer<br>Layer Ratios for Biodegradation in the Liquid Phase<br>Layer Ratios for Biodegradation in the Solid Phase<br>Layer Ratios for Organic Carbon Content of the Soil<br>Layer Ratios for Cation Exchange Capacity in the Soil<br>Layer Ratios for Freundlich Exponent<br>Layer Ratios for Absorption Coefficient<br>Monthly Pollutant Load (Mass/Unit Area) entering Each Zone<br>Monthly Mass of Pollutant Transformed in Each Sublayer by Some Other Process<br>Monthly Mass of Pollutant Removed from Each Sublayer by Some Other Process<br>Monthly Ligand Mass Input to Each Sublayer<br>Index of Volatilization/Diffusion Occurrence from Each Soil | |

### 4.3 CHEMICAL DATA

The pollutant fate cycle of SESOIL focuses on the various chemical transport and transformation processes which may occur in the soil zone. These processes include volatilization/diffusion, adsorption/desorption, and cation exchange, biodegradation, hydrolysis, and metal complexation. The chemical data file of SESOIL requires the parameters listed in Table 2 for each of the pollutants to be modeled depending upon the chemical transformations that are being simulated.

Solubility in water, air diffusion coefficient, Henry's law constant, molecular weight, the valence of the compound, and organic carbon partition coefficients are chemical-specific parameters and can be obtained from literature. The remaining input parameters listed in Table 2 are both chemical and site-specific (e.g., soil adsorption coefficient, biodegradation rates, etc.).

### 4.4 APPLICATION DATA

The application data file of SESOIL contains the general information describing the specifics of the chemical releases or application to the unsaturated soil column. This information includes the number of years the chemical is released to the soils, number of soil layers and sublayers, thickness of layers, the area of application, and additional soil parameters beyond those specified in the soil data file. SESOIL allows the user to initialize the concentrations in the sublayers plus simulate multiple spills to the surface or load the contaminant to any first sublayer of any major layer.

As stated earlier, SESOIL provides the user with an option of specifying up to 4 layers with 10 sublayers each to define the soil column. Heterogeneity in vadose systems in terms of soil and chemical properties can be depicted in the soil column using "layer" ratios. Layer ratio of a particular layer is defined as the ratio of an input parameter of that layer to layer 1, i.e., intrinsic permeability layer ratio of 2 for layer 3 signifies that the permeability of layer 3 is 3 times that of layer 1.

Information on transformation, addition, or deletion of pollutant masses to the soil column in addition to the user defined initial pollutant loading can be specified in the application data file. SESOIL allows the user to specify if volatilization/diffusion is allowed to occur from each layer through the index of volatilization/diffusion.

## 5.0 MODELING APPROACH

The modeling approach adopted for the soil leaching study to develop generic Leach-based soil values across the state of Ohio consisted of: a sensitivity analysis, parameter development, uncertainty/variability analysis, model calibration, model execution, and an evaluation of modeled results.

When fate and transport models are used to evaluate risk from chemicals in the vadose zone, the question arises as to the sensitivity of the model output to uncertainties/variability in model input parameter values. A first step in answering this question is the identification of model variables that have the most influence on model predictions, i.e., a sensitivity analysis. The

variables determined to have the largest impact on model output values are those which should be determined most accurately for input to the model.

A sensitivity analysis was conducted for this study using two different soil types representative of geology of Ohio, i.e., sand/gravel and tills/silty clay. This analysis was conducted separately for two chemicals, benzene and phenol, which possess strikingly different chemical properties and thus differentially influence model results. The results of the sensitivity analysis were utilized to identify the "sensitive" parameters, i.e., those parameters having the greatest influence on the model outcomes. The sensitivity analysis is discussed in greater detail in section 5.1.

The goal of uncertainty analysis is to take into account the effect of uncertainty and variability in the model input variables on the model predictions. Conducting an uncertainty analysis results in the refinement of model predictions in which a higher degree of confidence can be placed.

An uncertainty analysis was conducted for each of the three soil types. The most sensitive parameters identified by the sensitivity analysis were assigned a distribution of values, representing the range of values as found across the state of Ohio. Appropriate parameter values were determined from literature and an evaluation of Ground Water Pollution Potential Maps (DRASTIC maps) for various counties. Parameters with a lower order of sensitivity were assigned point estimates representative of its specific soil type. Seventy (70) discrete data sets per soil type were created. Uncertainty analysis is discussed in greater detail in section 8.

Model calibrations (see section 8) were performed using SESOIL on each data set with a calibration target as the corresponding recharge rate ranges. Appropriate recharge rates for this modeling effort were determined from an evaluation of DRASTIC maps (See section 5.2.2). The calibrated sets were then executed in SESOIL for the length of time sufficient to allow the chemical to leach to ground water.

This exercise generated an output distribution of concentrations in the ground water underlying the soil column. The predicted ground water concentrations were used to back-calculate the leach-based values for each data set according to the following linear relationship (which holds true only if the Freundlich exponent is one):

where:

$$SCN = \frac{MCL \times PLC}{C_{max}}$$

Where:
SCN = soil cleanup number (leach-based soil values) (ppm),
MCL = maximum contaminant level or risk-based ground water quality standard (ppm),
$C_{max}$ = maximum predicted concentration in ground water (SESOIL output, ppm), and
PLC = pollutant loading concentration (SESOIL input).

## 5.1 SENSITIVITY ANALYSIS

A sensitivity analysis was conducted to identify the relative sensitivity of the input parameters, and thus help select the parameters to which distribution would be developed for an uncertainty/variability analysis. The parameters utilized in SESOIL that were tested for sensitivity were: climate, hydraulic conductivity, porosity, organic carbon content, thicknesses of layers 1, 2, and 3, Henry's Law Constant, and octanol-water partitioning coefficient. Sensitivity analysis as not conducted on bulk density because this parameter does not vary significantly per soil type. Also sensitivity analysis was not conducted on the pore disconnectedness index since this parameter is based on literature values and is used to calibrate the model. More than 100 simulations were performed to test the sensitivity of the SESOIL model to these parameters.

This sensitivity analysis was performed for two soil types: sand and gravel and silty clay. These two soil types represent the extremes of resistance to fluid flow found in Ohio. A baseline data set consisting of soil properties typical of these soil types and geology representative of Ohio was developed for execution of sensitivity analysis. For the base line run, the climatic data set of Columbus city was chosen. Soil properties such as recharge rate, bulk density, organic carbon content, and porosity were assumed to be typical of sand/gravel or clay tills (see Tables 3 and 7 for baseline parameter values). These properties were entered in the model. The values for pore disconnectedness, porosity, hydraulic conductivity are adjusted within a reasonable and realistic range to calibrate the model to a specified range of recharge rates (See Tables 4 and 8 for calibration summaries).

For the development of generic leach-based soil values', the unsaturated zone (soil column in SESOIL) was broken down into 4 layers. Layer 1 represents the backfill or native soil overlying the zone of vadose contamination. This layer was assumed to be uncontaminated. Layer 2 in SESOIL depicted the zone with soil contamination distributed uniformly across it. Layer 3 signifies the actual leaching zone extending from the base of the contaminated zone to the ground water table. Layer 4 is a thin layer directly above the water table and was utilized in SESOIL to provide a discrete location for the output files of the model.

Two chemicals, benzene and phenol were chosen to be evaluated in the sensitivity analysis. These are two common pollutants with divergent solubilities and volatilities. The chemical data for the baseline data set were obtained from literature and is summarized in Table 13. Maximum contaminant levels (MCLs) established under the Safe Drinking Water Act or risk-based values for chemicals which have no MCL, have been adopted as unrestricted potable use ground water quality standards.

Sensitivity of individual parameters was tested by varying the input parameters one at a time. Each parameter was changed to a value above and below the baseline but within the expected high and low values for that soil type. The sensitivity ranking of the input values along with the absolute percentage change in soil cleanup numbers are provided in Tables 5, 6 for the sand /gravel and 9 and 10 for the clay till.

### 5.1.1 Discussion of Results of Sensitivity Analysis

Data obtained from sensitivity analysis provide information about various environmental processes and conditions, as well as some insights into working of the model. For this project, sensitivity analysis was conducted to help identify the parameters on which a distribution would be provided for uncertainty analysis.

**Climate**

Sensitivity of the climate was tested for data from two weather stations, Columbus and Cleveland. The climate was found to be a fairly insensitive parameter for climatic variation in Ohio. As the model was calibrated to the recharge rate corresponding to the soil type, using different climatic datasets did not affect the outcome significantly.

**Hydraulic Conductivity**

Hydraulic conductivity can range over several orders of magnitude for various soil types and is difficult to accurately estimate for any geologic scenario. SESOIL was highly sensitive to changes in hydraulic conductivities. A tighter matrix (i.e., lower K) resulted in lower pollutant losses due to volatilization of a chemical as compared to the baseline run. Hence, with a tighter matrix, a higher contaminant mass was available in the aqueous phase to leach to ground water in comparison to the baseline run. The soil cleanup number for the tighter matrix was lower than the cleanup number corresponding to the baseline run. Conversely, a looser matrix resulted in a higher cleanup number when compared to the baseline run. This trend is especially evident in the analysis on benzene as it is more volatile than phenol, and thus a lower contaminant mass in the aqueous phase.

**Porosity**

A lower porosity signifies a tighter matrix which resulted in a lower pollutant loss due to volatilization compared to the baseline run. Hence, as in the case with hydraulic conductivity, soil cleanup numbers were lower with a tighter matrix and vice-versa. This is again evident in the case of benzene. As this parameter was found to be fairly sensitive, a distribution was provided for uncertainty analysis.

**Organic Carbon Content**

The organic carbon content of a geologic medium directly affects the pollutant sorption tendency of that medium. The higher the organic carbon content of the soil, the greater the amount of the pollutant is adsorbed onto the soil particles. Hence, less of the pollutant mass is available to leach to the ground water as compared to the baseline run. The soil cleanup number for a high organic carbon content soil is usually higher than that of the baseline run. Benzene in sand and gravel, however, was an exception to this pattern; the high volatility of benzene and the looseness of the soil matrix resulted in aqueous phase loss through volatilization exceeding the adsorption tendencies of the matrix

**Thickness of Layer 1 (Backfill)**

Layer 1 represents the backfill or native soil overlying the contaminated zone. In the case of benzene, a lower backfill thickness encouraged volatilization losses; hence a higher soil cleanup number was obtained. A higher backfill thickness limited upward diffusion and volatilization, resulting in smaller soil cleanup numbers as the mass of pollutant threatening ground water was higher than in the baseline run.

The variability associated with changes in the changing thickness of layer 1 was much larger to the high volatility chemical benzene than for the low volatility chemical phenol. Due to the high dependency of model outputs to thickness of layer 1 and its variability throughout the state, it was decided to provide a distribution to this parameter for uncertainty analysis.

**Thickness of Layer 2 (Contaminated Zone)**

Layer 2 is the zone in which the contaminant was loaded. Increasing or decreasing the thickness of this layer has a direct impact on the quantity of pollutant mass threatening underlying ground water. The smaller the layer 2 thickness, lower a corresponding pollutant mass is available to leach to ground water. Hence, the soil cleanup number is higher than compared to the baseline run and vice-versa.

**Thickness of Layer 3 (Leaching Zone)**

As thicknesses of layers 1 and 2 are assumed to be fixed within specified ranges, thickness of layer 3 is directly proportional to the depth to ground water, a parameter which varies significantly throughout the state.

A higher leaching zone depth allows relatively more adsorption of the pollutant to the soil particles and upward diffusion. Since both these phenomena depict pollutant loss mechanisms, a higher leaching zone depth results in lower mass of the pollutant in the aqueous phase. This, in turn, results in higher cleanup numbers. The reverse logic also holds true, i.e., a smaller leaching zone results in lower cleanup numbers.

**Henry's Law Constant**

Varying Henry's constant affected model results significantly while modeling benzene than while conducting phenol runs. This is due to the fact that high Henry's Law constant of benzene controls its volatilization in the subsurface dominating other pollutant loss mechanisms. Hence, a slight change in this parameter for benzene affected the model results to a great degree. Henry's law constants, however, do not vary to a great degree as reported in literature.

**Octanol-Water Partitioning Coefficient** ($K_{ow}$)

The octanol-water partitioning coefficient is a chemical-specific parameter that was varied between low and high values reported in literature. A large variation in $K_{ow}$, however, did not result in equally large variations in $K_{oc}$, the octanol-carbon partitioning coefficient (chemical-specific regression equations were used to convert $K_{ow}$ to $K_{oc}$, see section 7.4.3).

Hence, the soil cleanup numbers were not significantly affected by the variation of this parameter.

**TABLE 3: BASELINE INPUT PARAMETERS FOR THE SENSITIVITY ANALYSIS ON SAND AND GRAVEL**

| PARAMETER | VALUE | SOURCE/REFERENCE |
|---|---|---|
| Climate | Columbus, OH | GSC Data |
| Bulk Density (g/cm$^3$) | 1.4 | SESOIL Manual |
| Hyd. Conductivity (cm/sec) | 2.0E-4 | Calibrated (See Table 4) |
| Recharge Rate (in/yr) | 9-11 | Assumed |
| Disconnectedness Index | 5 | SESOIL Manual |
| Effective Porosity | 0.35 | Assumed |
| Organic Carbon Content (%) | 0.2 | Assumed |
| NO OF LAYERS - 4 | | |
| Thickness - Layer 1 (ft) | 2 | Assumed |
| Sublayer - Layer 1 | 1 | Assumed |
| Thickness - Layer 2 (ft) | 3 | Assumed |
| Sublayer - Layer 2 | 1 | Assumed |
| Thickness - Layer 3 (ft) | 20 | Assumed |
| Sublayer - Layer 3 | 5 | Assumed |
| Thickness - Layer 4 (ft) | 1 | Assumed |
| Sublayers - Layer 4 | 1 | Assumed |
| Total Thickness (ft) | 26 | |
| | | |
| CHEMICAL DATA for Benzene | | |
| Solubility (mg/L) | 1780 | US EPA 1993 |
| Air Diffusion Coefficient (cm$^2$/sec) | 9.18E-2 | US EPA 1989b |
| Henry's Constant (atm.m$^3$/mole) | 5.43 E-3 | Howard et al. 1991 |
| $K_{ow}$ (ml/ml) | 34.89 | Howard et al. 1991 |
| $K_{oc}$ = 0.63 $K_{ow}$ | 84.98 | Calculated |
| MCL (ppm) | 0.005 | federal register |
| Biodegradation Rate 1/day) | 0 | Assumed |
| PHENOL | | |
| Solubility (mg/l) | 80,000 | US EPA 1993 |
| Air Diffusion Coefficient (cm$^2$/sec) | 8.63E-02 | Shen et al. 1993 |
| Henry's Constant (atm.m$^3$/mole) | 3.98E-7 | Howard et al. 1991 |
| $K_{ow}$ (ml/ml) | 28.84 | Howard et al. 1991 |
| $K_{oc}$ = 0.63 $K_{ow}$ | 18.16 | Calculated |
| Ground Water Standard (ppm) | 22 | risked-based number |
| Biodegradation Rate (1/day) | 0 | Assumed |

**TABLE 4: CALIBRATION SUMMARY FOR SAND AND GRAVEL**

| K (cm/sec) | Porosity | Discon. Index | Recharge Rate (in/yr) |
|---|---|---|---|
| 1.0E-03 | 0.35 | 4 | 18.11 |
| 1.0E-04 | 0.35 | 4 | 7.40 |
| 5.0E-04 | 0.35 | 4 | 16.57 |
| 5.0E-04 | 0.35 | 5 | 13.83 |
| 5.0E-04 | 0.38 | 5 | 13.40 |
| 4.0E-04 | 0.35 | 5 | 13.42 |
| 3.0E-04 | 0.35 | 5 | 12.66 |
| ***2.0E-04** | **0.35** | **5** | **11.3** |

* Calibrated Model

**TABLE 5: PARAMETER VARIATION AND SENSITIVITY ANALYSIS RESULTS FOR BENZENE - SAND AND GRAVEL.**

| PARAMETER | BASELINE | PARAMETER VARIATION | |
|---|---|---|---|
| | | **less than baseline** | **greater than baseline** |
| Climate | Columbus | Cleveland, OH *(-68.6%)** **[0.2]**** | |
| Hyd. Conductivity (cm/sec) | 2.0E-4 | 6.0E-5 *(-92.66%)* **[0.046]** | 2.0E-3 *(+2807.41%)* **[18.5]** |
| Effective Porosity | 0.35 | 0.30 *(-75.41%)* **[0.156]** | 0.40 *(+236.91%)* **[2.15]** |
| Org. Carbon Content (%) | 0.2 | 0.08 *(+22.66%)* **[0.78]** | 0.5 *(-43.93%)* **[0.35]** |
| Thickness - Layer 1 (ft) | 2 | 0 *(+32608.33%)* **[208]** | 4 *(-74.68%)* **[0.16]** |
| Thickness - Layer 2 (ft) | 3 | 1 *(+1166.13%)* **[8.06]** | 5 *(-83.65%)* **[0.10]** |
| Thickness - Layer 3 (ft) | 20 | 5 *(-88.11%)* **[0.075]** | 30 *(+13.77%)* **[0.72]** |
| **CHEMICAL PARAMETERS** | | | |
| Henry's Constant (atm-m$^3$/mole) | 5.43 E-3 | 4.35 E-3 *(-64.32%)* **[0.22]** | 7.30E-3 *(+518.11%)* **[3.94]** |
| $K_{ow}$ (ml/ml) | 134.89 | 125.89 *(+0.64%)* **[0.64]** | 141.25 *(+0.0%)* **[0.63]** |

* Italics in parentheses denote percentage change in soil cleanup levels from a baseline value of 0.63 ppm.
**Bold numbers in parentheses are the cleanup value corresponding to the change in the scenario in ppm.

## RANKING OF PARAMETERS FOR BENZENE - SAND AND GRAVEL

| RANK | PARAMETER |
|---|---|
| 1 | Thickness of layer 1 (backfill, native soil) - 32682.9% |
| 2 | Hydraulic Conductivity - 2900.07% |
| 3 | Thickness of layer 2 (contaminated zone) - 1249.77% |
| 4 | Henry's Law Constant - 582.43% |
| 5 | Effective Porosity - 312.38% |
| 6 | Thickness of layer 3 (leaching zone depth) - 101.87% |
| 7 | Climate - 68.6% |
| 8 | Organic Carbon Content - 66.58% |
| 9 | Octanol-Water Partitioning Coefficient - 0.64% |

**TABLE 6: PARAMETER VARIATION AND SENSITIVITY ANALYSIS RESULTS FOR PHENOL - SAND AND GRAVEL.**

| PARAMETER | BASELINE | PARAMETER VARIATION | |
|---|---|---|---|
| | | **Less than baseline** | **greater than baseline** |
| Climate | Columbus | Cleveland, OH *(+10.62%)** **[12.60]**** | |
| Hyd. Conductivity (cm/sec) | 2.0E-4 | 6.0E-5 *(-15.80%)* **[9.59]** | 2.0E-3 *(+23.17%)* **[14.03]** |
| Effective Porosity | 0.35 | 0.30 *(-8.77%)* **[10.39]** | 0.40 *(-13.08%)* **[9.90]** |
| Org. Carbon Content (%) | 0.2 | 0.08 *(-22.56%)* **[8.82]** | 0.5 *(+29.49%)* **[14.75]** |
| Thickness - Layer 1 (ft) | 2 | 0 *(-5.09%)* **[10.81]** | 4 *(+3.33%)* **[11.77]** |
| Thickness - Layer 2 (ft) | 3 | 1 *(+194.99%)* **[33.60]** | 5 *(-40.47%)* **[6.78]** |
| Thickness - Layer 3 (ft) | 20 | 5 *(-51.0%)* **[5.58]** | 30 *(+43.89%)* **[16.39]** |
| **CHEMICAL PARAMETERS** | | | |
| Henry's Constant ($atm.m^3/mole$) | 3.98 E-7 | 2.71E-7 *(+0.0%)* **[11.39]** | 9.50E-7 *(+0.17%)* **[11.41]** |
| $K_{ow}$ (ml/ml) | 28.84 | 22.90 *(+5.0%)* **[11.96]** | 57.54 *(+21.77%)* **[13.87]** |

*Italics in parentheses denote percentage change in soil cleanup levels from a baseline value of 11.39 ppm.
**Bold number in parentheses is the cleanup level corresponding to the change in the scenario in ppm.

## RANKING OF PARAMETERS FOR PHENOL - SAND AND GRAVEL

| RANK | PARAMETER |
|---|---|
| 1 | Thickness of layer 2 (contaminated zone) - 235.46% |
| 2 | Thickness of layer 3 (leaching zone depth) - 94.89% |
| 3 | Organic Carbon Content - 52.05% |
| 4 | Hydraulic Conductivity - 38.97% |
| 5 | Octanol-Water Partitioning Coefficient - 26.77% |
| 6 | Effective Porosity - 21.85% |
| 7 | Climate - 10.62% |
| 8 | Thickness of layer 1 (backfill, native soil) - 8.42% |
| 9 | Henry's Law Constant - 0.17% |

**TABLE 7: BASELINE INPUT PARAMETERS FOR THE SENSITIVITY ANALYSIS ON TILL AND/OR SILTY CLAYS**

| PARAMETER | VALUE | SOURCE/REFERENCE |
|---|---|---|
| Climate | Columbus, OH | GSC Data |
| Bulk Density (g/cm$^3$) | 1.8 | SESOIL Manual |
| Hyd. Conductivity (cm/sec) | 2.0E-5 | Calibrated (see Table 8) |
| Recharge Rate (in/yr) | 4-7 | Assumed |
| Disconnectedness Index | 10 | SESOIL Manual |
| Effective Porosity | 0.40 | Assumed |
| Organic Carbon Content (%) | 0.3 | Assumed |
| Other input parameters are same as that for Sand & Gravel (See Table 3) | | |

**TABLE 8: CALIBRATION SUMMARY FOR TILL AND/OR SILTY CLAYS**

| K (cm/sec) | Porosity | Discon. Index | Recharge Rate (in/yr) |
|---|---|---|---|
| 1.0E-5 | 0.40 | 10 | 2.85 |
| 1.0E-5 | 0.45 | 10 | 2.89 |
| 5.0E-6 | 0.40 | 10 | 1.40 |
| 5.0E-5 | 0.40 | 10 | 9.48 |
| 4.0E-5 | 0.40 | 10 | 8.26 |
| 3.0E-5 | 0.40 | 10 | 6.87 |
| 3.0E-5 | 0.40 | 11 | 6.31 |
| 3.0E-5 | 0.40 | 9 | 7.37 |
| 3.0E-5 | 0.40 | 10 | 6.87 |
| *** 2.0E-5** | **0.40** | **10** | **5.12** |
| 1.0E-5 | 0.40 | 10 | 2.86 |

* Calibrated Model

**TABLE 9: PARAMETER VARIATION AND SENSITIVITY ANALYSIS RESULTS FOR BENZENE - TILL AND/OR SILTY CLAYS**

| PARAMETER | BASELINE | PARAMETER VARIATION | |
|---|---|---|---|
| | | **less than baseline** | **greater than baseline** |
| Climate | Columbus | Cleveland, OH *(-32.28%)* *[**16.93**]** | |
| Hyd. Conductivity (cm/sec) | 2.0E-05 | 2.0E-6 *(+307.32%)* **[101.8]** | 2.0E-4 *(+2.6%)* **[25.65]** |
| Effective Porosity | 0.40 | 0.35 *(-20%)* **[20]** | 0.45 *(+28.36%)* **[32.09]** |
| Org. Carbon Content (%) | 0.3 | 0.1 *(-41.28%)* **[14.68]** | 0.8 *(+104.28%)* **[51.07]** |
| Thickness - Layer 1 (ft) | 2 | 0 *(+132.52%)* **[58.13]** | 4 *(-20.64%)* **[19.84]** |
| Thickness - Layer 2 (ft) | 3 | 1 *(+365.08%)* **[116.27]** | 5 *(-50.56%)* **[12.36]** |
| Thickness - Layer 3 (ft) | 20 | 5 *(-49.04%)* **[12.74]** | 30 *(+26.72%)* **[31.68]** |
| **CHEMICAL PARAMETERS** | | | |
| Henry's Constant ($atm.m^3/mole$) | 5.43 E-03 | 4.35E-03 *(-24.04%)* **[18.99]** | 7.3E-3 (+63.92%) **[40.98]** |
| $K_{ow}$ (ml/ml) | 134.89 | 125.89 *(-3.04%)* **[24.24]** | 141.25 *(+4.24%)* **[26.06]** |

*Italics in parentheses denote percentage changes in soil cleanup levels from a baseline value of 0.025 ppm.
** Bold number in parentheses is the cleanup level corresponding to the change in scenario in ppb.

## RANKING OF PARAMETERS FOR BENZENE - TILL AND/OR SILTY CLAYS

| RANK | PARAMETER |
|---|---|
| 1 | Thickness of layer 2 (contaminated zone) - 415.64% |
| 2 | Hydraulic Conductivity - 309.92% |
| 3. | Thickness of layer 1 (backfill, native soil) - 153.16% |
| 4 | Organic Carbon Content - 145.56% |
| 5 | Henry's Law Constant - 87.96% |
| 6 | Thickness of layer 3 (leaching zone depth) - 75.76% |
| 7 | Effective Porosity - 48.36% |
| 8 | Climate - 32.28% |
| 9 | Octanol-Water Partitioning Coefficient - 7.28% |

**TABLE 10: PARAMETER VARIATION AND SENSITIVITY ANALYSIS RESULTS FOR PHENOL - TILL AND/OR SILTY CLAYS.**

| PARAMETER | BASELINE | PARAMETER VARIATION | |
|---|---|---|---|
| | | less than baseline | greater than baseline |
| Climate | Columbus | Cleveland, OH *(+7.60%)* ***[15.85]** ** | |
| Hyd. Conductivity (cm/sec) | 2.0E-05 | 2.0E-6 *(-48.74%)* **[7.55]** | 2.0E-4 *(+11.06%)* **[16.36]** |
| Effective Porosity | 0.40 | 0.35 *(-6.04%)* **[13.84]** | 0.45 *(+9.30%)* **[16.10]** |
| Org. Carbon Content (%) | 0.3 | 0.1 *(-15.95%)* **[12.38]** | 0.8 *(+43.99%)* **[21.21]** |
| Thickness - Layer 1 (ft) | 2 | 0 *(-1.22%)* **[14.55]** | 4 *(+2.98%)* **[15.17]** |
| Thickness - Layer 2 (ft) | 3 | 1 *(+198.57%)* **[43.98]** | 5 *(-37.40%)* **[9.22]** |
| Thickness - Layer 3 (ft) | 20 | 5 *(-63.47%)* **[5.38]** | 30 *(+47.86%)* **[21.78]** |
| **CHEMICAL PARAMETERS** | | | |
| Henry's Constant ($atm.m^3/mole$) | 3.98 E-07 | 2.71E-07 *(0%)* **[14.73]** | 9.50E-07 *(0.1%)* **[14.73]** |
| $K_{ow}$ (ml/ml) | 28.84 | 22.90 *(-3.93%)* **[4.15]** | 57.54 *(+27.63%)* **[18.80]** |

*Italics in parentheses denote percentage change in soil cleanup levels from a baseline value of 14.73 ppm.
** Bold number in parentheses is the cleanup level corresponding to the change scenario in ppm.

**RANKING OF PARAMETERS FOR PHENOL - TILL AND/OR SILTY CLAYS**

| RANK | PARAMETER |
|---|---|
| 1 | Thickness of layer 2 (contaminated zone) - 235.97% |
| 2 | Thickness of layer 3 (leaching zone depth) - 111.33% |
| 3 | Organic Carbon Content - 59.94% |
| 4 | Hydraulic Conductivity - 59.80% |
| 5 | Octanol-Water Partitioning Coefficient - 31.56% |
| 6 | Effective Porosity - 15.34% |
| 7 | Climate - 7.60% |
| 8 | Thickness of layer 1 (backfill, native soil) - 4.2% |
| 9 | Henry's Law Constant - 0.1% |

### 5.1.2 Summary of Results

The order of sensitivity of the parameters varied between the soil types and chemical types (Table 11). Several general observations can be made:

- Changes in climate did not effect modeled results
- Thickness of layer 2 (contaminant loading zone) had significant impact on all situations
- Changes in K affected all situations
- Sensitivity of layer 1 (zone above the contaminant loading) depended on the volatility of the chemical

The information form the sensitivity analysis along with a evaluation of Ohio=s subsurface materials were utilized to determine which parameters would be assigned distributions and which would have point values and what these values would be.

**TABLE 11. SUMMARY OF SENSITIVITY RESULTS: RANKS AND PERCENT CHANGE IN VALUE.**

| PARAMETER | SAND AND GRAVEL | | | | CLAY TILL | | | |
|---|---|---|---|---|---|---|---|---|
| | Benzene | | Phenol | | Benzene | | Phenol | |
| | rank | % change | rank | % change | rank | % change | rank | % change |
| Thickness of layer 1 | 1 | 32683 | 8 | 8 | 3 | 153 | 8 | 4 |
| Thickness of layer 2 | 3 | 1250 | 1 | 236 | 1 | 416 | 1 | 236 |
| Thickness of layer 3 | 6 | 102 | 2 | 95 | 6 | 76 | 2 | 111 |
| Hydraulic Conductivity | 2 | 2900 | 4 | 39 | 2 | 310 | 4 | 60 |
| Porosity | 5 | 312 | 6 | 22 | 7 | 48 | 6 | 15 |
| Organic Carbon Content | 8 | 67 | 3 | 52 | 4 | 146 | 3 | 60 |
| Octanol-Water Coefficient | 9 | <1 | 5 | 27 | 9 | 7 | 5 | 32 |
| Henry=s Law Constant | 4 | 582 | 9 | <1 | 5 | 88 | 9 | <1 |
| Climate | 7 | 68 | 7 | 11 | 8 | 32 | 7 | 7 |

## 5.2 PARAMETER DEVELOPMENT - GENERIC LEACH-BASED SOIL VALUES

Table 12 summarizes the list of input parameters that were retained to develop Leach-based soil values. As stated earlier, the sediment module was not used in this application; therefore, washload input data were not required. In addition, sorption was represented through the use of soil adsorption coefficients; hence input data related to cation exchange process was not required. The process of hydrolysis was not modeled in this study because of the large uncertainty in the hydrolysis rates. For example, the rates of hydrolysis for various organic chemicals vary over more than 14 orders of magnitude. Due to this large variation, SESOIL model hydrolysis loss results are considered only as approximations at best. In addition, hydrolysis estimations require the acidic, basic, and neutral hydrolysis rate constants for different chemicals. These parameters were not needed and were set to zero for this study.

SESOIL has two options for performing simulations, an annual time step option and a monthly time step option. The annual option was used for all the modeling on this project.

**TABLE 12: DATA USED TO DEVELOP GENERIC LEACH-BASED SOIL VALUES.**

| | |
|---|---|
| SOIL DATA<br>Description of Soil Type<br>Soil Bulk Density<br>Soil Intrinsic Permeability (Unsaturated Zone)<br>Soil Disconnectedness Index<br>Soil Porosity<br>Organic Carbon Content of the Soil<br>Freundlich Exponent<br>Recharge Rate<br><br>CLIMATE DATA<br><br>Average Monthly Temperature<br>Average Monthly Fraction of Cloud Cover<br>Average Monthly Relative Humidity<br>Average Monthly Shortwave Albedo<br>Average Daily Evapotranspiration<br>Monthly Precipitation Depth<br>Mean Time of Rainfall<br>Mean Number of Storm Events/Month<br>Mean Length of Rainy Season | APPLICATION DATA<br><br>Number of Soil Layers<br>Surface Area of the Compartment<br>Depth of Each Layer (Unsaturated Zone)<br>Intrinsic Permeability of Each Layer<br>Layer Ratios for Biodegradation in the Liquid Phase<br>Layer Ratios for Biodegradation in the Solid Phase<br>Layer Ratios for Organic Carbon Content of the Soil<br>Pollutant Loading Concentration<br><br>CHEMICAL DATA<br><br>Description of the Compound<br>Solubility in Water<br>Diffusion Coefficient in Air<br>Henry's Law Constant<br>Adsorption Coefficient on Organic Carbon<br>Biodegradation Rate in the Liquid Phase<br>Biodegradation Rate in the Solid phase |

### 5.2.1 Climatic Data

Climatic datasets consisting of an array of mean monthly temperature, mean monthly cloud cover fraction, average monthly relative humidity, etc. are available for RISKPRO SESOIL. These climatic datasets are developed from information obtained from the National Weather Service database and represent a 40-year average. The climatic data set for Ohio, consists of observations from 101 weather stations. As this parameter was found to be fairly insensitive to the model results, it was decided to use the data set for the city of Columbus, OH for all the simulations.

### 5.2.2 Soil Data

#### Classification of Soil Types

Information was obtained for soil types in Ohio in order to determine the appropriate physical properties for developing the leach-based values. Ohio has some very diverse geological settings that will affect the migration of chemicals of concern through the vadose zone to an aquifer. Typical vadose zone settings include low permeability glacial till and lake sediments, moderate permeability alluvial sediments and soils developed on bedrock, and high permeability sand and gravel deposits associated with glacial outwash and buried valley aquifers. These units can be relatively consistent throughout the vadose zone, or can be interbedded with each other resulting in geologically complex settings. Likewise, the aquifer settings can vary significantly in terms of ground water yield, permeability and thickness. Aquifers that are typical of Ohio include high yield buried valley aquifers (sand and gravel) and karst limestone, moderate yield sandstones, limestones and alluvial deposits, and low yield bedded sedimentary rocks and sand lenses in tills.

The complex nature of Ohio geological settings required incorporation of an assessment system that would be able to identify and differentiate between the most prevalent vadose zone soil types in order to develop conceptual models of likely site stratigraphy and vadose zone properties. The Pollution Potential mapping system (here in known as the DRASTIC mapping system) was used to identify representative soil in various Ohio geological settings. This system utilizes a series of codes to classify a setting to estimate the vulnerability of an area to pollutants through the vadose zone and aquifer. DRASTIC uses seven parameters to calculate the pollution potential index, a numerical value describing the overall influence of geology on the vulnerability to contaminant migration.

The DRASTIC parameters include the following:

**D**epth to Ground water;
Net **R**echarge;
**A**quifer Media;
**S**oil Media;
**T**opography;
**I**mpact of the Vadose Zone; and
Hydraulic **C**onductivity of the Aquifer.

Scores are entered for a given setting and each of these parameters is weighted to estimate the influence. The DRASTIC score is generated to identify the overall vulnerability to contamination.

In order to meet the statutory requirement of evaluating settings within Ohio, a total of ten counties were selected for estimate vadose zone type and relative geometry. These counties include the following: Hamilton; Butler; Clark; Wood; Ottawa; Cuyahoga; Stark; Knox; Coshocton; and Pickaway. These criteria for selecting these counties included the representativeness of Ohio geological settings, the relative significance and number of possible Brownfield sites based on the distribution of Ohio EPA DERR State Master Sites, and availability of DRASTIC mapping data.

Total and parameter specific DRASTIC scores were compiled for all ten counties to determine the prevalent vadose zone types. Twenty different DRASTIC settings are identified in these counties. These twenty settings were combined into 12 groups having similar topology (e.g., thin and thick tills over limestone were combined). A total of 1411 scores were included in the initial evaluation with 1266 scores being used in the final assessment. The remaining 166 scores were dropped from the analysis for policy and geological reasons. It was decided by the work group and subcommittee that the depth to water could be no less than five feet, therefore, these DRASTIC scores were omitted from the process. In addition, swamp and marsh lands and areas having slopes greater than 12% were also omitted because of the lower likelihood that Brownfield sites would be located in these terrains.

Histograms were generated for to compare each of the 12 settings with the total DRASTIC score in order to identify which groups could be further on the basis of similarity. Three general groups were identified on the basis of this analysis. The three groups were evaluated by a multiple least-squares regression to evaluate the relationship between each of the individual parameters and the total DRASTIC score. The greatest correlation coefficients to the total DRASTIC score were the net recharge rate ($r = 0.850$) and the impact of the vadose zone ($r=0.841$). These two parameters also had a significant correlation coefficient ($r=0.768$). Other correlation coefficients ranged from 0.652 to 0.004, indicating the relative independence between the physical parameters. It is worth noting the depth to water parameter is poorly correlated with the total DRASTIC score ($r=0.431$) or other parameters (range is $r=0.299$ to 0.004).

On the basis of the evaluation above, the vadose zone soil types were consolidated into three groups based on the vadose zone material type. From the DRASTIC perspective, the three types include Type 1 - Sand and Gravel; Type 2 - Sand and Gravel with silt and clay lenses or till; and Type 3 - Tills, and Silts and Clays. Although there is overlap in both the total DRASTIC scores and the individual parameters, this grouping provided the most appropriate sets for differentiating between typical geological settings in Ohio, as stipulated by the statute.

The generic leach-based soil values apply to three general vadose zone soil types that are characteristic of geological settings common to Ohio. Vadose zone soil types are defined by the quantitative physical property of saturated vertical hydraulic conductivity ($\underline{K}_{vs}$) and the qualitative identification of geological setting. The vadose zone soil types are as follows:

(a) Vadose zone soil type 1 is characterized by bulk $\underline{K}_v$ ranging from $1\times10^{-3}$ to $1\times10^{-4}$ cm/s, net recharge rate ranging from approximately eight to fourteen inches per year and mean annual depth to ground water greater than five feet below grade. This soil type may include, but not be limited to, vertically continuous well-graded sand and gravel, fine sand, silty coarse sands that are typical of glacial outwash, buried valley aquifers, beach ridges and coarse alluvial deposits. This soil type may also include, but not be limited to, fill material (e.g., Non-toxic flyash and construction and demolition debris).

(b) Vadose zone soil type 2 is characterized by bulk $\underline{K}_v$ ranging from $1\times10^{-4}$ to $1\times10^{-5}$ cm/s net recharge ranging from approximately four to ten inches per year and mean annual depth to ground water greater than five feet below grade. This soil type may include, but not be limited to, interbedded sand and gravel lenses with silts and clays, silty/clayey sand and gravel, and poorly-graded sands that can be found in some buried valley aquifers, glacial end moraine deposits and alluvial deposits.

(c) Vadose zone soil type 3 is characterized by bulk $\underline{K}_v$ less than $1\times10^{-5}$, net recharge less than approximately four inches per year, and mean annual depth of ground water greater than five feet below grade. This soil type may include, but not be limited to, silts, clays, silty clays, and clayey gravels that can be found in glacial till, lacustrine sediments, flood plain deposits and thick colluvial deposits.

A total of sixty “type sections” were developed on the basis of the distribution of depth to water derived from the DRASTIC data. It is noted that the fate and transport of contaminants in the vadose zone is correlated to the depth to ground water in SESOIL. Because there is not a statistically significant difference between the distributions of depth to water for the three vadose zone soil type groups, and this parameter is common to all settings, the depth to water was selected as one of the most reasonable parameters to input as a variable distribution in the SESOIL program to derive leach based values.

A BETA distribution was used to describe the overall distribution of depth to water for all input data sets. The BETA distribution uses two “shape factors” and upper and lower boundaries to generate a histogram of output values. Given the input distribution of DRASTIC Depth to Water parameters, an iterative approach was used along with the Chi-Square test and residuals test to evaluate the correlation between the DRASTIC data and the BETA distribution. Once a suitable correlation was established, the BETA parameters were used to generate hypothetical geological settings for input into SESOIL.

For the purposes of modeling, it was assumed that the material was physically similar throughout the zone of contamination and the leaching zone, with the exception of reducing the permeability of Layer 1 for Soil Type 1 in order to simulate the development of a soil horizon on top of ~~a~~ sand and gravel deposit.

## Bulk Density

Point values were selected for bulk density since literature values for bulk density do not vary significantly. Values in published literature, soil mechanics and geotechnical handbooks were screened to identify representative bulk densities for the three soil types. These range from 1.4 g/cm$^3$ for clean sand and gravel to 1.8 g/cm$^3$ for silty clays (Hern and Melancon, 1986 and Evert et al., 1984).

## Hydraulic Conductivity

As stated earlier, hydraulic conductivity can range over several orders of magnitude for various soil types. The wide variability in conductivity rates within soil types and its effects on the model results, indicated that this parameter would utilize an input distribution for the uncertainty analysis.

The Leach-based soil values= are applicable to vadose formations with a bulk saturated vertical hydraulic conductivity of 1x10$^{-3}$ cm/sec or lower. The three soil types were assigned hydraulic conductivity ranges as: soil type 1: 1 x 10$^{-3}$ to 1 x 10$^{-4}$ cm/sec; soil type 2:1 x 10$^{-4}$ to 1 x 10$^{-5}$ cm/sec; soil type 3: 1 x 10$^{-5}$ and lower. These were based on hydraulic conductivity ranges reported in literature to be typical of the soil types.

An assumption of an equal probability of occurrence of a medium bulk saturated conductivity value with this range for each soil type (i.e., geologic medium), was expressed in the uniform distribution type assigned to this parameter.

## Porosity

Literature values for porosity for soil types can vary significantly. The sensitivity of porosity varies per soil and chemical type. Hence, it was decided to provide a distribution for the uncertainty analysis. A range of porosity values typical to the soil types was assigned a uniform distribution so that an equal probability of occurrence is attained during sampling for uncertainty analysis. These ranges were: soil type 1 - 25 to 35%; soil type 2 - 25 to 50%; soil type 3 - 30 to 60%. (Freeze and Cherry, 1979; Fetter, 1994; Seeve, 1991; and Sara, 1994).

## Organic Carbon Content

Organic carbon content (OC) can vary widely over time and space. However, subsurface vadose materials generally have organic carbon content less than one percent. Therefore, it was decided to input OC as a single value. Literature values of carbon contents were reviewed to identify the representative values for different soil types (Domenico and Schwartz, 1990; USEPA, 1996). The carbon content value used in SESOIL reflects an average for the entire vadose zone. This is important to note as organic carbon contents in the vadose zone decrease sharply with depth. This value was entered in the model as a point estimate (single value) for each soil category. Category 1 (sand and gravel), category 2 (silty sand), and category 3 (silts and clays) were assigned organic carbon contents or 0.20, 0.25 and 0.30 percent respectively.

### Soil Disconnectedness Index

The New SESOIL User's Guide default point values for soil disconnectedness index appropriate for each soil type were utilized in the uncertainty analysis. In many instances, this parameter had to be adjusted to calibrate the model. Model calibration is discussed in section 8.1.

### Recharge Rate

Recharge rate in inches per year was obtained for the three soil types from DRASTIC information. Additional input was obtained from Ohio Department of Natural Resources (ODNR) personnel (R. Petty, 1995, personal communication) to verify the validity of these values. In many cases, the recharge rate in DRASTIC included the losses and gains to nearby streams in addition to the vertical recharge to ground water by rainfall, which is inappropriate as an entry value for SESOIL. The ranges of recharge rate values for soil types were as follows: soil type 1 : 8 to 14 inches/yr; soil type 2 : 4 to 10 inches/yr; soil type 3 : 2 to 4 inches/yr. During model calibration, these recharge rate ranges were fixed as calibration targets. A model was assumed to be calibrated when the ground water runoff predicted by the model fell in the corresponding recharge rate range. Efforts were made to calibrate the random models uniformly within the recharge rate range.

### Freundlich Exponent

A Freundlich exponent of 1 representing linear equilibrium partitioning between the aqueous and dissolved phases was utilized for all simulations. Values for this exponent can be found in the literature. These literature values range between 0.3 and 1.371, although most values are typically between 0.7 and 1.1. In the absence of site-specific data, as is the case when developing generic leach-based soil values for VAP, a value of 1.0 is recommended (Hetrick and Scott 1993b).

## 5.2.3 Application Data

Application data file of SESOIL describes the characteristics of the soil column, i.e., the unsaturated zone. Number of soil layers, thicknesses of various layers, layer ratios of chemical and soil properties, surface area of the soil compartment, and input pollutant loading concentrations were specified in this file.

### Number of Soil Layers

The unsaturated zone was represented by four layers. The significance of various layers is discussed in previous sections. Layer 3, the leaching zone is in direct proportion to the depth to ground water as thicknesses of layers 1 (backfill zone) and 2 (contaminated zone) were fixed within specified ranges. Layer 4 was distinguished from layer 3 for the purposes of modeling a point of application layer 4, a uniform thickness of 1 foot and consisted of material identical to layer 3 and was positioned directly above the water table. Each layer had one sublayer each except layer 3 which had 5 sublayers. This was done to provide adequate model resolution in the thick leaching zone.

**Thickness of Layer 1 (backfill, native soil)**

Layer 1 represented the native soil cover overlying the contaminated zone. As indicated by the sensitivity analysis, layer 1 is highly dependant on the chemical and soil types. Also, the thickness of the layer above the contaminated soil varies considerably throughout the state; therefore, it was decided to provide a distribution to this parameter for the uncertainty analysis.

A multidisciplinary technical team consisting of representatives from industry, government, and consulting organizations met to determine the appropriate thickness of layer 1. The group=s decision focused on engineering judgment, site-specific data, and impact of layer 1 thicknesses on SESOIL model results. Layer 1 was assigned a thickness of 0 to 10 feet with increments of 0, 2, 4, and 10 feet. The distribution on layer 1 thickness was defined as a probability function. The probability of occurrence of a particular thickness of layer 1 during random number sampling for uncertainty analysis was specified as: 10% - 0 ft.; 30% - 2 ft.; 30% - 4 ft.; 30% - 10 ft. Hence, 10 percent of the random numbers sampled (or model simulations) would have a layer 1 thickness of 0 ft. and so on.

**Thickness of Layer 2 (contaminated zone)**

Layer 2 in SESOIL depicts the initial contaminant loading zone. Due to its high sensitivity to the model results and extreme variability in the state, a distribution was provided for this parameter.

As represented in SESOIL, this layer uniformly contains the user-specified pollutant concentration which is rarely the case in real geologic settings where contamination is spread irregularly and non-uniformly. Hence, an equivalency in terms of pollutant mass had to be established between contamination in actual geologic systems and layer 2 as represented in SESOIL. Thus, as in the case of layer 1, the best professional judgment drawing upon the site-specific experience of representatives from government, industry, and consulting organizations was relied upon to assign a probability distribution to layer 2 thickness. This distribution was provided as: 25% - 1 ft.; 25% - 2 ft.; 25% - 3 ft.; 25% - 4 ft.

**Thickness of layer 3 (leaching zone)**

Layer 3 represented the thickness of the leaching zone (i.e., the zone between the contamination zone and the layer immediately above the water table). Due to the extreme variability of the depth to ground water in the state and its effects on the model outcome, it was decided to provide a distribution to this parameter for the uncertainty analysis.

Layer 3 thickness was calculated by subtracting the thickness of layers 1, 2, and 4 from depth to ground water value. The depth to ground water was determined from the evaluation of DRASTIC maps, as discussed in section 5.2.2. The minimum and maximum BETA depths to water used were 5 to 70 feet, respectively. The thickness of layer 3 varied from 0 to approximately 50 feet as developed by the BETA distribution parameters.

### Thickness of Layer 4

Layer 4 was assumed to be at 1 ft. for all model simulations and was used to monitor the derived leachate concentrations immediately adjacent to the water table. This layer was separated from layer 3 for ease during modeling as it represents a thin layer just above the ground water table. The maximum pollutant concentrations in the aqueous phase in this layer were assumed to be the same as ground water concentrations.

### Surface Area of the Compartment

The surface area of the vadose zone soil compartment was arbitrarily fixed at 10,000 $cm^2$. SESOIL converts the user's pollutant concentration input into pollutant mass using the surface area and layer thicknesses for model execution. These masses are converted back into concentration units in the output file, rendering the surface area parameter redundant. Surface area values do not affect the soil cleanup number as calculated by SESOIL.

### Pollutant Loading Concentration

The back-calculation equation presented in section 5 includes a pollutant loading concentration (PLC) and a maximum ground water concentration ($C_{max}$) term. $C_{max}$ increases or decreases in proportion to the PLC term such that the ratio of PLC/$C_{max}$ stays the same. This trend is not valid if PLC is big enough to introduce pure (free) phase contamination in the soil matrix. Hence, the PLC term was arbitrarily fixed at 100 ppm. Thus, layer 2 was assumed to contain the pollutant at a concentration of 100 ppm.

### Layer Ratios

As Leach-based soil values= were developed using generic assumptions, layer ratios which depict the variation of a soil or chemical property across different layers were all set to one, i.e., the soil and chemical properties were assumed to be uniform across the soil column.

Table 13 summarizes the input data developed for uncertainty analysis.

## 5.2.4 Chemical Data

### Selection of Chemicals

To determine which chemicals to first develop Ohio EPA Leach-based Soil Values, input was obtained from the VAP Subcommittee members and the scientific literature. The objective was to first develop Ohio EPA Leach-based Soil Values for the most commonly encountered ground water contaminants. VAP Subcommittee members recommended chemicals to include based on their knowledge of the most commonly encountered contaminants. Literature sources consulted for the most frequently detected ground water contaminants were: 1) The Committee on Ground Water Cleanup Alternatives, 1994; and 2) Plumb, R.H. 1987. From this information the chemicals to first develop leach-based soil values for were selected.

## Screening Procedure for Literature Values

The order of prioritization for chemical constants was: 1) Howard, P.H., 1989-91. Handbook of Environmental Fate and Exposure Data for Organic Chemicals, Volumes I-III; 2) ATSDR Toxicological Profiles U.S. Public Health Service; 3) Shen, T.H. 1982, Air Quality Assurance for Land Disposal of Industrial Waste, Environmental Management, Vol. 6, pp.297-305 (for diffusion coefficient in air); 4) Heath et al. 1993, Review of Chemical, Physical, and Toxicological Properties of Components of Total Petroleum Hydrocarbons, Journal of Soil Contamination, Vol. 2, No. 1 (data for mixed xylenes); 5) U.S. EPA Technical Background Document for Soil Screening Guidance, Draft November 1994, EPA 540/R-94/106.

## TABLE 13

## INPUT DATA SUMMARY
## GENERIC LEACH-BASED SOIL VALUES

| PARAMETER | SOIL TYPE 1<br>CLEAN SAND AND GRAVEL<br>(with a loam top) | SOIL TYPE 2<br>SILTY SAND AND GRAVEL | SOIL TYPE 3<br>TILL AND/OR SILTY CLAYS | SOURCE/REFERENCE |
|---|---|---|---|---|
| Climate Database | Columbus City | Columbus City | Columbus City | SESOIL climatic data base. Data obtained from the National Weather Service. |
| Bulk Density ($g/cm^3$) | 1.4 | 1.6 | 1.8 | Hern and Melancon, 1986; Evert et.al., 1984. |
| Hydraulic Conductivity (cm/sec) | $10^{-3}$ to $10^{-4}$ | $10^{-4}$ to $10^{-5}$ | $10^{-5}$ and lower | Fetter, 1994; Seeve, 1991; Sara, 1994; Freeze and Cherry, 1979. Calibration to recharge rates; an uniform distribution was provided so that equal probability of occurrence is attained. |
| Total Porosity (%) | 25 to 35 | 25 to 50 | 30 to 60 | Fetter, 1994; Seeve, 1991; Sara, 1994; Freeze and Cherry, 1979. Uniform distribution was provided for equal probability during random number sampling. |
| Organic Carbon Content (%) | 0.20 | 0.25 | 0.30 | Domenico and Schwartz, 1990; US EPA, 1996. |
| Recharge Rate (in/yr) | 8 to 14 | 4 to 10 | 2 to 4 | DRASTIC maps for the state of Ohio and discussions with ODNR personnel. |
| Thickness of Layer 1-backfill (ft) | A probabilistic distribution was provided as: 10%-0 ft, 30%-2 ft, 30%-4 ft, 30%-10 ft. This was decided based on engineering judgement and site-specific experience of representatives from industry, government, and environmental consulting organizations. | | | |
| Thickness of Layer 2-contaminated zone (ft) | A probabilistic distribution was provided as: 25% probability for each 1 ft thickness increment where thickness ranges from 1 to 4 ft. Based on contaminant mass equivalency between actual vadose systems and layer 2 as represented in SESOIL. | | | |
| Thickness of layer 3 - leaching zone depth (ft) | Computed from the difference of depth to ground water and the sum of thickness of layers 1, 2, and 4. A beta distribution was provided to the depth to ground water which is derived from DRASTIC maps. | | | |
| Thickness of layer 4 (ft) | 1 | 1 | 1 | Assumed for model resolution purposes only; this layer is actually a part of layer 3. |

**Partitioning Process**

For the VAP project, adsorption was represented using soil adsorption coefficients and not by cation exchange capacities. The reason(s) for utilizing the soil adsorption coefficient rather than cation exchange is due to uncertainties in the leachate characteristics of the subsurface (vadose) soil. These characteristics include pH, ionic strength, and the presence and concentrations of other cations. Characterizing these input parameters on a generic scale would be exceedingly time consuming and little or no additional benefit is expected in return when compared to using soil adsorption coefficients to represent sorption.

As noted in the earlier, changes in $K_d$ did not significantly affect the model results; therefore it was decided to use a point value for this parameter. The sorption of pollutants on to the soil particles was represented by the use of soil adsorption coefficients. This coefficient for organic pollutants is calculated in SESOIL as:

$$K_d = K_{oc} \times f_{oc} \quad \text{(EPA 1989c)}$$

where:

$K_d$ = soil adsorption coefficient, ml/g

$K_{oc}$ = octanol-carbon partitioning coefficient, calculated from Kow, the octanol-water partitioning coefficient (ml/g). Kow values were obtained from literature.

$f_{oc}$ = fraction organic carbon content, as input in SESOIL soil data file.

Literature provides values for both $K_{ow}$ and $K_{oc}$ values. Instead of using $K_{oc}$ values from literature, they were computed from $K_{ow}$ values using chemical-category specific regression equations. These equations are as following:

<u>Polynuclear Aromatic Hydrocarbons (PAHs) and other Aromatic Hydrocarbons:</u>

$K_{oc} = 0.63 \times K_{ow}$ (Mills et al. 1982)

<u>Non-Aromatic Chlorinated Hydrocarbons:</u>

$\text{Log } K_{oc} = 0.72 \text{ Log } K_{ow} + 0.49$ (Cleary et al. 1991)

<u>Pesticides:</u>

$\text{Log } K_{oc} = 0.544 \text{ Log } K_{ow} + 1.377$ (U.S. EPA 1988b)

The first equation (Mills et al. 1982) is generally used as the default equation for a chemical which did not fall into any of the above categories.

The $K_{oc}$ values were utilized here were derived by the above equations; literature $K_{oc}$ values were not used since they are specific to the experimental method being used to derive them. Hence, to avoid using a $K_{oc}$ which was derived under specific conditions, chemical-specific regression equations (which are based on a large number of test samples) were used.

## Biodegradation Rates

Biodegradation is the process by which microorganisms breakdown pollutants. Many indigenous microbes in the soil and ground water are capable of transforming both naturally occurring and man-made organic compounds through direct metabolism. However, the potential for and rate of natural biodegradation is affected by several factors, including: the presence of microorganisms, soil moisture content, soil temperature, soil pH, oxygen availability, presence of nutrients, redox potential, and presence of other electron acceptors.

Biodegradation is handled by the SESOIL model as a first order decay rate. The SESOIL model requires that the user enter both a dissolved and adsorbed decay rate. The degradation algorithm accounts for the mass loss of the contaminant but does not keep track of the degradation products. The user is responsible for knowing what degradation products will form and the significance of these products.

At this time, the inherent complexity of bioremediation does not lend itself to be incorporated into the development of generic leaching values. Literature values for biodegradation rates are highly variable and are often based on laboratory testing or controlled field conditions where the factors effecting biodegradation can be controlled. The *Committee on In Situ Bioremediation*[1] recommends that the effectiveness of intrinsic bioremediation should be continually monitored by analyzing the fate of the contaminants and other reactants and products indicative of bioremediation. This monitoring includes three types of information: documented loss of contaminants from a site, laboratory assays showing that the microorganisms from site samples have the potential to transform contaminants under the expected site conditions, and confirming evidence that the biodegradation potential is actually realized in the field (National Research Council, 1993).

The Ohio EPA will continue to research, collect, and evaluate data on bioremediation to determine whether future inclusion of biodegradation rates in development of Ohio=s EPA leaching values is appropriate.

## Henry's Law Constant, and Air Diffusion Coefficient

The Air Diffusion Coefficient is required to calculate losses of the pollutant due to the volatilization/diffusion process. Further, to determine the concentration of pollutant in the soil air (gaseous phase), Henry's Law constant is required in the chemical input file. These properties were screened from literature using the criteria established in section 7.4.2. Chemical solubility values were also obtained from literature using the same criteria.

The chemical properties are summarized in Table 14.

[1]The Committee on In Situ Bioremediation was established in 1992 with the specific task of developing guidelines for evaluating in situ bioremediation projects and to determine whether they are or will meet clean-up goals. It represents the span of groups involved in bioremediation: buyers of bioremediation services, bioremediation contractors, environmental regulators, and academic researchers.

## TABLE 14 Chemical Constants for Generic Leach-Based Soil Values

| Chemical Name | Solubility (mg/l) | Henry's Law Constant (atm-m$^3$/mol) | Diffusion Coef in Air (cm$^2$/sec) | log Kow | $K_{oc}$ (ml/g) | Regression Equation | Ground Water Standard (mg/L) |
|---|---|---|---|---|---|---|---|
| 1, 2-Dicloroethane | 8524 | 9.77E-04 | 9.38E-02 | 1.48 | 35.94 | Cleary | 0.005 |
| 1, 1, 1-Trichloroethane | 1495 | 8.00E-03 | 8.39E-02 | 2.49 | 191.77 | Cleary | 0.2 |
| Vinyl Chloride | 2763 | 1.07E-2 | 1.13E-01 | 1.38 | 30.45 | Cleary | 0.002 |
| 1, 1-Dichloroethene | 3344 | 3.01E-02 | 9.60E-02 | 2.13 | 105.58 | Cleary | 0.007 |
| trans-1, 2-Dichloroethene | 6300 | 6.72E-03 | 9.60E-02 | 2.06 | 94.01 | Cleary | 0.1 |
| cis-1, 2-Dichloroethene | 3500 | 3.37E-03 | 9.60E-02 | 1.86 | 67.48 | Cleary | 0.07 |
| Trichloroethylene | 1100 | 1.03E-02 | 8.55E-02 | 2.42 | 170.76 | Cleary | 0.005 |
| Tetrachloroethylene | 150 | 1.49E-02 | 7.81E-02 | 3.4 | 866.96 | Cleary | 0.005 |
| Carbon Tetrachloride | 805 | 3.04E-02 | 8.40E-02 | 2.83 | 336.97 | Cleary | 0.005 |
| n-hexane | 18 | 7.70E-01 | 7.87E-02 | 2.77 | 370.97 | Mills | 0.910 |
| Benzene | 1791 | 5.43E-03 | 9.18E-02 | 2.13 | 84.98 | Mills | 0.005 |
| Ethyl benzene | 161 | 8.44E-03 | 7.56E-02 | 3.15 | 889.89 | Mills | 0.7 |
| Toluene | 534.8 | 5.94E-03 | 8.26E-02 | 2.73 | 338.33 | Mills | 1 |
| Total Xylenes | 200 | 6.30E-03 | 7.56E-02 | 3.2 | 998.48 | Mills | 10 |
| Styrene | 310 | 2.81E-03 | 7.21E-02 | 2.95 | 561.48 | Mills | 0.1 |
| Naphthalene | 31.7 | 4.83E-04 | 7.22E-02 | 3.3 | 1257.01 | Mills | 0.067 |
| Phenol | 87000 | 3.97E-07 | 8.75E-02 | 1.46 | 18.16 | Mills | 4.7 |
| Methyl Ethyl Ketone | 239,000 | 1.05E-05 | 9.42E-02 | 0.29 | 1.22 | Mills | 8.9 |

Values from: 1)Howard, P.H. 1989-1991. Handbook of Environmental Fate and Exposure Data for Organic Chemicals, Volumes I-iii; 2)ATSDR Toxicological Profiles; 3) (for calculation of molecular diffusivities in air) USEPA, 1988, Superfund Exposure Assessment Manual; 4) (data for n-hexane and mixed xylenes) Heath et al. 1993. Review of chemical, physical and toxicological properties of components of total petroleum hydrocarbons, Journal of Soil Contamination, Vol. 2, No. 1. 5) Mills et al. 1982 6) Cleary et al. 1991

## 5.3 UNCERTAINTY ANALYSIS

Uncertainty analysis seeks to quantify the uncertainty in the model output as a function of uncertainty and variability in the input parameters. It accounts for the effects on uncertainties in the input values, the heterogeneities of the site and the parameters spatial and temporal variations. The result is a distribution of the model predications in which a higher degree of confidence can be placed.

The uncertainty analysis is conducted by assigning distributions to parameters which are demonstrated to have the most variability at the site and are the most sensitivity to the model output. Point values can be assigned to parameters in which have relatively little effect on model results or appear to be constant for a site. Values are selected by a computer program to generate input data sets. Each data set is then calibrated and SESOIL is then run for each calibrated set.

Monte Carlo analysis generates random numbers for a probability distribution over the entire range of possible values for that distribution. In contrast, Latin Hypercube sampling, assumes the probability distribution is divided into equal intervals of probability. Values are generated for each interval according to the interval=s probability distribution. Therefore, Latin Hypercube sampling has been shown to require fewer model iterations to approximate the desired variable distribution than Monte Carlo method.

### 5.3.1 Latin Hypercube Sampling

The computer program selected to generate the random sets was Latin Hypercube Sampling (LHS) (Iman and Shortencarier, 1984). Latin Hypercube Sampling is a Fortran 77 program for the generation of Latin hypercube and random samples for use with computer models. The Latin hypercube technique employs a constrained sampling scheme. The generation of these samples is based on information supplied to the program by the user describing the variables or parameters used as input to the computer model. The actual sampled values are used to form vectors of variables commonly used as input to computer models for purposes of sensitivity and uncertainty analysis studies.

LHS selects *n* different values from each of *k* variables $X_1$, ..., $X_k$ in the following manner. The range of each variable is divided into *n* nonoverlapping intervals on the basis of equal probability. One value for each interval is selected at random with respect to the probability density in the interval. The *n* values thus obtained for $X_1$ are paired in a random manner (equally likely combinations) with the *n* values of $X_2$. These *n* pairs are combined in a random manner with the *n* values of $X_3$ to form n-triplets, and so on, until *n* K-tuplets are formed. This is the Latin hypercube sample. (It is convenient to think of the LHS, or a random sample of size *n*, as forming an *n x k* matrix of input values where the ith row contains specific values of each of the *k* input variables to be used on the ith run of the computer model).

Distributions for input variables were provided in LHS for hydraulic conductivity, thickness of layers 1 and 2, depth to ground water, and porosity. Seventy random sets (*n*=70) were generated per soil type by utilizing LHS. Each random set was then calibrated to the soil type-specific recharge rate range.

## 5.4 MODEL CALIBRATION

Model calibration is the process of adjusting selected model parameters within an acceptable range until the difference between the model predictions and field observations are within a selected criterion of performance. The exercise of calibration adjusts the model so that it better represents the fate and transport of a contaminant similar to real geologic systems.

Recharge rate, a hydrologic cycle component of SESOIL, was selected as the calibration target for this study. Other hydrologic parameters (i.e., porosity, intrinsic permeability, and soil disconnectedness index) were adjusted within their acceptable ranges until the recharge rate predicted by the model fell within the specified range for that soil type.

Porosity, intrinsic permeability, and soil disconnectedness index are the key parameters that influence the prediction of the hydrologic cycle in SESOIL. Initially, the parameters as predicted by the execution of LHS were input in the model along with SESOIL defaults for soil disconnectedness index. These parameters were then varied until the recharge rate predictions by the SESOIL model lied in between the selected range of recharge rates. Calibration logistics developed for this study involved changing soil parameters in following order (first to last): soil disconnectedness index, porosity, and intrinsic permeability. Hence, these parameters were varied in this order till the target was attained. Calibration worksheets were filled out for each calibration attempted. This was done for a total of 210 random sets (70 per soil type). Table 15 shows a calibration worksheet for random set no. 53 for soil type 1. It should be noted that the top layer in soil type 1 was modeled as a low conductivity layer (simulating a loam top). The calibrated random sets were then saved for the execution of uncertainty analysis.

As discussed earlier, thickness of layer 3 was calculated as the difference of the depth to ground water and sum of thicknesses of layers 1, 2, and 4. In few cases, the output of LHS contained a combination of layer 1, 2, and depth to ground water thicknesses that resulted in a negative value for thickness of layer 3. In such cases, layer 3 thickness was made to default to 0 ft., i.e., the leaching zone was limited to the thickness of layer 4 (1 ft.).

Appendix A contains the calibration run summaries for all three soil types. The LHS prediction and calibrated set properties are indicated for every random set. A scatter graph showing the recharge rates for calibrated random sets for each soil type is also shown.

## 5.5 SESOIL EXECUTIONS OF CALIBRATED SETS

The calibrated sets were executed for the chemicals listed in Table 14. SESOIL was run for adequate number of years for layer 4 to reach peak concentration. The peak concentrations in layer 4, which is a thin layer immediately overlying the ground water table were assumed to be the same as the ground water concentration. The dilution effects on the concentration of the contaminant in ground water are discussed in section 6. The soil cleanup numbers (70 in number for each chemical and soil type) were back-calculated from the peak concentration in layer 4 according to the following linear equation:

$$SCN = \frac{MCL \times PLC}{C_{max}}$$

Where:

| | | |
|---|---|---|
| SCN | = | Predicted soil cleanup number, ppm) |
| MCL | = | Maximum contaminant level or risk-based ground water quality standard, ppm) |
| $C_{max}$ | = | Maximum concentration predicted by SESOIL in layer 4, ppm |
| PLC | = | Pollutant Loading Concentration in SESOIL (PLC = 100 ppm for all runs) |

Appendix B contains a total of 54 SESOIL execution summaries (18 chemicals for three soil types). The 90th percentile of Leach-based soil values= is presented in Table 16. The 90th percentile value from the distribution of leach-based soil values for each chemical and soil type was selected to be the clean-up value. The 90th percentile value was selected to represent the upper bound value for each distribution.

In some cases, the geometry of the soil compartment forced the input pollutant loading of 100 ppm to be either totally adsorbed or volatilize/diffuse upwards. In these cases, near zero concentrations were recorded in layer 4. These minuscule concentrations resulted in soil cleanup numbers in excess of soil saturation limits. Soil saturation limits were calculated assuming the pore spaces in the geologic media to be saturated with the contaminant. For correcting the soil cleanup numbers that were higher than the soil saturation limit, following method was followed:

1. Compute soil saturation limit (SSL) for each chemical. Soil Saturation was calculated by the following equation

$$C_{sat} = \frac{S}{\rho_b}(K_d \times \rho_b + \theta_w + H' \times \theta_a)$$

Where:

| | | |
|---|---|---|
| $C_{sat}$ | = | Soil saturation concentration (mg/kg) |
| s | = | Solubility in water (mg/L) (Chemical Specific, See Table 14) |
| $\rho_b$ | = | dry bulk density g/cm$^3$) |
| Kd | = | soil water partitioning coefficient (L/Kg) Chemical Specific, See Table 14, chemical specific $K_{oc}$ × fraction of organic carbon) |
| $\theta_w$ | = | water-filled porosity (0.15) |
| $\theta_a$ | = | air filled porosity (0.26) |
| H' | = | Henry's law constant (dimensionless) (Chemical Specific, See Table 14, Table 14 value in atm-m$^3$/mole ×41) |

2. Screen computed soil cleanup numbers against the computed SSLs for each of the 70 runs.

a) If the SCN<SSL, then the SCN was retained as the leach-based value.

b) If the SCN>SSL, then the SSL value was retained

3. Computed the 90$^{th}$ percentile, for each soil type. This value was selected as the Ohio EPA leach-based value (assuming no dilution).

**TABLE 15**
**CALIBRATION WORKSHEET**

**CALIBRATION EXERCISE**
**SOIL TYPE 1**

RUN NO: 53

RECHARGE RATE RANGE: 20.32 to 35.56 cm/yr (8 to 14"/yr)

DISCONNECTEDNESS INDEX RANGE: 4 to 6

TL1: 2 TL2: 1 TL3: 32.6

TL4: Always 1 ft.

| TRIAL NO. | KL1 | KL2/L3/L4 | N | C | RR (cm/yr) | CALIBRATED (YES/NO) |
|---|---|---|---|---|---|---|
| LHS DATA SET | 3.02E-4 | 6.05E-4 | 0.32 | 5 | 37.51 | N |
| 1 | 3.02E-4 | 6.05E-4 | 0.32 | 6 | 35.81 | N |
| 2 | 3.02E-4 | 6.05E-4 | 0.35 | 6 | 34.42 | Y |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | | | | | | |
| DISCARD/REJECT THIS RANDOM SET IF NO CALIBRATION REACHED YET | | | | | | |

**TABLE 16: GENERIC LEACH-BASED SOIL VALUES - ORGANICS**

| CHEMICAL (ORGANICS) | SOIL TYPE I (mg/kg) | SOIL TYPE II (mg/kg) | SOIL TYPE III (mg/kg) |
|---|---|---|---|
| Benzene | 0.017 | 0.0090 | 0.015 |
| Toluene | 6.8 | 4.1 | 7.7 |
| Ethylbenzene | 12 | 7.9 | 16 |
| Total Xylenes | 160 | 96 | 190 |
| Styrene | 0.46 | 0.37 | 0.62 |
| Naphthalene | 0.27 | 0.28 | 0.34 |
| *n*-Hexane | 121 | 111 | 104 |
| Methyl Ethyl Ketone | 1.8 | 1.8 | 1.8 |
| Phenol | 1.1 | 1.1 | 1.2 |
| Carbon Tetrachloride | 0.25 | 0.25 | 0.28 |
| 1,2-Dichloroethane | 0.0030 | 0.0020 | 0.0030 |
| 1,1,1-Trichloroethane | 1.2 | 0.74 | 1.3 |
| Vinyl Chloride | 0.0090 | 0.0050 | 0.012 |
| 1,1-Dichloroethene | 0.28 | 0.10 | 0.24 |
| *cis*-1,2-Dichloroethene | 0.12 | 0.070 | 0.12 |
| *trans*-1,2-Dichloroethene | 0.41 | 0.23 | 0.40 |
| Trichloroethene | 0.036 | 0.023 | 0.048 |
| Tetrachloroethene | 0.15 | 0.11 | 0.27 |

Note: The leach-based soil values contained in Table I assume a dilution factor of 1.0.

# 6.0 DILUTION FACTORS

## 6.1 DETERMINING "GENERIC" DILUTION FACTORS

The Summers model (U.S. EPA, 1996) was used to develop dilution values when background water quality has not been impacted by any releases upgradient of the property. The Summers model is based on hydrogeologic water-balance relationship and is expressed as:

$$C_{gw} = \frac{(Q_R)(C_p) + (Q_{GW})(C_a)}{Q_{GW} + Q_R} \quad \text{Equation 1}$$

Where:

$C_{gw}$ = concentration of the contaminant in the saturated zone, μg/ml
$Q_R$ = volumetric flow rate of infiltration (soil water) to the saturated zone, $cm^3/d$
$Q_{gw}$ = volumetric flow rate of ground water beneath the contaminated area, $cm^3/d$
$C_a$ = upgradient concentration of the pollutant in the saturated zone (if any), μg/ml
$C_p$ = concentration in the soil pore water before entering the saturated zone, μg/ml

If $C_a$ is equal to zero (i.e., ambient ground water is not contaminated), the equation is simplified and the dilution factor (DF) becomes:

$$C_{gw} = \frac{(Q_R) + (Q_{GW})}{Q_R} \quad \text{Equation 2}$$

This equation can be expressed as hydraulic conductivity (K), hydraulic gradient (i), mixing zone thickness (m), recharge to the aquifer (r), and the length of the source parallel to ground water flow (L). (Note: $Q_r$ = r*L*w, and $Q_{gw}$ = K*i*m*w, where w = the length of the source perpendicular to round water flow.)

$$DF = 1 + \frac{Kim}{rL} \quad \text{Equation 3}$$

Dilution factors were calculated using various hydraulic conductivities of the aquifer and various source sizes for each of the soil categories. The dilution factors were developed for properties in which a release has not impacted the upgradient water quality (Table 17).

Information on the parameters for the dilution model is summarized below. If the site does not approximate the input parameters selected for the generic leach-based soil values, the volunteer may opt to conduct additional investigation to determine a site-specific dilution factor (See Site-Specific Dilution as Calculated by Summers Model, Section 6.2).

**Area of Contamination**. Dilution factors were calculated based on a 0.5, 1.0, 5, and 10 acres source size. The highest size in the range was used to calculate the dilution factor.

**Source length parallel to flow (L)**. The length parallel to flow was taken as the square root of the contaminated area. This would be conservative for some sites and liberal for others.

**Hydraulic conductivity (K).** Dilution factors were calculated for aquifers in which K was greater or equal to 1 X $10^{-1}$ cm/sec, between 1 X $10^{-1}$ and 1 x $10^{-2}$ cm/sec, and between 1 x $10^{-2}$ and 1 x $10^{-3}$ cm/sec. If the hydraulic conductivity of the aquifer is 9.9 x $10^{-4}$ cm/sec or less, then the dilution factor is equal to 1. The lowest value in the range was used to calculate the dilution factor.

**Gradient (I).** A default value of 0.002 was selected for the hydraulic gradient. This was based on data provided in the Hydrogeologic Data Base (HGDB)[2] for sites in the glaciated and non-glaciated regions of Central Ohio (U.S. EPA, 1994) and from reviewing ground water data from various Ohio facilities.

**Mixing zone depth (m)**. A default value of 10 feet was selected for the mixing zone depth. This is based on assuming that most residential well would not be less than 10 feet. It is believed that this would be appropriate even if the mixing zone was less than 10 feet because a pumping well would also draw in uncontaminated water that would dilute the constituent.

**Recharge rate (r)**. Recharge rates for each soil category defaulted to the approximate mean value from the uncertainty analysis (Soil type 1 = 12.5 in/year, Soil type 2 = 8 in/year, Soil type 3 = 2.5 in/year.) Note: These default values are consistent with the average recharge rates used to determine the leaching soil values.

[2]HGDB Contains results form a survey sponsored by API and the National Water Well Association. The survey involved 400 ground water professionals who submitted data on aquifer characteristics. The data base contains information on 272 sites. All sites were categorized according to the DRASTIC categories.

**TABLE 17. DILUTION TABLES**

Soil Category 1: Clean Sand and Gravel. (Recharge rate = 12.5 in/year)

| **Hydraulic Conductivity of the Aquifer** (cm/sec) | **Size of Source Area** (Acres) | | | |
|---|---|---|---|---|
| | **≤ 0.5** | **> 0.5 to 1** | **>1 to 5** | **> 5 to 10** |
| **≥ 1.0 x $10^{-1}$** | 15 | 10 | 5.3 | 4.0 |
| **≥ 1.0 x $10^{-2}$ but < 1.0 x $10^{-1}$** | 2.3 | 2.0 | 1.4 | 1.3 |
| **≥ 1.0 x $10^{-3}$ but < 1.0 x $10^{-2}$** | 1.1 | 1.1 | 1.0 | 1.0 |

Soil Category 2: Silty Sand. (Recharge rate = 8.0 in/year)

| **Hydraulic Conductivity of the Aquifer** (cm/sec) | **Size of Source Area** (acres) | | | |
|---|---|---|---|---|
| | **≤ 0.5** | **> 0.5 to 1** | **>1 to 5** | **> 5 to 10** |
| **≥ 1.0 x $10^{-1}$** | 22 | 16 | 7.6 | 5.7 |
| **≥ 1.0 x $10^{-2}$ but < 1.0 x $10^{-1}$** | 3.1 | 2.5 | 1.7 | 1.5 |
| **≥ 1.0 x $10^{-3}$ but < 1.0 x $10^{-2}$** | 1.2 | 1.1 | 1.1 | 1.0 |

Soil Type 3: Tills/clays and Silts. (Recharge rate = 2.5 in/year)

| **Hydraulic Conductivity of the Aquifer** (cm/sec) | **Size of Source Area** (acres) | | | |
|---|---|---|---|---|
| | **≤ 0.5** | **> 0.5 to 1** | **>1 to 5** | **> 5 to 10** |
| **≥ 1.0 x $10^{-1}$** | 68 | 49 | 22 | 16 |
| **≥ 1.0 x $10^{-2}$ but < 1.0 x $10^{-1}$** | 7.7 | 5.8 | 3.1 | 2.5 |
| **≥ 1.0 x $10^{-3}$ but < 1.0 x $10^{-2}$** | 1.7 | 1.5 | 1.2 | 1.1 |

## 6.2 SITE-SPECIFIC DILUTION AS CALCULATED BY SUMMERS MODEL.

If background water quality has been impacted, then the leach-based soil values must consider a dilution factor of 1 or calculate a dilution factor(s) using a dilution model that incorporates background concentrations or other. Also, if the site did not approximate the fixed parameters of the Summers model derived dilution factors in Table 17, then the volunteer can gather information to develop a site-specific dilution factor. These values could be used with the leaching tables provided in Table 16.

The volunteer may gather information to develop a site-specific dilution factor utilizing Summers model. Summers model is based on hydrogeologic water-balance relationship and is expressed as:
Where:

$$C_{gw} = \frac{(Q_R)(C_p) + (Q_{gw})(C_a)}{Q_{gw} + Q_R}$$

$C_{gw}$ = concentration of the contaminant in the saturated zone, μg/ml
$Q_R$ = volumetric flow rate of infiltration (soil water) to the aquifer, $cm^3$ d ($Q_R$=rLw)
$Q_{gw}$ = volumetric flow rate of ground water beneath the contaminated area, $cm^3$/d ($Q_{gw}$=Kimw)
$C_a$ = upgradient concentration of the pollutant in the aquifer (if any), μg/ml
$C_p$ = contaminant concentration in the soil pore water before entering the aquifer, μg/ml
R = recharge to the aquifer, cm
L = length of the source parallel to ground water flow, cm
W = length of source area perpendicular to ground water flow, cm
K = hydraulic conductivity, cm/sec
i = hydraulic gradient
m = mixing zone thickness in the aquifer, cm

The parameters for the above dilution model must be determined in the following way. Default values are provided when appropriate.

**Hydraulic Conductivity (K):** Values must be derived from actual field testing. The hydraulic conductivity values can be derived from site-specific field calculations or from other measured values cited in hydrogeologic reports if the professional can demonstrate continuity between the reported values and the property and that the K value typifies the same saturated zone as directly below the leaching zone.

**Gradient (i):** Site-specific information should be used if available and be based on a minimum of 3 wells installed in the aquifer. If the site-specific K value is less than or equal to 1 X $10^{-1}$ cm/sec, the gradient can default to 0.002. If a site-specific gradient is calculated, it must be demonstrated that the gradient is not under the influence of any pumping wells.

**Recharge Rate (r)**: If the site-specific dilution values are to be used with the leaching soil values provided in Table X, then the recharge rates must default to the following values. (The default recharge values are consistent with the average recharge rates used in SESOIL to determine the soil leaching values).

| | |
|---|---|
| Soil Type 1 (clean sand and gravel) | 12.5 inches |
| Soil Type 2 (silty sand) | 8.0 inches |
| Soil type 3 (till/clay) | 2.5 inches |

**Source Length Parallel to Ground Water Flow (L):** This parameter requires both the knowledge of ground water flow direction and size of the contaminated area. The length of the source area parallel to flow must be based on results of soil sampling in conjunction with professional judgment. If ground water flow direction is not known then it should default to the square root of the source area.

**Mixing zone depth (m)**: The mixing zone depth should default to 10 feet. This is based on the assumption that a residential well would always be at least 10 feet in length. It is believed that this is appropriate even if the mixing zone was less than 10 feet because a pumping well would also draw in uncontaminated water that would dilute the constituent. Mixing zone depth may also be determined from the equation from U.S EPA (1996).

$$d = (0.0112L^2)^{0.5} + d_\alpha\left(1 - \exp\frac{(-Lr)}{(Kid_\alpha)}\right)$$

Where:

$d_a$ = aquifer thickness (m)
L = source length parallel to ground water flow (m)
r = infiltration rate (meters/year)
K = aquifer hydraulic conductivity (m/yr)
i = hydraulic gradient (m/m)

The parameters and how they should be determined are the same as defined above. The only additional parameter information that is needed is a determination of aquifer thickness ($d_a$). If site specific information can not be reasonably obtained, then an a judgment can be made based on area Ohio Department of Natural Resources (ODNR) well logs, ODNR Ground Water Resource Maps, and other published literature on the hydrogeology of the site/local area may be utilized to determine an appropriate aquifer thickness.

There is a potential that the calculated mixing zone could be thicker than the aquifer. If this equation is utilized for determining property-specific dilution factors, then the user should default to the aquifer thickness when the equation calculates a mixing zone thickness greater than the aquifer thickness.

**Upgradient Water Quality ($C_a$)**: The upgradient concentration must be representative of the zones or depth intervals to which the values will be applied. It should be determined in areas not likely to be impacted by activities at the subject site.

**Contaminant concentration in the soil pore water before entering the aquifer ($C_p$):** The $C_p$ values are provided in Table 18. These values are the SESOIL modeling efforts predicted concentrations in ground water.

**TABLE 18. SESOIL PREDICTED CONCENTRATIONS IN THE SOIL PORE WATER BEFORE ENTERING THE SATURATED ZONE.**

| CHEMICAL | SOIL TYPE | | |
|---|---|---|---|
| | **I** | **II** | **III** |
| Benzene | 29.58 | 54.95 | 32.47 |
| Toluene | 117.34 | 24.44 | 12.92 |
| Ethylbenzene | 5.88 | 8.87 | 4.40 |
| Total Xylenes | 6.42 | 10.44 | 5.23 |
| Styrene | 21.92 | 27.10 | 16.19 |
| Naphthalene | 26.09 | 25.10 | 19.74 |
| n-Hexane | 3.64e-04 | 7.02e-04 | 5.97e-04 |
| MEK | 483.15 | 497.11 | 488.64 |
| Phenol | 425.34 | 408.70 | 309.21 |
| Carbon Tetrachloride | 2.00 | 54.95 | 1.77 |
| 1,2-Dichloroethane | 156.25 | 208.33 | 151.52 |
| 1,1,1-Trichloroethane | 16.55 | 26.95 | 15.52 |
| Vinyl Chloride | 22.47 | 37.74 | 16.39 |
| 1,1-Dichloroethene | 2.54 | 7.00 | 2.94 |
| cis-1,2-Dichloroethene | 57.24 | 100.57 | 61.14 |
| trans-1,2-Dichloroethene | 24.59 | 42.99 | 24.89 |
| Trichloroethene | 13.81 | 22.12 | 10.50 |
| Tetrachloroethene | 3.27 | 4.48 | 1.88 |

Note: Values are in μg/ml

## 7.0 INORGANIC LEACH-BASED SOIL VALUES

The leach-based soil values for *inorganic* chemicals are based on a conservative estimation of the concentration of the chemical in soil that would not result in exceedences of the acceptable concentration of the chemical in ground water due to leaching. These values were calculated based on the soil/water partitioning equation that describes the ability of contaminants to sorb to organic carbon in soil (EPA 1996). The partitioning equation contains chemical-specific parameters (Henry's law constant, equilibrium partitioning coefficient ($K_d$); and subsurface soil variables (dry bulk density, total porosity, air-filled and water-filled pore space). The generic unrestricted potable use standards for ground water (MCLs or risk-based concentrations if MCLs are not available) were used as the acceptable ground water limits in the partitioning equation.

A dilution-attenuation factor (DAF) of 10 was used to calculate the generic leach-based soil values. The DAF accounts for the various physical, chemical, and biological processes that represent contaminant loss mechanisms in the vadose and saturated zones. A value of 10 is believed to be protective of the majority of site conditions. The equation used to calculate leach-based soil values for inorganics is:

$$C_s = C_w \times [K_d + \frac{E_w + E_a H'}{\rho_b}] \times DAF$$

Where:

$C_s$ = Leach-Based Soil Value (mg/kg)
$C_w$ = Ground Water Quality Standard (mg/L)
$K_d$ = soil/water partitioning coefficient (L/kg)
$E_w$ = Water-filled soil porosity (Lwater/Lsoil)
$E_a$ = Air-filled soil porosity (Lair/Lsoil)
H' = Henry's law constant (unitless) = H (atm-$m^3$/mol) x 41
$P_b$ = Dry soil bulk density (kg/L)
DAF = Dilution Attenuation Factor

Henry=s Law Constant was assumed to be zero since we are dealing with metals. This simplifies the equation to:

$$C_s = C_w \times [K_d + \frac{E_w}{\rho_b}] \times DAF$$

The following values were selected for the soil-water portioning coefficient, water-filled porosity, and dry bulk density.

**Soil-Water Partitioning Coefficient:** Partitioning of inorganic constituents in the subsurface is more complex than that for organics. $K_d$, the soil-water partitioning coefficient governs the amount and proportion of a contaminant adsorbed on to the soil media. $K_d$ values for metals can be affected by a variety of soil and chemical conditions, i.e., pH, speciation of

elements, Eh, ionic strength, and clay and organic matter in the soil. There is a high variability in $K_d$ values reported in literature.

In general, estimation of $K_d$ in a laboratory setup requires mixing an aqueous solution containing solutes (chemicals) of known composition and concentration with a given mass of adsorbent (soil) for a given period of time. The solution is then separated from the sorbent and chemically analyzed to determine changes in solute concentrations. The amount of solute adsorbed by the sorbent is assumed to be the difference between the initial concentration and the solute concentration after the mixing period. This is also known as the batch-adsorption technique. The $K_d$ values as reported in literature measured using this technique vary well over an order of magnitude due to various chemical and media-specific factors.

The $K_d$'s used to calculate the generic leach-based values for the selected inorganics were obtained from Strenge and Peterson (1989), for soils that are in the pH range of 5 to 9 and have a percent fines of 10 to 30 percent (Table 19).

**Water-filled Porosity**: A default value of 0.30 for water-filled porosity was utilized, as taken from the EPA (1994).

**Dry Bulk Density**: Bulk density was assumed at 1.6 g/cm$^3$ as an average representative value for soil types 1, 2, and 3.

The generic leach-based soil levels for selected inorganic chemicals are presented in Table 19.

**TABLE 19. GENERIC LEACH-BASED SOIL VALUES - INORGANICS**

| Chemical | UPUS (mg/L) | Soil/Water Partition Coefficient (Kd), (ml/g) | Leach-Based Soil Value for site <2 acre, (mg/kg) | Leach-Based Soil Value for site ≥ 2 acre, (mg/kg) |
|---|---|---|---|---|
| Antimony | 0.06 | 6 | 7.2 | 3.6 |
| Arsenic | 0.01 | 19 | 5.8 | 2.9 |
| Barium | 2 | 2800 | 110,000 | 56,000 |
| Beryllium | 0.004 | 1430 | 114.4 | 57.2 |
| Cadmium | 0.005 | 423 | 42 | 21 |
| Chromium* | 0.1 | 45 | 110 | 56 |
| Lead | 0.015 | 592 | 177.6 | 88.8 |
| Mercury | 0.002 | 580 | 23 | 12 |
| Nickel | 0.32 | 59 | 363 | 182 |
| Selenium | 0.05 | 4.3 | 4.3 | 2.15 |
| Silver | 79 | 4 | 6120 | 3120 |
| Thallium | 0.002 | 74.5 | 2.98 | 1.49 |
| Vanadium | 0.13 | 50 | 130 | 65 |
| Zinc | 4.7 | 939 | 88,000 | 44,000 |

*The Kd used assumed that the Chromium was in the form of Chromium (VI). If it can be demonstrated that the Chromium is Cr(III), then the leach-based soil value can be calculated based on a Kd value of 6,300

Note: leach-based soil concentration calculated assuming a dilution-attenuation factor of 10 for sites greater then 2 acre and 20 for sites less than 2 acre. The DAF factor accounts for both dilution as it enters the ground water zone, attenuation in the vadose zone.

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# APPENDIX A
# SUMMARY OF MODEL CALIBRATIONS

**CALIBRATED RANDOM SETS FOR UNCERTAINTY ANALYSIS**
**SOIL TYPE 1**

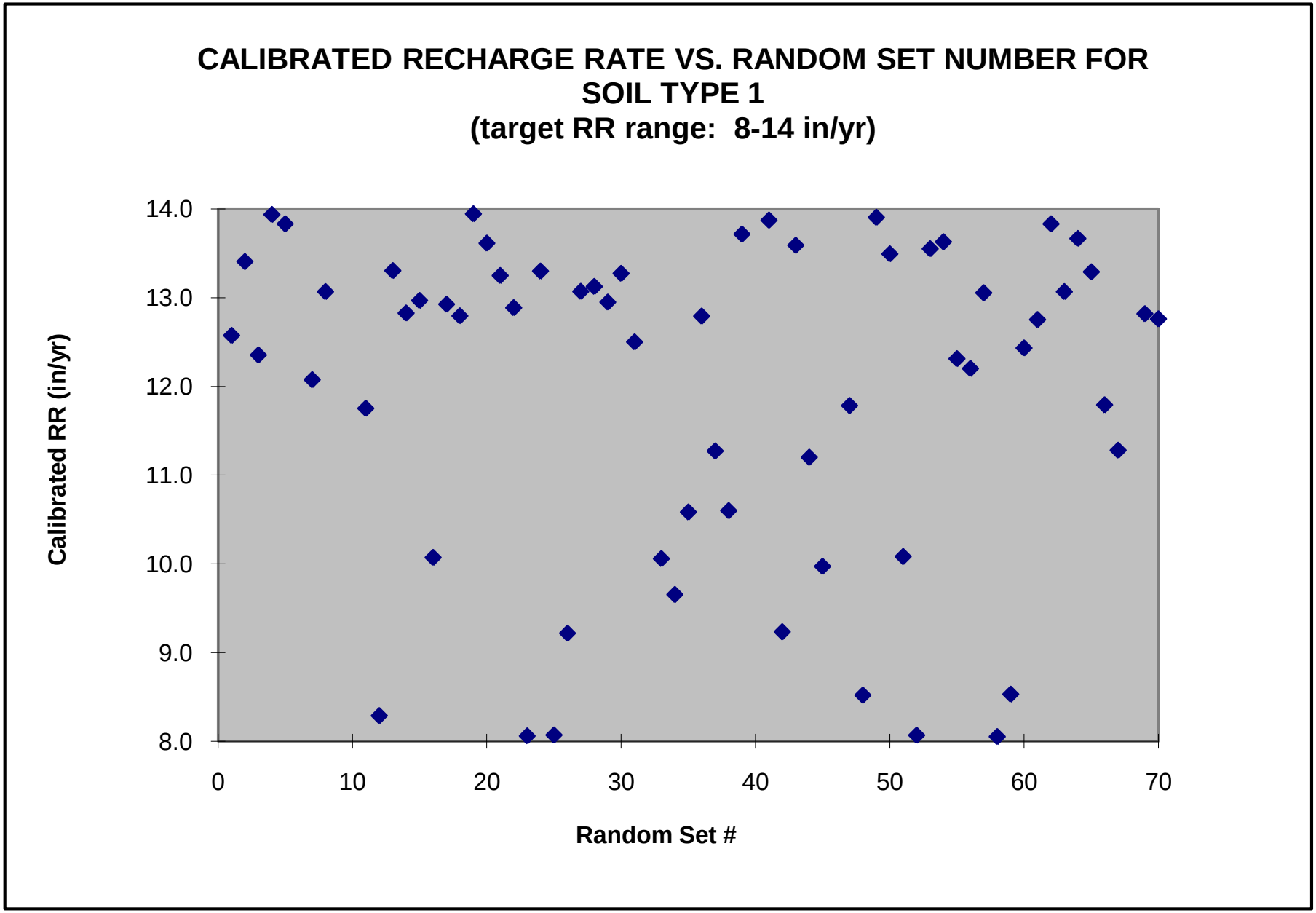
| | |
|---|---|
| bulk density | 1.4 g/cm3 |
| organic carbon content | 0.20% |
| climate | Columbus city |
| recharge rate | 8-14"/yr |

The following table presents the results of calibration runs on the LHS random sets for soil type 1.
For each of the 70 sets, both the LHS generated random set and the final calibrated set are shown.
For random sets in which modifications were made to K (hydraulic conductivity) and/or N (porosity) during calibration,
the final K and/or N is noted on the line marked "Calibrated".
A blank cell on the line marked "Calibrated" signifies that that parameter was not changed during calibration.

| | | K (cm/s) | | | Thicknesses (ft) | | | | | Calibrated |
|---|---|---|---|---|---|---|---|---|---|---|
| Random Set # | | Layer 1 | Layers 2-4 | N | Layer 1 | Layer 2 | Depth to GW | Layer 3 | C | Recharge Rate (in/yr) |
| 1 | LHS | 1.16E-04 | 2.33E-04 | 0.32 | 0.0 | 3.0 | 28.6 | - | - | - |
| | Calibrated | | | | | | | 24.6 | 6 | 12.575 |
| 2 | LHS | 2.72E-04 | 5.44E-04 | 0.28 | 4.0 | 4.0 | 17.8 | - | | - |
| | Calibrated | | | | | | | 8.8 | 6 | 13.406 |
| 3 | LHS | 3.20E-04 | 6.37E-04 | 0.32 | 10.0 | 2.0 | 7.1 | | | |
| | Calibrated | | 6.40E-04 | | | | 13.0 | 0.0 | 7 | 12.354 |
| 4 | LHS | 4.00E-04 | 9.18E-04 | 0.34 | 10.0 | 3.0 | 51.1 | - | | - |
| | Calibrated | | | | | | | 37.1 | 6 | 13.937 |
| 5 | LHS | 3.99E-04 | 7.99E-04 | 0.28 | 4.0 | 2.0 | 32.6 | - | | - |
| | Calibrated | 3.50E-04 | 7.00E-04 | 0.34 | | | | 25.6 | 6 | 13.831 |
| 6 | LHS | 3.70E-04 | 7.41E-04 | 0.27 | 10.0 | 2.0 | 39.4 | - | | - |
| | Calibrated | | | 0.32 | | | | 26.4 | 6 | 14.028 |
| 7 | LHS | 5.48E-05 | 1.37E-04 | 0.30 | 2.0 | 3.0 | 34.6 | - | | - |
| | Calibrated | 8.22E-05 | | | | | | 28.6 | 6 | 12.075 |
| 8 | LHS | 1.02E-04 | 2.05E-04 | 0.25 | 10.0 | 1.0 | 32.0 | - | | - |
| | Calibrated | | | | | | | 20.0 | 6 | 13.067 |
| 9 | LHS | 3.75E-04 | 7.51E-04 | 0.28 | 4.0 | 3.0 | 28.1 | - | | - |
| | Calibrated | | | 0.32 | | | | 20.1 | 6 | 14.169 |
| 10 | LHS | 3.80E-04 | 7.61E-04 | 0.30 | 2.0 | 1.0 | 30.6 | - | | - |
| | Calibrated | | | 0.33 | | | | 26.6 | 6 | 14.150 |
| 11 | LHS | 7.50E-05 | 1.50E-04 | 0.33 | 4.0 | 4.0 | 44.0 | - | | - |
| | Calibrated | | | | | | | 35.0 | 6 | 11.752 |
| 12 | LHS | 4.00E-05 | 1.00E-04 | 0.31 | 2.0 | 2.0 | 20.3 | - | | - |
| | Calibrated | 6.00E-05 | | | | | | 15.3 | 6 | 8.287 |
| 13 | LHS | 1.64E-04 | 4.12E-04 | 0.31 | 10.0 | 4.0 | 31.3 | - | | - |
| | Calibrated | 2.06E-04 | | | | | | 16.3 | 6 | 13.303 |
| 14 | LHS | 2.11E-04 | 4.23E-04 | 0.34 | 10.0 | 1.0 | 30.2 | - | | - |
| | Calibrated | | | | | | | 18.2 | 6 | 12.827 |
| 15 | LHS | 2.75E-04 | 5.50E-04 | 0.33 | 2.0 | 4.0 | 19.2 | - | | - |
| | Calibrated | | | | | | | 12.2 | 6 | 12.969 |
| 16 | LHS | 2.00E-04 | 4.00E-04 | 0.33 | 4.0 | 4.0 | 6.4 | | | |
| | Calibrated | | | 0.25 | | | 9.0 | 0.0 | 7 | 10.071 |
| 17 | LHS | 1.88E-04 | 3.76E-04 | 0.31 | 2.0 | 3.0 | 21.5 | - | | - |
| | Calibrated | | | | | | | 15.5 | 6 | 12.925 |
| 18 | LHS | 4.50E-04 | 9.40E-04 | 0.27 | 10.0 | 4.0 | 13.4 | | | |
| | Calibrated | | | | | | 15.0 | 0.0 | 5 | 12.795 |
| 19 | LHS | 3.42E-04 | 6.85E-04 | 0.28 | 4.0 | 3.0 | 35.2 | - | | - |
| | Calibrated | | | 0.33 | | | | 27.2 | 6 | 13.945 |
| 20 | LHS | 4.30E-04 | 8.60E-04 | 0.25 | 0.0 | 3.0 | 18.7 | - | | - |
| | Calibrated | | | 0.35 | | | | 14.7 | 6 | 13.614 |
| 21 | LHS | 2.57E-04 | 5.14E-04 | 0.25 | 4.0 | 1.0 | 47.4 | - | | - |
| | Calibrated | | | 0.35 | | | | 41.4 | 6 | 13.248 |
| 22 | LHS | 2.90E-04 | 5.80E-04 | 0.33 | 10.0 | 1.0 | 22.1 | - | | - |
| | Calibrated | | | | | | | 10.1 | 6 | 12.886 |

| Random Set # | | K (cm/s) Layer 1 | K (cm/s) Layers 2-4 | N | Thicknesses (ft) Layer 1 | Thicknesses (ft) Layer 2 | Thicknesses (ft) Depth to GW | Thicknesses (ft) Layer 3 | C | Calibrated Recharge Rate (in/yr) |
|---|---|---|---|---|---|---|---|---|---|---|
| 23 | LHS | 2.00E-04 | 3.80E-04 | 0.27 | 4.0 | 1.0 | 8.2 | - | | - |
| | Calibrated | | | 0.25 | | | | 2.2 | 7 | 8.059 |
| 24 | LHS | 3.57E-04 | 7.15E-04 | 0.30 | 2.0 | 1.0 | 20.2 | - | | - |
| | Calibrated | | | 0.35 | | | | 16.2 | 6 | 13.299 |
| 25 | LHS | 8.00E-05 | 1.80E-04 | 0.29 | 10.0 | 1.0 | 11.2 | | | |
| | Calibrated | | | | | | 12.0 | 0.0 | 7.2 | 8.071 |
| 26 | LHS | 1.37E-04 | 2.75E-04 | 0.34 | 0.0 | 3.0 | 15.8 | - | | - |
| | Calibrated | | | | | | | 11.8 | 6 | 9.217 |
| 27 | LHS | 3.91E-04 | 7.82E-04 | 0.34 | 2.0 | 2.0 | 17.4 | - | | - |
| | Calibrated | | | | | | | 12.4 | 6 | 13.071 |
| 28 | LHS | 2.68E-04 | 5.36E-04 | 0.30 | 4.0 | 2.0 | 24.7 | - | | - |
| | Calibrated | | | 0.35 | | | | 17.7 | 6 | 13.126 |
| 29 | LHS | 4.64E-04 | 9.28E-04 | 0.25 | 4.0 | 2.0 | 17.0 | - | | - |
| | Calibrated | | | 0.35 | | | | 10.0 | 6 | 12.949 |
| 30 | LHS | 4.39E-04 | 8.79E-04 | 0.33 | 10.0 | 1.0 | 21.6 | - | | - |
| | Calibrated | | | 0.35 | | | | 9.6 | 6 | 13.272 |
| 31 | LHS | 2.43E-04 | 4.87E-04 | 0.27 | 4.0 | 3.0 | 21.0 | - | | - |
| | Calibrated | | | 0.35 | | | | 13.0 | 6 | 12.500 |
| 32 | LHS | 4.79E-04 | 9.59E-04 | 0.27 | 2.0 | 1.0 | 27.6 | - | | - |
| | Calibrated | | | 0.35 | | | | 23.6 | 6 | 14.126 |
| 33 | LHS | 8.40E-05 | 1.68E-04 | 0.25 | 0.0 | 2.0 | 8.6 | - | | - |
| | Calibrated | | | | | | | 5.6 | 7.4 | 10.059 |
| 34 | LHS | 4.00E-04 | 7.80E-04 | 0.31 | 10.0 | 2.0 | 12.3 | | | |
| | Calibrated | | | | | | 13.0 | 0.0 | 6 | 9.654 |
| 35 | LHS | 3.00E-04 | 5.80E-04 | 0.31 | 10.0 | 4.0 | 10.8 | | | |
| | Calibrated | | | | | | 15.0 | 0.0 | 6 | 10.583 |
| 36 | LHS | 1.08E-04 | 2.16E-04 | 0.26 | 10.0 | 1.0 | 27.1 | - | | - |
| | Calibrated | | | | | | | 15.1 | 6 | 12.791 |
| 37 | LHS | 2.41E-04 | 4.82E-04 | 0.33 | 4.0 | 1.0 | 18.1 | - | | - |
| | Calibrated | | | | | | | 12.1 | 5 | 11.272 |
| 38 | LHS | 4.83E-04 | 9.67E-04 | 0.28 | 2.0 | 4.0 | 11.7 | - | | - |
| | Calibrated | | | | | | | 4.7 | 5 | 10.598 |
| 39 | LHS | 3.50E-04 | 7.01E-04 | 0.26 | 2.0 | 2.0 | 42.4 | - | | - |
| | Calibrated | | | 0.35 | | | | 37.4 | 6 | 13.717 |
| 40 | LHS | 4.08E-04 | 8.16E-04 | 0.32 | 0.0 | 1.0 | 29.0 | - | | - |
| | Calibrated | | | 0.35 | | | | 27.0 | 6 | 14.043 |
| 41 | LHS | 4.24E-04 | 8.49E-04 | 0.34 | 2.0 | 4.0 | 59.2 | - | | - |
| | Calibrated | | | 0.35 | | | | 52.2 | 6 | 13.874 |
| 42 | LHS | 5.90E-05 | 1.18E-04 | 0.29 | 10.0 | 3.0 | 22.4 | - | | - |
| | Calibrated | | | | | | | 8.4 | 6 | 9.232 |
| 43 | LHS | 4.52E-04 | 9.04E-04 | 0.29 | 10.0 | 3.0 | 24.9 | - | | - |
| | Calibrated | | | 0.35 | | | | 10.9 | 6 | 13.591 |
| 44 | LHS | 4.00E-04 | 8.30E-04 | 0.33 | 10.0 | 4.0 | 10.1 | | | |
| | Calibrated | | | | | | 15.0 | 0.0 | 6 | 11.201 |
| 45 | LHS | 3.64E-04 | 7.28E-04 | 0.28 | 4.0 | 2.0 | 13.2 | - | | - |
| | Calibrated | | | | | | | 6.2 | 5 | 9.972 |
| 46 | LHS | 4.91E-04 | 9.83E-04 | 0.26 | 2.0 | 1.0 | 40.5 | - | | - |
| | Calibrated | 4.50E-04 | 9.00E-04 | 0.35 | | | | 36.5 | 6 | 14.079 |
| 47 | LHS | 9.90E-05 | 1.99E-04 | 0.25 | 10.0 | 4.0 | 45.0 | - | | - |
| | Calibrated | | | 0.35 | | | | 30.0 | 6 | 11.783 |
| 48 | LHS | 1.62E-04 | 3.25E-04 | 0.34 | 2.0 | 4.0 | 14.9 | - | | - |
| | Calibrated | | | | | | | 7.9 | 6 | 8.520 |
| 49 | LHS | 4.00E-04 | 6.59E-04 | 0.26 | 0.0 | 4.0 | 1.2 | | | |
| | Calibrated | | 7.50E-04 | 0.35 | | | 5.0 | 0.0 | 8.5 | 13.906 |
| 50 | LHS | 3.34E-04 | 6.68E-04 | 0.31 | 4.0 | 2.0 | 26.5 | - | | - |
| | Calibrated | | | 0.35 | | | | 19.5 | 6 | 13.492 |
| 51 | LHS | 1.67E-04 | 3.34E-04 | 0.32 | 4.0 | 3.0 | 9.4 | - | | - |
| | Calibrated | | | 0.25 | | | | 1.4 | 7 | 10.083 |
| 52 | LHS | 1.74E-04 | 3.48E-04 | 0.29 | 2.0 | 1.0 | 15.5 | - | | - |
| | Calibrated | | | | | | | 11.5 | 5 | 8.067 |
| 53 | LHS | 3.02E-04 | 6.05E-04 | 0.32 | 2.0 | 1.0 | 36.6 | - | | - |
| | Calibrated | | | 0.35 | | | | 32.6 | 6 | 13.551 |

| Random Set # | | K (cm/s) Layer 1 | K (cm/s) Layers 2-4 | N | Thicknesses (ft) Layer 1 | Thicknesses (ft) Layer 2 | Thicknesses (ft) Depth to GW | Thicknesses (ft) Layer 3 | C | Calibrated Recharge Rate (in/yr) |
|---|---|---|---|---|---|---|---|---|---|---|
| 54 | LHS | 3.25E-04 | 6.51E-04 | 0.32 | 2.0 | 1.0 | 33.6 | - | | - |
| | Calibrated | | | 0.35 | | | | 29.6 | 6 | 13.630 |
| 55 | LHS | 1.42E-04 | 2.84E-04 | 0.30 | 10.0 | 2.0 | 41.2 | - | | - |
| | Calibrated | | | 0.35 | | | | 28.2 | 6 | 12.311 |
| 56 | LHS | 1.22E-04 | 2.44E-04 | 0.29 | 4.0 | 3.0 | 52.4 | - | | - |
| | Calibrated | | | 0.35 | | | | 44.4 | 6 | 12.201 |
| 57 | LHS | 2.18E-04 | 4.37E-04 | 0.32 | 4.0 | 1.0 | 23.0 | - | | - |
| | Calibrated | | | | | | | 17.0 | 6 | 13.055 |
| 58 | LHS | 7.65E-04 | 1.53E-04 | 0.28 | 10.0 | 3.0 | 14.7 | - | | - |
| | Calibrated | | | 0.35 | | | | 0.7 | 7 | 8.051 |
| 59 | LHS | 1.30E-04 | 2.61E-04 | 0.33 | 4.0 | 4.0 | 16.2 | - | | - |
| | Calibrated | | | | | | | 7.2 | 6 | 8.528 |
| 60 | LHS | 2.53E-04 | 5.07E-04 | 0.30 | 2.0 | 3.0 | 19.4 | - | | - |
| | Calibrated | | | 0.35 | | | | 13.4 | 6 | 12.433 |
| 61 | LHS | 2.33E-04 | 4.67E-04 | 0.29 | 4.0 | 2.0 | 23.5 | - | | - |
| | Calibrated | | | 0.35 | | | | 16.5 | 6 | 12.752 |
| 62 | LHS | 2.98E-04 | 5.97E-04 | 0.27 | 2.0 | 3.0 | 37.0 | - | | - |
| | Calibrated | | | 0.33 | | | | 31.0 | 6 | 13.831 |
| 63 | LHS | 2.27E-04 | 4.55E-04 | 0.26 | 4.0 | 3.0 | 24.2 | - | | - |
| | Calibrated | | | 0.33 | | | | 16.2 | 6 | 13.067 |
| 64 | LHS | 4.16E-04 | 8.32E-04 | 0.31 | 10.0 | 3.0 | 29.8 | - | | - |
| | Calibrated | | | 0.35 | | | | 15.8 | 6 | 13.665 |
| 65 | LHS | 1.46E-04 | 2.93E-04 | 0.27 | 2.0 | 4.0 | 38.4 | - | | - |
| | Calibrated | | | 0.30 | | | | 31.4 | 6 | 13.291 |
| 66 | LHS | 3.12E-04 | 6.24E-04 | 0.26 | 2.0 | 2.0 | 5.1 | - | | - |
| | Calibrated | | | | | | | 0.1 | 8 | 11.791 |
| 67 | LHS | 4.45E-04 | 8.90E-04 | 0.34 | 2.0 | 2.0 | 14.2 | - | | - |
| | Calibrated | | | | | | | 9.2 | 5 | 11.280 |
| 68 | LHS | 4.97E-04 | 9.95E-04 | 0.27 | 4.0 | 4.0 | 25.5 | - | | - |
| | Calibrated | | | 0.35 | | | | 16.5 | 6 | 14.118 |
| 69 | LHS | 1.54E-04 | 3.09E-04 | 0.29 | 0.0 | 4.0 | 26.1 | - | | - |
| | Calibrated | | | 0.33 | | | | 21.1 | 6 | 12.819 |
| 70 | LHS | 1.79E-04 | 3.58E-04 | 0.26 | 10.0 | 2.0 | 34.0 | - | | - |
| | Calibrated | | | 0.34 | | | | 21.0 | 6 | 12.760 |
| | | | | | | | | | max | 14.169 |
| | | | | | | | | | min | 8.051 |
| | | | | | | | | | mean | 12.194 |
| | | | | | | | | | stand. dev. | 1.842 |


CALIBRATED RECHARGE RATE VS. RANDOM SET NUMBER FOR SOIL TYPE 1
(target RR range: 8-14 in/yr)
Calibrated RR (in/yr)
14.0
13.0
12.0
11.0
10.0
9.0
8.0
0
10
20
30
40
50
60
70
Random Set #

CALST1.XLS

CALIBRATED RANDOM SETS FOR UNCERTAINTY ANALYSIS
SOIL TYPE 2

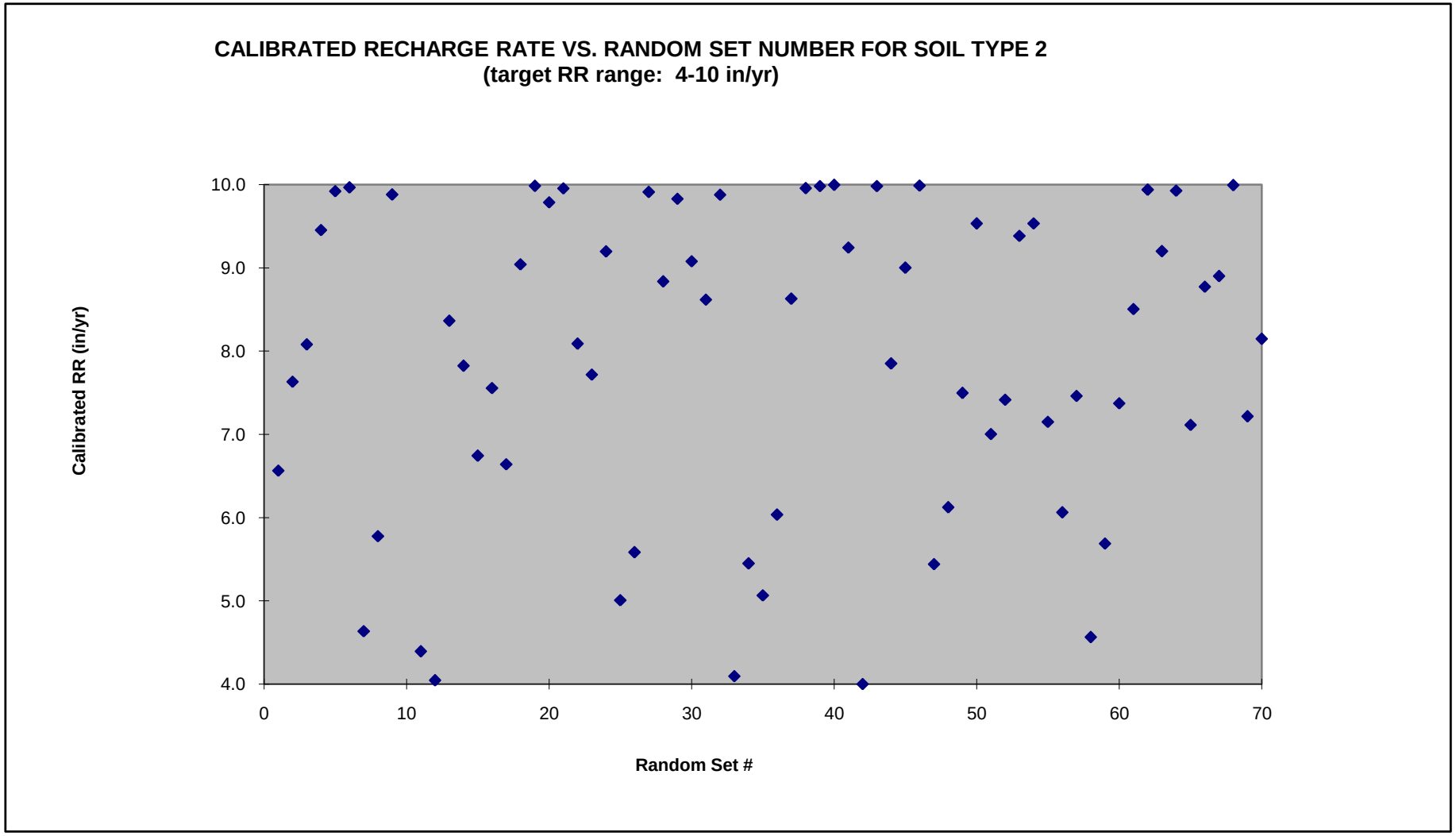
| | |
|---|---|
| bulk density | 1.6 g/cm3 |
| organic carbon content | 0.25% |
| climate | Columbus city |
| recharge rate | 4-10"/yr |

The following table presents the results of calibration runs on the LHS random sets for soil type 2.
For each of the 70 sets, both the LHS generated random set and the final calibrated set are shown.
For random sets in which modifications were made to K (hydraulic conductivity) and/or N (porosity) during calibration, the final K and/or N is noted on the line marked "Calibrated".
A blank cell on the line marked "Calibrated" signifies that that parameter was not changed during calibration.

| | | K (cm/s) | | Thicknesses (ft) | | | | | Calibrated |
|---|---|---|---|---|---|---|---|---|---|
| Random Set # | | Layers 1-4 | N | Layer 1 | Layer 2 | Depth to GW | Layer 3 | C | Recharge Rate (in/yr) |
| 1 | LHS | 2.33E-05 | 0.45 | 0.0 | 3.0 | 28.6 | - | - | - |
| | Calibrated | | | | | | 24.6 | 8 | 6.564 |
| 2 | LHS | 5.45E-05 | 0.34 | 4.0 | 4.0 | 17.8 | - | - | - |
| | Calibrated | | | | | | 8.8 | 7 | 7.631 |
| 3 | LHS | 6.37E-05 | 0.43 | 10.0 | 2.0 | 7.1 | | | |
| | Calibrated | | 0.50 | | | 13.0 | 0.0 | 8 | 8.079 |
| 4 | LHS | 9.19E-05 | 0.49 | 10.0 | 3.0 | 51.1 | - | - | - |
| | Calibrated | | | | | | 37.1 | 7 | 9.454 |
| 5 | LHS | 7.99E-05 | 0.33 | 4.0 | 2.0 | 32.6 | - | - | - |
| | Calibrated | | 0.45 | | | | 25.6 | 7 | 9.920 |
| 6 | LHS | 7.41E-05 | 0.31 | 10.0 | 2.0 | 39.4 | - | - | - |
| | Calibrated | | 0.42 | | | | 26.4 | 7 | 9.965 |
| 7 | LHS | 1.37E-05 | 0.38 | 2.0 | 3.0 | 34.6 | - | - | - |
| | Calibrated | | | | | | 28.6 | 7 | 4.635 |
| 8 | LHS | 2.06E-05 | 0.27 | 10.0 | 1.0 | 32.0 | - | - | - |
| | Calibrated | | | | | | 20.0 | 9 | 5.776 |
| 9 | LHS | 7.51E-05 | 0.34 | 4.0 | 3.0 | 28.1 | - | - | - |
| | Calibrated | | 0.42 | | | | 20.1 | 7 | 9.879 |
| 10 | LHS | 7.61E-05 | 0.38 | 2.0 | 1.0 | 30.6 | - | - | - |
| | Calibrated | | 0.42 | | | | 26.6 | 7 | 10.031 |
| 11 | LHS | 1.51E-05 | 0.46 | 4.0 | 4.0 | 44.0 | - | - | - |
| | Calibrated | | | | | | 35.0 | 9 | 4.393 |
| 12 | LHS | 1.00E-05 | 0.42 | 2.0 | 2.0 | 20.3 | - | - | - |
| | Calibrated | 1.20E-05 | | | | | 15.3 | 9 | 4.045 |
| 13 | LHS | 4.13E-05 | 0.42 | 10.0 | 4.0 | 31.3 | - | - | - |
| | Calibrated | | | | | | 16.3 | 7 | 8.362 |
| 14 | LHS | 4.24E-05 | 0.49 | 10.0 | 1.0 | 30.2 | - | - | - |
| | Calibrated | | | | | | 18.2 | 7 | 7.822 |
| 15 | LHS | 5.50E-05 | 0.46 | 2.0 | 4.0 | 19.2 | - | - | - |
| | Calibrated | | | | | | 12.2 | 7 | 6.743 |
| 16 | LHS | 4.03E-05 | 0.46 | 4.0 | 4.0 | 6.4 | | | |
| | Calibrated | | | | | 9.0 | 0.0 | 9 | 7.555 |
| 17 | LHS | 3.77E-05 | 0.41 | 2.0 | 3.0 | 21.5 | - | - | - |
| | Calibrated | | | | | | 15.5 | 7 | 6.640 |
| 18 | LHS | 9.42E-05 | 0.30 | 10.0 | 4.0 | 13.4 | | | |
| | Calibrated | | 0.45 | | | 15.0 | 0.0 | 7.5 | 9.042 |
| 19 | LHS | 6.85E-05 | 0.35 | 4.0 | 3.0 | 35.2 | - | - | - |
| | Calibrated | | 0.40 | | | | 27.2 | 7 | 9.983 |

| Random Set # | | K (cm/s) Layers 1-4 | N | Thicknesses (ft) Layer 1 | Layer 2 | Depth to GW | Layer 3 | C | Calibrated Recharge Rate (in/yr) |
|---|---|---|---|---|---|---|---|---|---|
| 20 | LHS | 8.61E-05 | 0.25 | 0.0 | 3.0 | 18.7 | - | - | - |
| | Calibrated | | 0.35 | | | | 14.7 | 7 | 9.787 |
| 21 | LHS | 5.15E-05 | 0.26 | 4.0 | 1.0 | 47.4 | - | - | - |
| | Calibrated | | | | | | 41.4 | 8 | 9.955 |
| 22 | LHS | 5.81E-05 | 0.45 | 10.0 | 1.0 | 22.1 | - | - | - |
| | Calibrated | | | | | | 10.1 | 7 | 8.089 |
| 23 | LHS | 3.83E-05 | 0.30 | 4.0 | 1.0 | 8.2 | - | - | - |
| | Calibrated | | | | | | 2.2 | 9 | 7.717 |
| 24 | LHS | 7.16E-05 | 0.38 | 2.0 | 1.0 | 20.2 | - | - | - |
| | Calibrated | | | | | | 16.2 | 7 | 9.196 |
| 25 | LHS | 1.81E-05 | 0.35 | 10.0 | 1.0 | 11.2 | | | |
| | Calibrated | | | | | 12.0 | 0.0 | 9 | 5.008 |
| 26 | LHS | 2.75E-05 | 0.49 | 0.0 | 3.0 | 15.8 | - | - | - |
| | Calibrated | | | | | | 11.8 | 8 | 5.582 |
| 27 | LHS | 7.83E-05 | 0.50 | 2.0 | 2.0 | 17.4 | - | - | - |
| | Calibrated | | | | | | 12.4 | 8 | 9.910 |
| 28 | LHS | 5.37E-05 | 0.40 | 4.0 | 2.0 | 24.7 | - | - | - |
| | Calibrated | | | | | | 17.7 | 7 | 8.836 |
| 29 | LHS | 9.28E-05 | 0.27 | 4.0 | 2.0 | 17.0 | - | - | - |
| | Calibrated | | 0.33 | | | | 10.0 | 7 | 9.830 |
| 30 | LHS | 8.80E-05 | 0.47 | 10.0 | 1.0 | 21.6 | - | - | - |
| | Calibrated | | | | | | 9.6 | 7 | 9.079 |
| 31 | LHS | 4.87E-05 | 0.32 | 4.0 | 3.0 | 21.0 | - | - | - |
| | Calibrated | | | | | | 13.0 | 7 | 8.618 |
| 32 | LHS | 9.59E-05 | 0.31 | 2.0 | 1.0 | 27.6 | - | - | - |
| | Calibrated | | 0.48 | | | | 23.6 | 7 | 9.878 |
| 33 | LHS | 1.69E-05 | 0.26 | 0.0 | 2.0 | 8.6 | - | - | - |
| | Calibrated | | | | | | 5.6 | 9 | 4.095 |
| 34 | LHS | 7.78E-05 | 0.41 | 10.0 | 2.0 | 12.3 | | | |
| | Calibrated | | 0.35 | | | 13.0 | 0.0 | 7 | 5.449 |
| 35 | LHS | 5.76E-05 | 0.39 | 10.0 | 4.0 | 10.8 | | | |
| | Calibrated | | | | | 15.0 | 0.0 | 7 | 5.065 |
| 36 | LHS | 2.17E-05 | 0.28 | 10.0 | 1.0 | 27.1 | - | - | - |
| | Calibrated | | | | | | 15.1 | 9 | 6.034 |
| 37 | LHS | 4.82E-05 | 0.47 | 4.0 | 1.0 | 18.1 | - | - | - |
| | Calibrated | | | | | | 12.1 | 8 | 8.629 |
| 38 | LHS | 9.67E-05 | 0.33 | 2.0 | 4.0 | 11.7 | - | - | - |
| | Calibrated | | | | | | 4.7 | 7.7 | 9.956 |
| 39 | LHS | 7.02E-05 | 0.29 | 2.0 | 2.0 | 42.4 | - | - | - |
| | Calibrated | | 0.40 | | | | 37.4 | 7 | 9.982 |
| 40 | LHS | 8.17E-05 | 0.44 | 0.0 | 1.0 | 29.0 | - | - | - |
| | Calibrated | | | | | | 27.0 | 7 | 9.995 |
| 41 | LHS | 8.49E-05 | 0.48 | 2.0 | 4.0 | 59.2 | - | - | - |
| | Calibrated | | | | | | 52.2 | 7 | 9.244 |
| 42 | LHS | 1.19E-05 | 0.36 | 10.0 | 3.0 | 22.4 | - | - | - |
| | Calibrated | | | | | | 8.4 | 8 | 4.000 |
| 43 | LHS | 9.05E-05 | 0.37 | 10.0 | 3.0 | 24.9 | - | - | - |
| | Calibrated | | 0.44 | | | | 10.9 | 7 | 9.981 |
| 44 | LHS | 8.33E-05 | 0.45 | 10.0 | 4.0 | 10.1 | | | |
| | Calibrated | | 0.35 | | | 15.0 | 0.0 | 7 | 7.850 |
| 45 | LHS | 7.29E-05 | 0.34 | 4.0 | 2.0 | 13.2 | - | - | - |
| | Calibrated | | | | | | 6.2 | 7.6 | 9.000 |
| 46 | LHS | 9.84E-05 | 0.29 | 2.0 | 1.0 | 40.5 | - | - | - |
| | Calibrated | | 0.48 | | | | 36.5 | 7 | 9.988 |
| 47 | LHS | 1.99E-05 | 0.26 | 10.0 | 4.0 | 45.0 | - | - | - |
| | Calibrated | | | | | | 30.0 | 9 | 5.440 |

| Random Set # | | K (cm/s) Layers 1-4 | N | Thicknesses (ft) Layer 1 | Layer 2 | Depth to GW | Layer 3 | C | Calibrated Recharge Rate (in/yr) |
|---|---|---|---|---|---|---|---|---|---|
| 48 | LHS | 3.26E-05 | 0.49 | 2.0 | 4.0 | 14.9 | - | - | - |
| | Calibrated | | | | | | 7.9 | 8 | 6.122 |
| 49 | LHS | 6.59E-05 | 0.28 | 0.0 | 4.0 | 1.2 | | | |
| | Calibrated | | 0.40 | | | 5.0 | 0.0 | 9 | 7.496 |
| 50 | LHS | 6.68E-05 | 0.42 | 4.0 | 2.0 | 26.5 | - | - | - |
| | Calibrated | | | | | | 19.5 | 7 | 9.532 |
| 51 | LHS | 3.35E-05 | 0.41 | 4.0 | 3.0 | 9.4 | - | - | - |
| | Calibrated | | | | | | 1.4 | 9 | 7.004 |
| 52 | LHS | 3.48E-05 | 0.37 | 2.0 | 1.0 | 15.5 | - | - | - |
| | Calibrated | | | | | | 11.5 | 8 | 7.415 |
| 53 | LHS | 6.05E-05 | 0.43 | 2.0 | 1.0 | 36.6 | - | - | - |
| | Calibrated | | | | | | 32.6 | 7 | 9.384 |
| 54 | LHS | 6.52E-05 | 0.44 | 2.0 | 1.0 | 33.6 | - | - | - |
| | Calibrated | | | | | | 29.6 | 7 | 9.533 |
| 55 | LHS | 2.84E-05 | 0.40 | 10.0 | 2.0 | 41.2 | - | - | - |
| | Calibrated | | | | | | 28.2 | 8 | 7.149 |
| 56 | LHS | 2.45E-05 | 0.37 | 4.0 | 3.0 | 52.4 | - | - | - |
| | Calibrated | | | | | | 44.4 | 9 | 6.061 |
| 57 | LHS | 4.37E-05 | 0.43 | 4.0 | 1.0 | 23.0 | - | - | - |
| | Calibrated | | | | | | 17.0 | 7 | 7.461 |
| 58 | LHS | 1.54E-05 | 0.33 | 10.0 | 3.0 | 14.7 | - | - | - |
| | Calibrated | | | | | | 0.7 | 9 | 4.563 |
| 59 | LHS | 2.62E-05 | 0.47 | 4.0 | 4.0 | 16.2 | - | - | - |
| | Calibrated | | | | | | 7.2 | 8 | 5.688 |
| 60 | LHS | 5.08E-05 | 0.39 | 2.0 | 3.0 | 19.4 | - | - | - |
| | Calibrated | | | | | | 13.4 | 7 | 7.372 |
| 61 | LHS | 4.67E-05 | 0.36 | 4.0 | 2.0 | 23.5 | - | - | - |
| | Calibrated | | | | | | 16.5 | 7 | 8.504 |
| 62 | LHS | 5.97E-05 | 0.32 | 2.0 | 3.0 | 37.0 | - | - | - |
| | Calibrated | | 0.36 | | | | 31.0 | 7 | 9.938 |
| 63 | LHS | 4.55E-05 | 0.28 | 4.0 | 3.0 | 24.2 | - | - | - |
| | Calibrated | | | | | | 16.2 | 7 | 9.199 |
| 64 | LHS | 8.32E-05 | 0.40 | 10.0 | 3.0 | 29.8 | - | - | - |
| | Calibrated | | 0.45 | | | | 15.8 | 7 | 9.928 |
| 65 | LHS | 2.93E-05 | 0.30 | 2.0 | 4.0 | 38.4 | - | - | - |
| | Calibrated | | | | | | 31.4 | 9 | 7.112 |
| 66 | LHS | 6.24E-05 | 0.27 | 2.0 | 2.0 | 5.1 | - | - | - |
| | Calibrated | | | | | | 0.1 | 9 | 8.774 |
| 67 | LHS | 8.91E-05 | 0.48 | 2.0 | 2.0 | 14.2 | - | - | - |
| | Calibrated | | | | | | 9.2 | 7.7 | 8.900 |
| 68 | LHS | 9.95E-05 | 0.32 | 4.0 | 4.0 | 25.5 | - | - | - |
| | Calibrated | | 0.46 | | | | 16.5 | 7 | 9.993 |
| 69 | LHS | 3.09E-05 | 0.36 | 0.0 | 4.0 | 26.1 | - | - | - |
| | Calibrated | | | | | | 21.1 | 7 | 7.216 |
| 70 | LHS | 3.58E-05 | 0.30 | 10.0 | 2.0 | 34.0 | - | - | - |
| | Calibrated | | | | | | 21.0 | 9 | 8.146 |
| | | | | | | | | max | 10.031 |
| | | | | | | | | min | 4.000 |
| | | | | | | | | mean | 7.931 |
| | | | | | | | | stand. dev. | 1.859 |


CALIBRATED RECHARGE RATE VS. RANDOM SET NUMBER FOR SOIL TYPE 2
(target RR range: 4-10 in/yr)
Calibrated RR (in/yr)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
0
10
20
30
40
50
60
70
Random Set #

**CALIBRATED RANDOM SETS FOR UNCERTAINTY ANALYSIS**
**SOIL TYPE 3**

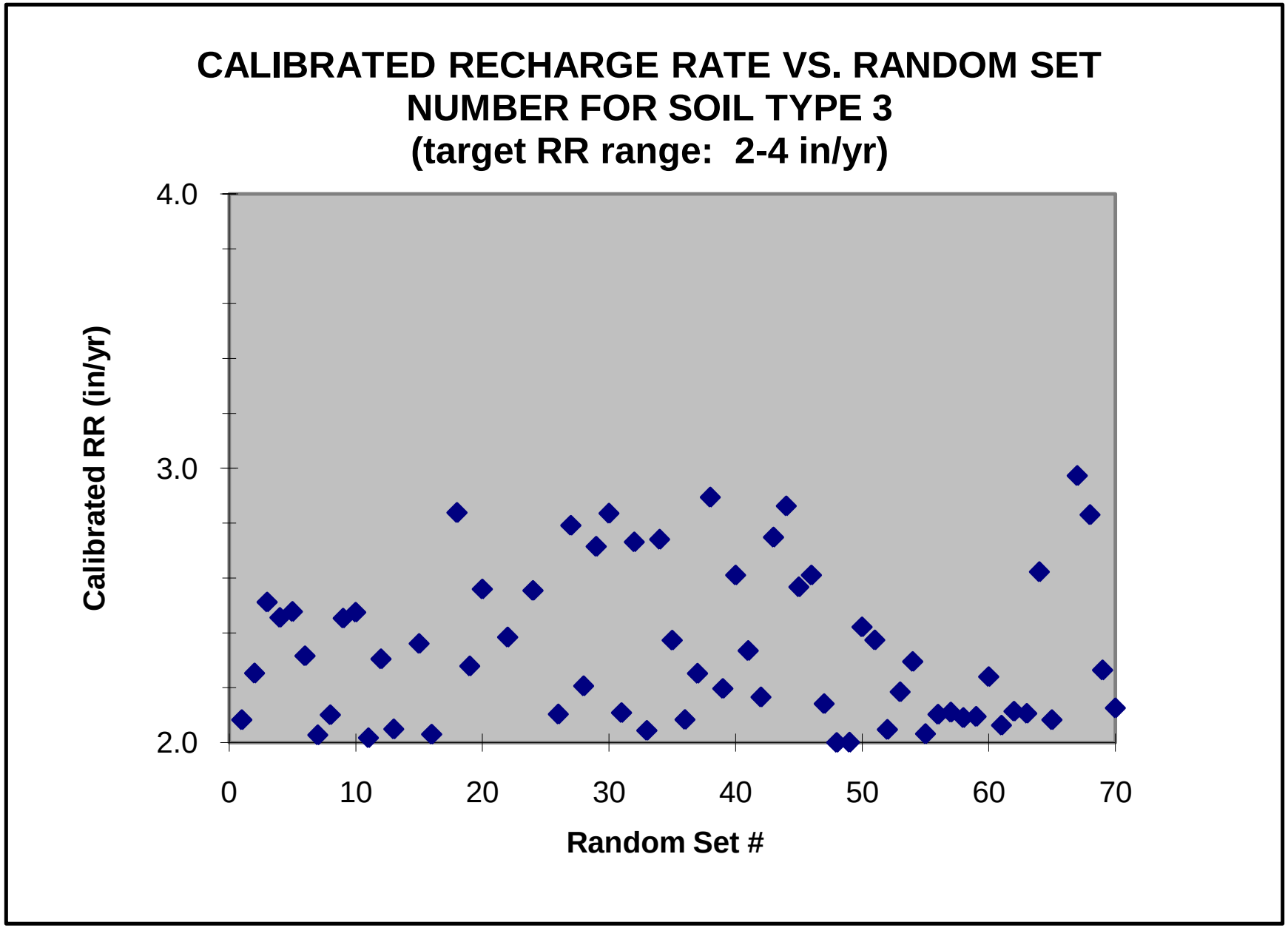
| | |
|---|---|
| bulk density | 1.8 g/cm3 |
| organic carbon content | 0.30% |
| climate | Columbus city |
| recharge rate | 2-4"/yr |

The following table presents the results of calibration runs on the LHS random sets for soil type 3.
For each of the 70 sets, both the LHS generated random set and the final calibrated set are shown.
For random sets in which modifications were made to K (hydraulic conductivity) and/or N (porosity) during calibration,
the final K and/or N is noted on the line marked "Calibrated".
A blank cell on the line marked "Calibrated" signifies that that parameter was not changed during calibration.

| | | K (cm/s) | | Thicknesses (ft) | | | | | Calibrated |
|---|---|---|---|---|---|---|---|---|---|
| Random Set # | | Layers 1-4 | N | Layer 1 | Layer 2 | Depth to GW | Layer 3 | C | Recharge Rate (in/yr) |
| 1 | LHS | 5.74E-06 | 0.54 | 0.0 | 3.0 | 28.6 | - | - | - |
| | Calibrated | 7.00E-06 | | | | | 24.6 | 10 | 2.083 |
| 2 | LHS | 7.47E-06 | 0.40 | 4.0 | 4.0 | 17.8 | - | - | - |
| | Calibrated | | | | | | 8.8 | 10 | 2.253 |
| 3 | LHS | 7.99E-06 | 0.51 | 10.0 | 2.0 | 7.1 | | | |
| | Calibrated | | | | | 13.0 | 0.0 | 10 | 2.512 |
| 4 | LHS | 9.55E-06 | 0.58 | 10.0 | 3.0 | 51.1 | - | - | - |
| | Calibrated | | | | | | 37.1 | 10 | 2.456 |
| 5 | LHS | 8.88E-06 | 0.40 | 4.0 | 2.0 | 32.6 | - | - | - |
| | Calibrated | | | | | | 25.6 | 10 | 2.477 |
| 6 | LHS | 8.56E-06 | 0.38 | 10.0 | 2.0 | 39.4 | - | - | - |
| | Calibrated | | | | | | 26.4 | 10 | 2.316 |
| 7 | LHS | 5.21E-06 | 0.45 | 2.0 | 3.0 | 34.6 | - | - | - |
| | Calibrated | 7.20E-06 | | | | | 28.6 | 10 | 2.028 |
| 8 | LHS | 5.59E-06 | 0.33 | 10.0 | 1.0 | 32.0 | - | - | - |
| | Calibrated | 7.50E-06 | 0.40 | | | | 20.0 | 10 | 2.101 |
| 9 | LHS | 8.62E-06 | 0.41 | 4.0 | 3.0 | 28.1 | - | - | - |
| | Calibrated | | | | | | 20.1 | 10 | 2.453 |
| 10 | LHS | 8.68E-06 | 0.46 | 2.0 | 1.0 | 30.6 | - | - | - |
| | Calibrated | | | | | | 26.6 | 10 | 2.475 |
| 11 | LHS | 5.28E-06 | 0.55 | 4.0 | 4.0 | 44.0 | - | - | - |
| | Calibrated | 7.50E-06 | | | | | 35.0 | 10 | 2.017 |
| 12 | LHS | 5.00E-06 | 0.51 | 2.0 | 2.0 | 20.3 | - | - | - |
| | Calibrated | 7.50E-06 | | | | | 15.3 | 10 | 2.304 |
| 13 | LHS | 6.74E-06 | 0.50 | 10.0 | 4.0 | 31.3 | - | - | - |
| | Calibrated | 7.10E-06 | | | | | 16.3 | 10 | 2.049 |
| 14 | LHS | 6.80E-06 | 0.58 | 10.0 | 1.0 | 30.2 | - | - | - |
| | Calibrated | | | | | | 18.2 | 10 | 1.970 |
| 15 | LHS | 7.50E-06 | 0.55 | 2.0 | 4.0 | 19.2 | - | - | - |
| | Calibrated | | | | | | 12.2 | 10 | 2.361 |
| 16 | LHS | 6.69E-06 | 0.55 | 4.0 | 4.0 | 6.4 | | | |
| | Calibrated | 7.20E-06 | 0.45 | | | 9.0 | 0.0 | 10 | 2.030 |
| 17 | LHS | 6.54E-06 | 0.49 | 2.0 | 3.0 | 21.5 | - | - | - |
| | Calibrated | | | | | | 15.5 | 10 | 1.988 |
| 18 | LHS | 9.68E-06 | 0.37 | 10.0 | 4.0 | 13.4 | | | |
| | Calibrated | | | | | 15.0 | 0.0 | 10 | 2.838 |
| 19 | LHS | 8.25E-06 | 0.42 | 4.0 | 3.0 | 35.2 | - | - | - |
| | Calibrated | | | | | | 27.2 | 10 | 2.278 |

| Random Set # | | K (cm/s) Layers 1-4 | N | Thicknesses (ft) Layer 1 | Layer 2 | Depth to GW | Layer 3 | C | Calibrated Recharge Rate (in/yr) |
|---|---|---|---|---|---|---|---|---|---|
| 20 | LHS | 9.23E-06 | 0.30 | 0.0 | 3.0 | 18.7 | - | - | - |
| | Calibrated | | | | | | 14.7 | 10 | 2.559 |
| 21 | LHS | 7.31E-06 | 0.32 | 4.0 | 1.0 | 47.4 | - | - | - |
| | Calibrated | 7.60E-06 | | | | | 41.4 | 10 | 1.971 |
| 22 | LHS | 7.67E-06 | 0.54 | 10.0 | 1.0 | 22.1 | - | - | - |
| | Calibrated | | | | | | 10.1 | 10 | 2.384 |
| 23 | LHS | 6.57E-06 | 0.36 | 4.0 | 1.0 | 8.2 | - | - | - |
| | Calibrated | 7.60E-06 | | | | | 2.2 | 10 | 1.994 |
| 24 | LHS | 8.42E-06 | 0.46 | 2.0 | 1.0 | 20.2 | - | - | - |
| | Calibrated | | | | | | 16.2 | 10 | 2.554 |
| 25 | LHS | 5.45E-06 | 0.42 | 10.0 | 1.0 | 11.2 | | | |
| | Calibrated | 6.30E-06 | 0.60 | | | 12.0 | 0.0 | 10 | 1.982 |
| 26 | LHS | 5.97E-06 | 0.59 | 0.0 | 3.0 | 15.8 | - | - | - |
| | Calibrated | 6.50E-06 | | | | | 11.8 | 10 | 2.103 |
| 27 | LHS | 8.79E-06 | 0.60 | 2.0 | 2.0 | 17.4 | - | - | - |
| | Calibrated | | | | | | 12.4 | 10 | 2.792 |
| 28 | LHS | 7.43E-06 | 0.47 | 4.0 | 2.0 | 24.7 | - | - | - |
| | Calibrated | | | | | | 17.7 | 10 | 2.206 |
| 29 | LHS | 9.60E-06 | 0.32 | 4.0 | 2.0 | 17.0 | - | - | - |
| | Calibrated | | | | | | 10.0 | 10 | 2.715 |
| 30 | LHS | 9.33E-06 | 0.56 | 10.0 | 1.0 | 21.6 | - | - | - |
| | Calibrated | | | | | | 9.6 | 10 | 2.835 |
| 31 | LHS | 7.15E-06 | 0.38 | 4.0 | 3.0 | 21.0 | - | - | - |
| | Calibrated | | | | | | 13.0 | 10 | 2.109 |
| 32 | LHS | 9.77E-06 | 0.37 | 2.0 | 1.0 | 27.6 | - | - | - |
| | Calibrated | | | | | | 23.6 | 10 | 2.731 |
| 33 | LHS | 5.38E-06 | 0.31 | 0.0 | 2.0 | 8.6 | - | - | - |
| | Calibrated | 7.40E-11 | 0.50 | | | | 5.6 | 10 | 2.044 |
| 34 | LHS | 8.77E-06 | 0.49 | 10.0 | 2.0 | 12.3 | | | |
| | Calibrated | | | | | 13.0 | 0.0 | 10 | 2.740 |
| 35 | LHS | 7.64E-06 | 0.47 | 10.0 | 4.0 | 10.8 | | | |
| | Calibrated | | | | | 15.0 | 0.0 | 10 | 2.373 |
| 36 | LHS | 5.65E-06 | 0.34 | 10.0 | 1.0 | 27.1 | - | - | - |
| | Calibrated | 7.00E-06 | 0.50 | | | | 15.1 | 10 | 2.084 |
| 37 | LHS | 7.12E-06 | 0.56 | 4.0 | 1.0 | 18.1 | - | - | - |
| | Calibrated | | | | | | 12.1 | 10 | 2.252 |
| 38 | LHS | 9.82E-06 | 0.40 | 2.0 | 4.0 | 11.7 | - | - | - |
| | Calibrated | | | | | | 4.7 | 10 | 2.894 |
| 39 | LHS | 8.34E-06 | 0.35 | 2.0 | 2.0 | 42.4 | - | - | - |
| | Calibrated | | | | | | 37.4 | 10 | 2.197 |
| 40 | LHS | 8.98E-06 | 0.52 | 0.0 | 1.0 | 29.0 | - | - | - |
| | Calibrated | | | | | | 27.0 | 10 | 2.610 |
| 41 | LHS | 9.16E-06 | 0.57 | 2.0 | 4.0 | 59.2 | - | - | - |
| | Calibrated | | | | | | 52.2 | 10 | 2.335 |
| 42 | LHS | 5.10E-06 | 0.43 | 10.0 | 3.0 | 22.4 | - | - | - |
| | Calibrated | 7.00E-06 | 0.60 | | | | 8.4 | 10 | 2.165 |
| 43 | LHS | 9.47E-06 | 0.43 | 10.0 | 3.0 | 24.9 | - | - | - |
| | Calibrated | | | | | | 10.9 | 10 | 2.748 |
| 44 | LHS | 9.08E-06 | 0.54 | 10.0 | 4.0 | 10.1 | | | |
| | Calibrated | | | | | 15.0 | 0.0 | 10 | 2.863 |
| 45 | LHS | 8.49E-06 | 0.41 | 4.0 | 2.0 | 13.2 | - | - | - |
| | Calibrated | | | | | | 6.2 | 10 | 2.567 |
| 46 | LHS | 9.91E-06 | 0.34 | 2.0 | 1.0 | 40.5 | - | - | - |
| | Calibrated | | | | | | 36.5 | 10 | 2.610 |
| 47 | LHS | 5.55E-06 | 0.31 | 10.0 | 4.0 | 45.0 | - | - | - |
| | Calibrated | 8.00E-06 | 0.60 | | | | 30.0 | 10 | 2.142 |

| Random Set # | | K (cm/s) Layers 1-4 | N | Thicknesses (ft) Layer 1 | Layer 2 | Depth to GW | Layer 3 | C | Calibrated Recharge Rate (in/yr) |
|---|---|---|---|---|---|---|---|---|---|
| 48 | LHS | 6.26E-06 | 0.59 | 2.0 | 4.0 | 14.9 | - | - | - |
| | Calibrated | | | | | | 7.9 | 10 | 2.000 |
| 49 | LHS | 8.11E-06 | 0.34 | 0.0 | 4.0 | 1.2 | | | |
| | Calibrated | | 0.60 | | | 5.0 | 0.0 | 11 | 2.001 |
| 50 | LHS | 8.16E-06 | 0.50 | 4.0 | 2.0 | 26.5 | - | - | - |
| | Calibrated | | | | | | 19.5 | 10 | 2.421 |
| 51 | LHS | 6.30E-06 | 0.50 | 4.0 | 3.0 | 9.4 | - | - | - |
| | Calibrated | 8.00E-06 | 0.60 | | | | 1.4 | 10 | 2.374 |
| 52 | LHS | 6.37E-06 | 0.45 | 2.0 | 1.0 | 15.5 | - | - | - |
| | Calibrated | | 0.55 | | | | 11.5 | 10 | 2.047 |
| 53 | LHS | 7.81E-06 | 0.51 | 2.0 | 1.0 | 36.6 | - | - | - |
| | Calibrated | | | | | | 32.6 | 10 | 2.185 |
| 54 | LHS | 8.07E-06 | 0.52 | 2.0 | 1.0 | 33.6 | - | - | - |
| | Calibrated | | | | | | 29.6 | 10 | 2.295 |
| 55 | LHS | 6.02E-06 | 0.47 | 10.0 | 2.0 | 41.2 | - | - | - |
| | Calibrated | 7.50E-06 | | | | | 28.2 | 10 | 2.031 |
| 56 | LHS | 5.80E-06 | 0.44 | 4.0 | 3.0 | 52.4 | - | - | - |
| | Calibrated | 8.00E-06 | | | | | 44.4 | 10 | 2.102 |
| 57 | LHS | 6.87E-06 | 0.52 | 4.0 | 1.0 | 23.0 | - | - | - |
| | Calibrated | | | | | | 17.0 | 10 | 2.110 |
| 58 | LHS | 5.30E-06 | 0.39 | 10.0 | 3.0 | 14.7 | - | - | - |
| | Calibrated | 6.50E-06 | 0.60 | | | | 0.7 | 10 | 2.091 |
| 59 | LHS | 5.90E-06 | 0.57 | 4.0 | 4.0 | 16.2 | - | - | - |
| | Calibrated | 6.50E-06 | 0.60 | | | | 7.2 | 10 | 2.094 |
| 60 | LHS | 7.27E-06 | 0.46 | 2.0 | 3.0 | 19.4 | - | - | - |
| | Calibrated | | | | | | 13.4 | 10 | 2.240 |
| 61 | LHS | 7.04E-06 | 0.42 | 4.0 | 2.0 | 23.5 | - | - | - |
| | Calibrated | | | | | | 16.5 | 10 | 2.063 |
| 62 | LHS | 7.76E-06 | 0.38 | 2.0 | 3.0 | 37.0 | - | - | - |
| | Calibrated | | | | | | 31.0 | 10 | 2.114 |
| 63 | LHS | 6.97E-06 | 0.33 | 4.0 | 3.0 | 24.2 | - | - | - |
| | Calibrated | | 0.50 | | | | 16.2 | 10 | 2.106 |
| 64 | LHS | 9.07E-06 | 0.48 | 10.0 | 3.0 | 29.8 | - | - | - |
| | Calibrated | | | | | | 15.8 | 10 | 2.622 |
| 65 | LHS | 6.07E-06 | 0.36 | 2.0 | 4.0 | 38.4 | - | - | - |
| | Calibrated | 7.50E-06 | 0.60 | | | | 31.4 | 10 | 2.083 |
| 66 | LHS | 7.91E-06 | 0.33 | 2.0 | 2.0 | 5.1 | - | - | - |
| | Calibrated | | 0.60 | | | | 0.1 | 11 | 1.969 |
| 67 | LHS | 9.39E-06 | 0.57 | 2.0 | 2.0 | 14.2 | - | - | - |
| | Calibrated | | | | | | 9.2 | 10 | 2.972 |
| 68 | LHS | 9.97E-06 | 0.38 | 4.0 | 4.0 | 25.5 | - | - | - |
| | Calibrated | | | | | | 16.5 | 10 | 2.830 |
| 69 | LHS | 6.16E-06 | 0.43 | 0.0 | 4.0 | 26.1 | - | - | - |
| | Calibrated | 7.50E-06 | 0.60 | | | | 21.1 | 10 | 2.264 |
| 70 | LHS | 6.43E-06 | 0.35 | 10.0 | 2.0 | 34.0 | - | - | - |
| | Calibrated | 7.50E-06 | 0.6 | | | | 21.0 | 10 | 2.126 |
| | | | | | | | | max | 2.972 |
| | | | | | | | | min | 1.969 |
| | | | | | | | | mean | 2.310 |
| | | | | | | | | stand. dev. | 0.285 |


CALIBRATED RECHARGE RATE VS. RANDOM SET NUMBER FOR SOIL TYPE 3
(target RR range: 2-4 in/yr)
Calibrated RR (in/yr)
4.0
3.0
2.0
0
10
20
30
40
50
60
70
Random Set #

CALST3.xls

# APPENDIX B
# RESULT OF UNCERTAINTY ANALYLSIS

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 1 |
| Bulk density (g/cm^3) | 1.4 |
| Chemical | 1,1,1-TCA |
| MCL (mg/l) | 0.2 |
| Da (cm^2/sec) | 8.39E-02 |
| Henry's Law Constant (m^3-atm/mole) | 8.00E-03 |
| log Kow | 2.49 |
| Koc (ml/g) | 191.77 |
| Solubility (mg/l) | 1495 |
| Chemical Density (g/cm^3) | 1.34 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.003019 | 12 | 6624.7102 | 0.32 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 2 | 17.8 | 1.579 | 7 | 12.6662 | 0.28 | 8.25E+02 | | 1.27E+01 |
| 3 | 13 | 19.54 | 2 | 1.0235 | 0.32 | 8.25E+02 | | 1.02E+00 |
| 4 | 51.1 | 0.466 | 23 | 42.9185 | 0.34 | 8.25E+02 | | 4.29E+01 |
| 5 | 32.6 | 0.009794 | 15 | 2042.0666 | 0.34 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 6 | 39.4 | 0.73 | 16 | 27.3973 | 0.32 | 8.25E+02 | | 2.74E+01 |
| 7 | 34.6 | 0.3849 | 16 | 51.9615 | 0.3 | 8.25E+02 | | 5.20E+01 |
| 8 | 32 | 2.525 | 13 | 7.9208 | 0.25 | 8.25E+02 | | 7.92E+00 |
| 9 | 28.1 | 0.05792 | 12 | 345.3039 | 0.32 | 8.25E+02 | | 3.45E+02 |
| 10 | 30.6 | 0.00007106 | 15 | 281452.2938 | 0.33 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 11 | 44 | 0.8047 | 22 | 24.8540 | 0.33 | 8.25E+02 | | 2.49E+01 |
| 12 | 20.3 | 0.2307 | 11 | 86.6927 | 0.31 | 8.25E+02 | | 8.67E+01 |
| 13 | 31.3 | 5.116 | 11 | 3.9093 | 0.31 | 8.25E+02 | | 3.91E+00 |
| 14 | 30.2 | 0.5419 | 12 | 36.9072 | 0.34 | 8.25E+02 | | 3.69E+01 |
| 15 | 19.2 | 0.04474 | 8 | 447.0273 | 0.33 | 8.25E+02 | | 4.47E+02 |
| 16 | 9 | 44.43 | 2 | 0.4501 | 0.25 | 8.25E+02 | | 4.50E-01 |
| 17 | 21.5 | 0.03095 | 10 | 646.2036 | 0.31 | 8.25E+02 | | 6.46E+02 |
| 18 | 15 | 24.42 | 2 | 0.8190 | 0.27 | 8.25E+02 | | 8.19E-01 |
| 19 | 35.2 | 0.04086 | 16 | 489.4763 | 0.33 | 8.25E+02 | | 4.89E+02 |
| 20 | 18.7 | 0.000002343 | 8 | 8536064.8741 | 0.35 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 21 | 47.4 | 0.006014 | 25 | 3325.5737 | 0.35 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 22 | 22.1 | 0.9848 | 8 | 20.3087 | 0.33 | 8.25E+02 | | 2.03E+01 |
| 23 | 8.15 | 5.141 | 3 | 3.8903 | 0.25 | 8.25E+02 | | 3.89E+00 |
| 24 | 20.2 | 0.00000559 | 10 | 3577817.5313 | 0.35 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 25 | 12 | 14.05 | 2 | 1.4235 | 0.29 | 8.25E+02 | | 1.42E+00 |
| 26 | 15.8 | 0.0003678 | 8 | 54377.3790 | 0.34 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 27 | 17.4 | 0.0001244 | 8 | 160771.7042 | 0.34 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 28 | 24.7 | 0.01147 | 11 | 1743.6792 | 0.35 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 29 | 17 | 0.008676 | 7 | 2305.2098 | 0.35 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 30 | 21.6 | 0.7138 | 7 | 28.0191 | 0.35 | 8.25E+02 | | 2.80E+01 |
| 31 | 21 | 0.06409 | 9 | 312.0612 | 0.35 | 8.25E+02 | | 3.12E+02 |
| 32 | 27.6 | 0.000006972 | 14 | 2868617.3264 | 0.35 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 33 | 8.63 | 0.2244 | 4 | 89.1266 | 0.25 | 8.25E+02 | | 8.91E+01 |
| 34 | 13 | 16.27 | 2 | 1.2293 | 0.31 | 8.25E+02 | | 1.23E+00 |
| 35 | 15 | 28.29 | 3 | 0.7070 | 0.31 | 8.25E+02 | | 7.07E-01 |
| 36 | 27.1 | 2.825 | 10 | 7.0796 | 0.26 | 8.25E+02 | | 7.08E+00 |
| 37 | 18.1 | 0.0007707 | 8 | 25950.4347 | 0.33 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 38 | 11.7 | 0.03646 | 4 | 548.5464 | 0.28 | 8.25E+02 | | 5.49E+02 |
| 39 | 42.4 | 0.0005404 | 21 | 37009.6225 | 0.35 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 40 | 29 | 1.00E-10 | 12 | 200000000000.0000 | 0.35 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 41 | 59.2 | 0.01096 | 27 | 1824.8175 | 0.35 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 42 | 22.4 | 12.52 | 9 | 1.5974 | 0.29 | 8.25E+02 | | 1.60E+00 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 1.963 | 8 | 10.1885 | 0.35 | 8.25E+02 | | 1.02E+01 |
| 44 | 15 | 23.31 | 3 | 0.8580 | 0.33 | 8.25E+02 | | 8.58E-01 |
| 45 | 13.2 | 0.03985 | 5 | 501.8821 | 0.28 | 8.25E+02 | | 5.02E+02 |
| 46 | 40.5 | 0.00004242 | 21 | 471475.7190 | 0.35 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 47 | 45 | 2.758 | 21 | 7.2516 | 0.35 | 8.25E+02 | | 7.25E+00 |
| 48 | 14.9 | 0.1452 | 7 | 137.7410 | 0.34 | 8.25E+02 | | 1.38E+02 |
| 49 | 5 | 2.321 | 2 | 8.6170 | 0.35 | 8.25E+02 | | 8.62E+00 |
| 50 | 26.5 | 0.00736 | 12 | 2717.3913 | 0.35 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 51 | 9.44 | 23.57 | 3 | 0.8485 | 0.25 | 8.25E+02 | | 8.49E-01 |
| 52 | 15.5 | 0.00003204 | 8 | 624219.7253 | 0.29 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 53 | 36.6 | 0.00008327 | 19 | 240182.5387 | 0.35 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 54 | 33.6 | 0.00005755 | 17 | 347523.8923 | 0.35 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 55 | 41.2 | 0.8788 | 19 | 22.7583 | 0.35 | 8.25E+02 | | 2.28E+01 |
| 56 | 52.4 | 0.1333 | 27 | 150.0375 | 0.35 | 8.25E+02 | | 1.50E+02 |
| 57 | 23 | 0.01354 | 11 | 1477.1049 | 0.32 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 58 | 14.7 | 25.02 | 4 | 0.7994 | 0.35 | 8.25E+02 | | 7.99E-01 |
| 59 | 16.2 | 1.665 | 7 | 12.0120 | 0.33 | 8.25E+02 | | 1.20E+01 |
| 60 | 19.4 | 0.003169 | 9 | 6311.1392 | 0.35 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 61 | 23.5 | 0.0164 | 11 | 1219.5122 | 0.35 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 62 | 37 | 0.007323 | 17 | 2731.1211 | 0.33 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 63 | 24.2 | 0.1079 | 11 | 185.3568 | 0.33 | 8.25E+02 | | 1.85E+02 |
| 64 | 29.8 | 1.285 | 11 | 15.5642 | 0.35 | 8.25E+02 | | 1.56E+01 |
| 65 | 38.4 | 0.266 | 17 | 75.1880 | 0.3 | 8.25E+02 | | 7.52E+01 |
| 66 | 5.13 | 13.08 | 2 | 1.5291 | 0.26 | 8.25E+02 | | 1.53E+00 |
| 67 | 14.2 | 0.000001056 | 6 | 18939393.9394 | 0.34 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 68 | 25.5 | 0.04403 | 10 | 454.2357 | 0.35 | 8.25E+02 | | 4.54E+02 |
| 69 | 26.1 | 0.006003 | 11 | 3331.6675 | 0.33 | 8.25E+02 | SCN>SSL | 8.25E+02 |
| 70 | 34 | 1.172 | 14 | 17.0648 | 0.34 | 8.25E+02 | | 1.71E+01 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 4.00E+00 | 2.86E+09 | 3.75E+02 |
| | std. dev. | 8.72E+00 | 2.39E+10 | 3.76E+02 |
| | max | 4.44E+01 | 2.00E+11 | 8.25E+02 |
| | min | 1.00E-10 | 4.50E-01 | 4.50E-01 |
| | median | 1.21E-01 | 1.68E+02 | 1.68E+02 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 1.68E+02 | 1.68E+02 |
| | 55 | 8.68E+01 | 8.68E+01 |
| | 60 | 4.05E+01 | 4.05E+01 |
| | 65 | 2.52E+01 | 2.52E+01 |
| | 70 | 1.66E+01 | 1.66E+01 |
| | 75 | 1.06E+01 | 1.06E+01 |
| | 80 | 7.22E+00 | 7.22E+00 |
| | 85 | 2.40E+00 | 2.40E+00 |
| | **90** | **1.21E+00** | **1.21E+00** |
| | 95 | 8.32E-01 | 8.32E-01 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 1 |
| Bulk density (g/cm^3) | 1.4 |
| Chemical | 1,1-DCE |
| MCL (mg/l) | 0.007 |
| Da (cm^2/sec) | 9.60E-02 |
| Henry's Law Constant (m^3-atm/mole) | 3.01E-02 |
| log Kow | 2.13 |
| Koc (ml/g) | 105.58 |
| Solubility (mg/l) | 3344 |
| Chemical Density (g/cm^3) | 1.22 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 1E-10 | 11 | 7000000000.0000 | 0.32 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 2 | 17.8 | 0.000007629 | 6 | 91755.1448 | 0.28 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 3 | 13 | 4.881 | 1 | 0.1434 | 0.32 | 1.83E+03 | | 1.43E-01 |
| 4 | 51.1 | 0.000001906 | 22 | 367261.2802 | 0.34 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 5 | 32.6 | 1E-10 | 14 | 7000000000.0000 | 0.34 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 6 | 39.4 | 0.00002294 | 15 | 30514.3854 | 0.32 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 7 | 34.6 | 2.779E-07 | 14 | 2518891.6877 | 0.3 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 8 | 32 | 0.0226 | 10 | 30.9735 | 0.25 | 1.83E+03 | | 3.10E+01 |
| 9 | 28.1 | 1E-10 | 11 | 7000000000.0000 | 0.32 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 10 | 30.6 | 1E-10 | 14 | 7000000000.0000 | 0.33 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 11 | 44 | 0.000002921 | 19 | 239643.9575 | 0.33 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 12 | 20.3 | 1E-10 | 9 | 7000000000.0000 | 0.31 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 13 | 31.3 | 0.006046 | 10 | 115.7790 | 0.31 | 1.83E+03 | | 1.16E+02 |
| 14 | 30.2 | 0.00005631 | 11 | 12431.1845 | 0.34 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 15 | 19.2 | 1E-10 | 8 | 7000000000.0000 | 0.33 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 16 | 9 | 3.094 | 2 | 0.2262 | 0.25 | 1.83E+03 | | 2.26E-01 |
| 17 | 21.5 | 1E-10 | 9 | 7000000000.0000 | 0.31 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 18 | 15 | 2.515 | 2 | 0.2783 | 0.27 | 1.83E+03 | | 2.78E-01 |
| 19 | 35.2 | 1E-10 | 15 | 7000000000.0000 | 0.33 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 20 | 18.7 | 1E-10 | 8 | 7000000000.0000 | 0.35 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 21 | 47.4 | 1E-10 | 23 | 7000000000.0000 | 0.35 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 22 | 22.1 | 0.0006796 | 7 | 1030.0177 | 0.33 | 1.83E+03 | | 1.03E+03 |
| 23 | 8.15 | 0.04303 | 2 | 16.2677 | 0.25 | 1.83E+03 | | 1.63E+01 |
| 24 | 20.2 | 1E-10 | 10 | 7000000000.0000 | 0.35 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 25 | 12 | 7.941 | 1 | 0.0882 | 0.29 | 1.83E+03 | | 8.82E-02 |
| 26 | 15.8 | 1E-10 | 7 | 7000000000.0000 | 0.34 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 27 | 17.4 | 1E-10 | 8 | 7000000000.0000 | 0.34 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 28 | 24.7 | 1E-10 | 11 | 7000000000.0000 | 0.35 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 29 | 17 | 1E-10 | 7 | 7000000000.0000 | 0.35 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 30 | 21.6 | 0.0001211 | 6 | 5780.3468 | 0.35 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 31 | 21 | 1E-10 | 9 | 7000000000.0000 | 0.35 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 32 | 27.6 | 1E-10 | 13 | 7000000000.0000 | 0.35 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 33 | 8.63 | 0.000000001 | 4 | 700000000.0000 | 0.25 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 34 | 13 | 3.232 | 1 | 0.2166 | 0.31 | 1.83E+03 | | 2.17E-01 |
| 35 | 15 | 4.549 | 2 | 0.1539 | 0.31 | 1.83E+03 | | 1.54E-01 |
| 36 | 27.1 | 0.02609 | 8 | 26.8302 | 0.26 | 1.83E+03 | | 2.68E+01 |
| 37 | 18.1 | 1E-10 | 8 | 7000000000.0000 | 0.33 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 38 | 11.7 | 1E-10 | 5 | 7000000000.0000 | 0.28 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 39 | 42.4 | 1E-10 | 20 | 7000000000.0000 | 0.35 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 40 | 29 | 1.00E-10 | 11 | 7000000000.0000 | 0.35 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 41 | 59.2 | 1E-10 | 25 | 7000000000.0000 | 0.35 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 42 | 22.4 | 0.3674 | 7 | 1.9053 | 0.29 | 1.83E+03 | | 1.91E+00 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 0.0002344 | 8 | 2986.3481 | 0.35 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 44 | 15 | 2.783 | 2 | 0.2515 | 0.33 | 1.83E+03 | | 2.52E-01 |
| 45 | 13.2 | 1E-10 | 5 | 7000000000.0000 | 0.28 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 46 | 40.5 | 1E-10 | 20 | 7000000000.0000 | 0.35 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 47 | 45 | 0.0008039 | 19 | 870.7551 | 0.35 | 1.83E+03 | | 8.71E+02 |
| 48 | 14.9 | 1E-10 | 7 | 7000000000.0000 | 0.34 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 49 | 5 | 0.0001424 | 2 | 4915.7303 | 0.35 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 50 | 26.5 | 1E-10 | 12 | 7000000000.0000 | 0.35 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 51 | 9.44 | 0.4762 | 2 | 1.4700 | 0.25 | 1.83E+03 | | 1.47E+00 |
| 52 | 15.5 | 1E-10 | 8 | 7000000000.0000 | 0.29 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 53 | 36.6 | 1E-10 | 18 | 7000000000.0000 | 0.35 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 54 | 33.6 | 0.00005755 | 17 | 12163.3362 | 0.35 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 55 | 41.2 | 0.8788 | 19 | 0.7965 | 0.35 | 1.83E+03 | | 7.97E-01 |
| 56 | 52.4 | 1E-10 | 25 | 7000000000.0000 | 0.35 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 57 | 23 | 1E-10 | 10 | 7000000000.0000 | 0.32 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 58 | 14.7 | 7.589 | 3 | 0.0922 | 0.35 | 1.83E+03 | | 9.22E-02 |
| 59 | 16.2 | 0.00001122 | 6 | 62388.5918 | 0.33 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 60 | 19.4 | 1E-10 | 9 | 7000000000.0000 | 0.35 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 61 | 23.5 | 1E-10 | 10 | 7000000000.0000 | 0.35 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 62 | 37 | 1E-10 | 16 | 7000000000.0000 | 0.33 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 63 | 24.2 | 1E-10 | 10 | 7000000000.0000 | 0.33 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 64 | 29.8 | 0.00005588 | 10 | 12526.8432 | 0.35 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 65 | 38.4 | 1E-10 | 15 | 7000000000.0000 | 0.3 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 66 | 5.13 | 0.3803 | 1 | 1.8407 | 0.26 | 1.83E+03 | | 1.84E+00 |
| 67 | 14.2 | 1E-10 | 7 | 7000000000.0000 | 0.34 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 68 | 25.5 | 1E-10 | 10 | 7000000000.0000 | 0.35 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 69 | 26.1 | 1E-10 | 10 | 7000000000.0000 | 0.33 | 1.83E+03 | SCN>SSL | 1.83E+03 |
| 70 | 34 | 0.0001473 | 13 | 4752.2064 | 0.34 | 1.83E+03 | SCN>SSL | 1.83E+03 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 5.54E-01 | 3.81E+09 | 1.39E+03 |
| | std. dev. | 1.61E+00 | 3.50E+09 | 7.70E+02 |
| | max | 7.94E+00 | 7.00E+09 | 1.83E+03 |
| | min | 1.00E-10 | 8.82E-02 | 8.82E-02 |
| | median | 1.00E-10 | 7.00E+09 | 1.83E+03 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 7.00E+09 | 1.83E+03 |
| | 55 | 1.01E+09 | 1.83E+03 |
| | 60 | 1.80E+05 | 1.83E+03 |
| | 65 | 1.52E+04 | 1.83E+03 |
| | 70 | 5.52E+03 | 1.83E+03 |
| | 75 | 1.52E+03 | 1.23E+03 |
| | 80 | 3.01E+01 | 3.01E+01 |
| | 85 | 1.86E+00 | 1.86E+00 |
| | **90** | **2.76E-01** | **2.76E-01** |
| | 95 | 1.82E-01 | 1.82E-01 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 1 |
| Bulk density (g/cm^3) | 1.4 |
| Chemical | 1,2-DCA |
| MCL (mg/l) | 0.005 |
| Da (cm^2/sec) | 9.38E-02 |
| Henry's Law Constant (m^3-atm/mole) | 9.77E-04 |
| log Kow | 1.48 |
| Koc (ml/g) | 35.94 |
| Solubility (mg/l) | 8524 |
| Chemical Density (g/cm^3) | 1.25 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 34.78 | 5 | 0.0144 | 0.32 | 1.59E+03 | | 1.44E-02 |
| 2 | 17.8 | 157.1 | 3 | 0.0032 | 0.28 | 1.59E+03 | | 3.18E-03 |
| 3 | 13 | 98.92 | 1 | 0.0051 | 0.32 | 1.59E+03 | | 5.05E-03 |
| 4 | 51.1 | 53.18 | 8 | 0.0094 | 0.34 | 1.59E+03 | | 9.40E-03 |
| 5 | 32.6 | 26.85 | 6 | 0.0186 | 0.34 | 1.59E+03 | | 1.86E-02 |
| 6 | 39.4 | 43.1 | 6 | 0.0116 | 0.32 | 1.59E+03 | | 1.16E-02 |
| 7 | 34.6 | 71.9 | 6 | 0.0070 | 0.3 | 1.59E+03 | | 6.95E-03 |
| 8 | 32 | 33.78 | 5 | 0.0148 | 0.25 | 1.59E+03 | | 1.48E-02 |
| 9 | 28.1 | 55.02 | 5 | 0.0091 | 0.32 | 1.59E+03 | | 9.09E-03 |
| 10 | 30.6 | 5.8 | 6 | 0.0862 | 0.33 | 1.59E+03 | | 8.62E-02 |
| 11 | 44 | 7.827 | 8 | 0.0639 | 0.33 | 1.59E+03 | | 6.39E-02 |
| 12 | 20.3 | 71.73 | 5 | 0.0070 | 0.31 | 1.59E+03 | | 6.97E-03 |
| 13 | 31.3 | 104.3 | 5 | 0.0048 | 0.31 | 1.59E+03 | | 4.79E-03 |
| 14 | 30.2 | 24.49 | 5 | 0.0204 | 0.34 | 1.59E+03 | | 2.04E-02 |
| 15 | 19.2 | 80.54 | 3 | 0.0062 | 0.33 | 1.59E+03 | | 6.21E-03 |
| 16 | 9 | 280.6 | 1 | 0.0018 | 0.25 | 1.59E+03 | | 1.78E-03 |
| 17 | 21.5 | 74.76 | 4 | 0.0067 | 0.31 | 1.59E+03 | | 6.69E-03 |
| 18 | 15 | 193.5 | 1 | 0.0026 | 0.27 | 1.59E+03 | | 2.58E-03 |
| 19 | 35.2 | 50.68 | 6 | 0.0099 | 0.33 | 1.59E+03 | | 9.87E-03 |
| 20 | 18.7 | 13.81 | 3 | 0.0362 | 0.35 | 1.59E+03 | | 3.62E-02 |
| 21 | 47.4 | 9.91 | 9 | 0.0505 | 0.35 | 1.59E+03 | | 5.05E-02 |
| 22 | 22.1 | 27.63 | 3 | 0.0181 | 0.33 | 1.59E+03 | | 1.81E-02 |
| 23 | 8.15 | 72.9 | 1 | 0.0069 | 0.25 | 1.59E+03 | | 6.86E-03 |
| 24 | 20.2 | 7.51 | 4 | 0.0666 | 0.35 | 1.59E+03 | | 6.66E-02 |
| 25 | 12 | 65.45 | 1 | 0.0076 | 0.29 | 1.59E+03 | | 7.64E-03 |
| 26 | 15.8 | 36.27 | 4 | 0.0138 | 0.34 | 1.59E+03 | | 1.38E-02 |
| 27 | 17.4 | 24.01 | 3 | 0.0208 | 0.34 | 1.59E+03 | | 2.08E-02 |
| 28 | 24.7 | 31.21 | 5 | 0.0160 | 0.35 | 1.59E+03 | | 1.60E-02 |
| 29 | 17 | 41.23 | 3 | 0.0121 | 0.35 | 1.59E+03 | | 1.21E-02 |
| 30 | 21.6 | 26.65 | 3 | 0.0188 | 0.35 | 1.59E+03 | | 1.88E-02 |
| 31 | 21 | 72.88 | 4 | 0.0069 | 0.35 | 1.59E+03 | | 6.86E-03 |
| 32 | 27.6 | 5.42 | 5 | 0.0923 | 0.35 | 1.59E+03 | | 9.23E-02 |
| 33 | 8.63 | 98.73 | 2 | 0.0051 | 0.25 | 1.59E+03 | | 5.06E-03 |
| 34 | 13 | 92.2 | 1 | 0.0054 | 0.31 | 1.59E+03 | | 5.42E-03 |
| 35 | 15 | 193.3 | 1 | 0.0026 | 0.31 | 1.59E+03 | | 2.59E-03 |
| 36 | 27.1 | 38.04 | 4 | 0.0131 | 0.26 | 1.59E+03 | | 1.31E-02 |
| 37 | 18.1 | 14.59 | 3 | 0.0343 | 0.33 | 1.59E+03 | | 3.43E-02 |
| 38 | 11.7 | 106.7 | 2 | 0.0047 | 0.28 | 1.59E+03 | | 4.69E-03 |
| 39 | 42.4 | 13.62 | 7 | 0.0367 | 0.35 | 1.59E+03 | | 3.67E-02 |
| 40 | 29 | 3.14E-01 | 5 | 1.5924 | 0.35 | 1.59E+03 | | 1.59E+00 |
| 41 | 59.2 | 34.42 | 9 | 0.0145 | 0.35 | 1.59E+03 | | 1.45E-02 |
| 42 | 22.4 | 137.5 | 4 | 0.0036 | 0.29 | 1.59E+03 | | 3.64E-03 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 66.3 | 3 | 0.0075 | 0.35 | 1.59E+03 | | 7.54E-03 |
| 44 | 15 | 175 | 1 | 0.0029 | 0.33 | 1.59E+03 | | 2.86E-03 |
| 45 | 13.2 | 59.95 | 2 | 0.0083 | 0.28 | 1.59E+03 | | 8.34E-03 |
| 46 | 40.5 | 4.5 | 7 | 0.1111 | 0.35 | 1.59E+03 | | 1.11E-01 |
| 47 | 45 | 92.01 | 8 | 0.0054 | 0.35 | 1.59E+03 | | 5.43E-03 |
| 48 | 14.9 | 115.4 | 3 | 0.0043 | 0.34 | 1.59E+03 | | 4.33E-03 |
| 49 | 5 | 111.5 | 1 | 0.0045 | 0.35 | 1.59E+03 | | 4.48E-03 |
| 50 | 26.5 | 30.76 | 5 | 0.0163 | 0.35 | 1.59E+03 | | 1.63E-02 |
| 51 | 9.44 | 200.8 | 2 | 0.0025 | 0.25 | 1.59E+03 | | 2.49E-03 |
| 52 | 15.5 | 14.77 | 3 | 0.0339 | 0.29 | 1.59E+03 | | 3.39E-02 |
| 53 | 36.6 | 5.62 | 7 | 0.0890 | 0.35 | 1.59E+03 | | 8.90E-02 |
| 54 | 33.6 | 5.47 | 6 | 0.0914 | 0.35 | 1.59E+03 | | 9.14E-02 |
| 55 | 41.2 | 42.89 | 7 | 0.0117 | 0.35 | 1.59E+03 | | 1.17E-02 |
| 56 | 52.4 | 43.64 | 10 | 0.0115 | 0.35 | 1.59E+03 | | 1.15E-02 |
| 57 | 23 | 19.38 | 4 | 0.0258 | 0.32 | 1.59E+03 | | 2.58E-02 |
| 58 | 14.7 | 163.7 | 2 | 0.0031 | 0.35 | 1.59E+03 | | 3.05E-03 |
| 59 | 16.2 | 144.3 | 3 | 0.0035 | 0.33 | 1.59E+03 | | 3.47E-03 |
| 60 | 19.4 | 52.25 | 4 | 0.0096 | 0.35 | 1.59E+03 | | 9.57E-03 |
| 61 | 23.5 | 33.35 | 4 | 0.0150 | 0.35 | 1.59E+03 | | 1.50E-02 |
| 62 | 37 | 39.14 | 6 | 0.0128 | 0.33 | 1.59E+03 | | 1.28E-02 |
| 63 | 24.2 | 71.46 | 4 | 0.0070 | 0.33 | 1.59E+03 | | 7.00E-03 |
| 64 | 29.8 | 67.45 | 4 | 0.0074 | 0.35 | 1.59E+03 | | 7.41E-03 |
| 65 | 38.4 | 79.29 | 6 | 0.0063 | 0.3 | 1.59E+03 | | 6.31E-03 |
| 66 | 5.13 | 166.3 | 1 | 0.0030 | 0.26 | 1.59E+03 | | 3.01E-03 |
| 67 | 14.2 | 15.14 | 3 | 0.0330 | 0.34 | 1.59E+03 | | 3.30E-02 |
| 68 | 25.5 | 80.57 | 4 | 0.0062 | 0.35 | 1.59E+03 | | 6.21E-03 |
| 69 | 26.1 | 46.78 | 5 | 0.0107 | 0.33 | 1.59E+03 | | 1.07E-02 |
| 70 | 34 | 43.32 | 6 | 0.0115 | 0.34 | 1.59E+03 | | 1.15E-02 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 6.61E+01 | 4.19E-02 | 4.19E-02 |
| | std. dev. | 5.76E+01 | 1.90E-01 | 1.90E-01 |
| | max | 2.81E+02 | 1.59E+00 | 1.59E+00 |
| | min | 3.14E-01 | 1.78E-03 | 1.78E-03 |
| | median | 4.87E+01 | 1.03E-02 | 1.03E-02 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 1.03E-02 | 1.03E-02 |
| | 55 | 9.10E-03 | 9.10E-03 |
| | 60 | 7.49E-03 | 7.49E-03 |
| | 65 | 6.96E-03 | 6.96E-03 |
| | 70 | 6.57E-03 | 6.57E-03 |
| | 75 | 5.63E-03 | 5.63E-03 |
| | 80 | 5.00E-03 | 5.00E-03 |
| | 85 | 4.39E-03 | 4.39E-03 |
| | **90** | **3.17E-03** | **3.17E-03** |
| | 95 | 2.71E-03 | 2.71E-03 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 1 |
| Bulk density (g/cm^3) | 1.4 |
| Chemical | cis-1,2-DCE |
| MCL (mg/l) | 0.07 |
| Da (cm^2/sec) | 7.91E-02 |
| Henry's Law Constant (m^3-atm/mole) | 3.37E-03 |
| log Kow | 1.86 |
| Koc (ml/g) | 67.48 |
| Solubility (mg/l) | 3500 |
| Chemical Density (g/cm^3) | 1.28 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 1.958 | 7 | 3.5751 | 0.32 | 9.37E+02 | | 3.58E+00 |
| 2 | 17.8 | 33.98 | 4 | 0.2060 | 0.28 | 9.37E+02 | | 2.06E-01 |
| 3 | 13 | 46.56 | 1 | 0.1503 | 0.32 | 9.37E+02 | | 1.50E-01 |
| 4 | 51.1 | 10.78 | 11 | 0.6494 | 0.34 | 9.37E+02 | | 6.49E-01 |
| 5 | 32.6 | 2.357 | 8 | 2.9699 | 0.34 | 9.37E+02 | | 2.97E+00 |
| 6 | 39.4 | 11.88 | 8 | 0.5892 | 0.32 | 9.37E+02 | | 5.89E-01 |
| 7 | 34.6 | 13.97 | 8 | 0.5011 | 0.3 | 9.37E+02 | | 5.01E-01 |
| 8 | 32 | 13.1 | 7 | 0.5344 | 0.25 | 9.37E+02 | | 5.34E-01 |
| 9 | 28.1 | 6.823 | 6 | 1.0259 | 0.32 | 9.37E+02 | | 1.03E+00 |
| 10 | 30.6 | 0.1538 | 8 | 45.5137 | 0.33 | 9.37E+02 | | 4.55E+01 |
| 11 | 44 | 19.5 | 11 | 0.3590 | 0.33 | 9.37E+02 | | 3.59E-01 |
| 12 | 20.3 | 12.95 | 6 | 0.5405 | 0.31 | 9.37E+02 | | 5.41E-01 |
| 13 | 31.3 | 42.39 | 6 | 0.1651 | 0.31 | 9.37E+02 | | 1.65E-01 |
| 14 | 30.2 | 6.235 | 7 | 1.1227 | 0.34 | 9.37E+02 | | 1.12E+00 |
| 15 | 19.2 | 6.994 | 4 | 1.0009 | 0.33 | 9.37E+02 | | 1.00E+00 |
| 16 | 9 | 147.3 | 2 | 0.0475 | 0.25 | 9.37E+02 | | 4.75E-02 |
| 17 | 21.5 | 6.464 | 5 | 1.0829 | 0.31 | 9.37E+02 | | 1.08E+00 |
| 18 | 15 | 74.91 | 2 | 0.0934 | 0.27 | 9.37E+02 | | 9.34E-02 |
| 19 | 35.2 | 5.737 | 8 | 1.2201 | 0.33 | 9.37E+02 | | 1.22E+00 |
| 20 | 18.7 | 0.09371 | 4 | 74.6985 | 0.35 | 9.37E+02 | | 7.47E+01 |
| 21 | 47.4 | 0.8762 | 12 | 7.9890 | 0.35 | 9.37E+02 | | 7.99E+00 |
| 22 | 22.1 | 9.589 | 4 | 0.7300 | 0.33 | 9.37E+02 | | 7.30E-01 |
| 23 | 8.15 | 31.51 | 2 | 0.2222 | 0.25 | 9.37E+02 | | 2.22E-01 |
| 24 | 20.2 | 0.07982 | 5 | 87.6973 | 0.35 | 9.37E+02 | | 8.77E+01 |
| 25 | 12 | 30.9 | 1 | 0.2265 | 0.29 | 9.37E+02 | | 2.27E-01 |
| 26 | 15.8 | 0.9084 | 4 | 7.7059 | 0.34 | 9.37E+02 | | 7.71E+00 |
| 27 | 17.4 | 0.5665 | 4 | 12.3566 | 0.34 | 9.37E+02 | | 1.24E+01 |
| 28 | 24.7 | 2.942 | 6 | 2.3793 | 0.35 | 9.37E+02 | | 2.38E+00 |
| 29 | 17 | 2.904 | 4 | 2.4105 | 0.35 | 9.37E+02 | | 2.41E+00 |
| 30 | 21.6 | 7.94 | 4 | 0.8816 | 0.35 | 9.37E+02 | | 8.82E-01 |
| 31 | 21 | 7.781 | 5 | 0.8996 | 0.35 | 9.37E+02 | | 9.00E-01 |
| 32 | 27.6 | 0.06803 | 7 | 102.8958 | 0.35 | 9.37E+02 | | 1.03E+02 |
| 33 | 8.63 | 16.95 | 3 | 0.4130 | 0.25 | 9.37E+02 | | 4.13E-01 |
| 34 | 13 | 43.73 | 1 | 0.1601 | 0.31 | 9.37E+02 | | 1.60E-01 |
| 35 | 15 | 91.14 | 2 | 0.0768 | 0.31 | 9.37E+02 | | 7.68E-02 |
| 36 | 27.1 | 14.56 | 5 | 0.4808 | 0.26 | 9.37E+02 | | 4.81E-01 |
| 37 | 18.1 | 0.6834 | 4 | 10.2429 | 0.33 | 9.37E+02 | | 1.02E+01 |
| 38 | 11.7 | 6.794 | 3 | 1.0303 | 0.28 | 9.37E+02 | | 1.03E+00 |
| 39 | 42.4 | 0.5325 | 10 | 13.1455 | 0.35 | 9.37E+02 | | 1.31E+01 |
| 40 | 29 | 1.36E-04 | 6 | 51622.4189 | 0.35 | 9.37E+02 | SCN>SSL | 9.37E+02 |
| 41 | 59.2 | 2.841 | 13 | 2.4639 | 0.35 | 9.37E+02 | | 2.46E+00 |
| 42 | 22.4 | 56.65 | 5 | 0.1236 | 0.29 | 9.37E+02 | | 1.24E-01 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 19.56 | 5 | 0.3579 | 0.35 | 9.37E+02 | | 3.58E-01 |
| 44 | 15 | 79.87 | 2 | 0.0876 | 0.33 | 9.37E+02 | | 8.76E-02 |
| 45 | 13.2 | 6.011 | 3 | 1.1645 | 0.28 | 9.37E+02 | | 1.16E+00 |
| 46 | 40.5 | 0.1018 | 10 | 68.7623 | 0.35 | 9.37E+02 | | 6.88E+01 |
| 47 | 45 | 28.15 | 11 | 0.2487 | 0.35 | 9.37E+02 | | 2.49E-01 |
| 48 | 14.9 | 13.56 | 4 | 0.5162 | 0.34 | 9.37E+02 | | 5.16E-01 |
| 49 | 5 | 33.42 | 2 | 0.2095 | 0.35 | 9.37E+02 | | 2.09E-01 |
| 50 | 26.5 | 2.087 | 6 | 3.3541 | 0.35 | 9.37E+02 | | 3.35E+00 |
| 51 | 9.44 | 101.4 | 2 | 0.0690 | 0.25 | 9.37E+02 | | 6.90E-02 |
| 52 | 15.5 | 0.3062 | 4 | 22.8609 | 0.29 | 9.37E+02 | | 2.29E+01 |
| 53 | 36.6 | 0.1336 | 10 | 52.3952 | 0.35 | 9.37E+02 | | 5.24E+01 |
| 54 | 33.6 | 0.1291 | 9 | 54.2215 | 0.35 | 9.37E+02 | | 5.42E+01 |
| 55 | 41.2 | 11.71 | 10 | 0.5978 | 0.35 | 9.37E+02 | | 5.98E-01 |
| 56 | 52.4 | 6.87 | 14 | 1.0189 | 0.35 | 9.37E+02 | | 1.02E+00 |
| 57 | 23 | 0.0001956 | 5 | 35787.3211 | 0.32 | 9.37E+02 | SCN>SSL | 9.37E+02 |
| 58 | 14.7 | 63.17 | 2 | 0.1108 | 0.35 | 9.37E+02 | | 1.11E-01 |
| 59 | 16.2 | 33.59 | 4 | 0.2084 | 0.33 | 9.37E+02 | | 2.08E-01 |
| 60 | 19.4 | 2.495 | 5 | 2.8056 | 0.35 | 9.37E+02 | | 2.81E+00 |
| 61 | 23.5 | 3.265 | 6 | 2.1440 | 0.35 | 9.37E+02 | | 2.14E+00 |
| 62 | 37 | 2.411 | 9 | 2.9034 | 0.33 | 9.37E+02 | | 2.90E+00 |
| 63 | 24.2 | 8.866 | 6 | 0.7895 | 0.33 | 9.37E+02 | | 7.90E-01 |
| 64 | 29.8 | 17.97 | 6 | 0.3895 | 0.35 | 9.37E+02 | | 3.90E-01 |
| 65 | 38.4 | 13.47 | 9 | 0.5197 | 0.3 | 9.37E+02 | | 5.20E-01 |
| 66 | 5.13 | 83.58 | 1 | 0.0838 | 0.26 | 9.37E+02 | | 8.38E-02 |
| 67 | 14.2 | 0.09008 | 3 | 77.7087 | 0.34 | 9.37E+02 | | 7.77E+01 |
| 68 | 25.5 | 6.684 | 6 | 1.0473 | 0.35 | 9.37E+02 | | 1.05E+00 |
| 69 | 26.1 | 3.428 | 6 | 2.0420 | 0.33 | 9.37E+02 | | 2.04E+00 |
| 70 | 34 | 12.87 | 8 | 0.5439 | 0.34 | 9.37E+02 | | 5.44E-01 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 1.93E+01 | 1.26E+03 | 3.66E+01 |
| | std. dev. | 2.86E+01 | 7.45E+03 | 1.57E+02 |
| | max | 1.47E+02 | 5.16E+04 | 9.37E+02 |
| | min | 1.36E-04 | 4.75E-02 | 4.75E-02 |
| | median | 7.39E+00 | 9.50E-01 | 9.50E-01 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 9.50E-01 | 9.50E-01 |
| | 55 | 7.33E-01 | 7.33E-01 |
| | 60 | 5.71E-01 | 5.71E-01 |
| | 65 | 5.22E-01 | 5.22E-01 |
| | 70 | 4.60E-01 | 4.60E-01 |
| | 75 | 3.58E-01 | 3.58E-01 |
| | 80 | 2.20E-01 | 2.20E-01 |
| | 85 | 1.79E-01 | 1.79E-01 |
| | **90** | **1.22E-01** | **1.22E-01** |
| | 95 | 8.55E-02 | 8.55E-02 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 1 |
| Bulk density (g/cm^3) | 1.4 |
| Chemical | trans-1,2-DCE |
| MCL (mg/l) | 0.1 |
| Da (cm^2/sec) | 9.60E-02 |
| Henry's Law Constant (m^3-atm/mole) | 6.72E-03 |
| log Kow | 2.06 |
| Koc (ml/g) | 94.01 |
| Solubility (mg/l) | 6300 |
| Chemical Density (g/cm^3) | 1.26 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.00999 | 8 | 1001.0010 | 0.32 | 2.18E+03 | | 1.00E+03 |
| 2 | 17.8 | 2.669 | 4 | 3.7467 | 0.28 | 2.18E+03 | | 3.75E+00 |
| 3 | 13 | 24.27 | 1 | 0.4120 | 0.32 | 2.18E+03 | | 4.12E-01 |
| 4 | 51.1 | 0.7962 | 15 | 12.5597 | 0.34 | 2.18E+03 | | 1.26E+01 |
| 5 | 32.6 | 0.02044 | 10 | 489.2368 | 0.34 | 2.18E+03 | | 4.89E+02 |
| 6 | 39.4 | 1.331 | 10 | 7.5131 | 0.32 | 2.18E+03 | | 7.51E+00 |
| 7 | 34.6 | 0.7868 | 10 | 12.7097 | 0.3 | 2.18E+03 | | 1.27E+01 |
| 8 | 32 | 4.62 | 8 | 2.1645 | 0.25 | 2.18E+03 | | 2.16E+00 |
| 9 | 28.1 | 0.1138 | 8 | 87.8735 | 0.32 | 2.18E+03 | | 8.79E+01 |
| 10 | 30.6 | 0.0001632 | 10 | 61274.5098 | 0.33 | 2.18E+03 | SCN>SSL | 2.18E+03 |
| 11 | 44 | 1.551 | 14 | 6.4475 | 0.33 | 2.18E+03 | | 6.45E+00 |
| 12 | 20.3 | 0.5975 | 16 | 16.7364 | 0.31 | 2.18E+03 | | 1.67E+01 |
| 13 | 31.3 | 8.177 | 7 | 1.2229 | 0.31 | 2.18E+03 | | 1.22E+00 |
| 14 | 30.2 | 1.01 | 8 | 9.9010 | 0.34 | 2.18E+03 | | 9.90E+00 |
| 15 | 19.2 | 0.0863 | 5 | 115.8749 | 0.33 | 2.18E+03 | | 1.16E+02 |
| 16 | 9 | 69.58 | 2 | 0.1437 | 0.25 | 2.18E+03 | | 1.44E-01 |
| 17 | 21.5 | 0.07394 | 6 | 135.2448 | 0.31 | 2.18E+03 | | 1.35E+02 |
| 18 | 15 | 37.53 | 2 | 0.2665 | 0.27 | 2.18E+03 | | 2.66E-01 |
| 19 | 35.2 | 0.0882 | 10 | 113.3787 | 0.33 | 2.18E+03 | | 1.13E+02 |
| 20 | 18.7 | 0.000007332 | 5 | 1363884.3426 | 0.35 | 2.18E+03 | SCN>SSL | 2.18E+03 |
| 21 | 47.4 | 0.0117 | 16 | 854.7009 | 0.35 | 2.18E+03 | | 8.55E+02 |
| 22 | 22.1 | 1.877 | 5 | 5.3277 | 0.33 | 2.18E+03 | | 5.33E+00 |
| 23 | 8.15 | 7.878 | 2 | 1.2694 | 0.25 | 2.18E+03 | | 1.27E+00 |
| 24 | 20.2 | 0.00001457 | 6 | 686341.7982 | 0.35 | 2.18E+03 | SCN>SSL | 2.18E+03 |
| 25 | 12 | 18.06 | 2 | 0.5537 | 0.29 | 2.18E+03 | | 5.54E-01 |
| 26 | 15.8 | 0.001078 | 5 | 9276.4378 | 0.34 | 2.18E+03 | SCN>SSL | 2.18E+03 |
| 27 | 17.4 | 0.0003121 | 5 | 32041.0125 | 0.34 | 2.18E+03 | SCN>SSL | 2.18E+03 |
| 28 | 24.7 | 0.02596 | 7 | 385.2080 | 0.35 | 2.18E+03 | | 3.85E+02 |
| 29 | 17 | 0.01602 | 5 | 624.2197 | 0.35 | 2.18E+03 | | 6.24E+02 |
| 30 | 21.6 | 1.105 | 5 | 9.0498 | 0.35 | 2.18E+03 | | 9.05E+00 |
| 31 | 21 | 0.1345 | 6 | 74.3494 | 0.35 | 2.18E+03 | | 7.43E+01 |
| 32 | 27.6 | 0.00002091 | 9 | 478240.0765 | 0.35 | 2.18E+03 | SCN>SSL | 2.18E+03 |
| 33 | 8.63 | 0.488 | 3 | 20.4918 | 0.25 | 2.18E+03 | | 2.05E+01 |
| 34 | 13 | 22.71 | 1 | 0.4403 | 0.31 | 2.18E+03 | | 4.40E-01 |
| 35 | 15 | 43.96 | 2 | 0.2275 | 0.31 | 2.18E+03 | | 2.27E-01 |
| 36 | 27.1 | 4.198 | 7 | 2.3821 | 0.26 | 2.18E+03 | | 2.38E+00 |
| 37 | 18.1 | 0.001794 | 5 | 5574.1360 | 0.33 | 2.18E+03 | SCN>SSL | 2.18E+03 |
| 38 | 11.7 | 0.06784 | 3 | 147.4057 | 0.28 | 2.18E+03 | | 1.47E+02 |
| 39 | 42.4 | 0.001375 | 13 | 7272.7273 | 0.35 | 2.18E+03 | SCN>SSL | 2.18E+03 |
| 40 | 29 | 1.00E-10 | 8 | 100000000000.0000 | 0.35 | 2.18E+03 | SCN>SSL | 2.18E+03 |
| 41 | 59.2 | 0.02805 | 17 | 356.5062 | 0.35 | 2.18E+03 | | 3.57E+02 |
| 42 | 22.4 | 20.19 | 6 | 0.4953 | 0.29 | 2.18E+03 | | 4.95E-01 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 2.894 | 5 | 3.4554 | 0.35 | 2.18E+03 | | 3.46E+00 |
| 44 | 15 | 37.43 | 2 | 0.2672 | 0.33 | 2.18E+03 | | 2.67E-01 |
| 45 | 13.2 | 0.08983 | 3 | 111.3214 | 0.28 | 2.18E+03 | | 1.11E+02 |
| 46 | 40.5 | 0.0001099 | 13 | 90991.8107 | 0.35 | 2.18E+03 | SCN>SSL | 2.18E+03 |
| 47 | 45 | 4.497 | 14 | 2.2237 | 0.35 | 2.18E+03 | | 2.22E+00 |
| 48 | 14.9 | 0.2495 | 5 | 40.0802 | 0.34 | 2.18E+03 | | 4.01E+01 |
| 49 | 5 | 4.115 | 2 | 2.4301 | 0.35 | 2.18E+03 | | 2.43E+00 |
| 50 | 26.5 | 0.01741 | 8 | 574.3825 | 0.35 | 2.18E+03 | | 5.74E+02 |
| 51 | 9.44 | 34.32 | 2 | 0.2914 | 0.25 | 2.18E+03 | | 2.91E-01 |
| 52 | 15.5 | 0.00009863 | 5 | 101389.0297 | 0.29 | 2.18E+03 | SCN>SSL | 2.18E+03 |
| 53 | 36.6 | 0.0001884 | 12 | 53078.5563 | 0.35 | 2.18E+03 | SCN>SSL | 2.18E+03 |
| 54 | 33.6 | 0.0001204 | 11 | 83056.4784 | 0.35 | 2.18E+03 | SCN>SSL | 2.18E+03 |
| 55 | 41.2 | 1.609 | 12 | 6.2150 | 0.35 | 2.18E+03 | | 6.22E+00 |
| 56 | 52.4 | 0.2915 | 17 | 34.3053 | 0.35 | 2.18E+03 | | 3.43E+01 |
| 57 | 23 | 0.03136 | 7 | 318.8776 | 0.32 | 2.18E+03 | | 3.19E+02 |
| 58 | 14.7 | 37.19 | 3 | 0.2689 | 0.35 | 2.18E+03 | | 2.69E-01 |
| 59 | 16.2 | 2.706 | 5 | 3.6955 | 0.33 | 2.18E+03 | | 3.70E+00 |
| 60 | 19.4 | 0.007303 | 6 | 1369.3003 | 0.35 | 2.18E+03 | | 1.37E+03 |
| 61 | 23.5 | 0.03658 | 7 | 273.3734 | 0.35 | 2.18E+03 | | 2.73E+02 |
| 62 | 37 | 0.01591 | 11 | 628.5355 | 0.33 | 2.18E+03 | | 6.29E+02 |
| 63 | 24.2 | 0.2509 | 7 | 39.8565 | 0.33 | 2.18E+03 | | 3.99E+01 |
| 64 | 29.8 | 2.268 | 7 | 4.4092 | 0.35 | 2.18E+03 | | 4.41E+00 |
| 65 | 38.4 | 0.5633 | 11 | 17.7525 | 0.3 | 2.18E+03 | | 1.78E+01 |
| 66 | 5.13 | 27.91 | 1 | 0.3583 | 0.26 | 2.18E+03 | | 3.58E-01 |
| 67 | 14.2 | 0.000004304 | 4 | 2323420.0743 | 0.34 | 2.18E+03 | SCN>SSL | 2.18E+03 |
| 68 | 25.5 | 0.1026 | 7 | 97.4659 | 0.35 | 2.18E+03 | | 9.75E+01 |
| 69 | 26.1 | 0.01596 | 7 | 626.5664 | 0.33 | 2.18E+03 | | 6.27E+02 |
| 70 | 34 | 2.041 | 9 | 4.8996 | 0.34 | 2.18E+03 | | 4.90E+00 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 6.18E+00 | 1.43E+09 | 5.60E+02 |
| | std. dev. | 1.34E+01 | 1.20E+10 | 8.56E+02 |
| | max | 6.96E+01 | 1.00E+11 | 2.18E+03 |
| | min | 1.00E-10 | 1.44E-01 | 1.44E-01 |
| | median | 2.50E-01 | 4.00E+01 | 4.00E+01 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 4.00E+01 | 4.00E+01 |
| | 55 | 1.79E+01 | 1.79E+01 |
| | 60 | 1.15E+01 | 1.15E+01 |
| | 65 | 6.61E+00 | 6.61E+00 |
| | 70 | 4.75E+00 | 4.75E+00 |
| | 75 | 3.52E+00 | 3.52E+00 |
| | 80 | 2.21E+00 | 2.21E+00 |
| | 85 | 7.88E-01 | 7.88E-01 |
| | **90** | **4.07E-01** | **4.07E-01** |
| | 95 | 2.68E-01 | 2.68E-01 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 1 |
| Bulk density (g/cm^3) | 1.4 |
| Chemical | Benzene |
| MCL (mg/l) | 0.005 |
| Da (cm^2/sec) | 9.18E-02 |
| Henry's Law Constant (m^3-atm/mole) | 5.43E-03 |
| log Kow | 2.13 |
| Koc (ml/g) | 84.98 |
| Solubility (mg/l) | 1791 |
| Chemical Density (g/cm^3) | 0.88 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.07 | 8 | 7.1429 | 0.32 | 5.70E+02 | | 7.14E+00 |
| 2 | 17.8 | 7.29 | 4 | 0.0686 | 0.28 | 5.70E+02 | | 6.86E-02 |
| 3 | 13 | 28.52 | 2 | 0.0175 | 0.32 | 5.70E+02 | | 1.75E-02 |
| 4 | 51.1 | 2.16 | 13 | 0.2315 | 0.34 | 5.70E+02 | | 2.31E-01 |
| 5 | 32.6 | 0.13 | 9 | 3.8462 | 0.34 | 5.70E+02 | | 3.85E+00 |
| 6 | 39.4 | 2.9 | 6 | 0.1724 | 0.32 | 5.70E+02 | | 1.72E-01 |
| 7 | 34.6 | 2.31 | 10 | 0.2165 | 0.3 | 5.70E+02 | | 2.16E-01 |
| 8 | 32 | 6.32 | 7 | 0.0791 | 0.25 | 5.70E+02 | | 7.91E-02 |
| 9 | 28.1 | 0.558 | 7 | 0.8961 | 0.32 | 5.70E+02 | | 8.96E-01 |
| 10 | 30.6 | 0.0024 | 9 | 208.3333 | 0.33 | 5.70E+02 | | 2.08E+02 |
| 11 | 44 | 4.15 | 13 | 0.1205 | 0.33 | 5.70E+02 | | 1.20E-01 |
| 12 | 20.3 | 1.78 | 7 | 0.2809 | 0.31 | 5.70E+02 | | 2.81E-01 |
| 13 | 31.3 | 15.5 | 6 | 0.0323 | 0.31 | 5.70E+02 | | 3.23E-02 |
| 14 | 30.2 | 1.83 | 7 | 0.2732 | 0.34 | 5.70E+02 | | 2.73E-01 |
| 15 | 19.2 | 0.515 | 5 | 0.9709 | 0.33 | 5.70E+02 | | 9.71E-01 |
| 16 | 9 | 92.45 | 2 | 0.0054 | 0.25 | 5.70E+02 | | 5.41E-03 |
| 17 | 21.5 | 0.402 | 6 | 1.2438 | 0.31 | 5.70E+02 | | 1.24E+00 |
| 18 | 15 | 47.31 | 2 | 0.0106 | 0.27 | 5.70E+02 | | 1.06E-02 |
| 19 | 35.2 | 0.378 | 9 | 1.3228 | 0.33 | 5.70E+02 | | 1.32E+00 |
| 20 | 18.7 | 0.00028 | 5 | 1785.7143 | 0.35 | 5.70E+02 | SCN>SSL | 5.70E+02 |
| 21 | 47.4 | 0.058 | 15 | 8.6207 | 0.35 | 5.70E+02 | | 8.62E+00 |
| 22 | 22.1 | 3.07 | 5 | 0.1629 | 0.33 | 5.70E+02 | | 1.63E-01 |
| 23 | 8.15 | 12.92 | 2 | 0.0387 | 0.25 | 5.70E+02 | | 3.87E-02 |
| 24 | 20.2 | 0.0003 | 6 | 1666.6667 | 0.35 | 5.70E+02 | SCN>SSL | 5.70E+02 |
| 25 | 12 | 20.7 | 2 | 0.0242 | 0.29 | 5.70E+02 | | 2.42E-02 |
| 26 | 15.8 | 0.014 | 5 | 35.7143 | 0.34 | 5.70E+02 | | 3.57E+01 |
| 27 | 17.4 | 0.0054 | 5 | 92.5926 | 0.34 | 5.70E+02 | | 9.26E+01 |
| 28 | 24.7 | 0.171 | 7 | 2.9240 | 0.35 | 5.70E+02 | | 2.92E+00 |
| 29 | 17 | 0.11 | 4 | 4.5455 | 0.35 | 5.70E+02 | | 4.55E+00 |
| 30 | 21.6 | 2.13 | 4 | 0.2347 | 0.35 | 5.70E+02 | | 2.35E-01 |
| 31 | 21 | 0.57 | 6 | 0.8772 | 0.35 | 5.70E+02 | | 8.77E-01 |
| 32 | 27.6 | 0.0004 | 8 | 1250.0000 | 0.35 | 5.70E+02 | SCN>SSL | 5.70E+02 |
| 33 | 8.63 | 1.93 | 3 | 0.2591 | 0.25 | 5.70E+02 | | 2.59E-01 |
| 34 | 13 | 28.6 | 1 | 0.0175 | 0.31 | 5.70E+02 | | 1.75E-02 |
| 35 | 15 | 57.04 | 2 | 0.0088 | 0.31 | 5.70E+02 | | 8.77E-03 |
| 36 | 27.1 | 7.3 | 6 | 0.0685 | 0.26 | 5.70E+02 | | 6.85E-02 |
| 37 | 18.1 | 0.019 | 5 | 26.3158 | 0.33 | 5.70E+02 | | 2.63E+01 |
| 38 | 11.7 | 0.374 | 3 | 1.3369 | 0.28 | 5.70E+02 | | 1.34E+00 |
| 39 | 42.4 | 0.0133 | 12 | 37.5940 | 0.35 | 5.70E+02 | | 3.76E+01 |
| 40 | 29 | 1.00E-10 | 7 | 5000000000.0000 | 0.35 | 5.70E+02 | SCN>SSL | 5.70E+02 |
| 41 | 59.2 | 0.15 | 16 | 3.3333 | 0.35 | 5.70E+02 | | 3.33E+00 |
| 42 | 22.4 | 26.87 | 6 | 0.0186 | 0.29 | 5.70E+02 | | 1.86E-02 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 6.81 | 5 | 0.0734 | 0.35 | 5.70E+02 | | 7.34E-02 |
| 44 | 15 | 49.3 | 2 | 0.0101 | 0.33 | 5.70E+02 | | 1.01E-02 |
| 45 | 13.2 | 0.463 | 3 | 1.0799 | 0.28 | 5.70E+02 | | 1.08E+00 |
| 46 | 40.5 | 0.0013 | 12 | 384.6154 | 0.35 | 5.70E+02 | | 3.85E+02 |
| 47 | 45 | 8.86 | 13 | 0.0564 | 0.35 | 5.70E+02 | | 5.64E-02 |
| 48 | 14.9 | 1.1 | 5 | 0.4545 | 0.34 | 5.70E+02 | | 4.55E-01 |
| 49 | 5 | 9.1 | 1 | 0.0549 | 0.35 | 5.70E+02 | | 5.49E-02 |
| 50 | 26.5 | 0.112 | 6 | 4.4643 | 0.35 | 5.70E+02 | | 4.46E+00 |
| 51 | 9.44 | 49.56 | 2 | 0.0101 | 0.25 | 5.70E+02 | | 1.01E-02 |
| 52 | 15.5 | 0.0025 | 5 | 200.0000 | 0.29 | 5.70E+02 | | 2.00E+02 |
| 53 | 36.6 | 0.002 | 11 | 250.0000 | 0.35 | 5.70E+02 | | 2.50E+02 |
| 54 | 33.6 | 0.0018 | 10 | 277.7778 | 0.35 | 5.70E+02 | | 2.78E+02 |
| 55 | 41.2 | 3.19 | 11 | 0.1567 | 0.35 | 5.70E+02 | | 1.57E-01 |
| 56 | 52.4 | 0.94 | 16 | 0.5319 | 0.35 | 5.70E+02 | | 5.32E-01 |
| 57 | 23 | 0.126 | 7 | 3.9683 | 0.32 | 5.70E+02 | | 3.97E+00 |
| 58 | 14.7 | 43.96 | 3 | 0.0114 | 0.35 | 5.70E+02 | | 1.14E-02 |
| 59 | 16.2 | 7.18 | 5 | 0.0696 | 0.33 | 5.70E+02 | | 6.96E-02 |
| 60 | 19.4 | 0.053 | 5 | 9.4340 | 0.35 | 5.70E+02 | | 9.43E+00 |
| 61 | 23.5 | 0.195 | 7 | 2.5641 | 0.35 | 5.70E+02 | | 2.56E+00 |
| 62 | 37 | 0.112 | 10 | 4.4643 | 0.33 | 5.70E+02 | | 4.46E+00 |
| 63 | 24.2 | 0.89 | 6 | 0.5618 | 0.33 | 5.70E+02 | | 5.62E-01 |
| 64 | 29.8 | 4.55 | 7 | 0.1099 | 0.35 | 5.70E+02 | | 1.10E-01 |
| 65 | 38.4 | 1.96 | 10 | 0.2551 | 0.3 | 5.70E+02 | | 2.55E-01 |
| 66 | 5.13 | 42.23 | 1 | 0.0118 | 0.26 | 5.70E+02 | | 1.18E-02 |
| 67 | 14.2 | 0.00019 | 4 | 2631.5789 | 0.34 | 5.70E+02 | SCN>SSL | 5.70E+02 |
| 68 | 25.5 | 0.488 | 6 | 1.0246 | 0.35 | 5.70E+02 | | 1.02E+00 |
| 69 | 26.1 | 0.133 | 7 | 3.7594 | 0.33 | 5.70E+02 | | 3.76E+00 |
| 70 | 34 | 3.84 | 9 | 0.1302 | 0.34 | 5.70E+02 | | 1.30E-01 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 8.74E+00 | 7.14E+07 | 6.34E+01 |
| | std. dev. | 1.74E+01 | 5.98E+08 | 1.58E+02 |
| | max | 9.25E+01 | 5.00E+09 | 5.70E+02 |
| | min | 1.00E-10 | 5.41E-03 | 5.41E-03 |
| | median | 9.15E-01 | 5.47E-01 | 5.47E-01 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 5.47E-01 | 5.47E-01 |
| | 55 | 2.74E-01 | 2.74E-01 |
| | 60 | 2.33E-01 | 2.33E-01 |
| | 65 | 1.64E-01 | 1.64E-01 |
| | 70 | 1.17E-01 | 1.17E-01 |
| | 75 | 7.06E-02 | 7.06E-02 |
| | 80 | 5.61E-02 | 5.61E-02 |
| | 85 | 2.70E-02 | 2.70E-02 |
| | **90** | **1.69E-02** | **1.69E-02** |
| | 95 | 1.03E-02 | 1.03E-02 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 1 |
| Bulk density (g/cm^3) | 1.4 |
| Chemical | Carbon Tetrachloride |
| MCL (mg/l) | 0.005 |
| Da (cm^2/sec) | 8.40E-02 |
| Henry's Law Constant (m^3-atm/mole) | 3.04E-02 |
| log Kow | 2.83 |
| Koc (ml/g) | 336.97 |
| Solubility (mg/l) | 805 |
| Chemical Density (g/cm^3) | 1.59 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 1E-10 | 20 | 5.00E+09 | 0.32 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 2 | 17.8 | 0.00002422 | 11 | 2.06E+04 | 0.28 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 3 | 13 | 3.735 | 3 | 1.34E-01 | 0.32 | 8.15E+02 | | 1.34E-01 |
| 4 | 51.1 | 0.000006487 | 41 | 7.71E+04 | 0.34 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 5 | 32.6 | 1E-10 | 26 | 5.00E+09 | 0.34 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 6 | 39.4 | 0.00006336 | 28 | 7.89E+03 | 0.32 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 7 | 34.6 | 5.808E-07 | 27 | 8.61E+05 | 0.3 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 8 | 32 | 0.02475 | 21 | 2.02E+01 | 0.25 | 8.15E+02 | | 2.02E+01 |
| 9 | 28.1 | 1E-10 | 21 | 5.00E+09 | 0.32 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 10 | 30.6 | 1E-10 | 26 | 5.00E+09 | 0.33 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 11 | 44 | 0.000009136 | 37 | 5.47E+04 | 0.33 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 12 | 20.3 | 0.00000001 | 19 | 5.00E+07 | 0.31 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 13 | 31.3 | 0.00878 | 19 | 5.69E+01 | 0.31 | 8.15E+02 | | 5.69E+01 |
| 14 | 30.2 | 0.0001175 | 21 | 4.26E+03 | 0.34 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 15 | 19.2 | 1E-10 | 14 | 5.00E+09 | 0.33 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 16 | 9 | 2.933 | 3 | 1.70E-01 | 0.25 | 8.15E+02 | | 1.70E-01 |
| 17 | 21.5 | 1E-10 | 16 | 5.00E+09 | 0.31 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 18 | 15 | 2.115 | 3 | 2.36E-01 | 0.27 | 8.15E+02 | | 2.36E-01 |
| 19 | 35.2 | 1E-10 | 27 | 5.00E+09 | 0.33 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 20 | 18.7 | 1E-10 | 14 | 5.00E+09 | 0.35 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 21 | 47.4 | 1E-10 | 43 | 5.00E+09 | 0.35 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 22 | 22.1 | 0.00106 | 12 | 4.72E+02 | 0.33 | 8.15E+02 | | 4.72E+02 |
| 23 | 8.15 | 0.02387 | 4 | 2.09E+01 | 0.25 | 8.15E+02 | | 2.09E+01 |
| 24 | 20.2 | 1E-10 | 17 | 5.00E+09 | 0.35 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 25 | 12 | 4.604 | 3 | 1.09E-01 | 0.29 | 8.15E+02 | | 1.09E-01 |
| 26 | 15.8 | 1E-10 | 13 | 5.00E+09 | 0.34 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 27 | 17.4 | 1E-10 | 14 | 5.00E+09 | 0.34 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 28 | 24.7 | 1E-10 | 19 | 5.00E+09 | 0.35 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 29 | 17 | 1E-10 | 12 | 5.00E+09 | 0.35 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 30 | 21.6 | 0.000265 | 12 | 1.89E+03 | 0.35 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 31 | 21 | 1E-10 | 15 | 5.00E+09 | 0.35 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 32 | 27.6 | 1E-10 | 24 | 5.00E+09 | 0.35 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 33 | 8.63 | 0.000000017 | 7 | 2.94E+07 | 0.25 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 34 | 13 | 2.236 | 3 | 2.24E-01 | 0.31 | 8.15E+02 | | 2.24E-01 |
| 35 | 15 | 3.189 | 4 | 1.57E-01 | 0.31 | 8.15E+02 | | 1.57E-01 |
| 36 | 27.1 | 0.02716 | 17 | 1.84E+01 | 0.26 | 8.15E+02 | | 1.84E+01 |
| 37 | 18.1 | 1E-10 | 15 | 5.00E+09 | 0.33 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 38 | 11.7 | 1E-10 | 8 | 5.00E+09 | 0.28 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 39 | 42.4 | 1E-10 | 36 | 5.00E+09 | 0.35 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 40 | 29 | 1.00E-10 | 20 | 5.00E+09 | 0.35 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 41 | 59.2 | 1E-10 | 47 | 5.00E+09 | 0.35 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 42 | 22.4 | 0.3508 | 14 | 1.43E+00 | 0.29 | 8.15E+02 | | 1.43E+00 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 0.0006592 | 14 | 7.58E+02 | 0.35 | 8.15E+02 | | 7.58E+02 |
| 44 | 15 | 1.985 | 4 | 2.52E-01 | 0.33 | 8.15E+02 | | 2.52E-01 |
| 45 | 13.2 | 1E-10 | 9 | 5.00E+09 | 0.28 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 46 | 40.5 | 1E-10 | 36 | 5.00E+09 | 0.35 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 47 | 45 | 0.001347 | 35 | 3.71E+02 | 0.35 | 8.15E+02 | | 3.71E+02 |
| 48 | 14.9 | 1E-10 | 12 | 5.00E+09 | 0.34 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 49 | 5 | 0.0002354 | 3 | 2.12E+03 | 0.35 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 50 | 26.5 | 1E-10 | 21 | 5.00E+09 | 0.35 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 51 | 9.44 | 0.4199 | 4 | 1.19E+00 | 0.25 | 8.15E+02 | | 1.19E+00 |
| 52 | 15.5 | 1E-10 | 14 | 5.00E+09 | 0.29 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 53 | 36.6 | 1E-10 | 33 | 5.00E+09 | 0.35 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 54 | 33.6 | 1E-10 | 30 | 5.00E+09 | 0.35 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 55 | 41.2 | 0.0001396 | 32 | 3.58E+03 | 0.35 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 56 | 52.4 | 4.033E-09 | 47 | 1.24E+08 | 0.35 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 57 | 23 | 1E-10 | 18 | 5.00E+09 | 0.32 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 58 | 14.7 | 5.038 | 5 | 9.92E-02 | 0.35 | 8.15E+02 | | 9.92E-02 |
| 59 | 16.2 | 0.00002232 | 12 | 2.24E+04 | 0.33 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 60 | 19.4 | 1E-10 | 15 | 5.00E+09 | 0.35 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 61 | 23.5 | 1E-10 | 19 | 5.00E+09 | 0.35 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 62 | 37 | 1E-10 | 29 | 5.00E+09 | 0.33 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 63 | 24.2 | 1E-10 | 18 | 5.00E+09 | 0.33 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 64 | 29.8 | 0.0001317 | 19 | 3.80E+03 | 0.35 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 65 | 38.4 | 0.000000092 | 30 | 5.43E+06 | 0.3 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 66 | 5.13 | 0.1499 | 2 | 3.34E+00 | 0.26 | 8.15E+02 | | 3.34E+00 |
| 67 | 14.2 | 1E-10 | 11 | 5.00E+09 | 0.34 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 68 | 25.5 | 1E-10 | 18 | 5.00E+09 | 0.35 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 69 | 26.1 | 1E-10 | 19 | 5.00E+09 | 0.33 | 8.15E+02 | SCN>SSL | 8.15E+02 |
| 70 | 34 | 0.0003116 | 24 | 1.60E+03 | 0.34 | 8.15E+02 | SCN>SSL | 8.15E+02 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 3.83E-01 | 2.57E+09 | 6.30E+02 |
| | std. dev. | 1.10E+00 | 2.51E+09 | 3.34E+02 |
| | max | 5.04E+00 | 5.00E+09 | 8.15E+02 |
| | min | 1.00E-10 | 9.92E-02 | 9.92E-02 |
| | median | 1.00E-10 | 5.00E+09 | 8.15E+02 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 5.00E+09 | 8.15E+02 |
| | 55 | 3.04E+07 | 8.15E+02 |
| | 60 | 6.81E+04 | 8.15E+02 |
| | 65 | 9.80E+03 | 8.15E+02 |
| | 70 | 3.14E+03 | 8.15E+02 |
| | 75 | 9.70E+02 | 7.73E+02 |
| | 80 | 4.97E+01 | 4.97E+01 |
| | 85 | 8.61E+00 | 8.61E+00 |
| | **90** | **2.50E-01** | **2.50E-01** |
| | 95 | 1.63E-01 | 1.63E-01 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 1 |
| Bulk density (g/cm^3) | 1.4 |
| Chemical | Ethylbenzene |
| MCL (mg/l) | 0.7 |
| Da (cm^2/sec) | 7.56E-02 |
| Henry's Law Constant (m^3-atm/mole) | 8.44E-03 |
| log Kow | 3.15 |
| Koc (ml/g) | 889.9 |
| Solubility (mg/l) | 161 |
| Chemical Density (g/cm^3) | 0.87 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.001 | 42 | 70000.0000 | 0.32 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 2 | 17.8 | 0.59 | 23 | 118.6441 | 0.28 | 3.14E+02 | | 1.19E+02 |
| 3 | 13 | 6.13 | 5 | 11.4192 | 0.32 | 3.14E+02 | | 1.14E+01 |
| 4 | 51.1 | 1.76 | 77 | 39.7727 | 0.34 | 3.14E+02 | | 3.98E+01 |
| 5 | 32.6 | 0.004 | 53 | 17500.0000 | 0.34 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 6 | 39.4 | 0.244 | 56 | 286.8852 | 0.32 | 3.14E+02 | | 2.87E+02 |
| 7 | 34.6 | 0.118 | 56 | 593.2203 | 0.3 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 8 | 32 | 0.817 | 41 | 85.6793 | 0.25 | 3.14E+02 | | 8.57E+01 |
| 9 | 28.1 | 0.0217 | 41 | 3225.8065 | 0.32 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 10 | 30.6 | 0.0006 | 54 | 116666.6667 | 0.33 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 11 | 44 | 0.277 | 71 | 252.7076 | 0.33 | 3.14E+02 | | 2.53E+02 |
| 12 | 20.3 | 0.067 | 31 | 1044.7761 | 0.31 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 13 | 31.3 | 1.71 | 35 | 40.9357 | 0.31 | 3.14E+02 | | 4.09E+01 |
| 14 | 30.2 | 0.194 | 37 | 360.8247 | 0.34 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 15 | 19.2 | 0.0192 | 28 | 3645.8333 | 0.33 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 16 | 9 | 15.27 | 7 | 4.5842 | 0.25 | 3.14E+02 | | 4.58E+00 |
| 17 | 21.5 | 0.0135 | 30 | 5185.1852 | 0.31 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 18 | 15 | 8.51 | 7 | 8.2256 | 0.27 | 3.14E+02 | | 8.23E+00 |
| 19 | 35.2 | 0.0175 | 52 | 4000.0000 | 0.33 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 20 | 18.7 | 0.0000012 | 30 | 58333333.3333 | 0.35 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 21 | 47.4 | 0.00235 | 82 | 29787.2340 | 0.35 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 22 | 22.1 | 0.38 | 21 | 184.2105 | 0.33 | 3.14E+02 | | 1.84E+02 |
| 23 | 8.15 | 1.6 | 10 | 43.7500 | 0.25 | 3.14E+02 | | 4.38E+01 |
| 24 | 20.2 | 0.0000025 | 34 | 28000000.0000 | 0.35 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 25 | 12 | 3.93 | 5 | 17.8117 | 0.29 | 3.14E+02 | | 1.78E+01 |
| 26 | 15.8 | 0.00017 | 26 | 411764.7059 | 0.34 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 27 | 17.4 | 0.000058 | 27 | 1206896.5517 | 0.34 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 28 | 24.7 | 0.0057 | 39 | 12280.7018 | 0.35 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 29 | 17 | 0.004 | 24 | 17500.0000 | 0.35 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 30 | 21.6 | 0.242 | 23 | 289.2562 | 0.35 | 3.14E+02 | | 2.89E+02 |
| 31 | 21 | 0.0277 | 31 | 2527.0758 | 0.35 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 32 | 27.6 | 0.0000034 | 50 | 20588235.2941 | 0.35 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 33 | 8.63 | 0.089 | 14 | 786.5169 | 0.25 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 34 | 13 | 5.12 | 6 | 13.6719 | 0.31 | 3.14E+02 | | 1.37E+01 |
| 35 | 15 | 9.39 | 8 | 7.4547 | 0.31 | 3.14E+02 | | 7.45E+00 |
| 36 | 27.1 | 0.81 | 31 | 86.4198 | 0.26 | 3.14E+02 | | 8.64E+01 |
| 37 | 18.1 | 0.0003 | 29 | 233333.3333 | 0.33 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 38 | 11.7 | 0.018 | 16 | 3888.8889 | 0.28 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 39 | 42.4 | 0.00019 | 72 | 368421.0526 | 0.35 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 40 | 29 | 1.00E-11 | 38 | 7000000000000.0000 | 0.35 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 41 | 59.2 | 0.0041 | 90 | 17073.1707 | 0.35 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 42 | 22.4 | 3.93 | 29 | 17.8117 | 0.29 | 3.14E+02 | | 1.78E+01 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 0.685 | 28 | 102.1898 | 0.35 | 3.14E+02 | | 1.02E+02 |
| 44 | 15 | 8.14 | 8 | 8.5995 | 0.33 | 3.14E+02 | | 8.60E+00 |
| 45 | 13.2 | 0.018 | 18 | 3888.8889 | 0.28 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 46 | 40.5 | 0.0000183 | 72 | 3825136.6120 | 0.35 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 47 | 45 | 0.9 | 71 | 77.7778 | 0.35 | 3.14E+02 | | 7.78E+01 |
| 48 | 14.9 | 0.068 | 23 | 1029.4118 | 0.34 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 49 | 5 | 1.53 | 7 | 45.7516 | 0.35 | 3.14E+02 | | 4.58E+01 |
| 50 | 26.5 | 0.003 | 42 | 23333.3333 | 0.35 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 51 | 9.44 | 7.64 | 11 | 9.1623 | 0.25 | 3.14E+02 | | 9.16E+00 |
| 52 | 15.5 | 0.0000119 | 30 | 5882352.9412 | 0.29 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 53 | 36.6 | 0.0000345 | 62 | 2028985.5072 | 0.35 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 54 | 33.6 | 0.0000212 | 59 | 3301886.7925 | 0.35 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 55 | 41.2 | 0.317 | 60 | 220.8202 | 0.35 | 3.14E+02 | | 2.21E+02 |
| 56 | 52.4 | 0.0471 | 89 | 1486.1996 | 0.35 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 57 | 23 | 0.00527 | 37 | 13282.7324 | 0.32 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 58 | 14.7 | 8.51 | 10 | 8.2256 | 0.35 | 3.14E+02 | | 8.23E+00 |
| 59 | 16.2 | 0.641 | 20 | 109.2044 | 0.33 | 3.14E+02 | | 1.09E+02 |
| 60 | 19.4 | 0.0014 | 30 | 50000.0000 | 0.35 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 61 | 23.5 | 0.00664 | 37 | 10542.1687 | 0.35 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 62 | 37 | 0.00256 | 59 | 27343.7500 | 0.33 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 63 | 24.2 | 0.0456 | 36 | 1535.0877 | 0.33 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 64 | 29.8 | 0.45 | 37 | 155.5556 | 0.35 | 3.14E+02 | | 1.56E+02 |
| 65 | 38.4 | 0.093 | 56 | 752.6882 | 0.3 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 66 | 5.13 | 5.85 | 4 | 11.9658 | 0.26 | 3.14E+02 | | 1.20E+01 |
| 67 | 14.2 | 0.00000055 | 22 | 127272727.2727 | 0.34 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 68 | 25.5 | 0.021 | 35 | 3333.3333 | 0.35 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 69 | 26.1 | 0.00251 | 38 | 27888.4462 | 0.33 | 3.14E+02 | SCN>SSL | 3.14E+02 |
| 70 | 34 | 0.39 | 48 | 179.4872 | 0.34 | 3.14E+02 | | 1.79E+02 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 1.38E+00 | 1.00E+11 | 2.23E+02 |
| | std. dev. | 2.95E+00 | 8.37E+11 | 1.26E+02 |
| | max | 1.53E+01 | 7.00E+12 | 3.14E+02 |
| | min | 1.00E-11 | 4.58E+00 | 4.58E+00 |
| | median | 4.64E-02 | 1.51E+03 | 3.14E+02 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 1.51E+03 | 3.14E+02 |
| | 55 | 7.99E+02 | 3.14E+02 |
| | 60 | 3.32E+02 | 3.04E+02 |
| | 65 | 2.26E+02 | 2.26E+02 |
| | 70 | 1.44E+02 | 1.44E+02 |
| | 75 | 9.04E+01 | 9.04E+01 |
| | 80 | 4.54E+01 | 4.54E+01 |
| | 85 | 2.55E+01 | 2.55E+01 |
| | **90** | **1.19E+01** | **1.19E+01** |
| | 95 | 8.39E+00 | 8.39E+00 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 1 |
| Bulk density (g/cm^3) | 1.4 |
| Chemical | n-hexane |
| MCL (mg/l) | 0.9 |
| Da (cm^2/sec) | 7.87E-02 |
| Henry's Law Constant (m^3-atm/mole) | 7.70E-01 |
| log Kow | 2.77 |
| Koc (ml/g) | 370.97 |
| Solubility (mg/l) | 18 |
| Chemical Density (g/cm^3) | 0.65 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 1E-11 | 104 | 9.00E+12 | 0.32 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 2 | 17.8 | 1E-11 | 51 | 9.00E+12 | 0.28 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 3 | 13 | 1.508E-08 | 7 | 5.97E+09 | 0.32 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 4 | 51.1 | 1E-11 | 240 | 9.00E+12 | 0.34 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 5 | 32.6 | 1E-11 | 152 | 9.00E+12 | 0.34 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 6 | 39.4 | 1E-11 | 154 | 9.00E+12 | 0.32 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 7 | 34.6 | 1E-11 | 125 | 9.00E+12 | 0.3 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 8 | 32 | 1E-11 | 87 | 9.00E+12 | 0.25 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 9 | 28.1 | 1E-11 | 114 | 9.00E+12 | 0.32 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 10 | 30.6 | 1E-11 | 151 | 9.00E+12 | 0.33 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 11 | 44 | 1E-11 | 186 | 9.00E+12 | 0.33 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 12 | 20.3 | 1E-11 | 75 | 9.00E+12 | 0.31 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 13 | 31.3 | 1E-11 | 95 | 9.00E+12 | 0.31 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 14 | 30.2 | 1E-11 | 111 | 9.00E+12 | 0.34 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 15 | 19.2 | 1E-11 | 73 | 9.00E+12 | 0.33 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 16 | 9 | 1E-11 | 10 | 9.00E+12 | 0.25 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 17 | 21.5 | 1E-11 | 81 | 9.00E+12 | 0.31 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 18 | 15 | 1E-11 | 13 | 9.00E+12 | 0.27 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 19 | 35.2 | 1E-11 | 156 | 9.00E+12 | 0.33 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 20 | 18.7 | 1E-11 | 78 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 21 | 47.4 | 1E-11 | 254 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 22 | 22.1 | 1E-11 | 63 | 9.00E+12 | 0.33 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 23 | 8.15 | 1E-11 | 14 | 9.00E+12 | 0.25 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 24 | 20.2 | 1E-11 | 99 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 25 | 12 | 0.0017 | 4 | 5.29E+04 | 0.29 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 26 | 15.8 | 1E-11 | 63 | 9.00E+12 | 0.34 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 27 | 17.4 | 1E-11 | 75 | 9.00E+12 | 0.34 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 28 | 24.7 | 1E-11 | 110 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 29 | 17 | 1E-11 | 68 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 30 | 21.6 | 1E-11 | 65 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 31 | 21 | 1E-11 | 84 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 32 | 27.6 | 1E-11 | 144 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 33 | 8.63 | 1E-11 | 22 | 9.00E+12 | 0.25 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 34 | 13 | 1E-11 | 8 | 9.00E+12 | 0.31 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 35 | 15 | 1E-11 | 14 | 9.00E+12 | 0.31 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 36 | 27.1 | 1E-11 | 69 | 9.00E+12 | 0.26 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 37 | 18.1 | 1E-11 | 81 | 9.00E+12 | 0.33 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 38 | 11.7 | 1E-11 | 38 | 9.00E+12 | 0.28 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 39 | 42.4 | 1E-11 | 217 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 40 | 29 | 1E-11 | 121 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 41 | 59.2 | 1E-11 | 292 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 42 | 22.4 | 1E-11 | 52 | 9.00E+12 | 0.29 | 1.21E+02 | SCN>SSL | 1.21E+02 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 1E-11 | 77 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 44 | 15 | 1E-11 | 15 | 9.00E+12 | 0.33 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 45 | 13.2 | 1E-11 | 43 | 9.00E+12 | 0.28 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 46 | 40.5 | 1E-11 | 222 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 47 | 45 | 1E-11 | 186 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 48 | 14.9 | 1E-11 | 58 | 9.00E+12 | 0.34 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 49 | 5 | 1E-11 | 14 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 50 | 26.5 | 1E-11 | 121 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 51 | 9.44 | 1E-11 | 14 | 9.00E+12 | 0.25 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 52 | 15.5 | 1E-11 | 71 | 9.00E+12 | 0.29 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 53 | 36.6 | 1E-11 | 197 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 54 | 33.6 | 1E-11 | 177 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 55 | 41.2 | 1E-11 | 175 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 56 | 52.4 | 1E-11 | 257 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 57 | 23 | 1E-11 | 96 | 9.00E+12 | 0.32 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 58 | 14.7 | 1E-11 | 15 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 59 | 16.2 | 1E-11 | 55 | 9.00E+12 | 0.33 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 60 | 19.4 | 1E-11 | 83 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 61 | 23.5 | 1E-11 | 103 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 62 | 37 | 1E-11 | 166 | 9.00E+12 | 0.33 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 63 | 24.2 | 1E-11 | 95 | 9.00E+12 | 0.33 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 64 | 29.8 | 1E-11 | 106 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 65 | 38.4 | 1E-11 | 145 | 9.00E+12 | 0.3 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 66 | 5.13 | 1E-11 | 6 | 9.00E+12 | 0.26 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 67 | 14.2 | 1E-11 | 65 | 9.00E+12 | 0.34 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 68 | 25.5 | 1E-11 | 107 | 9.00E+12 | 0.35 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 69 | 26.1 | 1E-11 | 99 | 9.00E+12 | 0.33 | 1.21E+02 | SCN>SSL | 1.21E+02 |
| 70 | 34 | 1E-11 | 128 | 9.00E+12 | 0.34 | 1.21E+02 | SCN>SSL | 1.21E+02 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 2.43E-05 | 8.74E+12 | 1.21E+02 |
| | std. dev. | 2.03E-04 | 1.51E+12 | 2.29E-13 |
| | max | 1.70E-03 | 9.00E+12 | 1.21E+02 |
| | min | 1.00E-11 | 5.29E+04 | 1.21E+02 |
| | median | 1.00E-11 | 9.00E+12 | 1.21E+02 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 9.00E+12 | 1.21E+02 |
| | 55 | 9.00E+12 | 1.21E+02 |
| | 60 | 9.00E+12 | 1.21E+02 |
| | 65 | 9.00E+12 | 1.21E+02 |
| | 70 | 9.00E+12 | 1.21E+02 |
| | 75 | 9.00E+12 | 1.21E+02 |
| | 80 | 9.00E+12 | 1.21E+02 |
| | 85 | 9.00E+12 | 1.21E+02 |
| | **90** | **9.00E+12** | **1.21E+02** |
| | 95 | 9.00E+12 | 1.21E+02 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 1 |
| Bulk density (g/cm^3) | 1.4 |
| Chemical | Methyl Ethyl Ketone |
| MCL (mg/l) | 8.9 |
| Da (cm^2/sec) | 9.42E-02 |
| Henry's Law Constant (m^3-atm/mole) | 1.05E-05 |
| log Kow | 0.29 |
| Koc (ml/g) | 1.228 |
| Solubility (mg/l) | 239000 |
| Chemical Density (g/cm^3) | 0.8 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 198.5 | 3 | 4.4836 | 0.32 | 2.62E+04 | | 4.48E+00 |
| 2 | 17.8 | 408 | 2 | 2.1814 | 0.28 | 2.62E+04 | | 2.18E+00 |
| 3 | 13 | 224.7 | 1 | 3.9608 | 0.32 | 2.62E+04 | | 3.96E+00 |
| 4 | 51.1 | 171.3 | 5 | 5.1956 | 0.34 | 2.62E+04 | | 5.20E+00 |
| 5 | 32.6 | 130.5 | 3 | 6.8199 | 0.34 | 2.62E+04 | | 6.82E+00 |
| 6 | 39.4 | 122.8 | 3 | 7.2476 | 0.32 | 2.62E+04 | | 7.25E+00 |
| 7 | 34.6 | 214.9 | 4 | 4.1415 | 0.3 | 2.62E+04 | | 4.14E+00 |
| 8 | 32 | 93.12 | 3 | 9.5576 | 0.25 | 2.62E+04 | | 9.56E+00 |
| 9 | 28.1 | 241.8 | 3 | 3.6807 | 0.32 | 2.62E+04 | | 3.68E+00 |
| 10 | 30.6 | 69.71 | 3 | 12.7672 | 0.33 | 2.62E+04 | | 1.28E+01 |
| 11 | 44 | 198.5 | 5 | 4.4836 | 0.33 | 2.62E+04 | | 4.48E+00 |
| 12 | 20.3 | 216.5 | 3 | 4.1109 | 0.31 | 2.62E+04 | | 4.11E+00 |
| 13 | 31.3 | 345.4 | 3 | 2.5767 | 0.31 | 2.62E+04 | | 2.58E+00 |
| 14 | 30.2 | 85.72 | 3 | 10.3826 | 0.34 | 2.62E+04 | | 1.04E+01 |
| 15 | 19.2 | 401.9 | 2 | 2.2145 | 0.33 | 2.62E+04 | | 2.21E+00 |
| 16 | 9 | 574.6 | 1 | 1.5489 | 0.25 | 2.62E+04 | | 1.55E+00 |
| 17 | 21.5 | 287.3 | 2 | 3.0978 | 0.31 | 2.62E+04 | | 3.10E+00 |
| 18 | 15 | 405.4 | 1 | 2.1954 | 0.27 | 2.62E+04 | | 2.20E+00 |
| 19 | 35.2 | 175.9 | 3 | 5.0597 | 0.33 | 2.62E+04 | | 5.06E+00 |
| 20 | 18.7 | 269.4 | 2 | 3.3036 | 0.35 | 2.62E+04 | | 3.30E+00 |
| 21 | 47.4 | 46.09 | 5 | 19.3100 | 0.35 | 2.62E+04 | | 1.93E+01 |
| 22 | 22.1 | 102.2 | 2 | 8.7084 | 0.33 | 2.62E+04 | | 8.71E+00 |
| 23 | 8.15 | 186.5 | 1 | 4.7721 | 0.25 | 2.62E+04 | | 4.77E+00 |
| 24 | 20.2 | 88.78 | 2 | 10.0248 | 0.35 | 2.62E+04 | | 1.00E+01 |
| 25 | 12 | 157.5 | 1 | 5.6508 | 0.29 | 2.62E+04 | | 5.65E+00 |
| 26 | 15.8 | 390.7 | 2 | 2.2780 | 0.34 | 2.62E+04 | | 2.28E+00 |
| 27 | 17.4 | 206.4 | 2 | 4.3120 | 0.34 | 2.62E+04 | | 4.31E+00 |
| 28 | 24.7 | 185.9 | 3 | 4.7875 | 0.35 | 2.62E+04 | | 4.79E+00 |
| 29 | 17 | 211.4 | 2 | 4.2100 | 0.35 | 2.62E+04 | | 4.21E+00 |
| 30 | 21.6 | 103.7 | 2 | 8.5824 | 0.35 | 2.62E+04 | | 8.58E+00 |
| 31 | 21 | 302.7 | 2 | 2.9402 | 0.35 | 2.62E+04 | | 2.94E+00 |
| 32 | 27.6 | 78.39 | 3 | 11.3535 | 0.35 | 2.62E+04 | | 1.14E+01 |
| 33 | 8.63 | 314 | 1 | 2.8344 | 0.25 | 2.62E+04 | | 2.83E+00 |
| 34 | 13 | 251.7 | 1 | 3.5360 | 0.31 | 2.62E+04 | | 3.54E+00 |
| 35 | 15 | 510.8 | 1 | 1.7424 | 0.31 | 2.62E+04 | | 1.74E+00 |
| 36 | 27.1 | 101.9 | 2 | 8.7341 | 0.26 | 2.62E+04 | | 8.73E+00 |
| 37 | 18.1 | 118.7 | 2 | 7.4979 | 0.33 | 2.62E+04 | | 7.50E+00 |
| 38 | 11.7 | 979.7 | 1 | 0.9084 | 0.28 | 2.62E+04 | | 9.08E-01 |
| 39 | 42.4 | 95.35 | 5 | 9.3340 | 0.35 | 2.62E+04 | | 9.33E+00 |
| 40 | 29 | 6.59E+01 | 3 | 13.5156 | 0.35 | 2.62E+04 | | 1.35E+01 |
| 41 | 59.2 | 155.7 | 6 | 5.7161 | 0.35 | 2.62E+04 | | 5.72E+00 |
| 42 | 22.4 | 444.7 | 2 | 2.0013 | 0.29 | 2.62E+04 | | 2.00E+00 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 291.1 | 2 | 3.0574 | 0.35 | 2.62E+04 | | 3.06E+00 |
| 44 | 15 | 479.3 | 1 | 1.8569 | 0.33 | 2.62E+04 | | 1.86E+00 |
| 45 | 13.2 | 617.7 | 1 | 1.4408 | 0.28 | 2.62E+04 | | 1.44E+00 |
| 46 | 40.5 | 53.03 | 4 | 16.7830 | 0.35 | 2.62E+04 | | 1.68E+01 |
| 47 | 45 | 246.6 | 5 | 3.6091 | 0.35 | 2.62E+04 | | 3.61E+00 |
| 48 | 14.9 | 599.5 | 2 | 1.4846 | 0.34 | 2.62E+04 | | 1.48E+00 |
| 49 | 5 | 437.7 | 1 | 2.0334 | 0.35 | 2.62E+04 | | 2.03E+00 |
| 50 | 26.5 | 179.6 | 3 | 4.9555 | 0.35 | 2.62E+04 | | 4.96E+00 |
| 51 | 9.44 | 590.2 | 1 | 1.5080 | 0.25 | 2.62E+04 | | 1.51E+00 |
| 52 | 15.5 | 139.5 | 2 | 6.3799 | 0.29 | 2.62E+04 | | 6.38E+00 |
| 53 | 36.6 | 59.97 | 4 | 14.8408 | 0.35 | 2.62E+04 | | 1.48E+01 |
| 54 | 33.6 | 70.64 | 4 | 12.5991 | 0.35 | 2.62E+04 | | 1.26E+01 |
| 55 | 41.2 | 120.9 | 5 | 7.3615 | 0.35 | 2.62E+04 | | 7.36E+00 |
| 56 | 52.4 | 137.8 | 6 | 6.4586 | 0.35 | 2.62E+04 | | 6.46E+00 |
| 57 | 23 | 87.31 | 3 | 10.1936 | 0.32 | 2.62E+04 | | 1.02E+01 |
| 58 | 14.7 | 470.1 | 1 | 1.8932 | 0.35 | 2.62E+04 | | 1.89E+00 |
| 59 | 16.2 | 615.7 | 2 | 1.4455 | 0.33 | 2.62E+04 | | 1.45E+00 |
| 60 | 19.4 | 317.1 | 2 | 2.8067 | 0.35 | 2.62E+04 | | 2.81E+00 |
| 61 | 23.5 | 191.6 | 3 | 4.6451 | 0.35 | 2.62E+04 | | 4.65E+00 |
| 62 | 37 | 192.2 | 4 | 4.6306 | 0.33 | 2.62E+04 | | 4.63E+00 |
| 63 | 24.2 | 254.3 | 3 | 3.4998 | 0.33 | 2.62E+04 | | 3.50E+00 |
| 64 | 29.8 | 233.2 | 3 | 3.8165 | 0.35 | 2.62E+04 | | 3.82E+00 |
| 65 | 38.4 | 265.2 | 4 | 3.3560 | 0.3 | 2.62E+04 | | 3.36E+00 |
| 66 | 5.13 | 227.1 | 1 | 3.9190 | 0.26 | 2.62E+04 | | 3.92E+00 |
| 67 | 14.2 | 231.6 | 2 | 3.8428 | 0.34 | 2.62E+04 | | 3.84E+00 |
| 68 | 25.5 | 287.5 | 2 | 3.0957 | 0.35 | 2.62E+04 | | 3.10E+00 |
| 69 | 26.1 | 323.7 | 3 | 2.7495 | 0.33 | 2.62E+04 | | 2.75E+00 |
| 70 | 34 | 135.6 | 3 | 6.5634 | 0.34 | 2.62E+04 | | 6.56E+00 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 2.54E+02 | 5.47E+00 | 5.47E+00 |
| | std. dev. | 1.75E+02 | 3.92E+00 | 3.92E+00 |
| | max | 9.80E+02 | 1.93E+01 | 1.93E+01 |
| | min | 4.61E+01 | 9.08E-01 | 9.08E-01 |
| | median | 2.13E+02 | 4.18E+00 | 4.18E+00 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 4.18E+00 | 4.18E+00 |
| | 55 | 3.92E+00 | 3.92E+00 |
| | 60 | 3.65E+00 | 3.65E+00 |
| | 65 | 3.38E+00 | 3.38E+00 |
| | 70 | 3.08E+00 | 3.08E+00 |
| | 75 | 2.81E+00 | 2.81E+00 |
| | 80 | 2.27E+00 | 2.27E+00 |
| | 85 | 2.09E+00 | 2.09E+00 |
| | **90** | **1.85E+00** | **1.85E+00** |
| | 95 | 1.50E+00 | 1.50E+00 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 1 |
| Bulk density (g/cm^3) | 1.4 |
| Chemical | Napthalene |
| MCL (mg/l) | 0.067 |
| Da (cm^2/sec) | 7.22E-02 |
| Henry's Law Constant (m^3-atm/mole) | 4.83E-04 |
| log Kow | 3.3 |
| Koc (ml/g) | 1257.01 |
| Solubility (mg/l) | 31.7 |
| Chemical Density (g/cm^3) | 1.16 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 5.102 | 63 | 1.3132 | 0.32 | 8.32E+01 | | 1.31E+00 |
| 2 | 17.8 | 18.97 | 31 | 0.3532 | 0.28 | 8.32E+01 | | 3.53E-01 |
| 3 | 13 | 19.52 | 7 | 0.3432 | 0.32 | 8.32E+01 | | 3.43E-01 |
| 4 | 51.1 | 5.639 | 109 | 1.1882 | 0.34 | 8.32E+01 | | 1.19E+00 |
| 5 | 32.6 | 4.588 | 71 | 1.4603 | 0.34 | 8.32E+01 | | 1.46E+00 |
| 6 | 39.4 | 4.666 | 76 | 1.4359 | 0.32 | 8.32E+01 | | 1.44E+00 |
| 7 | 34.6 | 7.126 | 79 | 0.9402 | 0.3 | 8.32E+01 | | 9.40E-01 |
| 8 | 32 | 3.243 | 61 | 2.0660 | 0.25 | 8.32E+01 | | 2.07E+00 |
| 9 | 28.1 | 8.631 | 57 | 0.7763 | 0.32 | 8.32E+01 | | 7.76E-01 |
| 10 | 30.6 | 1.705 | 72 | 3.9296 | 0.33 | 8.32E+01 | | 3.93E+00 |
| 11 | 44 | 8.333 | 102 | 0.8040 | 0.33 | 8.32E+01 | | 8.04E-01 |
| 12 | 20.3 | 9.42 | 51 | 0.7113 | 0.31 | 8.32E+01 | | 7.11E-01 |
| 13 | 31.3 | 12.81 | 53 | 0.5230 | 0.31 | 8.32E+01 | | 5.23E-01 |
| 14 | 30.2 | 2.734 | 57 | 2.4506 | 0.34 | 8.32E+01 | | 2.45E+00 |
| 15 | 19.2 | 14.96 | 38 | 0.4479 | 0.33 | 8.32E+01 | | 4.48E-01 |
| 16 | 9 | 31.7 | 11 | 0.2114 | 0.25 | 8.32E+01 | | 2.11E-01 |
| 17 | 21.5 | 10.73 | 45 | 0.6244 | 0.31 | 8.32E+01 | | 6.24E-01 |
| 18 | 15 | 25.74 | 10 | 0.2603 | 0.27 | 8.32E+01 | | 2.60E-01 |
| 19 | 35.2 | 6.912 | 75 | 0.9693 | 0.33 | 8.32E+01 | | 9.69E-01 |
| 20 | 18.7 | 5.281 | 38 | 1.2687 | 0.35 | 8.32E+01 | | 1.27E+00 |
| 21 | 47.4 | 1.496 | 117 | 4.4786 | 0.35 | 8.32E+01 | | 4.48E+00 |
| 22 | 22.1 | 3.275 | 34 | 2.0458 | 0.33 | 8.32E+01 | | 2.05E+00 |
| 23 | 8.15 | 11.85 | 14 | 0.5654 | 0.25 | 8.32E+01 | | 5.65E-01 |
| 24 | 20.2 | 2.312 | 47 | 2.8979 | 0.35 | 8.32E+01 | | 2.90E+00 |
| 25 | 12 | 13.55 | 7 | 0.4945 | 0.29 | 8.32E+01 | | 4.94E-01 |
| 26 | 15.8 | 9.385 | 36 | 0.7139 | 0.34 | 8.32E+01 | | 7.14E-01 |
| 27 | 17.4 | 6.65 | 37 | 1.0075 | 0.34 | 8.32E+01 | | 1.01E+00 |
| 28 | 24.7 | 6.031 | 53 | 1.1109 | 0.35 | 8.32E+01 | | 1.11E+00 |
| 29 | 17 | 7.727 | 33 | 0.8671 | 0.35 | 8.32E+01 | | 8.67E-01 |
| 30 | 21.6 | 3.045 | 32 | 2.2003 | 0.35 | 8.32E+01 | | 2.20E+00 |
| 31 | 21 | 11.13 | 42 | 0.6020 | 0.35 | 8.32E+01 | | 6.02E-01 |
| 32 | 27.6 | 1.646 | 64 | 4.0705 | 0.35 | 8.32E+01 | | 4.07E+00 |
| 33 | 8.63 | 16.53 | 20 | 0.4053 | 0.25 | 8.32E+01 | | 4.05E-01 |
| 34 | 13 | 16.39 | 8 | 0.4088 | 0.31 | 8.32E+01 | | 4.09E-01 |
| 35 | 15 | 27.5 | 11 | 0.2436 | 0.31 | 8.32E+01 | | 2.44E-01 |
| 36 | 27.1 | 3.663 | 48 | 1.8291 | 0.26 | 8.32E+01 | | 1.83E+00 |
| 37 | 18.1 | 3.297 | 40 | 2.0322 | 0.33 | 8.32E+01 | | 2.03E+00 |
| 38 | 11.7 | 20.5 | 22 | 0.3268 | 0.28 | 8.32E+01 | | 3.27E-01 |
| 39 | 42.4 | 2.816 | 97 | 2.3793 | 0.35 | 8.32E+01 | | 2.38E+00 |
| 40 | 29 | 3.28E-01 | 60 | 20.4144 | 0.35 | 8.32E+01 | | 2.04E+01 |
| 41 | 59.2 | 4.513 | 130 | 1.4846 | 0.35 | 8.32E+01 | | 1.48E+00 |
| 42 | 22.4 | 16.36 | 39 | 0.4095 | 0.29 | 8.32E+01 | | 4.10E-01 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 9.774 | 37 | 0.6855 | 0.35 | 8.32E+01 | | 6.85E-01 |
| 44 | 15 | 25.46 | 11 | 0.2632 | 0.33 | 8.32E+01 | | 2.63E-01 |
| 45 | 13.2 | 10.31 | 26 | 0.6499 | 0.28 | 8.32E+01 | | 6.50E-01 |
| 46 | 40.5 | 1.186 | 97 | 5.6492 | 0.35 | 8.32E+01 | | 5.65E+00 |
| 47 | 45 | 9.112 | 96 | 0.7353 | 0.35 | 8.32E+01 | | 7.35E-01 |
| 48 | 14.9 | 22.09 | 33 | 0.3033 | 0.34 | 8.32E+01 | | 3.03E-01 |
| 49 | 5 | 29.26 | 10 | 0.2290 | 0.35 | 8.32E+01 | | 2.29E-01 |
| 50 | 26.5 | 5.508 | 57 | 1.2164 | 0.35 | 8.32E+01 | | 1.22E+00 |
| 51 | 9.44 | 27.9 | 14 | 0.2401 | 0.25 | 8.32E+01 | | 2.40E-01 |
| 52 | 15.5 | 4.141 | 41 | 1.6180 | 0.29 | 8.32E+01 | | 1.62E+00 |
| 53 | 36.6 | 1.392 | 90 | 4.8132 | 0.35 | 8.32E+01 | | 4.81E+00 |
| 54 | 33.6 | 1.49 | 80 | 4.4966 | 0.35 | 8.32E+01 | | 4.50E+00 |
| 55 | 41.2 | 4.652 | 87 | 1.4402 | 0.35 | 8.32E+01 | | 1.44E+00 |
| 56 | 52.4 | 4.872 | 126 | 1.3752 | 0.35 | 8.32E+01 | | 1.38E+00 |
| 57 | 23 | 3.293 | 51 | 2.0346 | 0.32 | 8.32E+01 | | 2.03E+00 |
| 58 | 14.7 | 24.71 | 14 | 0.2711 | 0.35 | 8.32E+01 | | 2.71E-01 |
| 59 | 16.2 | 23.25 | 33 | 0.2882 | 0.33 | 8.32E+01 | | 2.88E-01 |
| 60 | 19.4 | 10.43 | 41 | 0.6424 | 0.35 | 8.32E+01 | | 6.42E-01 |
| 61 | 23.5 | 6.38 | 51 | 1.0502 | 0.35 | 8.32E+01 | | 1.05E+00 |
| 62 | 37 | 5.626 | 80 | 1.1909 | 0.33 | 8.32E+01 | | 1.19E+00 |
| 63 | 24.2 | 10.27 | 49 | 0.6524 | 0.33 | 8.32E+01 | | 6.52E-01 |
| 64 | 29.8 | 8.581 | 50 | 0.7808 | 0.35 | 8.32E+01 | | 7.81E-01 |
| 65 | 38.4 | 8.366 | 82 | 0.8009 | 0.3 | 8.32E+01 | | 8.01E-01 |
| 66 | 5.13 | 26.29 | 7 | 0.2548 | 0.26 | 8.32E+01 | | 2.55E-01 |
| 67 | 14.2 | 6.03 | 31 | 1.1111 | 0.34 | 8.32E+01 | | 1.11E+00 |
| 68 | 25.5 | 11.79 | 49 | 0.5683 | 0.35 | 8.32E+01 | | 5.68E-01 |
| 69 | 26.1 | 7.943 | 57 | 0.8435 | 0.33 | 8.32E+01 | | 8.44E-01 |
| 70 | 34 | 5.426 | 66 | 1.2348 | 0.34 | 8.32E+01 | | 1.23E+00 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 1.02E+01 | 1.55E+00 | 1.55E+00 |
| | std. dev. | 8.14E+00 | 2.58E+00 | 2.58E+00 |
| | max | 3.17E+01 | 2.04E+01 | 2.04E+01 |
| | min | 3.28E-01 | 2.11E-01 | 2.11E-01 |
| | median | 7.84E+00 | 8.55E-01 | 8.55E-01 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 8.55E-01 | 8.55E-01 |
| | 55 | 7.82E-01 | 7.82E-01 |
| | 60 | 7.13E-01 | 7.13E-01 |
| | 65 | 6.50E-01 | 6.50E-01 |
| | 70 | 5.92E-01 | 5.92E-01 |
| | 75 | 5.02E-01 | 5.02E-01 |
| | 80 | 4.08E-01 | 4.08E-01 |
| | 85 | 3.33E-01 | 3.33E-01 |
| | **90** | **2.70E-01** | **2.70E-01** |
| | 95 | 2.49E-01 | 2.49E-01 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 1 |
| Bulk density (g/cm^3) | 1.4 |
| Chemical | PCE |
| MCL (mg/l) | 0.005 |
| Da (cm^2/sec) | 7.81E-02 |
| Henry's Law Constant (m^3-atm/mole) | 1.49E-02 |
| log Kow | 3.4 |
| Koc (ml/g) | 866.96 |
| Solubility (mg/l) | 150 |
| Chemical Density (g/cm^3) | 1.62 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 6.557E-07 | 42 | 762543.8463 | 0.32 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 2 | 17.8 | 0.02898 | 22 | 17.2533 | 0.28 | 2.93E+02 | | 1.73E+01 |
| 3 | 13 | 4.651 | 5 | 0.1075 | 0.32 | 2.93E+02 | | 1.08E-01 |
| 4 | 51.1 | 0.007715 | 81 | 64.8088 | 0.34 | 2.93E+02 | | 6.48E+01 |
| 5 | 32.6 | 9.786E-06 | 53 | 51093.3987 | 0.34 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 6 | 39.4 | 0.01954 | 56 | 25.5885 | 0.32 | 2.93E+02 | | 2.56E+01 |
| 7 | 34.6 | 0.003017 | 55 | 165.7275 | 0.3 | 2.93E+02 | | 1.66E+02 |
| 8 | 32 | 0.2402 | 44 | 2.0816 | 0.25 | 2.93E+02 | | 2.08E+00 |
| 9 | 28.1 | 0.0001211 | 42 | 4128.8192 | 0.32 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 10 | 30.6 | 1E-10 | 51 | 5000000000.0000 | 0.33 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 11 | 44 | 0.01185 | 75 | 42.1941 | 0.33 | 2.93E+02 | | 4.22E+01 |
| 12 | 20.3 | 0.0008661 | 37 | 577.3005 | 0.31 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 13 | 31.3 | 0.3082 | 38 | 1.6223 | 0.31 | 2.93E+02 | | 1.62E+00 |
| 14 | 30.2 | 0.01932 | 41 | 25.8799 | 0.34 | 2.93E+02 | | 2.59E+01 |
| 15 | 19.2 | 0.00005979 | 27 | 8362.6024 | 0.33 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 16 | 9 | 7.975 | 7 | 0.0627 | 0.25 | 2.93E+02 | | 6.27E-02 |
| 17 | 21.5 | 0.00003427 | 33 | 14590.0204 | 0.31 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 18 | 15 | 4.705 | 7 | 0.1063 | 0.27 | 2.93E+02 | | 1.06E-01 |
| 19 | 35.2 | 0.00008378 | 55 | 5968.0115 | 0.33 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 20 | 18.7 | 1E-10 | 25 | 5000000000.0000 | 0.35 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 21 | 47.4 | 0.00001117 | 86 | 44762.7574 | 0.35 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 22 | 22.1 | 0.06035 | 25 | 8.2850 | 0.33 | 2.93E+02 | | 8.29E+00 |
| 23 | 8.15 | 0.4108 | 9 | 1.2171 | 0.25 | 2.93E+02 | | 1.22E+00 |
| 24 | 20.2 | 1E-10 | 33 | 5000000000.0000 | 0.35 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 25 | 12 | 3.503 | 5 | 0.1427 | 0.29 | 2.93E+02 | | 1.43E-01 |
| 26 | 15.8 | 1E-10 | 24 | 5000000000.0000 | 0.34 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 27 | 17.4 | 1E-10 | 26 | 5000000000.0000 | 0.34 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 28 | 24.7 | 0.00001194 | 39 | 41876.0469 | 0.35 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 29 | 17 | 6.367E-06 | 23 | 78529.9199 | 0.35 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 30 | 21.6 | 0.03083 | 23 | 16.2180 | 0.35 | 2.93E+02 | | 1.62E+01 |
| 31 | 21 | 0.0001522 | 31 | 3285.1511 | 0.35 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 32 | 27.6 | 1E-10 | 46 | 5000000000.0000 | 0.35 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 33 | 8.63 | 0.0009079 | 14 | 550.7214 | 0.25 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 34 | 13 | 3.242 | 5 | 0.1542 | 0.31 | 2.93E+02 | | 1.54E-01 |
| 35 | 15 | 5.543 | 8 | 0.0902 | 0.31 | 2.93E+02 | | 9.02E-02 |
| 36 | 27.1 | 0.2583 | 35 | 1.9357 | 0.26 | 2.93E+02 | | 1.94E+00 |
| 37 | 18.1 | 1.336E-07 | 29 | 3742514.9701 | 0.33 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 38 | 11.7 | 0.00004916 | 15 | 10170.8706 | 0.28 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 39 | 42.4 | 1.048E-08 | 73 | 47709923.6641 | 0.35 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 40 | 29 | 1.00E-10 | 39 | 5000000000.0000 | 0.35 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 41 | 59.2 | 0.00001119 | 94 | 44682.7525 | 0.35 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 42 | 22.4 | 1.673 | 28 | 0.2989 | 0.29 | 2.93E+02 | | 2.99E-01 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 0.08353 | 27 | 5.9859 | 0.35 | 2.93E+02 | | 5.99E+00 |
| 44 | 15 | 4.372 | 7 | 0.1144 | 0.33 | 2.93E+02 | | 1.14E-01 |
| 45 | 13.2 | 0.00008433 | 18 | 5929.0881 | 0.28 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 46 | 40.5 | 1E-10 | 70 | 5000000000.0000 | 0.35 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 47 | 45 | 0.1201 | 70 | 4.1632 | 0.35 | 2.93E+02 | | 4.16E+00 |
| 48 | 14.9 | 0.0003628 | 24 | 1378.1698 | 0.34 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 49 | 5 | 0.1023 | 7 | 4.8876 | 0.35 | 2.93E+02 | | 4.89E+00 |
| 50 | 26.5 | 5.233E-06 | 42 | 95547.4871 | 0.35 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 51 | 9.44 | 2.926 | 9 | 0.1709 | 0.25 | 2.93E+02 | | 1.71E-01 |
| 52 | 15.5 | 1E-10 | 28 | 5000000000.0000 | 0.29 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 53 | 36.6 | 1E-10 | 64 | 5000000000.0000 | 0.35 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 54 | 33.6 | 1E-10 | 58 | 5000000000.0000 | 0.35 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 55 | 41.2 | 0.02904 | 64 | 17.2176 | 0.35 | 2.93E+02 | | 1.72E+01 |
| 56 | 52.4 | 0.0008081 | 93 | 618.7353 | 0.35 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 57 | 23 | 0.00002386 | 37 | 20955.5742 | 0.32 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 58 | 14.7 | 6.057 | 10 | 0.0825 | 0.35 | 2.93E+02 | | 8.25E-02 |
| 59 | 16.2 | 0.02846 | 24 | 17.5685 | 0.33 | 2.93E+02 | | 1.76E+01 |
| 60 | 19.4 | 6.288E-07 | 30 | 795165.3944 | 0.35 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 61 | 23.5 | 0.00001902 | 37 | 26288.1178 | 0.35 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 62 | 37 | 3.658E-06 | 59 | 136686.7141 | 0.33 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 63 | 24.2 | 0.0004003 | 36 | 1249.0632 | 0.33 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 64 | 29.8 | 0.03813 | 37 | 13.1130 | 0.35 | 2.93E+02 | | 1.31E+01 |
| 65 | 38.4 | 0.001599 | 59 | 312.6954 | 0.3 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 66 | 5.13 | 1.773 | 4 | 0.2820 | 0.26 | 2.93E+02 | | 2.82E-01 |
| 67 | 14.2 | 1E-10 | 21 | 5000000000.0000 | 0.34 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 68 | 25.5 | 0.00007703 | 36 | 6490.9775 | 0.35 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 69 | 26.1 | 2.326E-06 | 38 | 214961.3070 | 0.33 | 2.93E+02 | SCN>SSL | 2.93E+02 |
| 70 | 34 | 0.04373 | 48 | 11.4338 | 0.34 | 2.93E+02 | | 1.14E+01 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 6.90E-01 | 8.58E+08 | 1.74E+02 |
| | std. dev. | 1.70E+00 | 1.90E+09 | 1.40E+02 |
| | max | 7.98E+00 | 5.00E+09 | 2.93E+02 |
| | min | 1.00E-10 | 6.27E-02 | 6.27E-02 |
| | median | 3.82E-04 | 1.31E+03 | 2.93E+02 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 1.31E+03 | 2.93E+02 |
| | 55 | 5.52E+02 | 2.93E+02 |
| | 60 | 5.58E+01 | 5.58E+01 |
| | 65 | 1.88E+01 | 1.88E+01 |
| | 70 | 1.53E+01 | 1.53E+01 |
| | 75 | 6.56E+00 | 6.56E+00 |
| | 80 | 2.05E+00 | 2.05E+00 |
| | 85 | 6.20E-01 | 6.20E-01 |
| | **90** | **1.53E-01** | **1.53E-01** |
| | 95 | 1.07E-01 | 1.07E-01 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 1 |
| Bulk density (g/cm^3) | 1.4 |
| Chemical | Phenol |
| MCL (mg/l) | 4.7 |
| Da (cm^2/sec) | 8.75E-02 |
| Henry's Law Constant (m^3-atm/mole) | 3.97E-07 |
| log Kow | 1.46 |
| Koc (ml/g) | 18.16 |
| Solubility (mg/l) | 87000 |
| Chemical Density (g/cm^3) | 1.06 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 177.1 | 4 | 2.6539 | 0.32 | 1.25E+04 | | 2.65E+00 |
| 2 | 17.8 | 388.6 | 2 | 1.2095 | 0.28 | 1.25E+04 | | 1.21E+00 |
| 3 | 13 | 238.8 | 1 | 1.9682 | 0.32 | 1.25E+04 | | 1.97E+00 |
| 4 | 51.1 | 143.2 | 6 | 3.2821 | 0.34 | 1.25E+04 | | 3.28E+00 |
| 5 | 32.6 | 103.6 | 4 | 4.5367 | 0.34 | 1.25E+04 | | 4.54E+00 |
| 6 | 39.4 | 99.18 | 5 | 4.7389 | 0.32 | 1.25E+04 | | 4.74E+00 |
| 7 | 34.6 | 169.2 | 5 | 2.7778 | 0.3 | 1.25E+04 | | 2.78E+00 |
| 8 | 32 | 71.39 | 4 | 6.5836 | 0.25 | 1.25E+04 | | 6.58E+00 |
| 9 | 28.1 | 178 | 4 | 2.6404 | 0.32 | 1.25E+04 | | 2.64E+00 |
| 10 | 30.6 | 54.79 | 4 | 8.5782 | 0.33 | 1.25E+04 | | 8.58E+00 |
| 11 | 44 | 172.8 | 7 | 2.7199 | 0.33 | 1.25E+04 | | 2.72E+00 |
| 12 | 20.3 | 210 | 4 | 2.2381 | 0.31 | 1.25E+04 | | 2.24E+00 |
| 13 | 31.3 | 248.2 | 3 | 1.8936 | 0.31 | 1.25E+04 | | 1.89E+00 |
| 14 | 30.2 | 77.05 | 4 | 6.0999 | 0.34 | 1.25E+04 | | 6.10E+00 |
| 15 | 19.2 | 350 | 3 | 1.3429 | 0.33 | 1.25E+04 | | 1.34E+00 |
| 16 | 9 | 525.2 | 1 | 0.8949 | 0.25 | 1.25E+04 | | 8.95E-01 |
| 17 | 21.5 | 244.6 | 3 | 1.9215 | 0.31 | 1.25E+04 | | 1.92E+00 |
| 18 | 15 | 422.8 | 1 | 1.1116 | 0.27 | 1.25E+04 | | 1.11E+00 |
| 19 | 35.2 | 150.7 | 5 | 3.1188 | 0.33 | 1.25E+04 | | 3.12E+00 |
| 20 | 18.7 | 231.7 | 3 | 2.0285 | 0.35 | 1.25E+04 | | 2.03E+00 |
| 21 | 47.4 | 44.05 | 7 | 10.6697 | 0.35 | 1.25E+04 | | 1.07E+01 |
| 22 | 22.1 | 98.22 | 2 | 4.7852 | 0.33 | 1.25E+04 | | 4.79E+00 |
| 23 | 8.15 | 267.1 | 1 | 1.7596 | 0.25 | 1.25E+04 | | 1.76E+00 |
| 24 | 20.2 | 79.41 | 3 | 5.9187 | 0.35 | 1.25E+04 | | 5.92E+00 |
| 25 | 12 | 169.4 | 1 | 2.7745 | 0.29 | 1.25E+04 | | 2.77E+00 |
| 26 | 15.8 | 341.9 | 3 | 1.3747 | 0.34 | 1.25E+04 | | 1.37E+00 |
| 27 | 17.4 | 165 | 3 | 2.8485 | 0.34 | 1.25E+04 | | 2.85E+00 |
| 28 | 24.7 | 134.7 | 4 | 3.4892 | 0.35 | 1.25E+04 | | 3.49E+00 |
| 29 | 17 | 216.3 | 2 | 2.1729 | 0.35 | 1.25E+04 | | 2.17E+00 |
| 30 | 21.6 | 103.7 | 2 | 4.5323 | 0.35 | 1.25E+04 | | 4.53E+00 |
| 31 | 21 | 261.6 | 3 | 1.7966 | 0.35 | 1.25E+04 | | 1.80E+00 |
| 32 | 27.6 | 69.75 | 4 | 6.7384 | 0.35 | 1.25E+04 | | 6.74E+00 |
| 33 | 8.63 | 259.6 | 2 | 1.8105 | 0.25 | 1.25E+04 | | 1.81E+00 |
| 34 | 13 | 287.1 | 1 | 1.6371 | 0.31 | 1.25E+04 | | 1.64E+00 |
| 35 | 15 | 468.7 | 1 | 1.0028 | 0.31 | 1.25E+04 | | 1.00E+00 |
| 36 | 27.1 | 83.98 | 3 | 5.5966 | 0.26 | 1.25E+04 | | 5.60E+00 |
| 37 | 18.1 | 106.6 | 3 | 4.4090 | 0.33 | 1.25E+04 | | 4.41E+00 |
| 38 | 11.7 | 447.8 | 2 | 1.0496 | 0.28 | 1.25E+04 | | 1.05E+00 |
| 39 | 42.4 | 90.53 | 6 | 5.1916 | 0.35 | 1.25E+04 | | 5.19E+00 |
| 40 | 29 | 5.22E+01 | 4 | 8.9987 | 0.35 | 1.25E+04 | | 9.00E+00 |
| 41 | 59.2 | 134.4 | 7 | 3.4970 | 0.35 | 1.25E+04 | | 3.50E+00 |
| 42 | 22.4 | 352.2 | 3 | 1.3345 | 0.29 | 1.25E+04 | | 1.33E+00 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 240.9 | 3 | 1.9510 | 0.35 | 1.25E+04 | | 1.95E+00 |
| 44 | 15 | 448 | 1 | 1.0491 | 0.33 | 1.25E+04 | | 1.05E+00 |
| 45 | 13.2 | 249.7 | 2 | 1.8823 | 0.28 | 1.25E+04 | | 1.88E+00 |
| 46 | 40.5 | 45.18 | 6 | 10.4028 | 0.35 | 1.25E+04 | | 1.04E+01 |
| 47 | 45 | 173.6 | 7 | 2.7074 | 0.35 | 1.25E+04 | | 2.71E+00 |
| 48 | 14.9 | 521.2 | 3 | 0.9018 | 0.34 | 1.25E+04 | | 9.02E-01 |
| 49 | 5 | 339.9 | 1 | 1.3828 | 0.35 | 1.25E+04 | | 1.38E+00 |
| 50 | 26.5 | 141 | 4 | 3.3333 | 0.35 | 1.25E+04 | | 3.33E+00 |
| 51 | 9.44 | 526.4 | 1 | 0.8929 | 0.25 | 1.25E+04 | | 8.93E-01 |
| 52 | 15.5 | 129 | 3 | 3.6434 | 0.29 | 1.25E+04 | | 3.64E+00 |
| 53 | 36.6 | 43.49 | 5 | 10.8071 | 0.35 | 1.25E+04 | | 1.08E+01 |
| 54 | 33.6 | 58.57 | 5 | 8.0246 | 0.35 | 1.25E+04 | | 8.02E+00 |
| 55 | 41.2 | 107.1 | 6 | 4.3884 | 0.35 | 1.25E+04 | | 4.39E+00 |
| 56 | 52.4 | 114.2 | 8 | 4.1156 | 0.35 | 1.25E+04 | | 4.12E+00 |
| 57 | 23 | 75.53 | 3 | 6.2227 | 0.32 | 1.25E+04 | | 6.22E+00 |
| 58 | 14.7 | 360.5 | 2 | 1.3037 | 0.35 | 1.25E+04 | | 1.30E+00 |
| 59 | 16.2 | 518.3 | 3 | 0.9068 | 0.33 | 1.25E+04 | | 9.07E-01 |
| 60 | 19.4 | 272.6 | 3 | 1.7241 | 0.35 | 1.25E+04 | | 1.72E+00 |
| 61 | 23.5 | 139.1 | 3 | 3.3789 | 0.35 | 1.25E+04 | | 3.38E+00 |
| 62 | 37 | 159.2 | 5 | 2.9523 | 0.33 | 1.25E+04 | | 2.95E+00 |
| 63 | 24.2 | 212.2 | 3 | 2.2149 | 0.33 | 1.25E+04 | | 2.21E+00 |
| 64 | 29.8 | 206.5 | 3 | 2.2760 | 0.35 | 1.25E+04 | | 2.28E+00 |
| 65 | 38.4 | 211.3 | 5 | 2.2243 | 0.3 | 1.25E+04 | | 2.22E+00 |
| 66 | 5.13 | 256.4 | 1 | 1.8331 | 0.26 | 1.25E+04 | | 1.83E+00 |
| 67 | 14.2 | 238.9 | 2 | 1.9674 | 0.34 | 1.25E+04 | | 1.97E+00 |
| 68 | 25.5 | 273 | 3 | 1.7216 | 0.35 | 1.25E+04 | | 1.72E+00 |
| 69 | 26.1 | 253.4 | 4 | 1.8548 | 0.33 | 1.25E+04 | | 1.85E+00 |
| 70 | 34 | 113.9 | 4 | 4.1264 | 0.34 | 1.25E+04 | | 4.13E+00 |

| statistics | | | | |
|---|---|---|---|---|
| | mean | 2.13E+02 | 3.37E+00 | 3.37E+00 |
| | std. dev. | 1.31E+02 | 2.46E+00 | 2.46E+00 |
| | max | 5.26E+02 | 1.08E+01 | 1.08E+01 |
| | min | 4.35E+01 | 8.93E-01 | 8.93E-01 |
| | median | 1.78E+02 | 2.65E+00 | 2.65E+00 |

| percentiles | | | |
|---|---|---|---|
| | 50 | 2.65E+00 | 2.65E+00 |
| | 55 | 2.23E+00 | 2.23E+00 |
| | 60 | 2.00E+00 | 2.00E+00 |
| | 65 | 1.93E+00 | 1.93E+00 |
| | 70 | 1.85E+00 | 1.85E+00 |
| | 75 | 1.77E+00 | 1.77E+00 |
| | 80 | 1.59E+00 | 1.59E+00 |
| | 85 | 1.34E+00 | 1.34E+00 |
| | **90** | **1.11E+00** | **1.11E+00** |
| | 95 | 9.50E-01 | 9.50E-01 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 1 |
| Bulk density (g/cm^3) | 1.4 |
| Chemical | Styrene |
| MCL (mg/l) | 0.1 |
| Da (cm^2/sec) | 7.21E-02 |
| Henry's Law Constant (m^3-atm/mole) | 2.81E-03 |
| log Kow | 2.95 |
| Koc (ml/g) | 561.48 |
| Solubility (mg/l) | 310 |
| Chemical Density (g/cm^3) | 0.9 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.8309 | 28 | 12.0351 | 0.32 | 3.88E+02 | | 1.20E+01 |
| 2 | 17.8 | 12.78 | 15 | 0.7825 | 0.28 | 3.88E+02 | | 7.82E-01 |
| 3 | 13 | 13.23 | 4 | 0.7559 | 0.32 | 3.88E+02 | | 7.56E-01 |
| 4 | 51.1 | 3.608 | 52 | 2.7716 | 0.34 | 3.88E+02 | | 2.77E+00 |
| 5 | 32.6 | 1.084 | 34 | 9.2251 | 0.34 | 3.88E+02 | | 9.23E+00 |
| 6 | 39.4 | 3.41 | 36 | 2.9326 | 0.32 | 3.88E+02 | | 2.93E+00 |
| 7 | 34.6 | 4.466 | 37 | 2.2391 | 0.3 | 3.88E+02 | | 2.24E+00 |
| 8 | 32 | 3.66 | 29 | 2.7322 | 0.25 | 3.88E+02 | | 2.73E+00 |
| 9 | 28.1 | 2.842 | 27 | 3.5186 | 0.32 | 3.88E+02 | | 3.52E+00 |
| 10 | 30.6 | 0.1116 | 34 | 89.6057 | 0.33 | 3.88E+02 | | 8.96E+01 |
| 11 | 44 | 6.212 | 49 | 1.6098 | 0.33 | 3.88E+02 | | 1.61E+00 |
| 12 | 20.3 | 4.506 | 24 | 2.2193 | 0.31 | 3.88E+02 | | 2.22E+00 |
| 13 | 31.3 | 11.25 | 26 | 0.8889 | 0.31 | 3.88E+02 | | 8.89E-01 |
| 14 | 30.2 | 2.1 | 28 | 4.7619 | 0.34 | 3.88E+02 | | 4.76E+00 |
| 15 | 19.2 | 4.217 | 18 | 2.3714 | 0.33 | 3.88E+02 | | 2.37E+00 |
| 16 | 9 | 46.54 | 5 | 0.2149 | 0.25 | 3.88E+02 | | 2.15E-01 |
| 17 | 21.5 | 2.936 | 22 | 3.4060 | 0.31 | 3.88E+02 | | 3.41E+00 |
| 18 | 15 | 24.38 | 5 | 0.4102 | 0.27 | 3.88E+02 | | 4.10E-01 |
| 19 | 35.2 | 2.247 | 36 | 4.4504 | 0.33 | 3.88E+02 | | 4.45E+00 |
| 20 | 18.7 | 0.1219 | 18 | 82.0345 | 0.35 | 3.88E+02 | | 8.20E+01 |
| 21 | 47.4 | 0.3781 | 56 | 26.4480 | 0.35 | 3.88E+02 | | 2.64E+01 |
| 22 | 22.1 | 2.744 | 17 | 3.6443 | 0.33 | 3.88E+02 | | 3.64E+00 |
| 23 | 8.15 | 8.962 | 7 | 1.1158 | 0.25 | 3.88E+02 | | 1.12E+00 |
| 24 | 20.2 | 0.07302 | 22 | 136.9488 | 0.35 | 3.88E+02 | | 1.37E+02 |
| 25 | 12 | 7.63 | 4 | 1.3106 | 0.29 | 3.88E+02 | | 1.31E+00 |
| 26 | 15.8 | 0.7848 | 17 | 12.7421 | 0.34 | 3.88E+02 | | 1.27E+01 |
| 27 | 17.4 | 0.4326 | 18 | 23.1160 | 0.34 | 3.88E+02 | | 2.31E+01 |
| 28 | 24.7 | 1.389 | 25 | 7.1994 | 0.35 | 3.88E+02 | | 7.20E+00 |
| 29 | 17 | 1.549 | 16 | 6.4558 | 0.35 | 3.88E+02 | | 6.46E+00 |
| 30 | 21.6 | 2.37 | 16 | 4.2194 | 0.35 | 3.88E+02 | | 4.22E+00 |
| 31 | 21 | 3.465 | 21 | 2.8860 | 0.35 | 3.88E+02 | | 2.89E+00 |
| 32 | 27.6 | 0.05811 | 31 | 172.0874 | 0.35 | 3.88E+02 | | 1.72E+02 |
| 33 | 8.63 | 6.626 | 10 | 1.5092 | 0.25 | 3.88E+02 | | 1.51E+00 |
| 34 | 13 | 12.28 | 4 | 0.8143 | 0.31 | 3.88E+02 | | 8.14E-01 |
| 35 | 15 | 25.84 | 5 | 0.3870 | 0.31 | 3.88E+02 | | 3.87E-01 |
| 36 | 27.1 | 3.889 | 23 | 2.5714 | 0.26 | 3.88E+02 | | 2.57E+00 |
| 37 | 18.1 | 0.3994 | 19 | 25.0376 | 0.33 | 3.88E+02 | | 2.50E+01 |
| 38 | 11.7 | 4.791 | 11 | 2.0872 | 0.28 | 3.88E+02 | | 2.09E+00 |
| 39 | 42.4 | 0.2968 | 47 | 33.6927 | 0.35 | 3.88E+02 | | 3.37E+01 |
| 40 | 29 | 2.73E-04 | 27 | 36656.8915 | 0.35 | 3.88E+02 | SCN>SSL | 3.88E+02 |
| 41 | 59.2 | 1.124 | 61 | 8.8968 | 0.35 | 3.88E+02 | | 8.90E+00 |
| 42 | 22.4 | 14.96 | 19 | 0.6684 | 0.29 | 3.88E+02 | | 6.68E-01 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 7.124 | 18 | 1.4037 | 0.35 | 3.88E+02 | | 1.40E+00 |
| 44 | 15 | 23.7 | 5 | 0.4219 | 0.33 | 3.88E+02 | | 4.22E-01 |
| 45 | 13.2 | 1.578 | 11 | 6.3371 | 0.28 | 3.88E+02 | | 6.34E+00 |
| 46 | 40.5 | 0.07111 | 47 | 140.6272 | 0.35 | 3.88E+02 | | 1.41E+02 |
| 47 | 45 | 8.329 | 46 | 1.2006 | 0.35 | 3.88E+02 | | 1.20E+00 |
| 48 | 14.9 | 7.388 | 16 | 1.3535 | 0.34 | 3.88E+02 | | 1.35E+00 |
| 49 | 5 | 21.84 | 5 | 0.4579 | 0.35 | 3.88E+02 | | 4.58E-01 |
| 50 | 26.5 | 1.142 | 27 | 8.7566 | 0.35 | 3.88E+02 | | 8.76E+00 |
| 51 | 9.44 | 29.42 | 7 | 0.3399 | 0.25 | 3.88E+02 | | 3.40E-01 |
| 52 | 15.5 | 0.1831 | 20 | 54.6150 | 0.29 | 3.88E+02 | | 5.46E+01 |
| 53 | 36.6 | 0.09756 | 43 | 102.5010 | 0.35 | 3.88E+02 | | 1.03E+02 |
| 54 | 33.6 | 0.09279 | 39 | 107.7702 | 0.35 | 3.88E+02 | | 1.08E+02 |
| 55 | 41.2 | 3.645 | 42 | 2.7435 | 0.35 | 3.88E+02 | | 2.74E+00 |
| 56 | 52.4 | 2.424 | 61 | 4.1254 | 0.35 | 3.88E+02 | | 4.13E+00 |
| 57 | 23 | 0.8661 | 25 | 11.5460 | 0.32 | 3.88E+02 | | 1.15E+01 |
| 58 | 14.7 | 22.67 | 7 | 0.4411 | 0.35 | 3.88E+02 | | 4.41E-01 |
| 59 | 16.2 | 13.72 | 16 | 0.7289 | 0.33 | 3.88E+02 | | 7.29E-01 |
| 60 | 19.4 | 1.518 | 20 | 6.5876 | 0.35 | 3.88E+02 | | 6.59E+00 |
| 61 | 23.5 | 1.562 | 24 | 6.4020 | 0.35 | 3.88E+02 | | 6.40E+00 |
| 62 | 37 | 1.174 | 38 | 8.5179 | 0.33 | 3.88E+02 | | 8.52E+00 |
| 63 | 24.2 | 3.905 | 24 | 2.5608 | 0.33 | 3.88E+02 | | 2.56E+00 |
| 64 | 29.8 | 5.988 | 24 | 1.6700 | 0.35 | 3.88E+02 | | 1.67E+00 |
| 65 | 38.4 | 4.564 | 39 | 2.1911 | 0.3 | 3.88E+02 | | 2.19E+00 |
| 66 | 5.13 | 27.7 | 3 | 0.3610 | 0.26 | 3.88E+02 | | 3.61E-01 |
| 67 | 14.2 | 0.1086 | 15 | 92.0810 | 0.34 | 3.88E+02 | | 9.21E+01 |
| 68 | 25.5 | 3.456 | 23 | 2.8935 | 0.35 | 3.88E+02 | | 2.89E+00 |
| 69 | 26.1 | 1.491 | 26 | 6.7069 | 0.33 | 3.88E+02 | | 6.71E+00 |
| 70 | 34 | 4.212 | 32 | 2.3742 | 0.34 | 3.88E+02 | | 2.37E+00 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 6.44E+00 | 5.42E+02 | 2.38E+01 |
| | std. dev. | 8.90E+00 | 4.38E+03 | 5.79E+01 |
| | max | 4.65E+01 | 3.67E+04 | 3.88E+02 |
| | min | 2.73E-04 | 2.15E-01 | 2.15E-01 |
| | median | 3.43E+00 | 2.91E+00 | 2.91E+00 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 2.91E+00 | 2.91E+00 |
| | 55 | 2.74E+00 | 2.74E+00 |
| | 60 | 2.49E+00 | 2.49E+00 |
| | 65 | 2.22E+00 | 2.22E+00 |
| | 70 | 1.65E+00 | 1.65E+00 |
| | 75 | 1.37E+00 | 1.37E+00 |
| | 80 | 1.07E+00 | 1.07E+00 |
| | 85 | 7.65E-01 | 7.65E-01 |
| | **90** | **4.56E-01** | **4.56E-01** |
| | 95 | 3.97E-01 | 3.97E-01 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 1 |
| Bulk density (g/cm^3) | 1.4 |
| Chemical | TCE |
| MCL (mg/l) | 0.005 |
| Da (cm^2/sec) | 8.55E-02 |
| Henry's Law Constant (m^3-atm/mole) | 1.03E-02 |
| log Kow | 2.42 |
| Koc (ml/g) | 170.8 |
| Solubility (mg/l) | 1100 |
| Chemical Density (g/cm^3) | 1.46 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.000227 | 12 | 2202.6432 | 0.32 | 5.80E+02 | SCN>SSL | 5.80E+02 |
| 2 | 17.8 | 0.535 | 6 | 0.9346 | 0.28 | 5.80E+02 | | 9.35E-01 |
| 3 | 13 | 17.88 | 2 | 0.0280 | 0.32 | 5.80E+02 | | 2.80E-02 |
| 4 | 51.1 | 0.143 | 22 | 3.4965 | 0.34 | 5.80E+02 | | 3.50E+00 |
| 5 | 32.6 | 0.000899 | 12 | 556.1735 | 0.34 | 5.80E+02 | | 5.56E+02 |
| 6 | 39.4 | 0.275 | 15 | 1.8182 | 0.32 | 5.80E+02 | | 1.82E+00 |
| 7 | 34.6 | 0.101 | 15 | 4.9505 | 0.3 | 5.80E+02 | | 4.95E+00 |
| 8 | 32 | 1.68 | 12 | 0.2976 | 0.25 | 5.80E+02 | | 2.98E-01 |
| 9 | 28.1 | 0.00722 | 11 | 69.2521 | 0.32 | 5.80E+02 | | 6.93E+01 |
| 10 | 30.6 | 0.0000023 | 14 | 217391.3043 | 0.33 | 5.80E+02 | SCN>SSL | 5.80E+02 |
| 11 | 44 | 0.241 | 21 | 2.0747 | 0.33 | 5.80E+02 | | 2.07E+00 |
| 12 | 20.3 | 0.04 | 10 | 12.5000 | 0.31 | 5.80E+02 | | 1.25E+01 |
| 13 | 31.3 | 2.65 | 11 | 0.1887 | 0.31 | 5.80E+02 | | 1.89E-01 |
| 14 | 30.2 | 0.283 | 10 | 1.7668 | 0.34 | 5.80E+02 | | 1.77E+00 |
| 15 | 19.2 | 0.00448 | 8 | 111.6071 | 0.33 | 5.80E+02 | | 1.12E+02 |
| 16 | 9 | 38 | 2 | 0.0132 | 0.25 | 5.80E+02 | | 1.32E-02 |
| 17 | 21.5 | 0.00341 | 9 | 146.6276 | 0.31 | 5.80E+02 | | 1.47E+02 |
| 18 | 15 | 21.06 | 2 | 0.0237 | 0.27 | 5.80E+02 | | 2.37E-02 |
| 19 | 35.2 | 0.000604 | 13 | 827.8146 | 0.33 | 5.80E+02 | SCN>SSL | 5.80E+02 |
| 20 | 18.7 | 1E-10 | 8 | 5000000000.0000 | 0.35 | 5.80E+02 | SCN>SSL | 5.80E+02 |
| 21 | 47.4 | 0.00076 | 23 | 657.8947 | 0.35 | 5.80E+02 | SCN>SSL | 5.80E+02 |
| 22 | 22.1 | 0.558 | 7 | 0.8961 | 0.33 | 5.80E+02 | | 8.96E-01 |
| 23 | 8.15 | 2.97 | 3 | 0.1684 | 0.25 | 5.80E+02 | | 1.68E-01 |
| 24 | 20.2 | 7.08E-08 | 9 | 7062146.8927 | 0.35 | 5.80E+02 | SCN>SSL | 5.80E+02 |
| 25 | 12 | 13.58 | 2 | 0.0368 | 0.29 | 5.80E+02 | | 3.68E-02 |
| 26 | 15.8 | 0.0000118 | 7 | 42372.8814 | 0.34 | 5.80E+02 | SCN>SSL | 5.80E+02 |
| 27 | 17.4 | 0.00000247 | 8 | 202429.1498 | 0.34 | 5.80E+02 | SCN>SSL | 5.80E+02 |
| 28 | 24.7 | 0.00119 | 11 | 420.1681 | 0.35 | 5.80E+02 | | 4.20E+02 |
| 29 | 17 | 0.000728 | 7 | 686.8132 | 0.35 | 5.80E+02 | SCN>SSL | 5.80E+02 |
| 30 | 21.6 | 0.306 | 7 | 1.6340 | 0.35 | 5.80E+02 | | 1.63E+00 |
| 31 | 21 | 0.0095 | 7 | 52.6316 | 0.35 | 5.80E+02 | | 5.26E+01 |
| 32 | 27.6 | 1.23E-07 | 13 | 4065040.6504 | 0.35 | 5.80E+02 | SCN>SSL | 5.80E+02 |
| 33 | 8.63 | 0.039 | 4 | 12.8205 | 0.25 | 5.80E+02 | | 1.28E+01 |
| 34 | 13 | 12.98 | 2 | 0.0385 | 0.31 | 5.80E+02 | | 3.85E-02 |
| 35 | 15 | 21.85 | 2 | 0.0229 | 0.31 | 5.80E+02 | | 2.29E-02 |
| 36 | 27.1 | 1.69 | 10 | 0.2959 | 0.26 | 5.80E+02 | | 2.96E-01 |
| 37 | 18.1 | 0.0000407 | 8 | 12285.0123 | 0.33 | 5.80E+02 | SCN>SSL | 5.80E+02 |
| 38 | 11.7 | 0.00475 | 4 | 105.2632 | 0.28 | 5.80E+02 | | 1.05E+02 |
| 39 | 42.4 | 0.0000278 | 17 | 17985.6115 | 0.35 | 5.80E+02 | SCN>SSL | 5.80E+02 |
| 40 | 29 | 1.00E-11 | 9 | 50000000000.0000 | 0.35 | 5.80E+02 | SCN>SSL | 5.80E+02 |
| 41 | 59.2 | 0.00117 | 23 | 427.3504 | 0.35 | 5.80E+02 | | 4.27E+02 |
| 42 | 22.4 | 9.56 | 8 | 0.0523 | 0.29 | 5.80E+02 | | 5.23E-02 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 0.86 | 8 | 0.5814 | 0.35 | 5.80E+02 | | 5.81E-01 |
| 44 | 15 | 18.59 | 2 | 0.0269 | 0.33 | 5.80E+02 | | 2.69E-02 |
| 45 | 13.2 | 0.00469 | 5 | 106.6098 | 0.28 | 5.80E+02 | | 1.07E+02 |
| 46 | 40.5 | 0.0000014 | 20 | 357142.8571 | 0.35 | 5.80E+02 | SCN>SSL | 5.80E+02 |
| 47 | 45 | 1.14 | 19 | 0.4386 | 0.35 | 5.80E+02 | | 4.39E-01 |
| 48 | 14.9 | 0.0221 | 7 | 22.6244 | 0.34 | 5.80E+02 | | 2.26E+01 |
| 49 | 5 | 1.05 | 2 | 0.4762 | 0.35 | 5.80E+02 | | 4.76E-01 |
| 50 | 26.5 | 0.000614 | 12 | 814.3322 | 0.35 | 5.80E+02 | SCN>SSL | 5.80E+02 |
| 51 | 9.44 | 16.1 | 3 | 0.0311 | 0.25 | 5.80E+02 | | 3.11E-02 |
| 52 | 15.5 | 5.83E-07 | 8 | 857632.9331 | 0.29 | 5.80E+02 | SCN>SSL | 5.80E+02 |
| 53 | 36.6 | 0.00000313 | 18 | 159744.4089 | 0.35 | 5.80E+02 | SCN>SSL | 5.80E+02 |
| 54 | 33.6 | 0.0000016 | 16 | 312500.0000 | 0.35 | 5.80E+02 | SCN>SSL | 5.80E+02 |
| 55 | 41.2 | 0.363 | 18 | 1.3774 | 0.35 | 5.80E+02 | | 1.38E+00 |
| 56 | 52.4 | 0.0279 | 26 | 17.9211 | 0.35 | 5.80E+02 | | 1.79E+01 |
| 57 | 23 | 0.0016 | 10 | 312.5000 | 0.32 | 5.80E+02 | | 3.13E+02 |
| 58 | 14.7 | 24.1 | 3 | 0.0207 | 0.35 | 5.80E+02 | | 2.07E-02 |
| 59 | 16.2 | 0.55 | 7 | 0.9091 | 0.33 | 5.80E+02 | | 9.09E-01 |
| 60 | 19.4 | 0.000145 | 8 | 3448.2759 | 0.35 | 5.80E+02 | SCN>SSL | 5.80E+02 |
| 61 | 23.5 | 0.00148 | 10 | 337.8378 | 0.35 | 5.80E+02 | | 3.38E+02 |
| 62 | 37 | 0.000637 | 16 | 784.9294 | 0.33 | 5.80E+02 | SCN>SSL | 5.80E+02 |
| 63 | 24.2 | 0.0192 | 10 | 26.0417 | 0.33 | 5.80E+02 | | 2.60E+01 |
| 64 | 29.8 | 0.47 | 10 | 1.0638 | 0.35 | 5.80E+02 | | 1.06E+00 |
| 65 | 38.4 | 0.0584 | 16 | 8.5616 | 0.3 | 5.80E+02 | | 8.56E+00 |
| 66 | 5.13 | 7.46 | 1 | 0.0670 | 0.26 | 5.80E+02 | | 6.70E-02 |
| 67 | 14.2 | 1E-10 | 7 | 5000000000.0000 | 0.34 | 5.80E+02 | SCN>SSL | 5.80E+02 |
| 68 | 25.5 | 0.00581 | 10 | 86.0585 | 0.35 | 5.80E+02 | | 8.61E+01 |
| 69 | 26.1 | 0.000371 | 11 | 1347.7089 | 0.33 | 5.80E+02 | SCN>SSL | 5.80E+02 |
| 70 | 34 | 0.457 | 14 | 1.0941 | 0.34 | 5.80E+02 | | 1.09E+00 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 3.11E+00 | 8.57E+08 | 2.23E+02 |
| | std. dev. | 7.34E+00 | 6.02E+09 | 2.66E+02 |
| | max | 3.80E+01 | 5.00E+10 | 5.80E+02 |
| | min | 1.00E-11 | 1.32E-02 | 1.32E-02 |
| | median | 2.07E-02 | 2.43E+01 | 2.43E+01 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 24.333 | 2.43E+01 |
| | 55 | 12.516 | 1.25E+01 |
| | 60 | 2.928 | 2.93E+00 |
| | 65 | 1.654 | 1.65E+00 |
| | 70 | 1.025 | 1.03E+00 |
| | 75 | 0.660 | 6.60E-01 |
| | 80 | 0.297 | 2.97E-01 |
| | 85 | 0.102 | 1.02E-01 |
| | **90** | **0.036** | **3.62E-02** |
| | 95 | 0.025 | 2.52E-02 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 1 |
| Bulk density (g/cm^3) | 1.4 |
| Chemical | Toluene |
| MCL (mg/l) | 1 |
| Da (cm^2/sec) | 8.26E-02 |
| Henry's Law Constant (m^3-atm/mole) | 5.94E-03 |
| log Kow | 2.73 |
| Koc (ml/g) | 338.3 |
| Solubility (mg/l) | 535 |
| Chemical Density (g/cm^3) | 0.87 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.02118 | 18 | 4721.4353 | 0.32 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 2 | 17.8 | 3.354 | 10 | 29.8151 | 0.28 | 4.43E+02 | | 2.98E+01 |
| 3 | 13 | 14.34 | 3 | 6.9735 | 0.32 | 4.43E+02 | | 6.97E+00 |
| 4 | 51.1 | 0.9012 | 34 | 110.9632 | 0.34 | 4.43E+02 | | 1.11E+02 |
| 5 | 32.6 | 0.05129 | 23 | 1949.6978 | 0.34 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 6 | 39.4 | 0.2443 | 56 | 409.3328 | 0.32 | 4.43E+02 | | 4.09E+02 |
| 7 | 34.6 | 0.8385 | 24 | 119.2606 | 0.3 | 4.43E+02 | | 1.19E+02 |
| 8 | 32 | 2.633 | 19 | 37.9795 | 0.25 | 4.43E+02 | | 3.80E+01 |
| 9 | 28.1 | 0.2306 | 18 | 433.6513 | 0.32 | 4.43E+02 | | 4.34E+02 |
| 10 | 30.6 | 0.001001 | 23 | 99900.0999 | 0.33 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 11 | 44 | 1.557 | 33 | 64.2261 | 0.33 | 4.43E+02 | | 6.42E+01 |
| 12 | 20.3 | 0.5975 | 16 | 167.3640 | 0.31 | 4.43E+02 | | 1.67E+02 |
| 13 | 31.3 | 6.259 | 17 | 15.9770 | 0.31 | 4.43E+02 | | 1.60E+01 |
| 14 | 30.2 | 0.8345 | 18 | 119.8322 | 0.34 | 4.43E+02 | | 1.20E+02 |
| 15 | 19.2 | 0.2307 | 12 | 433.4634 | 0.33 | 4.43E+02 | | 4.33E+02 |
| 16 | 9 | 39.55 | 4 | 2.5284 | 0.25 | 4.43E+02 | | 2.53E+00 |
| 17 | 21.5 | 0.1571 | 14 | 636.5372 | 0.31 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 18 | 15 | 21.27 | 3 | 4.7015 | 0.27 | 4.43E+02 | | 4.70E+00 |
| 19 | 35.2 | 0.1655 | 24 | 604.2296 | 0.33 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 20 | 18.7 | 0.0001073 | 12 | 931966.4492 | 0.35 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 21 | 47.4 | 0.02522 | 37 | 3965.1071 | 0.35 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 22 | 22.1 | 1.442 | 11 | 69.3481 | 0.33 | 4.43E+02 | | 6.93E+01 |
| 23 | 8.15 | 5.02 | 4 | 19.9203 | 0.25 | 4.43E+02 | | 1.99E+01 |
| 24 | 20.2 | 0.000174 | 15 | 574712.6437 | 0.35 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 25 | 12 | 9.477 | 3 | 10.5519 | 0.29 | 4.43E+02 | | 1.06E+01 |
| 26 | 15.8 | 0.005573 | 12 | 17943.6569 | 0.34 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 27 | 17.4 | 0.00249 | 12 | 40160.6426 | 0.34 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 28 | 24.7 | 0.06777 | 17 | 1475.5792 | 0.35 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 29 | 17 | 0.05215 | 11 | 1917.5455 | 0.35 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 30 | 21.6 | 0.9586 | 11 | 104.3188 | 0.35 | 4.43E+02 | | 1.04E+02 |
| 31 | 21 | 0.2735 | 14 | 365.6307 | 0.35 | 4.43E+02 | | 3.66E+02 |
| 32 | 27.6 | 0.0001734 | 21 | 576701.2687 | 0.35 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 33 | 8.63 | 0.7124 | 7 | 140.3706 | 0.25 | 4.43E+02 | | 1.40E+02 |
| 34 | 13 | 13.17 | 3 | 7.5930 | 0.31 | 4.43E+02 | | 7.59E+00 |
| 35 | 15 | 24.49 | 4 | 4.0833 | 0.31 | 4.43E+02 | | 4.08E+00 |
| 36 | 27.1 | 2.778 | 15 | 35.9971 | 0.26 | 4.43E+02 | | 3.60E+01 |
| 37 | 18.1 | 0.00698 | 13 | 14326.6476 | 0.33 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 38 | 11.7 | 0.2264 | 7 | 441.6961 | 0.28 | 4.43E+02 | | 4.42E+02 |
| 39 | 42.4 | 0.004985 | 31 | 20060.1805 | 0.35 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 40 | 29 | 1.00E-10 | 17 | 1000000000000.0000 | 0.35 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 41 | 59.2 | 0.05585 | 40 | 1790.5103 | 0.35 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 42 | 22.4 | 11.85 | 13 | 8.4388 | 0.29 | 4.43E+02 | | 8.44E+00 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 3.062 | 12 | 32.6584 | 0.35 | 4.43E+02 | | 3.27E+01 |
| 44 | 15 | 21.35 | 4 | 4.6838 | 0.33 | 4.43E+02 | | 4.68E+00 |
| 45 | 13.2 | 0.191 | 8 | 523.5602 | 0.28 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 46 | 40.5 | 0.0006398 | 31 | 156298.8434 | 0.35 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 47 | 45 | 3.788 | 31 | 26.3992 | 0.35 | 4.43E+02 | | 2.64E+01 |
| 48 | 14.9 | 0.5676 | 11 | 176.1804 | 0.34 | 4.43E+02 | | 1.76E+02 |
| 49 | 5 | 5.463 | 3 | 18.3050 | 0.35 | 4.43E+02 | | 1.83E+01 |
| 50 | 26.5 | 0.04463 | 18 | 2240.6453 | 0.35 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 51 | 9.44 | 21.69 | 4 | 4.6104 | 0.25 | 4.43E+02 | | 4.61E+00 |
| 52 | 15.5 | 0.0007363 | 13 | 135814.2062 | 0.29 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 53 | 36.6 | 0.001024 | 29 | 97656.2500 | 0.35 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 54 | 33.6 | 0.0007868 | 26 | 127097.1022 | 0.35 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 55 | 41.2 | 1.383 | 28 | 72.3066 | 0.35 | 4.43E+02 | | 7.23E+01 |
| 56 | 52.4 | 0.3546 | 40 | 282.0079 | 0.35 | 4.43E+02 | | 2.82E+02 |
| 57 | 23 | 0.0571 | 16 | 1751.3135 | 0.32 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 58 | 14.7 | 21.97 | 5 | 4.5517 | 0.35 | 4.43E+02 | | 4.55E+00 |
| 59 | 16.2 | 3.43 | 11 | 29.1545 | 0.33 | 4.43E+02 | | 2.92E+01 |
| 60 | 19.4 | 0.03016 | 13 | 3315.6499 | 0.35 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 61 | 23.5 | 0.08146 | 16 | 1227.5964 | 0.35 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 62 | 37 | 0.04136 | 25 | 2417.7950 | 0.33 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 63 | 24.2 | 0.4039 | 16 | 247.5860 | 0.33 | 4.43E+02 | | 2.48E+02 |
| 64 | 29.8 | 2.141 | 16 | 46.7071 | 0.35 | 4.43E+02 | | 4.67E+01 |
| 65 | 38.4 | 0.6949 | 26 | 143.9056 | 0.3 | 4.43E+02 | | 1.44E+02 |
| 66 | 5.13 | 17.36 | 2 | 5.7604 | 0.26 | 4.43E+02 | | 5.76E+00 |
| 67 | 14.2 | 0.00006627 | 10 | 1508978.4216 | 0.34 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 68 | 25.5 | 0.215 | 16 | 465.1163 | 0.35 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 69 | 26.1 | 0.0443 | 17 | 2257.3363 | 0.33 | 4.43E+02 | SCN>SSL | 4.43E+02 |
| 70 | 34 | 1.729 | 21 | 57.8369 | 0.34 | 4.43E+02 | | 5.78E+01 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 3.86E+00 | 1.43E+10 | 2.52E+02 |
| | std. dev. | 7.68E+00 | 1.20E+11 | 1.96E+02 |
| | max | 3.96E+01 | 1.00E+12 | 4.43E+02 |
| | min | 1.00E-10 | 2.53E+00 | 2.53E+00 |
| | median | 3.14E-01 | 3.24E+02 | 3.24E+02 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 3.24E+02 | 3.24E+02 |
| | 55 | 1.68E+02 | 1.68E+02 |
| | 60 | 1.20E+02 | 1.20E+02 |
| | 65 | 7.71E+01 | 7.71E+01 |
| | 70 | 5.45E+01 | 5.45E+01 |
| | 75 | 3.35E+01 | 3.35E+01 |
| | 80 | 2.51E+01 | 2.51E+01 |
| | 85 | 1.25E+01 | 1.25E+01 |
| | **90** | **6.85E+00** | **6.85E+00** |
| | 95 | 4.64E+00 | 4.64E+00 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 1 |
| Bulk density (g/cm^3) | 1.4 |
| Chemical | vinyl chloride |
| MCL (mg/l) | 0.002 |
| Da (cm^2/sec) | 1.13E-01 |
| Henry's Law Constant (m^3-atm/mole) | 1.07E-02 |
| log Kow | 1.38 |
| Koc (ml/g) | 30.45 |
| Solubility (mg/l) | 2763 |
| Chemical Density (g/cm^3) | 0.91 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.000008783 | 6 | 22771.2627 | 0.32 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 2 | 17.8 | 0.1536 | 3 | 1.3021 | 0.28 | 6.89E+02 | | 1.30E+00 |
| 3 | 13 | 26.85 | 1 | 0.0074 | 0.32 | 6.89E+02 | | 7.45E-03 |
| 4 | 51.1 | 0.04716 | 10 | 4.2409 | 0.34 | 6.89E+02 | | 4.24E+00 |
| 5 | 32.6 | 0.00006523 | 7 | 3066.0739 | 0.34 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 6 | 39.4 | 0.1339 | 7 | 1.4937 | 0.32 | 6.89E+02 | | 1.49E+00 |
| 7 | 34.6 | 0.03237 | 7 | 6.1786 | 0.3 | 6.89E+02 | | 6.18E+00 |
| 8 | 32 | 1.776 | 5 | 0.1126 | 0.25 | 6.89E+02 | | 1.13E-01 |
| 9 | 28.1 | 0.0005786 | 5 | 345.6619 | 0.32 | 6.89E+02 | | 3.46E+02 |
| 10 | 30.6 | 0.000000001 | 7 | 200000000.0000 | 0.33 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 11 | 44 | 0.08762 | 10 | 2.2826 | 0.33 | 6.89E+02 | | 2.28E+00 |
| 12 | 20.3 | 0.009889 | 5 | 20.2245 | 0.31 | 6.89E+02 | | 2.02E+01 |
| 13 | 31.3 | 1.908 | 5 | 0.1048 | 0.31 | 6.89E+02 | | 1.05E-01 |
| 14 | 30.2 | 0.09726 | 6 | 2.0563 | 0.34 | 6.89E+02 | | 2.06E+00 |
| 15 | 19.2 | 0.0002659 | 4 | 752.1625 | 0.33 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 16 | 9 | 59.13 | 1 | 0.0034 | 0.25 | 6.89E+02 | | 3.38E-03 |
| 17 | 21.5 | 0.000259 | 4 | 772.2008 | 0.31 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 18 | 15 | 31.05 | 1 | 0.0064 | 0.27 | 6.89E+02 | | 6.44E-03 |
| 19 | 35.2 | 0.0005898 | 7 | 339.0980 | 0.33 | 6.89E+02 | | 3.39E+02 |
| 20 | 18.7 | 1E-10 | 4 | 2000000000.0000 | 0.35 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 21 | 47.4 | 0.0000568 | 11 | 3521.1268 | 0.35 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 22 | 22.1 | 0.295 | 3 | 0.6780 | 0.33 | 6.89E+02 | | 6.78E-01 |
| 23 | 8.15 | 4.798 | 1 | 0.0417 | 0.25 | 6.89E+02 | | 4.17E-02 |
| 24 | 20.2 | 1E-10 | 5 | 2000000000.0000 | 0.35 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 25 | 12 | 22.57 | 1 | 0.0089 | 0.29 | 6.89E+02 | | 8.86E-03 |
| 26 | 15.8 | 1.028E-07 | 4 | 1945525.2918 | 0.34 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 27 | 17.4 | 3.608E-08 | 4 | 5543237.2506 | 0.34 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 28 | 24.7 | 0.00006437 | 5 | 3107.0374 | 0.35 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 29 | 17 | 0.00004461 | 3 | 4483.2997 | 0.35 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 30 | 21.6 | 0.1551 | 3 | 1.2895 | 0.35 | 6.89E+02 | | 1.29E+00 |
| 31 | 21 | 0.0007319 | 4 | 273.2614 | 0.35 | 6.89E+02 | | 2.73E+02 |
| 32 | 27.6 | 1E-10 | 7 | 2000000000.0000 | 0.35 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 33 | 8.63 | 0.01876 | 2 | 10.6610 | 0.25 | 6.89E+02 | | 1.07E+01 |
| 34 | 13 | 22.38 | 1 | 0.0089 | 0.31 | 6.89E+02 | | 8.94E-03 |
| 35 | 15 | 35.38 | 1 | 0.0057 | 0.31 | 6.89E+02 | | 5.65E-03 |
| 36 | 27.1 | 1.787 | 4 | 0.1119 | 0.26 | 6.89E+02 | | 1.12E-01 |
| 37 | 18.1 | 0.000001599 | 4 | 125078.1739 | 0.33 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 38 | 11.7 | 0.0003088 | 2 | 647.6684 | 0.28 | 6.89E+02 | | 6.48E+02 |
| 39 | 42.4 | 6.352E-07 | 9 | 314861.4610 | 0.35 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 40 | 29 | 1.00E-10 | 6 | 2000000000.0000 | 0.35 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 41 | 59.2 | 0.00008769 | 12 | 2280.7618 | 0.35 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 42 | 22.4 | 10.3 | 4 | 0.0194 | 0.29 | 6.89E+02 | | 1.94E-02 |
| 43 | 24.9 | 0.4191 | 4 | 0.4772 | 0.35 | 6.89E+02 | | 4.77E-01 |
| 44 | 15 | 26.97 | 1 | 0.0074 | 0.33 | 6.89E+02 | | 7.42E-03 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 45 | 13.2 | 0.001184 | 2 | 168.9189 | 0.28 | 6.89E+02 | | 1.69E+02 |
| 46 | 40.5 | 0.000000001 | 9 | 200000000.0000 | 0.35 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 47 | 45 | 0.6757 | 10 | 0.2960 | 0.35 | 6.89E+02 | | 2.96E-01 |
| 48 | 14.9 | 0.001201 | 3 | 166.5279 | 0.34 | 6.89E+02 | | 1.67E+02 |
| 49 | 5 | 0.3907 | 1 | 0.5119 | 0.35 | 6.89E+02 | | 5.12E-01 |
| 50 | 26.5 | 0.00001969 | 6 | 10157.4403 | 0.35 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 51 | 9.44 | 16.85 | 1 | 0.0119 | 0.25 | 6.89E+02 | | 1.19E-02 |
| 52 | 15.5 | 0.000000003 | 4 | 66666666.6667 | 0.29 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 53 | 36.6 | 5.625E-08 | 9 | 3555555.5556 | 0.35 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 54 | 33.6 | 0.000000001 | 8 | 200000000.0000 | 0.35 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 55 | 41.2 | 0.1694 | 9 | 1.1806 | 0.35 | 6.89E+02 | | 1.18E+00 |
| 56 | 52.4 | 0.006622 | 12 | 30.2024 | 0.35 | 6.89E+02 | | 3.02E+01 |
| 57 | 23 | 0.0001956 | 5 | 1022.4949 | 0.32 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 58 | 14.7 | 35.02 | 2 | 0.0057 | 0.35 | 6.89E+02 | | 5.71E-03 |
| 59 | 16.2 | 0.09629 | 3 | 2.0771 | 0.33 | 6.89E+02 | | 2.08E+00 |
| 60 | 19.4 | 0.00000465 | 4 | 43010.7527 | 0.35 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 61 | 23.5 | 0.000108 | 5 | 1851.8519 | 0.35 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 62 | 37 | 0.000028 | 7 | 7142.8571 | 0.33 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 63 | 24.2 | 0.002124 | 5 | 94.1620 | 0.33 | 6.89E+02 | | 9.42E+01 |
| 64 | 29.8 | 0.2053 | 5 | 0.9742 | 0.35 | 6.89E+02 | | 9.74E-01 |
| 65 | 38.4 | 0.01277 | 7 | 15.6617 | 0.3 | 6.89E+02 | | 1.57E+01 |
| 66 | 5.13 | 9.461 | 1 | 0.0211 | 0.26 | 6.89E+02 | | 2.11E-02 |
| 67 | 14.2 | 1E-10 | 4 | 2000000000.0000 | 0.34 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 68 | 25.5 | 0.0003507 | 5 | 570.2880 | 0.35 | 6.89E+02 | | 5.70E+02 |
| 69 | 26.1 | 0.00001923 | 5 | 10400.4160 | 0.33 | 6.89E+02 | SCN>SSL | 6.89E+02 |
| 70 | 34 | 0.2293 | 6 | 0.8722 | 0.34 | 6.89E+02 | | 8.72E-01 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 4.42E+00 | 1.53E+08 | 3.14E+02 |
| | std. dev. | 1.11E+01 | 5.18E+08 | 3.30E+02 |
| | max | 5.91E+01 | 2.00E+09 | 6.89E+02 |
| | min | 1.00E-10 | 3.38E-03 | 3.38E-03 |
| | median | 1.66E-03 | 1.30E+02 | 1.30E+02 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 1.30E+02 | 1.30E+02 |
| | 55 | 1.59E+01 | 1.59E+01 |
| | 60 | 3.46E+00 | 3.46E+00 |
| | 65 | 1.58E+00 | 1.58E+00 |
| | 70 | 1.12E+00 | 1.12E+00 |
| | 75 | 5.53E-01 | 5.53E-01 |
| | 80 | 1.12E-01 | 1.12E-01 |
| | 85 | 2.83E-02 | 2.83E-02 |
| | **90** | **8.93E-03** | **8.93E-03** |
| | 95 | 6.88E-03 | 6.88E-03 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 1 |
| Bulk density (g/cm^3) | 1.4 |
| Chemical | Xylenes |
| MCL (mg/l) | 10 |
| Da (cm^2/sec) | 7.20E-02 |
| Henry's Law Constant (m^3-atm/mole) | 6.30E-03 |
| log Kow | 3.2 |
| Koc (ml/g) | 998.5 |
| Solubility (mg/l) | 200 |
| Chemical Density (g/cm^3) | 0.87 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.01241 | 47 | 80580.1773 | 0.32 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 2 | 17.8 | 1.65 | 25 | 606.0606 | 0.28 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 3 | 13 | 6.229 | 6 | 160.5394 | 0.32 | 4.30E+02 | | 1.61E+02 |
| 4 | 51.1 | 0.4438 | 89 | 2253.2672 | 0.34 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 5 | 32.6 | 0.03056 | 58 | 32722.5131 | 0.34 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 6 | 39.4 | 0.5479 | 62 | 1825.1506 | 0.32 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 7 | 34.6 | 0.4045 | 62 | 2472.1879 | 0.3 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 8 | 32 | 1.083 | 49 | 923.3610 | 0.25 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 9 | 28.1 | 0.1257 | 46 | 7955.4495 | 0.32 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 10 | 30.6 | 0.0006244 | 58 | 1601537.4760 | 0.33 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 11 | 44 | 0.7585 | 83 | 1318.3916 | 0.33 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 12 | 20.3 | 0.3104 | 41 | 3221.6495 | 0.31 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 13 | 31.3 | 2.76 | 43 | 362.3188 | 0.31 | 4.30E+02 | | 3.62E+02 |
| 14 | 30.2 | 0.3913 | 46 | 2555.5840 | 0.34 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 15 | 19.2 | 0.1358 | 31 | 7363.7703 | 0.33 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 16 | 9 | 18.6 | 8 | 53.7634 | 0.25 | 4.30E+02 | | 5.38E+01 |
| 17 | 21.5 | 0.09104 | 37 | 10984.1828 | 0.31 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 18 | 15 | 9.521 | 8 | 105.0310 | 0.27 | 4.30E+02 | | 1.05E+02 |
| 19 | 35.2 | 0.09339 | 61 | 10707.7846 | 0.33 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 20 | 18.7 | 0.0001041 | 30 | 9606147.9347 | 0.35 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 21 | 47.4 | 0.01364 | 95 | 73313.7830 | 0.35 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 22 | 22.1 | 0.6355 | 27 | 1573.5641 | 0.33 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 23 | 8.15 | 2.412 | 11 | 414.5937 | 0.25 | 4.30E+02 | | 4.15E+02 |
| 24 | 20.2 | 0.0001361 | 38 | 7347538.5746 | 0.35 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 25 | 12 | 3.937 | 6 | 254.0005 | 0.29 | 4.30E+02 | | 2.54E+02 |
| 26 | 15.8 | 0.004286 | 29 | 233317.7788 | 0.34 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 27 | 17.4 | 0.001803 | 30 | 554631.1703 | 0.34 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 28 | 24.7 | 0.04029 | 43 | 24820.0546 | 0.35 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 29 | 17 | 0.03579 | 26 | 27940.7656 | 0.35 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 30 | 21.6 | 0.4908 | 26 | 2037.4898 | 0.35 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 31 | 21 | 0.1607 | 34 | 6222.7754 | 0.35 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 32 | 27.6 | 0.0001355 | 52 | 7380073.8007 | 0.35 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 33 | 8.63 | 0.3993 | 16 | 2504.3827 | 0.25 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 34 | 13 | 5.286 | 7 | 189.1790 | 0.31 | 4.30E+02 | | 1.89E+02 |
| 35 | 15 | 10.4 | 9 | 96.1538 | 0.31 | 4.30E+02 | | 9.62E+01 |
| 36 | 27.1 | 1.161 | 39 | 861.3264 | 0.26 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 37 | 18.1 | 0.005028 | 32 | 198886.2371 | 0.33 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 38 | 11.7 | 0.1436 | 17 | 6963.7883 | 0.28 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 39 | 42.4 | 0.00294 | 79 | 340136.0544 | 0.35 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 40 | 29 | 1.00E-10 | 43 | ################### | 0.35 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 41 | 59.2 | 0.03126 | 105 | 31989.7633 | 0.35 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 42 | 22.4 | 4.975 | 32 | 201.0050 | 0.29 | 4.30E+02 | | 2.01E+02 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 1.389 | 30 | 719.9424 | 0.35 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 44 | 15 | 9.093 | 9 | 109.9747 | 0.33 | 4.30E+02 | | 1.10E+02 |
| 45 | 13.2 | 0.1151 | 20 | 8688.0973 | 0.28 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 46 | 40.5 | 0.0003849 | 79 | 2598077.4227 | 0.35 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 47 | 45 | 1.718 | 78 | 582.0722 | 0.35 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 48 | 14.9 | 0.3485 | 27 | 2869.4405 | 0.34 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 49 | 5 | 3.444 | 8 | 290.3600 | 0.35 | 4.30E+02 | | 2.90E+02 |
| 50 | 26.5 | 0.02741 | 46 | 36483.0354 | 0.35 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 51 | 9.44 | 10.3 | 11 | 97.0874 | 0.25 | 4.30E+02 | | 9.71E+01 |
| 52 | 15.5 | 0.0005365 | 33 | 1863932.8984 | 0.29 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 53 | 36.6 | 0.0006103 | 73 | 1638538.4237 | 0.35 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 54 | 33.6 | 0.0004878 | 66 | 2050020.5002 | 0.35 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 55 | 41.2 | 0.6397 | 71 | 1563.2328 | 0.35 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 56 | 52.4 | 0.1774 | 103 | 5636.9786 | 0.35 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 57 | 23 | 0.03376 | 41 | 29620.8531 | 0.32 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 58 | 14.7 | 8.89 | 12 | 112.4859 | 0.35 | 4.30E+02 | | 1.12E+02 |
| 59 | 16.2 | 1.793 | 27 | 557.7245 | 0.33 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 60 | 19.4 | 0.01957 | 33 | 51098.6203 | 0.35 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 61 | 23.5 | 0.04936 | 41 | 20259.3193 | 0.35 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 62 | 37 | 0.02471 | 65 | 40469.4456 | 0.33 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 63 | 24.2 | 0.2206 | 40 | 4533.0916 | 0.33 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 64 | 29.8 | 0.9781 | 41 | 1022.3903 | 0.35 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 65 | 38.4 | 0.3473 | 66 | 2879.3550 | 0.3 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 66 | 5.13 | 8.9 | 5 | 112.3596 | 0.26 | 4.30E+02 | | 1.12E+02 |
| 67 | 14.2 | 0.00006883 | 24 | 14528548.5980 | 0.34 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 68 | 25.5 | 0.1307 | 40 | 7651.1094 | 0.35 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 69 | 26.1 | 0.0269 | 43 | 37174.7212 | 0.33 | 4.30E+02 | SCN>SSL | 4.30E+02 |
| 70 | 34 | 0.7891 | 53 | 1267.2665 | 0.34 | 4.30E+02 | SCN>SSL | 4.30E+02 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 1.75E+00 | 1.43E+11 | 3.81E+02 |
| | std. dev. | 3.46E+00 | 1.20E+12 | 1.11E+02 |
| | max | 1.86E+01 | 1.00E+13 | 4.30E+02 |
| | min | 1.00E-10 | 5.38E+01 | 5.38E+01 |
| | median | 1.99E-01 | 5.09E+03 | 4.30E+02 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 5085 | 4.30E+02 |
| | 55 | 2870 | 4.30E+02 |
| | 60 | 2385 | 4.30E+02 |
| | 65 | 1611 | 4.30E+02 |
| | 70 | 1194 | 4.30E+02 |
| | 75 | 755 | 4.30E+02 |
| | 80 | 529 | 4.27E+02 |
| | 85 | 267 | 2.67E+02 |
| | **90** | **156** | **1.56E+02** |
| | 95 | 107 | 1.07E+02 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 2 |
| Bulk density (g/cm^3) | 1.6 |
| Chemical | 1,1,1-TCA |
| MCL (mg/l) | 0.2 |
| Da (cm^2/sec) | 8.39E-02 |
| Henry's Law Constant (m^3-atm/mole) | 8.00E-03 |
| log Kow | 2.49 |
| Koc (ml/g) | 191.77 |
| Solubility (mg/l) | 1495 |
| Chemical Density (g/cm^3) | 1.34 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.2583 | 25 | 77.4293 | 0.45 | 9.37E+02 | | 7.74E+01 |
| 2 | 17.8 | 14.68 | 11 | 1.3624 | 0.34 | 9.37E+02 | | 1.36E+00 |
| 3 | 13 | 17.04 | 3 | 1.1737 | 0.5 | 9.37E+02 | | 1.17E+00 |
| 4 | 51.1 | 2.052 | 31 | 9.7466 | 0.49 | 9.37E+02 | | 9.75E+00 |
| 5 | 32.6 | 0.5156 | 20 | 38.7898 | 0.45 | 9.37E+02 | | 3.88E+01 |
| 6 | 39.4 | 2.988 | 22 | 6.6934 | 0.42 | 9.37E+02 | | 6.69E+00 |
| 7 | 34.6 | 3.164 | 32 | 6.3211 | 0.38 | 9.37E+02 | | 6.32E+00 |
| 8 | 32 | 6.534 | 28 | 3.0609 | 0.27 | 9.37E+02 | | 3.06E+00 |
| 9 | 28.1 | 1.76 | 17 | 11.3636 | 0.42 | 9.37E+02 | | 1.14E+01 |
| 10 | 30.6 | 0.08645 | 19 | 231.3476 | 0.42 | 9.37E+02 | | 2.31E+02 |
| 11 | 44 | 8.193 | 52 | 2.4411 | 0.46 | 9.37E+02 | | 2.44E+00 |
| 12 | 20.3 | 2.582 | 23 | 7.7459 | 0.42 | 9.37E+02 | | 7.75E+00 |
| 13 | 31.3 | 11.11 | 18 | 1.8002 | 0.42 | 9.37E+02 | | 1.80E+00 |
| 14 | 30.2 | 1.393 | 19 | 14.3575 | 0.49 | 9.37E+02 | | 1.44E+01 |
| 15 | 19.2 | 1.926 | 13 | 10.3842 | 0.46 | 9.37E+02 | | 1.04E+01 |
| 16 | 9 | 51.88 | 4 | 0.3855 | 0.46 | 9.37E+02 | | 3.86E-01 |
| 17 | 21.5 | 1.991 | 16 | 10.0452 | 0.41 | 9.37E+02 | | 1.00E+01 |
| 18 | 15 | 31.48 | 4 | 0.6353 | 0.45 | 9.37E+02 | | 6.35E-01 |
| 19 | 35.2 | 2.177 | 21 | 9.1870 | 0.4 | 9.37E+02 | | 9.19E+00 |
| 20 | 18.7 | 0.1052 | 12 | 190.1141 | 0.35 | 9.37E+02 | | 1.90E+02 |
| 21 | 47.4 | 2.852 | 32 | 7.0126 | 0.26 | 9.37E+02 | | 7.01E+00 |
| 22 | 22.1 | 2.429 | 12 | 8.2338 | 0.45 | 9.37E+02 | | 8.23E+00 |
| 23 | 8.15 | 12.11 | 5 | 1.6515 | 0.3 | 9.37E+02 | | 1.65E+00 |
| 24 | 20.2 | 0.1736 | 13 | 115.2074 | 0.38 | 9.37E+02 | | 1.15E+02 |
| 25 | 12 | 11.73 | 4 | 1.7050 | 0.35 | 9.37E+02 | | 1.71E+00 |
| 26 | 15.8 | 0.1367 | 15 | 146.3058 | 0.49 | 9.37E+02 | | 1.46E+02 |
| 27 | 17.4 | 0.2664 | 12 | 75.0751 | 0.5 | 9.37E+02 | | 7.51E+01 |
| 28 | 24.7 | 1.58 | 16 | 12.6582 | 0.4 | 9.37E+02 | | 1.27E+01 |
| 29 | 17 | 3.49 | 9 | 5.7307 | 0.33 | 9.37E+02 | | 5.73E+00 |
| 30 | 21.6 | 1.839 | 11 | 10.8755 | 0.47 | 9.37E+02 | | 1.09E+01 |
| 31 | 21 | 8.876 | 13 | 2.2533 | 0.32 | 9.37E+02 | | 2.25E+00 |
| 32 | 27.6 | 0.01416 | 18 | 1412.4294 | 0.48 | 9.37E+02 | SCN>SSL | 9.37E+02 |
| 33 | 8.63 | 1.898 | 11 | 10.5374 | 0.26 | 9.37E+02 | | 1.05E+01 |
| 34 | 13 | 21.34 | 3 | 0.9372 | 0.35 | 9.37E+02 | | 9.37E-01 |
| 35 | 15 | 39.59 | 4 | 0.5052 | 0.39 | 9.37E+02 | | 5.05E-01 |
| 36 | 27.1 | 7.129 | 21 | 2.8054 | 0.28 | 9.37E+02 | | 2.81E+00 |
| 37 | 18.1 | 0.8931 | 12 | 22.3939 | 0.47 | 9.37E+02 | | 2.24E+01 |
| 38 | 11.7 | 16.71 | 6 | 1.1969 | 0.33 | 9.37E+02 | | 1.20E+00 |
| 39 | 42.4 | 0.4549 | 27 | 43.9657 | 0.4 | 9.37E+02 | | 4.40E+01 |
| 40 | 29 | 1.72E-05 | 19 | 1162115.0494 | 0.44 | 9.37E+02 | SCN>SSL | 9.37E+02 |
| 41 | 59.2 | 0.469 | 40 | 42.6439 | 0.48 | 9.37E+02 | | 4.26E+01 |
| 42 | 22.4 | 18.31 | 18 | 1.0923 | 0.36 | 9.37E+02 | | 1.09E+00 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 6.687 | 12 | 2.9909 | 0.44 | 9.37E+02 | | 2.99E+00 |
| 44 | 15 | 39.16 | 4 | 0.5107 | 0.35 | 9.37E+02 | | 5.11E-01 |
| 45 | 13.2 | 7.132 | 7 | 2.8043 | 0.34 | 9.37E+02 | | 2.80E+00 |
| 46 | 40.5 | 0.02242 | 26 | 892.0607 | 0.48 | 9.37E+02 | | 8.92E+02 |
| 47 | 45 | 23.74 | 43 | 0.8425 | 0.26 | 9.37E+02 | | 8.42E-01 |
| 48 | 14.9 | 5.456 | 12 | 3.6657 | 0.49 | 9.37E+02 | | 3.67E+00 |
| 49 | 5 | 26.67 | 4 | 0.7499 | 0.4 | 9.37E+02 | | 7.50E-01 |
| 50 | 26.5 | 1.018 | 16 | 19.6464 | 0.42 | 9.37E+02 | | 1.96E+01 |
| 51 | 9.44 | 29.73 | 5 | 0.6727 | 0.41 | 9.37E+02 | | 6.73E-01 |
| 52 | 15.5 | 0.9481 | 12 | 21.0948 | 0.37 | 9.37E+02 | | 2.11E+01 |
| 53 | 36.6 | 0.1098 | 24 | 182.1494 | 0.43 | 9.37E+02 | | 1.82E+02 |
| 54 | 33.6 | 0.07809 | 22 | 256.1147 | 0.44 | 9.37E+02 | | 2.56E+02 |
| 55 | 41.2 | 6.174 | 31 | 3.2394 | 0.4 | 9.37E+02 | | 3.24E+00 |
| 56 | 52.4 | 7.429 | 53 | 2.6922 | 0.37 | 9.37E+02 | | 2.69E+00 |
| 57 | 23 | 0.5574 | 16 | 35.8809 | 0.43 | 9.37E+02 | | 3.59E+01 |
| 58 | 14.7 | 34.63 | 7 | 0.5775 | 0.33 | 9.37E+02 | | 5.78E-01 |
| 59 | 16.2 | 11.65 | 12 | 1.7167 | 0.47 | 9.37E+02 | | 1.72E+00 |
| 60 | 19.4 | 2.191 | 13 | 9.1283 | 0.39 | 9.37E+02 | | 9.13E+00 |
| 61 | 23.5 | 2.944 | 15 | 6.7935 | 0.36 | 9.37E+02 | | 6.79E+00 |
| 62 | 37 | 1.879 | 23 | 10.6440 | 0.36 | 9.37E+02 | | 1.06E+01 |
| 63 | 24.2 | 11.37 | 14 | 1.7590 | 0.28 | 9.37E+02 | | 1.76E+00 |
| 64 | 29.8 | 4.886 | 16 | 4.0933 | 0.45 | 9.37E+02 | | 4.09E+00 |
| 65 | 38.4 | 15.01 | 34 | 1.3324 | 0.3 | 9.37E+02 | | 1.33E+00 |
| 66 | 5.13 | 42.74 | 2 | 0.4679 | 0.27 | 9.37E+02 | | 4.68E-01 |
| 67 | 14.2 | 0.2294 | 9 | 87.1840 | 0.48 | 9.37E+02 | | 8.72E+01 |
| 68 | 25.5 | 1.6 | 15 | 12.5000 | 0.46 | 9.37E+02 | | 1.25E+01 |
| 69 | 26.1 | 0.9876 | 20 | 20.2511 | 0.36 | 9.37E+02 | | 2.03E+01 |
| 70 | 34 | 12.29 | 23 | 1.6273 | 0.3 | 9.37E+02 | | 1.63E+00 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 8.74E+00 | 1.67E+04 | 6.58E+01 |
| | std. dev. | 1.19E+01 | 1.39E+05 | 1.90E+02 |
| | max | 5.19E+01 | 1.16E+06 | 9.37E+02 |
| | min | 1.72E-05 | 3.86E-01 | 3.86E-01 |
| | median | 2.90E+00 | 6.90E+00 | 6.90E+00 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 6.90E+00 | 6.90E+00 |
| | 55 | 5.76E+00 | 5.76E+00 |
| | 60 | 3.17E+00 | 3.17E+00 |
| | 65 | 2.80E+00 | 2.80E+00 |
| | 70 | 2.12E+00 | 2.12E+00 |
| | 75 | 1.71E+00 | 1.71E+00 |
| | 80 | 1.36E+00 | 1.36E+00 |
| | 85 | 1.12E+00 | 1.12E+00 |
| | **90** | **7.42E-01** | **7.42E-01** |
| | 95 | 5.41E-01 | 5.41E-01 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 2 |
| Bulk density (g/cm^3) | 1.6 |
| Chemical | 1,2-DCA |
| MCL (mg/l) | 0.005 |
| Da (cm^2/sec) | 9.38E-02 |
| Henry's Law Constant (m^3-atm/mole) | 9.77E-04 |
| log Kow | 1.48 |
| Koc (ml/g) | 35.94 |
| Solubility (mg/l) | 8524 |
| Chemical Density (g/cm^3) | 1.25 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 48.26 | 12 | 0.0104 | 0.45 | 1.62E+03 | | 1.04E-02 |
| 2 | 17.8 | 202.8 | 5 | 0.0025 | 0.34 | 1.62E+03 | | 2.47E-03 |
| 3 | 13 | 89.4 | 2 | 0.0056 | 0.5 | 1.62E+03 | | 5.59E-03 |
| 4 | 51.1 | 43.51 | 13 | 0.0115 | 0.49 | 1.62E+03 | | 1.15E-02 |
| 5 | 32.6 | 39.94 | 8 | 0.0125 | 0.45 | 1.62E+03 | | 1.25E-02 |
| 6 | 39.4 | 42.84 | 9 | 0.0117 | 0.42 | 1.62E+03 | | 1.17E-02 |
| 7 | 34.6 | 78.59 | 14 | 0.0064 | 0.38 | 1.62E+03 | | 6.36E-03 |
| 8 | 32 | 39.35 | 10 | 0.0127 | 0.27 | 1.62E+03 | | 1.27E-02 |
| 9 | 28.1 | 79.5 | 7 | 0.0063 | 0.42 | 1.62E+03 | | 6.29E-03 |
| 10 | 30.6 | 17.25 | 8 | 0.0290 | 0.42 | 1.62E+03 | | 2.90E-02 |
| 11 | 44 | 74.05 | 23 | 0.0068 | 0.46 | 1.62E+03 | | 6.75E-03 |
| 12 | 20.3 | 76.98 | 11 | 0.0065 | 0.42 | 1.62E+03 | | 6.50E-03 |
| 13 | 31.3 | 119.7 | 8 | 0.0042 | 0.42 | 1.62E+03 | | 4.18E-03 |
| 14 | 30.2 | 22.23 | 9 | 0.0225 | 0.49 | 1.62E+03 | | 2.25E-02 |
| 15 | 19.2 | 142 | 6 | 0.0035 | 0.46 | 1.62E+03 | | 3.52E-03 |
| 16 | 9 | 231.3 | 2 | 0.0022 | 0.46 | 1.62E+03 | | 2.16E-03 |
| 17 | 21.5 | 109.4 | 7 | 0.0046 | 0.41 | 1.62E+03 | | 4.57E-03 |
| 18 | 15 | 185.8 | 2 | 0.0027 | 0.45 | 1.62E+03 | | 2.69E-03 |
| 19 | 35.2 | 69.23 | 9 | 0.0072 | 0.4 | 1.62E+03 | | 7.22E-03 |
| 20 | 18.7 | 75.28 | 5 | 0.0066 | 0.35 | 1.62E+03 | | 6.64E-03 |
| 21 | 47.4 | 22.29 | 11 | 0.0224 | 0.26 | 1.62E+03 | | 2.24E-02 |
| 22 | 22.1 | 29.9 | 6 | 0.0167 | 0.45 | 1.62E+03 | | 1.67E-02 |
| 23 | 8.15 | 102.2 | 2 | 0.0049 | 0.3 | 1.62E+03 | | 4.89E-03 |
| 24 | 20.2 | 29.99 | 6 | 0.0167 | 0.38 | 1.62E+03 | | 1.67E-02 |
| 25 | 12 | 77.43 | 1 | 0.0065 | 0.35 | 1.62E+03 | | 6.46E-03 |
| 26 | 15.8 | 73.26 | 7 | 0.0068 | 0.49 | 1.62E+03 | | 6.83E-03 |
| 27 | 17.4 | 55.33 | 6 | 0.0090 | 0.5 | 1.62E+03 | | 9.04E-03 |
| 28 | 24.7 | 63.3 | 7 | 0.0079 | 0.4 | 1.62E+03 | | 7.90E-03 |
| 29 | 17 | 104.6 | 4 | 0.0048 | 0.33 | 1.62E+03 | | 4.78E-03 |
| 30 | 21.6 | 27.04 | 5 | 0.0185 | 0.47 | 1.62E+03 | | 1.85E-02 |
| 31 | 21 | 146.3 | 5 | 0.0034 | 0.32 | 1.62E+03 | | 3.42E-03 |
| 32 | 27.6 | 14.03 | 8 | 0.0356 | 0.48 | 1.62E+03 | | 3.56E-02 |
| 33 | 8.63 | 171.2 | 4 | 0.0029 | 0.26 | 1.62E+03 | | 2.92E-03 |
| 34 | 13 | 155.2 | 1 | 0.0032 | 0.35 | 1.62E+03 | | 3.22E-03 |
| 35 | 15 | 232.1 | 2 | 0.0022 | 0.39 | 1.62E+03 | | 2.15E-03 |
| 36 | 27.1 | 45.56 | 8 | 0.0110 | 0.28 | 1.62E+03 | | 1.10E-02 |
| 37 | 18.1 | 33.66 | 6 | 0.0149 | 0.47 | 1.62E+03 | | 1.49E-02 |
| 38 | 11.7 | 263.5 | 3 | 0.0019 | 0.33 | 1.62E+03 | | 1.90E-03 |
| 39 | 42.4 | 32.21 | 11 | 0.0155 | 0.4 | 1.62E+03 | | 1.55E-02 |
| 40 | 29 | 2.57E+00 | 8 | 0.1947 | 0.44 | 1.62E+03 | | 1.95E-01 |
| 41 | 59.2 | 41.59 | 17 | 0.0120 | 0.48 | 1.62E+03 | | 1.20E-02 |
| 42 | 22.4 | 154.6 | 8 | 0.0032 | 0.36 | 1.62E+03 | | 3.23E-03 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 88.32 | 5 | 0.0057 | 0.44 | 1.62E+03 | | 5.66E-03 |
| 44 | 15 | 243.7 | 2 | 0.0021 | 0.35 | 1.62E+03 | | 2.05E-03 |
| 45 | 13.2 | 119.1 | 3 | 0.0042 | 0.34 | 1.62E+03 | | 4.20E-03 |
| 46 | 40.5 | 10.02 | 11 | 0.0499 | 0.48 | 1.62E+03 | | 4.99E-02 |
| 47 | 45 | 118.2 | 15 | 0.0042 | 0.26 | 1.62E+03 | | 4.23E-03 |
| 48 | 14.9 | 173.2 | 6 | 0.0029 | 0.49 | 1.62E+03 | | 2.89E-03 |
| 49 | 5 | 266.5 | 2 | 0.0019 | 0.4 | 1.62E+03 | | 1.88E-03 |
| 50 | 26.5 | 53.74 | 7 | 0.0093 | 0.42 | 1.62E+03 | | 9.30E-03 |
| 51 | 9.44 | 206.2 | 3 | 0.0024 | 0.41 | 1.62E+03 | | 2.42E-03 |
| 52 | 15.5 | 48.81 | 5 | 0.0102 | 0.37 | 1.62E+03 | | 1.02E-02 |
| 53 | 36.6 | 15.12 | 10 | 0.0331 | 0.43 | 1.62E+03 | | 3.31E-02 |
| 54 | 33.6 | 15.06 | 9 | 0.0332 | 0.44 | 1.62E+03 | | 3.32E-02 |
| 55 | 41.2 | 46.34 | 13 | 0.0108 | 0.4 | 1.62E+03 | | 1.08E-02 |
| 56 | 52.4 | 51.16 | 21 | 0.0098 | 0.37 | 1.62E+03 | | 9.77E-03 |
| 57 | 23 | 30.01 | 7 | 0.0167 | 0.43 | 1.62E+03 | | 1.67E-02 |
| 58 | 14.7 | 234.2 | 3 | 0.0021 | 0.33 | 1.62E+03 | | 2.13E-03 |
| 59 | 16.2 | 181.5 | 6 | 0.0028 | 0.47 | 1.62E+03 | | 2.75E-03 |
| 60 | 19.4 | 118.1 | 6 | 0.0042 | 0.39 | 1.62E+03 | | 4.23E-03 |
| 61 | 23.5 | 74.93 | 6 | 0.0067 | 0.36 | 1.62E+03 | | 6.67E-03 |
| 62 | 37 | 66.56 | 9 | 0.0075 | 0.36 | 1.62E+03 | | 7.51E-03 |
| 63 | 24.2 | 133.3 | 6 | 0.0038 | 0.28 | 1.62E+03 | | 3.75E-03 |
| 64 | 29.8 | 77.56 | 7 | 0.0064 | 0.45 | 1.62E+03 | | 6.45E-03 |
| 65 | 38.4 | 104.8 | 13 | 0.0048 | 0.3 | 1.62E+03 | | 4.77E-03 |
| 66 | 5.13 | 230.6 | 1 | 0.0022 | 0.27 | 1.62E+03 | | 2.17E-03 |
| 67 | 14.2 | 65.56 | 5 | 0.0076 | 0.48 | 1.62E+03 | | 7.63E-03 |
| 68 | 25.5 | 102.4 | 7 | 0.0049 | 0.46 | 1.62E+03 | | 4.88E-03 |
| 69 | 26.1 | 92.95 | 9 | 0.0054 | 0.36 | 1.62E+03 | | 5.38E-03 |
| 70 | 34 | 69.97 | 9 | 0.0071 | 0.3 | 1.62E+03 | | 7.15E-03 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 9.58E+01 | 1.22E-02 | 1.22E-02 |
| | std. dev. | 6.97E+01 | 2.39E-02 | 2.39E-02 |
| | max | 2.67E+02 | 1.95E-01 | 1.95E-01 |
| | min | 2.57E+00 | 1.88E-03 | 1.88E-03 |
| | median | 7.61E+01 | 6.57E-03 | 6.57E-03 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 6.57E-03 | 6.57E-03 |
| | 55 | 6.37E-03 | 6.37E-03 |
| | 60 | 5.51E-03 | 5.51E-03 |
| | 65 | 4.80E-03 | 4.80E-03 |
| | 70 | 4.23E-03 | 4.23E-03 |
| | 75 | 3.86E-03 | 3.86E-03 |
| | 80 | 3.23E-03 | 3.23E-03 |
| | 85 | 2.80E-03 | 2.80E-03 |
| | **90** | **2.40E-03** | **2.40E-03** |
| | 95 | 2.14E-03 | 2.14E-03 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 2 |
| Bulk density (g/cm^3) | 1.6 |
| Chemical | 1,1-DCE |
| MCL (mg/l) | 0.007 |
| Da (cm^2/sec) | 9.60E-02 |
| Henry's Law Constant (m^3-atm/mole) | 3.01E-02 |
| log Kow | 2.13 |
| Koc (ml/g) | 105.58 |
| Solubility (mg/l) | 3344 |
| Chemical Density (g/cm^3) | 1.22 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 9.942E-08 | 23 | 7040836.8538 | 0.45 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 2 | 17.8 | 0.06068 | 8 | 11.5359 | 0.34 | 1.87E+03 | | 1.15E+01 |
| 3 | 13 | 6.462 | 2 | 0.1083 | 0.5 | 1.87E+03 | | 1.08E-01 |
| 4 | 51.1 | 0.001971 | 27 | 355.1497 | 0.49 | 1.87E+03 | | 3.55E+02 |
| 5 | 32.6 | 0.000006499 | 17 | 107708.8783 | 0.45 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 6 | 39.4 | 0.01928 | 18 | 36.3071 | 0.42 | 1.87E+03 | | 3.63E+01 |
| 7 | 34.6 | 0.001936 | 24 | 361.5702 | 0.38 | 1.87E+03 | | 3.62E+02 |
| 8 | 32 | 1.651 | 19 | 0.4240 | 0.27 | 1.87E+03 | | 4.24E-01 |
| 9 | 28.1 | 0.0001027 | 14 | 6815.9688 | 0.42 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 10 | 30.6 | 1E-10 | 16 | 7000000000.0000 | 0.42 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 11 | 44 | 0.06736 | 37 | 10.3919 | 0.46 | 1.87E+03 | | 1.04E+01 |
| 12 | 20.3 | 0.0005107 | 18 | 1370.6677 | 0.42 | 1.87E+03 | | 1.37E+03 |
| 13 | 31.3 | 0.2327 | 15 | 3.0082 | 0.42 | 1.87E+03 | | 3.01E+00 |
| 14 | 30.2 | 0.005836 | 16 | 119.9452 | 0.49 | 1.87E+03 | | 1.20E+02 |
| 15 | 19.2 | 0.00001795 | 11 | 38997.2145 | 0.46 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 16 | 9 | 7.544 | 3 | 0.0928 | 0.46 | 1.87E+03 | | 9.28E-02 |
| 17 | 21.5 | 0.00006099 | 13 | 11477.2914 | 0.41 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 18 | 15 | 8.969 | 3 | 0.0780 | 0.45 | 1.87E+03 | | 7.80E-02 |
| 19 | 35.2 | 0.0004681 | 17 | 1495.4070 | 0.4 | 1.87E+03 | | 1.50E+03 |
| 20 | 18.7 | 1E-10 | 10 | 7000000000.0000 | 0.35 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 21 | 47.4 | 0.1694 | 22 | 4.1322 | 0.26 | 1.87E+03 | | 4.13E+00 |
| 22 | 22.1 | 0.03183 | 10 | 21.9918 | 0.45 | 1.87E+03 | | 2.20E+01 |
| 23 | 8.15 | 1.296 | 3 | 0.5401 | 0.3 | 1.87E+03 | | 5.40E-01 |
| 24 | 20.2 | 9.937E-08 | 10 | 7044379.5914 | 0.38 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 25 | 12 | 8.991 | 3 | 0.0779 | 0.35 | 1.87E+03 | | 7.79E-02 |
| 26 | 15.8 | 1E-10 | 12 | 7000000000.0000 | 0.49 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 27 | 17.4 | 5.099E-08 | 9 | 13728181.9965 | 0.5 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 28 | 24.7 | 0.0002276 | 13 | 3075.5712 | 0.4 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 29 | 17 | 0.002133 | 7 | 328.1763 | 0.33 | 1.87E+03 | | 3.28E+02 |
| 30 | 21.6 | 0.01235 | 9 | 56.6802 | 0.47 | 1.87E+03 | | 5.67E+01 |
| 31 | 21 | 0.02717 | 10 | 25.7637 | 0.32 | 1.87E+03 | | 2.58E+01 |
| 32 | 27.6 | 1E-10 | 15 | 7000000000.0000 | 0.48 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 33 | 8.63 | 0.00001891 | 7 | 37017.4511 | 0.26 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 34 | 13 | 11.78 | 2 | 0.0594 | 0.35 | 1.87E+03 | | 5.94E-02 |
| 35 | 15 | 14.92 | 3 | 0.0469 | 0.39 | 1.87E+03 | | 4.69E-02 |
| 36 | 27.1 | 1.857 | 15 | 0.3770 | 0.28 | 1.87E+03 | | 3.77E-01 |
| 37 | 18.1 | 0.0001283 | 10 | 5455.9626 | 0.47 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 38 | 11.7 | 0.05159 | 5 | 13.5685 | 0.33 | 1.87E+03 | | 1.36E+01 |
| 39 | 42.4 | 0.00001266 | 22 | 55292.2591 | 0.4 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 40 | 29 | 1.00E-10 | 16 | 7000000000.0000 | 0.44 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 41 | 59.2 | 0.000005034 | 33 | 139054.4299 | 0.48 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 42 | 22.4 | 2.193 | 14 | 0.3192 | 0.36 | 1.87E+03 | | 3.19E-01 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 0.06403 | 10 | 10.9324 | 0.44 | 1.87E+03 | | 1.09E+01 |
| 44 | 15 | 15.32 | 3 | 0.0457 | 0.35 | 1.87E+03 | | 4.57E-02 |
| 45 | 13.2 | 0.02341 | 5 | 29.9018 | 0.34 | 1.87E+03 | | 2.99E+01 |
| 46 | 40.5 | 1E-10 | 22 | 7000000000.0000 | 0.48 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 47 | 45 | 6.945 | 29 | 0.1008 | 0.26 | 1.87E+03 | | 1.01E-01 |
| 48 | 14.9 | 0.0009095 | 9 | 769.6537 | 0.49 | 1.87E+03 | | 7.70E+02 |
| 49 | 5 | 0.3869 | 3 | 1.8093 | 0.4 | 1.87E+03 | | 1.81E+00 |
| 50 | 26.5 | 0.00004315 | 13 | 16222.4797 | 0.42 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 51 | 9.44 | 2.219 | 4 | 0.3155 | 0.41 | 1.87E+03 | | 3.15E-01 |
| 52 | 15.5 | 0.00006911 | 9 | 10128.7802 | 0.37 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 53 | 36.6 | 3.327E-07 | 20 | 2103997.5954 | 0.43 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 54 | 33.6 | 0.000000035 | 19 | 20000000.0000 | 0.44 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 55 | 41.2 | 0.3428 | 23 | 2.0420 | 0.4 | 1.87E+03 | | 2.04E+00 |
| 56 | 52.4 | 0.2375 | 37 | 2.9474 | 0.37 | 1.87E+03 | | 2.95E+00 |
| 57 | 23 | 0.00003057 | 13 | 22898.2663 | 0.43 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 58 | 14.7 | 18.73 | 5 | 0.0374 | 0.33 | 1.87E+03 | | 3.74E-02 |
| 59 | 16.2 | 6.704 | 11 | 0.1044 | 0.47 | 1.87E+03 | | 1.04E-01 |
| 60 | 19.4 | 0.00005246 | 10 | 13343.4998 | 0.39 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 61 | 23.5 | 0.001877 | 12 | 372.9355 | 0.36 | 1.87E+03 | | 3.73E+02 |
| 62 | 37 | 0.0004364 | 18 | 1604.0330 | 0.36 | 1.87E+03 | | 1.60E+03 |
| 63 | 24.2 | 0.107 | 11 | 6.5421 | 0.28 | 1.87E+03 | | 6.54E+00 |
| 64 | 29.8 | 0.02631 | 13 | 26.6059 | 0.45 | 1.87E+03 | | 2.66E+01 |
| 65 | 38.4 | 0.5586 | 24 | 1.2531 | 0.3 | 1.87E+03 | | 1.25E+00 |
| 66 | 5.13 | 5.619 | 2 | 0.1246 | 0.27 | 1.87E+03 | | 1.25E-01 |
| 67 | 14.2 | 0.000000018 | 8 | 38888888.8889 | 0.48 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 68 | 25.5 | 0.00001616 | 13 | 43316.8317 | 0.46 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 69 | 26.1 | 0.000007298 | 16 | 95916.6895 | 0.36 | 1.87E+03 | SCN>SSL | 1.87E+03 |
| 70 | 34 | 2.946 | 17 | 0.2376 | 0.3 | 1.87E+03 | | 2.38E-01 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 1.81E+00 | 6.01E+08 | 8.21E+02 |
| | std. dev. | 4.05E+00 | 1.97E+09 | 8.91E+02 |
| | max | 1.87E+01 | 7.00E+09 | 1.87E+03 |
| | min | 1.00E-10 | 3.74E-02 | 3.74E-02 |
| | median | 3.98E-03 | 2.24E+02 | 2.24E+02 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 2.24E+02 | 2.24E+02 |
| | 55 | 3.02E+01 | 3.02E+01 |
| | 60 | 1.86E+01 | 1.86E+01 |
| | 65 | 1.05E+01 | 1.05E+01 |
| | 70 | 2.99E+00 | 2.99E+00 |
| | 75 | 1.39E+00 | 1.39E+00 |
| | 80 | 3.65E-01 | 3.65E-01 |
| | 85 | 1.64E-01 | 1.64E-01 |
| | **90** | **1.00E-01** | **1.00E-01** |
| | 95 | 6.77E-02 | 6.77E-02 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 2 |
| Bulk density (g/cm^3) | 1.6 |
| Chemical | cis-1,2-DCE |
| MCL (mg/l) | 0.07 |
| Da (cm^2/sec) | 7.91E-02 |
| Henry's Law Constant (m^3-atm/mole) | 3.37E-03 |
| log Kow | 1.86 |
| Koc (ml/g) | 67.48 |
| Solubility (mg/l) | 3500 |
| Chemical Density (g/cm^3) | 1.28 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 9.303 | 15 | 0.7524 | 0.45 | 9.97E+02 | | 7.52E-01 |
| 2 | 17.8 | 89.21 | 6 | 0.0785 | 0.34 | 9.97E+02 | | 7.85E-02 |
| 3 | 13 | 47.7 | 2 | 0.1468 | 0.5 | 9.97E+02 | | 1.47E-01 |
| 4 | 51.1 | 16.52 | 17 | 0.4237 | 0.49 | 9.97E+02 | | 4.24E-01 |
| 5 | 32.6 | 10.73 | 11 | 0.6524 | 0.45 | 9.97E+02 | | 6.52E-01 |
| 6 | 39.4 | 17.92 | 12 | 0.3906 | 0.42 | 9.97E+02 | | 3.91E-01 |
| 7 | 34.6 | 30.5 | 18 | 0.2295 | 0.38 | 9.97E+02 | | 2.30E-01 |
| 8 | 32 | 21.26 | 14 | 0.3293 | 0.27 | 9.97E+02 | | 3.29E-01 |
| 9 | 28.1 | 25.01 | 9 | 0.2799 | 0.42 | 9.97E+02 | | 2.80E-01 |
| 10 | 30.6 | 3.142 | 10 | 2.2279 | 0.42 | 9.97E+02 | | 2.23E+00 |
| 11 | 44 | 39.02 | 29 | 0.1794 | 0.46 | 9.97E+02 | | 1.79E-01 |
| 12 | 20.3 | 28.28 | 13 | 0.2475 | 0.42 | 9.97E+02 | | 2.48E-01 |
| 13 | 31.3 | 52.38 | 10 | 0.1336 | 0.42 | 9.97E+02 | | 1.34E-01 |
| 14 | 30.2 | 8.664 | 11 | 0.8079 | 0.49 | 9.97E+02 | | 8.08E-01 |
| 15 | 19.2 | 37.55 | 8 | 0.1864 | 0.46 | 9.97E+02 | | 1.86E-01 |
| 16 | 9 | 129.1 | 3 | 0.0542 | 0.46 | 9.97E+02 | | 5.42E-02 |
| 17 | 21.5 | 34.54 | 9 | 0.2027 | 0.41 | 9.97E+02 | | 2.03E-01 |
| 18 | 15 | 83.12 | 2 | 0.0842 | 0.45 | 9.97E+02 | | 8.42E-02 |
| 19 | 35.2 | 23.8 | 12 | 0.2941 | 0.4 | 9.97E+02 | | 2.94E-01 |
| 20 | 18.7 | 10.08 | 7 | 0.6944 | 0.35 | 9.97E+02 | | 6.94E-01 |
| 21 | 47.4 | 11.69 | 15 | 0.5988 | 0.26 | 9.97E+02 | | 5.99E-01 |
| 22 | 22.1 | 12.15 | 7 | 0.5761 | 0.45 | 9.97E+02 | | 5.76E-01 |
| 23 | 8.15 | 44.71 | 3 | 0.1566 | 0.3 | 9.97E+02 | | 1.57E-01 |
| 24 | 20.2 | 6.129 | 7 | 1.1421 | 0.38 | 9.97E+02 | | 1.14E+00 |
| 25 | 12 | 34.85 | 2 | 0.2009 | 0.35 | 9.97E+02 | | 2.01E-01 |
| 26 | 15.8 | 10.1 | 9 | 0.6931 | 0.49 | 9.97E+02 | | 6.93E-01 |
| 27 | 17.4 | 11.65 | 7 | 0.6009 | 0.5 | 9.97E+02 | | 6.01E-01 |
| 28 | 24.7 | 20.77 | 9 | 0.3370 | 0.4 | 9.97E+02 | | 3.37E-01 |
| 29 | 17 | 35.5 | 5 | 0.1972 | 0.33 | 9.97E+02 | | 1.97E-01 |
| 30 | 21.6 | 10.27 | 6 | 0.6816 | 0.47 | 9.97E+02 | | 6.82E-01 |
| 31 | 21 | 60.12 | 7 | 0.1164 | 0.32 | 9.97E+02 | | 1.16E-01 |
| 32 | 27.6 | 1.57 | 10 | 4.4586 | 0.48 | 9.97E+02 | | 4.46E+00 |
| 33 | 8.63 | 42.55 | 6 | 0.1645 | 0.26 | 9.97E+02 | | 1.65E-01 |
| 34 | 13 | 58.85 | 2 | 0.1189 | 0.35 | 9.97E+02 | | 1.19E-01 |
| 35 | 15 | 100.6 | 3 | 0.0696 | 0.39 | 9.97E+02 | | 6.96E-02 |
| 36 | 27.1 | 23.3 | 11 | 0.3004 | 0.28 | 9.97E+02 | | 3.00E-01 |
| 37 | 18.1 | 10.71 | 7 | 0.6536 | 0.47 | 9.97E+02 | | 6.54E-01 |
| 38 | 11.7 | 100.6 | 4 | 0.0696 | 0.33 | 9.97E+02 | | 6.96E-02 |
| 39 | 42.4 | 9.031 | 14 | 0.7751 | 0.4 | 9.97E+02 | | 7.75E-01 |
| 40 | 29 | 4.24E-02 | 10 | 165.2502 | 0.44 | 9.97E+02 | | 1.65E+02 |
| 41 | 59.2 | 10.95 | 22 | 0.6393 | 0.48 | 9.97E+02 | | 6.39E-01 |
| 42 | 22.4 | 66.89 | 10 | 0.1046 | 0.36 | 9.97E+02 | | 1.05E-01 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 34.83 | 7 | 0.2010 | 0.44 | 9.97E+02 | | 2.01E-01 |
| 44 | 15 | 111.5 | 2 | 0.0628 | 0.35 | 9.97E+02 | | 6.28E-02 |
| 45 | 13.2 | 49.59 | 4 | 0.1412 | 0.34 | 9.97E+02 | | 1.41E-01 |
| 46 | 40.5 | 1.345 | 14 | 5.2045 | 0.48 | 9.97E+02 | | 5.20E+00 |
| 47 | 45 | 70.56 | 21 | 0.0992 | 0.26 | 9.97E+02 | | 9.92E-02 |
| 48 | 14.9 | 58.89 | 7 | 0.1189 | 0.49 | 9.97E+02 | | 1.19E-01 |
| 49 | 5 | 107 | 3 | 0.0654 | 0.4 | 9.97E+02 | | 6.54E-02 |
| 50 | 26.5 | 16.26 | 9 | 0.4305 | 0.42 | 9.97E+02 | | 4.31E-01 |
| 51 | 9.44 | 101.8 | 3 | 0.0688 | 0.41 | 9.97E+02 | | 6.88E-02 |
| 52 | 15.5 | 14.7 | 7 | 0.4762 | 0.37 | 9.97E+02 | | 4.76E-01 |
| 53 | 36.6 | 3.092 | 13 | 2.2639 | 0.43 | 9.97E+02 | | 2.26E+00 |
| 54 | 33.6 | 2.848 | 12 | 2.4579 | 0.44 | 9.97E+02 | | 2.46E+00 |
| 55 | 41.2 | 24.07 | 17 | 0.2908 | 0.4 | 9.97E+02 | | 2.91E-01 |
| 56 | 52.4 | 29.43 | 28 | 0.2379 | 0.37 | 9.97E+02 | | 2.38E-01 |
| 57 | 23 | 8.939 | 9 | 0.7831 | 0.43 | 9.97E+02 | | 7.83E-01 |
| 58 | 14.7 | 104.6 | 4 | 0.0669 | 0.33 | 9.97E+02 | | 6.69E-02 |
| 59 | 16.2 | 73.86 | 7 | 0.0948 | 0.47 | 9.97E+02 | | 9.48E-02 |
| 60 | 19.4 | 36.07 | 7 | 0.1941 | 0.39 | 9.97E+02 | | 1.94E-01 |
| 61 | 23.5 | 27.91 | 8 | 0.2508 | 0.36 | 9.97E+02 | | 2.51E-01 |
| 62 | 37 | 23.83 | 12 | 0.2937 | 0.36 | 9.97E+02 | | 2.94E-01 |
| 63 | 24.2 | 63.53 | 8 | 0.1102 | 0.28 | 9.97E+02 | | 1.10E-01 |
| 64 | 29.8 | 30.12 | 9 | 0.2324 | 0.45 | 9.97E+02 | | 2.32E-01 |
| 65 | 38.4 | 59.38 | 17 | 0.1179 | 0.3 | 9.97E+02 | | 1.18E-01 |
| 66 | 5.13 | 128.7 | 2 | 0.0544 | 0.27 | 9.97E+02 | | 5.44E-02 |
| 67 | 14.2 | 11.48 | 6 | 0.6098 | 0.48 | 9.97E+02 | | 6.10E-01 |
| 68 | 25.5 | 27.33 | 8 | 0.2561 | 0.46 | 9.97E+02 | | 2.56E-01 |
| 69 | 26.1 | 23.24 | 11 | 0.3012 | 0.36 | 9.97E+02 | | 3.01E-01 |
| 70 | 34 | 39.02 | 12 | 0.1794 | 0.3 | 9.97E+02 | | 1.79E-01 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 3.84E+01 | 2.89E+00 | 2.89E+00 |
| | std. dev. | 3.35E+01 | 1.97E+01 | 1.97E+01 |
| | max | 1.29E+02 | 1.65E+02 | 1.65E+02 |
| | min | 4.24E-02 | 5.42E-02 | 5.42E-02 |
| | median | 2.81E+01 | 2.49E-01 | 2.49E-01 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 2.49E-01 | 2.49E-01 |
| | 55 | 2.30E-01 | 2.30E-01 |
| | 60 | 1.99E-01 | 1.99E-01 |
| | 65 | 1.80E-01 | 1.80E-01 |
| | 70 | 1.54E-01 | 1.54E-01 |
| | 75 | 1.23E-01 | 1.23E-01 |
| | 80 | 1.15E-01 | 1.15E-01 |
| | 85 | 9.63E-02 | 9.63E-02 |
| | **90** | **6.96E-02** | **6.96E-02** |
| | 95 | 6.61E-02 | 6.61E-02 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 2 |
| Bulk density (g/cm^3) | 1.6 |
| Chemical | trans-1,2-DCE |
| MCL (mg/l) | 0.1 |
| Da (cm^2/sec) | 9.60E-02 |
| Henry's Law Constant (m^3-atm/mole) | 6.72E-03 |
| log Kow | 2.06 |
| Koc (ml/g) | 94.01 |
| Solubility (mg/l) | 6300 |
| Chemical Density (g/cm^3) | 1.26 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.4656 | 17 | 21.4777 | 0.45 | 2.35E+03 | | 2.15E+01 |
| 2 | 17.8 | 25.73 | 7 | 0.3887 | 0.34 | 2.35E+03 | | 3.89E-01 |
| 3 | 13 | 24.51 | 2 | 0.4080 | 0.5 | 2.35E+03 | | 4.08E-01 |
| 4 | 51.1 | 3.567 | 20 | 2.8035 | 0.49 | 2.35E+03 | | 2.80E+00 |
| 5 | 32.6 | 1.011 | 13 | 9.8912 | 0.45 | 2.35E+03 | | 9.89E+00 |
| 6 | 39.4 | 5.165 | 14 | 1.9361 | 0.42 | 2.35E+03 | | 1.94E+00 |
| 7 | 34.6 | 6.005 | 20 | 1.6653 | 0.38 | 2.35E+03 | | 1.67E+00 |
| 8 | 32 | 11.24 | 17 | 0.8897 | 0.27 | 2.35E+03 | | 8.90E-01 |
| 9 | 28.1 | 3.262 | 11 | 3.0656 | 0.42 | 2.35E+03 | | 3.07E+00 |
| 10 | 30.6 | 0.1517 | 12 | 65.9196 | 0.42 | 2.35E+03 | | 6.59E+01 |
| 11 | 44 | 13.53 | 33 | 0.7391 | 0.46 | 2.35E+03 | | 7.39E-01 |
| 12 | 20.3 | 4.701 | 15 | 2.1272 | 0.42 | 2.35E+03 | | 2.13E+00 |
| 13 | 31.3 | 18.48 | 12 | 0.5411 | 0.42 | 2.35E+03 | | 5.41E-01 |
| 14 | 30.2 | 2.248 | 13 | 4.4484 | 0.49 | 2.35E+03 | | 4.45E+00 |
| 15 | 19.2 | 3.492 | 9 | 2.8637 | 0.46 | 2.35E+03 | | 2.86E+00 |
| 16 | 9 | 76.37 | 3 | 0.1309 | 0.46 | 2.35E+03 | | 1.31E-01 |
| 17 | 21.5 | 3.9 | 10 | 2.5641 | 0.41 | 2.35E+03 | | 2.56E+00 |
| 18 | 15 | 46.67 | 3 | 0.2143 | 0.45 | 2.35E+03 | | 2.14E-01 |
| 19 | 35.2 | 4.058 | 14 | 2.4643 | 0.4 | 2.35E+03 | | 2.46E+00 |
| 20 | 18.7 | 0.2378 | 8 | 42.0521 | 0.35 | 2.35E+03 | | 4.21E+01 |
| 21 | 47.4 | 5.132 | 19 | 1.9486 | 0.26 | 2.35E+03 | | 1.95E+00 |
| 22 | 22.1 | 3.911 | 8 | 2.5569 | 0.45 | 2.35E+03 | | 2.56E+00 |
| 23 | 8.15 | 21.58 | 3 | 0.4634 | 0.3 | 2.35E+03 | | 4.63E-01 |
| 24 | 20.2 | 0.3421 | 8 | 29.2312 | 0.38 | 2.35E+03 | | 2.92E+01 |
| 25 | 12 | 18.49 | 2 | 0.5408 | 0.35 | 2.35E+03 | | 5.41E-01 |
| 26 | 15.8 | 0.2794 | 10 | 35.7910 | 0.49 | 2.35E+03 | | 3.58E+01 |
| 27 | 17.4 | 0.5731 | 8 | 17.4490 | 0.5 | 2.35E+03 | | 1.74E+01 |
| 28 | 24.7 | 3.08 | 10 | 3.2468 | 0.4 | 2.35E+03 | | 3.25E+00 |
| 29 | 17 | 6.489 | 6 | 1.5411 | 0.33 | 2.35E+03 | | 1.54E+00 |
| 30 | 21.6 | 2.94 | 7 | 3.4014 | 0.47 | 2.35E+03 | | 3.40E+00 |
| 31 | 21 | 16.27 | 8 | 0.6146 | 0.32 | 2.35E+03 | | 6.15E-01 |
| 32 | 27.6 | 0.0252 | 12 | 396.8254 | 0.48 | 2.35E+03 | | 3.97E+02 |
| 33 | 8.63 | 3.888 | 7 | 2.5720 | 0.26 | 2.35E+03 | | 2.57E+00 |
| 34 | 13 | 37.3 | 2 | 0.2681 | 0.35 | 2.35E+03 | | 2.68E-01 |
| 35 | 15 | 63.32 | 3 | 0.1579 | 0.39 | 2.35E+03 | | 1.58E-01 |
| 36 | 27.1 | 12.31 | 13 | 0.8123 | 0.28 | 2.35E+03 | | 8.12E-01 |
| 37 | 18.1 | 1.632 | 8 | 6.1275 | 0.47 | 2.35E+03 | | 6.13E+00 |
| 38 | 11.7 | 26.62 | 4 | 0.3757 | 0.33 | 2.35E+03 | | 3.76E-01 |
| 39 | 42.4 | 0.911 | 17 | 10.9769 | 0.4 | 2.35E+03 | | 1.10E+01 |
| 40 | 29 | 3.27E-05 | 13 | 306278.7136 | 0.44 | 2.35E+03 | SCN>SSL | 2.35E+03 |
| 41 | 59.2 | 0.9566 | 26 | 10.4537 | 0.48 | 2.35E+03 | | 1.05E+01 |
| 42 | 22.4 | 30.2 | 12 | 0.3311 | 0.36 | 2.35E+03 | | 3.31E-01 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 10.76 | 8 | 0.9294 | 0.44 | 2.35E+03 | | 9.29E-01 |
| 44 | 15 | 58.35 | 3 | 0.1714 | 0.35 | 2.35E+03 | | 1.71E-01 |
| 45 | 13.2 | 12.61 | 5 | 0.7930 | 0.34 | 2.35E+03 | | 7.93E-01 |
| 46 | 40.5 | 0.03853 | 17 | 259.5380 | 0.48 | 2.35E+03 | | 2.60E+02 |
| 47 | 45 | 41.05 | 26 | 0.2436 | 0.26 | 2.35E+03 | | 2.44E-01 |
| 48 | 14.9 | 9.169 | 8 | 1.0906 | 0.49 | 2.35E+03 | | 1.09E+00 |
| 49 | 5 | 42.84 | 3 | 0.2334 | 0.4 | 2.35E+03 | | 2.33E-01 |
| 50 | 26.5 | 1.888 | 11 | 5.2966 | 0.42 | 2.35E+03 | | 5.30E+00 |
| 51 | 9.44 | 44.36 | 4 | 0.2254 | 0.41 | 2.35E+03 | | 2.25E-01 |
| 52 | 15.5 | 1.901 | 8 | 5.2604 | 0.37 | 2.35E+03 | | 5.26E+00 |
| 53 | 36.6 | 0.1944 | 15 | 51.4403 | 0.43 | 2.35E+03 | | 5.14E+01 |
| 54 | 33.6 | 0.1463 | 14 | 68.3527 | 0.44 | 2.35E+03 | | 6.84E+01 |
| 55 | 41.2 | 10.3 | 20 | 0.9709 | 0.4 | 2.35E+03 | | 9.71E-01 |
| 56 | 52.4 | 12.72 | 33 | 0.7862 | 0.37 | 2.35E+03 | | 7.86E-01 |
| 57 | 23 | 1.051 | 10 | 9.5147 | 0.43 | 2.35E+03 | | 9.51E+00 |
| 58 | 14.7 | 52.95 | 5 | 0.1889 | 0.33 | 2.35E+03 | | 1.89E-01 |
| 59 | 16.2 | 19.41 | 8 | 0.5152 | 0.47 | 2.35E+03 | | 5.15E-01 |
| 60 | 19.4 | 4.036 | 9 | 2.4777 | 0.39 | 2.35E+03 | | 2.48E+00 |
| 61 | 23.5 | 5.424 | 10 | 1.8437 | 0.36 | 2.35E+03 | | 1.84E+00 |
| 62 | 37 | 3.753 | 14 | 2.6645 | 0.36 | 2.35E+03 | | 2.66E+00 |
| 63 | 24.2 | 20.71 | 9 | 0.4829 | 0.28 | 2.35E+03 | | 4.83E-01 |
| 64 | 29.8 | 8.235 | 10 | 1.2143 | 0.45 | 2.35E+03 | | 1.21E+00 |
| 65 | 38.4 | 26.12 | 21 | 0.3828 | 0.3 | 2.35E+03 | | 3.83E-01 |
| 66 | 5.13 | 73.57 | 2 | 0.1359 | 0.27 | 2.35E+03 | | 1.36E-01 |
| 67 | 14.2 | 0.4464 | 6 | 22.4014 | 0.48 | 2.35E+03 | | 2.24E+01 |
| 68 | 25.5 | 2.749 | 10 | 3.6377 | 0.46 | 2.35E+03 | | 3.64E+00 |
| 69 | 26.1 | 1.956 | 13 | 5.1125 | 0.36 | 2.35E+03 | | 5.11E+00 |
| 70 | 34 | 21.07 | 14 | 0.4746 | 0.3 | 2.35E+03 | | 4.75E-01 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 1.43E+01 | 4.39E+03 | 4.99E+01 |
| | std. dev. | 1.87E+01 | 3.66E+04 | 2.85E+02 |
| | max | 7.64E+01 | 3.06E+05 | 2.35E+03 |
| | min | 3.27E-05 | 1.31E-01 | 1.31E-01 |
| | median | 5.15E+00 | 1.94E+00 | 1.94E+00 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 1.94E+00 | 1.94E+00 |
| | 55 | 1.55E+00 | 1.55E+00 |
| | 60 | 9.54E-01 | 9.54E-01 |
| | 65 | 7.96E-01 | 7.96E-01 |
| | 70 | 5.93E-01 | 5.93E-01 |
| | 75 | 4.91E-01 | 4.91E-01 |
| | 80 | 4.04E-01 | 4.04E-01 |
| | 85 | 3.47E-01 | 3.47E-01 |
| | **90** | **2.33E-01** | **2.33E-01** |
| | 95 | 1.79E-01 | 1.79E-01 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 2 |
| Bulk density (g/cm^3) | 1.6 |
| Chemical | Benzene |
| MCL (mg/l) | 0.005 |
| Da (cm^2/sec) | 9.18E-02 |
| Henry's Law Constant (m^3-atm/mole) | 5.43E-03 |
| log Kow | 2.13 |
| Koc (ml/g) | 84.98 |
| Solubility (mg/l) | 1791 |
| Chemical Density (g/cm^3) | 0.88 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 1.438 | 16 | 0.3477 | 0.45 | 6.13E+02 | | 3.48E-01 |
| 2 | 17.8 | 39.2 | 7 | 0.0128 | 0.34 | 6.13E+02 | | 1.28E-02 |
| 3 | 13 | 30.32 | 2 | 0.0165 | 0.5 | 6.13E+02 | | 1.65E-02 |
| 4 | 51.1 | 6.279 | 19 | 0.0796 | 0.49 | 6.13E+02 | | 7.96E-02 |
| 5 | 32.6 | 2.468 | 12 | 0.2026 | 0.45 | 6.13E+02 | | 2.03E-01 |
| 6 | 39.4 | 8.065 | 13 | 0.0620 | 0.42 | 6.13E+02 | | 6.20E-02 |
| 7 | 34.6 | 11.17 | 19 | 0.0448 | 0.38 | 6.13E+02 | | 4.48E-02 |
| 8 | 32 | 14.01 | 16 | 0.0357 | 0.27 | 6.13E+02 | | 3.57E-02 |
| 9 | 28.1 | 6.91 | 10 | 0.0724 | 0.42 | 6.13E+02 | | 7.24E-02 |
| 10 | 30.6 | 0.4745 | 12 | 1.0537 | 0.42 | 6.13E+02 | | 1.05E+00 |
| 11 | 44 | 20.29 | 32 | 0.0246 | 0.46 | 6.13E+02 | | 2.46E-02 |
| 12 | 20.3 | 9.326 | 15 | 0.0536 | 0.42 | 6.13E+02 | | 5.36E-02 |
| 13 | 31.3 | 26.6 | 11 | 0.0188 | 0.42 | 6.13E+02 | | 1.88E-02 |
| 14 | 30.2 | 3.754 | 12 | 0.1332 | 0.49 | 6.13E+02 | | 1.33E-01 |
| 15 | 19.2 | 8.156 | 9 | 0.0613 | 0.46 | 6.13E+02 | | 6.13E-02 |
| 16 | 9 | 90.85 | 3 | 0.0055 | 0.46 | 6.13E+02 | | 5.50E-03 |
| 17 | 21.5 | 8.963 | 10 | 0.0558 | 0.41 | 6.13E+02 | | 5.58E-02 |
| 18 | 15 | 54.8 | 3 | 0.0091 | 0.45 | 6.13E+02 | | 9.12E-03 |
| 19 | 35.2 | 8.093 | 13 | 0.0618 | 0.4 | 6.13E+02 | | 6.18E-02 |
| 20 | 18.7 | 0.9462 | 8 | 0.5284 | 0.35 | 6.13E+02 | | 5.28E-01 |
| 21 | 47.4 | 6.947 | 18 | 0.0720 | 0.26 | 6.13E+02 | | 7.20E-02 |
| 22 | 22.1 | 5.705 | 8 | 0.0876 | 0.45 | 6.13E+02 | | 8.76E-02 |
| 23 | 8.15 | 28.67 | 3 | 0.0174 | 0.3 | 6.13E+02 | | 1.74E-02 |
| 24 | 20.2 | 1.016 | 8 | 0.4921 | 0.38 | 6.13E+02 | | 4.92E-01 |
| 25 | 12 | 23.16 | 2 | 0.0216 | 0.35 | 6.13E+02 | | 2.16E-02 |
| 26 | 15.8 | 1.012 | 10 | 0.4941 | 0.49 | 6.13E+02 | | 4.94E-01 |
| 27 | 17.4 | 1.734 | 8 | 0.2884 | 0.5 | 6.13E+02 | | 2.88E-01 |
| 28 | 24.7 | 6.274 | 10 | 0.0797 | 0.4 | 6.13E+02 | | 7.97E-02 |
| 29 | 17 | 11.31 | 6 | 0.0442 | 0.33 | 6.13E+02 | | 4.42E-02 |
| 30 | 21.6 | 4.636 | 7 | 0.1079 | 0.47 | 6.13E+02 | | 1.08E-01 |
| 31 | 21 | 26.09 | 8 | 0.0192 | 0.32 | 6.13E+02 | | 1.92E-02 |
| 32 | 27.6 | 0.1225 | 11 | 4.0816 | 0.48 | 6.13E+02 | | 4.08E+00 |
| 33 | 8.63 | 9.772 | 6 | 0.0512 | 0.26 | 6.13E+02 | | 5.12E-02 |
| 34 | 13 | 43.24 | 2 | 0.0116 | 0.35 | 6.13E+02 | | 1.16E-02 |
| 35 | 15 | 73.25 | 3 | 0.0068 | 0.39 | 6.13E+02 | | 6.83E-03 |
| 36 | 27.1 | 15.31 | 12 | 0.0327 | 0.28 | 6.13E+02 | | 3.27E-02 |
| 37 | 18.1 | 3.215 | 8 | 0.1555 | 0.47 | 6.13E+02 | | 1.56E-01 |
| 38 | 11.7 | 45.33 | 4 | 0.0110 | 0.33 | 6.13E+02 | | 1.10E-02 |
| 39 | 42.4 | 2.164 | 16 | 0.2311 | 0.4 | 6.13E+02 | | 2.31E-01 |
| 40 | 29 | 4.62E-04 | 12 | 1082.9543 | 0.44 | 6.13E+02 | SCN>SSL | 6.13E+02 |
| 41 | 59.2 | 2.417 | 25 | 0.2069 | 0.48 | 6.13E+02 | | 2.07E-01 |
| 42 | 22.4 | 39.35 | 11 | 0.0127 | 0.36 | 6.13E+02 | | 1.27E-02 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 15.75 | 8 | 0.0317 | 0.44 | 6.13E+02 | | 3.17E-02 |
| 44 | 15 | 67.92 | 3 | 0.0074 | 0.35 | 6.13E+02 | | 7.36E-03 |
| 45 | 13.2 | 19.15 | 5 | 0.0261 | 0.34 | 6.13E+02 | | 2.61E-02 |
| 46 | 40.5 | 0.1467 | 16 | 3.4083 | 0.48 | 6.13E+02 | | 3.41E+00 |
| 47 | 45 | 49.38 | 24 | 0.0101 | 0.26 | 6.13E+02 | | 1.01E-02 |
| 48 | 14.9 | 17.88 | 8 | 0.0280 | 0.49 | 6.13E+02 | | 2.80E-02 |
| 49 | 5 | 62.88 | 3 | 0.0080 | 0.4 | 6.13E+02 | | 7.95E-03 |
| 50 | 26.5 | 4.307 | 10 | 0.1161 | 0.42 | 6.13E+02 | | 1.16E-01 |
| 51 | 9.44 | 57.12 | 4 | 0.0088 | 0.41 | 6.13E+02 | | 8.75E-03 |
| 52 | 15.5 | 4.211 | 7 | 0.1187 | 0.37 | 6.13E+02 | | 1.19E-01 |
| 53 | 36.6 | 0.5429 | 15 | 0.9210 | 0.43 | 6.13E+02 | | 9.21E-01 |
| 54 | 33.6 | 0.4383 | 13 | 1.1408 | 0.44 | 6.13E+02 | | 1.14E+00 |
| 55 | 41.2 | 13.99 | 19 | 0.0357 | 0.4 | 6.13E+02 | | 3.57E-02 |
| 56 | 52.4 | 17.49 | 31 | 0.0286 | 0.37 | 6.13E+02 | | 2.86E-02 |
| 57 | 23 | 2.38 | 10 | 0.2101 | 0.43 | 6.13E+02 | | 2.10E-01 |
| 58 | 14.7 | 66.38 | 4 | 0.0075 | 0.33 | 6.13E+02 | | 7.53E-03 |
| 59 | 16.2 | 32.85 | 8 | 0.0152 | 0.47 | 6.13E+02 | | 1.52E-02 |
| 60 | 19.4 | 9.799 | 8 | 0.0510 | 0.39 | 6.13E+02 | | 5.10E-02 |
| 61 | 23.5 | 10.12 | 9 | 0.0494 | 0.36 | 6.13E+02 | | 4.94E-02 |
| 62 | 37 | 7.659 | 14 | 0.0653 | 0.36 | 6.13E+02 | | 6.53E-02 |
| 63 | 24.2 | 31.34 | 9 | 0.0160 | 0.28 | 6.13E+02 | | 1.60E-02 |
| 64 | 29.8 | 13.11 | 10 | 0.0381 | 0.45 | 6.13E+02 | | 3.81E-02 |
| 65 | 38.4 | 35.59 | 20 | 0.0140 | 0.3 | 6.13E+02 | | 1.40E-02 |
| 66 | 5.13 | 90.11 | 2 | 0.0055 | 0.27 | 6.13E+02 | | 5.55E-03 |
| 67 | 14.2 | 1.617 | 6 | 0.3092 | 0.48 | 6.13E+02 | | 3.09E-01 |
| 68 | 25.5 | 6.293 | 9 | 0.0795 | 0.46 | 6.13E+02 | | 7.95E-02 |
| 69 | 26.1 | 5.007 | 12 | 0.0999 | 0.36 | 6.13E+02 | | 9.99E-02 |
| 70 | 34 | 25.82 | 14 | 0.0194 | 0.3 | 6.13E+02 | | 1.94E-02 |

| statistics | | | | |
|---|---|---|---|---|
| | mean | 1.96E+01 | 1.57E+01 | 8.99E+00 |
| | std. dev. | 2.25E+01 | 1.29E+02 | 7.33E+01 |
| | max | 9.09E+01 | 1.08E+03 | 6.13E+02 |
| | min | 4.62E-04 | 5.50E-03 | 5.50E-03 |
| | median | 9.79E+00 | 5.11E-02 | 5.11E-02 |

| percentiles | | | |
|---|---|---|---|
| | 50 | 5.11E-02 | 5.11E-02 |
| | 55 | 4.42E-02 | 4.42E-02 |
| | 60 | 3.45E-02 | 3.45E-02 |
| | 65 | 2.81E-02 | 2.81E-02 |
| | 70 | 2.09E-02 | 2.09E-02 |
| | 75 | 1.78E-02 | 1.78E-02 |
| | 80 | 1.50E-02 | 1.50E-02 |
| | 85 | 1.20E-02 | 1.20E-02 |
| | **90** | **9.09E-03** | **9.09E-03** |
| | 95 | 7.44E-03 | 7.44E-03 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 2 |
| Bulk density (g/cm^3) | 1.6 |
| Chemical | Carbon Tetrachloride |
| MCL (mg/l) | 0.005 |
| Da (cm^2/sec) | 8.40E-02 |
| Henry's Law Constant (m^3-atm/mole) | 3.04E-02 |
| log Kow | 2.83 |
| Koc (ml/g) | 336.97 |
| Solubility (mg/l) | 805 |
| Chemical Density (g/cm^3) | 1.59 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 1.438 | 16 | 0.3477 | 0.45 | 9.17E+02 | | 3.48E-01 |
| 2 | 17.8 | 39.2 | 7 | 0.0128 | 0.34 | 9.17E+02 | | 1.28E-02 |
| 3 | 13 | 30.32 | 2 | 0.0165 | 0.5 | 9.17E+02 | | 1.65E-02 |
| 4 | 51.1 | 6.279 | 19 | 0.0796 | 0.49 | 9.17E+02 | | 7.96E-02 |
| 5 | 32.6 | 2.468 | 12 | 0.2026 | 0.45 | 9.17E+02 | | 2.03E-01 |
| 6 | 39.4 | 8.065 | 13 | 0.0620 | 0.42 | 9.17E+02 | | 6.20E-02 |
| 7 | 34.6 | 11.17 | 19 | 0.0448 | 0.38 | 9.17E+02 | | 4.48E-02 |
| 8 | 32 | 14.01 | 16 | 0.0357 | 0.27 | 9.17E+02 | | 3.57E-02 |
| 9 | 28.1 | 6.91 | 10 | 0.0724 | 0.42 | 9.17E+02 | | 7.24E-02 |
| 10 | 30.6 | 0.4745 | 12 | 1.0537 | 0.42 | 9.17E+02 | | 1.05E+00 |
| 11 | 44 | 20.29 | 32 | 0.0246 | 0.46 | 9.17E+02 | | 2.46E-02 |
| 12 | 20.3 | 9.326 | 15 | 0.0536 | 0.42 | 9.17E+02 | | 5.36E-02 |
| 13 | 31.3 | 26.6 | 11 | 0.0188 | 0.42 | 9.17E+02 | | 1.88E-02 |
| 14 | 30.2 | 3.754 | 12 | 0.1332 | 0.49 | 9.17E+02 | | 1.33E-01 |
| 15 | 19.2 | 8.156 | 9 | 0.0613 | 0.46 | 9.17E+02 | | 6.13E-02 |
| 16 | 9 | 90.85 | 3 | 0.0055 | 0.46 | 9.17E+02 | | 5.50E-03 |
| 17 | 21.5 | 8.963 | 10 | 0.0558 | 0.41 | 9.17E+02 | | 5.58E-02 |
| 18 | 15 | 54.8 | 3 | 0.0091 | 0.45 | 9.17E+02 | | 9.12E-03 |
| 19 | 35.2 | 8.093 | 13 | 0.0618 | 0.4 | 9.17E+02 | | 6.18E-02 |
| 20 | 18.7 | 0.9462 | 8 | 0.5284 | 0.35 | 9.17E+02 | | 5.28E-01 |
| 21 | 47.4 | 6.947 | 18 | 0.0720 | 0.26 | 9.17E+02 | | 7.20E-02 |
| 22 | 22.1 | 5.705 | 8 | 0.0876 | 0.45 | 9.17E+02 | | 8.76E-02 |
| 23 | 8.15 | 28.67 | 3 | 0.0174 | 0.3 | 9.17E+02 | | 1.74E-02 |
| 24 | 20.2 | 1.016 | 8 | 0.4921 | 0.38 | 9.17E+02 | | 4.92E-01 |
| 25 | 12 | 23.16 | 2 | 0.0216 | 0.35 | 9.17E+02 | | 2.16E-02 |
| 26 | 15.8 | 1.012 | 10 | 0.4941 | 0.49 | 9.17E+02 | | 4.94E-01 |
| 27 | 17.4 | 1.734 | 8 | 0.2884 | 0.5 | 9.17E+02 | | 2.88E-01 |
| 28 | 24.7 | 6.274 | 10 | 0.0797 | 0.4 | 9.17E+02 | | 7.97E-02 |
| 29 | 17 | 11.31 | 6 | 0.0442 | 0.33 | 9.17E+02 | | 4.42E-02 |
| 30 | 21.6 | 4.636 | 7 | 0.1079 | 0.47 | 9.17E+02 | | 1.08E-01 |
| 31 | 21 | 26.09 | 8 | 0.0192 | 0.32 | 9.17E+02 | | 1.92E-02 |
| 32 | 27.6 | 0.1225 | 11 | 4.0816 | 0.48 | 9.17E+02 | | 4.08E+00 |
| 33 | 8.63 | 9.772 | 6 | 0.0512 | 0.26 | 9.17E+02 | | 5.12E-02 |
| 34 | 13 | 43.24 | 2 | 0.0116 | 0.35 | 9.17E+02 | | 1.16E-02 |
| 35 | 15 | 73.25 | 3 | 0.0068 | 0.39 | 9.17E+02 | | 6.83E-03 |
| 36 | 27.1 | 15.31 | 12 | 0.0327 | 0.28 | 9.17E+02 | | 3.27E-02 |
| 37 | 18.1 | 3.215 | 8 | 0.1555 | 0.47 | 9.17E+02 | | 1.56E-01 |
| 38 | 11.7 | 45.33 | 4 | 0.0110 | 0.33 | 9.17E+02 | | 1.10E-02 |
| 39 | 42.4 | 2.164 | 16 | 0.2311 | 0.4 | 9.17E+02 | | 2.31E-01 |
| 40 | 29 | 4.62E-04 | 12 | 1082.9543 | 0.44 | 9.17E+02 | SCN>SSL | 9.17E+02 |
| 41 | 59.2 | 2.417 | 25 | 0.2069 | 0.48 | 9.17E+02 | | 2.07E-01 |
| 42 | 22.4 | 39.35 | 11 | 0.0127 | 0.36 | 9.17E+02 | | 1.27E-02 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 15.75 | 8 | 0.0317 | 0.44 | 9.17E+02 | | 3.17E-02 |
| 44 | 15 | 67.92 | 3 | 0.0074 | 0.35 | 9.17E+02 | | 7.36E-03 |
| 45 | 13.2 | 19.15 | 5 | 0.0261 | 0.34 | 9.17E+02 | | 2.61E-02 |
| 46 | 40.5 | 0.1467 | 16 | 3.4083 | 0.48 | 9.17E+02 | | 3.41E+00 |
| 47 | 45 | 49.38 | 24 | 0.0101 | 0.26 | 9.17E+02 | | 1.01E-02 |
| 48 | 14.9 | 17.88 | 8 | 0.0280 | 0.49 | 9.17E+02 | | 2.80E-02 |
| 49 | 5 | 62.88 | 3 | 0.0080 | 0.4 | 9.17E+02 | | 7.95E-03 |
| 50 | 26.5 | 4.307 | 10 | 0.1161 | 0.42 | 9.17E+02 | | 1.16E-01 |
| 51 | 9.44 | 57.12 | 4 | 0.0088 | 0.41 | 9.17E+02 | | 8.75E-03 |
| 52 | 15.5 | 4.211 | 7 | 0.1187 | 0.37 | 9.17E+02 | | 1.19E-01 |
| 53 | 36.6 | 0.5429 | 15 | 0.9210 | 0.43 | 9.17E+02 | | 9.21E-01 |
| 54 | 33.6 | 0.4383 | 13 | 1.1408 | 0.44 | 9.17E+02 | | 1.14E+00 |
| 55 | 41.2 | 13.99 | 19 | 0.0357 | 0.4 | 9.17E+02 | | 3.57E-02 |
| 56 | 52.4 | 17.49 | 31 | 0.0286 | 0.37 | 9.17E+02 | | 2.86E-02 |
| 57 | 23 | 2.38 | 10 | 0.2101 | 0.43 | 9.17E+02 | | 2.10E-01 |
| 58 | 14.7 | 66.38 | 4 | 0.0075 | 0.33 | 9.17E+02 | | 7.53E-03 |
| 59 | 16.2 | 32.85 | 8 | 0.0152 | 0.47 | 9.17E+02 | | 1.52E-02 |
| 60 | 19.4 | 9.799 | 8 | 0.0510 | 0.39 | 9.17E+02 | | 5.10E-02 |
| 61 | 23.5 | 10.12 | 9 | 0.0494 | 0.36 | 9.17E+02 | | 4.94E-02 |
| 62 | 37 | 7.659 | 14 | 0.0653 | 0.36 | 9.17E+02 | | 6.53E-02 |
| 63 | 24.2 | 31.34 | 9 | 0.0160 | 0.28 | 9.17E+02 | | 1.60E-02 |
| 64 | 29.8 | 13.11 | 10 | 0.0381 | 0.45 | 9.17E+02 | | 3.81E-02 |
| 65 | 38.4 | 35.59 | 20 | 0.0140 | 0.3 | 9.17E+02 | | 1.40E-02 |
| 66 | 5.13 | 90.11 | 2 | 0.0055 | 0.27 | 9.17E+02 | | 5.55E-03 |
| 67 | 14.2 | 1.617 | 6 | 0.3092 | 0.48 | 9.17E+02 | | 3.09E-01 |
| 68 | 25.5 | 6.293 | 9 | 0.0795 | 0.46 | 9.17E+02 | | 7.95E-02 |
| 69 | 26.1 | 5.007 | 12 | 0.0999 | 0.36 | 9.17E+02 | | 9.99E-02 |
| 70 | 34 | 25.82 | 14 | 0.0194 | 0.3 | 9.17E+02 | | 1.94E-02 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 1.96E+01 | 1.57E+01 | 1.33E+01 |
| | std. dev. | 2.25E+01 | 1.29E+02 | 1.10E+02 |
| | max | 9.09E+01 | 1.08E+03 | 9.17E+02 |
| | min | 4.62E-04 | 5.50E-03 | 5.50E-03 |
| | median | 9.79E+00 | 5.11E-02 | 5.11E-02 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 5.11E-02 | 5.11E-02 |
| | 55 | 4.42E-02 | 4.42E-02 |
| | 60 | 3.45E-02 | 3.45E-02 |
| | 65 | 2.81E-02 | 2.81E-02 |
| | 70 | 2.09E-02 | 2.09E-02 |
| | 75 | 1.78E-02 | 1.78E-02 |
| | 80 | 1.50E-02 | 1.50E-02 |
| | 85 | 1.20E-02 | 1.20E-02 |
| | **90** | **9.09E-03** | **9.09E-03** |
| | 95 | 7.44E-03 | 7.44E-03 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 2 |
| Bulk density (g/cm^3) | 1.6 |
| Chemical | Ethylbenzene |
| MCL (mg/l) | 0.7 |
| Da (cm^2/sec) | 7.56E-02 |
| Henry's Law Constant (m^3-atm/mole) | 8.44E-03 |
| log Kow | 3.15 |
| Koc (ml/g) | 889.9 |
| Solubility (mg/l) | 161 |
| Chemical Density (g/cm^3) | 0.87 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.08101 | 88 | 864.0909 | 0.45 | 3.82E+02 | SCN>SSL | 3.82E+02 |
| 2 | 17.8 | 4.588 | 37 | 15.2572 | 0.34 | 3.82E+02 | | 1.53E+01 |
| 3 | 13 | 5.229 | 9 | 13.3869 | 0.5 | 3.82E+02 | | 1.34E+01 |
| 4 | 51.1 | 0.639 | 108 | 109.5462 | 0.49 | 3.82E+02 | | 1.10E+02 |
| 5 | 32.6 | 0.159 | 69 | 440.2516 | 0.45 | 3.82E+02 | SCN>SSL | 3.82E+02 |
| 6 | 39.4 | 0.8875 | 78 | 78.8732 | 0.42 | 3.82E+02 | | 7.89E+01 |
| 7 | 34.6 | 0.9367 | 116 | 74.7304 | 0.38 | 3.82E+02 | | 7.47E+01 |
| 8 | 32 | 1.723 | 104 | 40.6268 | 0.27 | 3.82E+02 | | 4.06E+01 |
| 9 | 28.1 | 0.5576 | 58 | 125.5380 | 0.42 | 3.82E+02 | | 1.26E+02 |
| 10 | 30.6 | 0.02204 | 67 | 3176.0436 | 0.42 | 3.82E+02 | SCN>SSL | 3.82E+02 |
| 11 | 44 | 2.504 | 178 | 27.9553 | 0.46 | 3.82E+02 | | 2.80E+01 |
| 12 | 20.3 | 0.8077 | 79 | 86.6658 | 0.42 | 3.82E+02 | | 8.67E+01 |
| 13 | 31.3 | 3.306 | 62 | 21.1736 | 0.42 | 3.82E+02 | | 2.12E+01 |
| 14 | 30.2 | 0.4434 | 63 | 157.8710 | 0.49 | 3.82E+02 | | 1.58E+02 |
| 15 | 19.2 | 0.6819 | 45 | 102.6543 | 0.46 | 3.82E+02 | | 1.03E+02 |
| 16 | 9 | 16.01 | 12 | 4.3723 | 0.46 | 3.82E+02 | | 4.37E+00 |
| 17 | 21.5 | 0.6714 | 53 | 104.2598 | 0.41 | 3.82E+02 | | 1.04E+02 |
| 18 | 15 | 9.629 | 12 | 7.2697 | 0.45 | 3.82E+02 | | 7.27E+00 |
| 19 | 35.2 | 0.6492 | 75 | 107.8250 | 0.4 | 3.82E+02 | | 1.08E+02 |
| 20 | 18.7 | 0.03414 | 43 | 2050.3808 | 0.35 | 3.82E+02 | SCN>SSL | 3.82E+02 |
| 21 | 47.4 | 0.7299 | 123 | 95.9035 | 0.26 | 3.82E+02 | | 9.59E+01 |
| 22 | 22.1 | 0.7581 | 40 | 92.3361 | 0.45 | 3.82E+02 | | 9.23E+01 |
| 23 | 8.15 | 3.719 | 15 | 18.8223 | 0.3 | 3.82E+02 | | 1.88E+01 |
| 24 | 20.2 | 0.04453 | 44 | 1571.9740 | 0.38 | 3.82E+02 | SCN>SSL | 3.82E+02 |
| 25 | 12 | 3.407 | 12 | 20.5459 | 0.35 | 3.82E+02 | | 2.05E+01 |
| 26 | 15.8 | 0.05122 | 49 | 1366.6537 | 0.49 | 3.82E+02 | SCN>SSL | 3.82E+02 |
| 27 | 17.4 | 0.09241 | 37 | 757.4938 | 0.5 | 3.82E+02 | SCN>SSL | 3.82E+02 |
| 28 | 24.7 | 0.502 | 54 | 139.4422 | 0.4 | 3.82E+02 | | 1.39E+02 |
| 29 | 17 | 1.087 | 32 | 64.3974 | 0.33 | 3.82E+02 | | 6.44E+01 |
| 30 | 21.6 | 0.5892 | 36 | 118.8052 | 0.47 | 3.82E+02 | | 1.19E+02 |
| 31 | 21 | 2.613 | 45 | 26.7891 | 0.32 | 3.82E+02 | | 2.68E+01 |
| 32 | 27.6 | 0.004079 | 60 | 17161.0689 | 0.48 | 3.82E+02 | SCN>SSL | 3.82E+02 |
| 33 | 8.63 | 0.5899 | 39 | 118.6642 | 0.26 | 3.82E+02 | | 1.19E+02 |
| 34 | 13 | 6.086 | 9 | 11.5018 | 0.35 | 3.82E+02 | | 1.15E+01 |
| 35 | 15 | 11.67 | 13 | 5.9983 | 0.39 | 3.82E+02 | | 6.00E+00 |
| 36 | 27.1 | 1.9 | 80 | 36.8421 | 0.28 | 3.82E+02 | | 3.68E+01 |
| 37 | 18.1 | 0.2893 | 40 | 241.9634 | 0.47 | 3.82E+02 | | 2.42E+02 |
| 38 | 11.7 | 5.153 | 22 | 13.5843 | 0.33 | 3.82E+02 | | 1.36E+01 |
| 39 | 42.4 | 0.1186 | 98 | 590.2192 | 0.4 | 3.82E+02 | SCN>SSL | 3.82E+02 |
| 40 | 29 | 4.90E-07 | 69 | 142973856.2092 | 0.44 | 3.82E+02 | SCN>SSL | 3.82E+02 |
| 41 | 59.2 | 0.1508 | 142 | 464.1910 | 0.48 | 3.82E+02 | SCN>SSL | 3.82E+02 |
| 42 | 22.4 | 5.34 | 63 | 13.1086 | 0.36 | 3.82E+02 | | 1.31E+01 |
| 43 | 24.9 | 2.017 | 41 | 34.7050 | 0.44 | 3.82E+02 | | 3.47E+01 |
| 44 | 15 | 11.57 | 12 | 6.0501 | 0.35 | 3.82E+02 | | 6.05E+00 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 45 | 13.2 | 2.332 | 25 | 30.0172 | 0.34 | 3.82E+02 | | 3.00E+01 |
| 46 | 40.5 | 0.006335 | 90 | 11049.7238 | 0.48 | 3.82E+02 | SCN>SSL | 3.82E+02 |
| 47 | 45 | 6.231 | 165 | 11.2342 | 0.26 | 3.82E+02 | | 1.12E+01 |
| 48 | 14.9 | 1.974 | 38 | 35.4610 | 0.49 | 3.82E+02 | | 3.55E+01 |
| 49 | 5 | 8.807 | 13 | 7.9482 | 0.4 | 3.82E+02 | | 7.95E+00 |
| 50 | 26.5 | 0.3176 | 56 | 220.4030 | 0.42 | 3.82E+02 | | 2.20E+02 |
| 51 | 9.44 | 9.464 | 17 | 7.3964 | 0.41 | 3.82E+02 | | 7.40E+00 |
| 52 | 15.5 | 0.2743 | 40 | 255.1950 | 0.37 | 3.82E+02 | | 2.55E+02 |
| 53 | 36.6 | 0.02811 | 85 | 2490.2170 | 0.43 | 3.82E+02 | SCN>SSL | 3.82E+02 |
| 54 | 33.6 | 0.0206 | 75 | 3398.0583 | 0.44 | 3.82E+02 | SCN>SSL | 3.82E+02 |
| 55 | 41.2 | 1.773 | 109 | 39.4811 | 0.4 | 3.82E+02 | | 3.95E+01 |
| 56 | 52.4 | 2.116 | 191 | 33.0813 | 0.37 | 3.82E+02 | | 3.31E+01 |
| 57 | 23 | 0.1769 | 53 | 395.7038 | 0.43 | 3.82E+02 | SCN>SSL | 3.82E+02 |
| 58 | 14.7 | 9.689 | 23 | 7.2247 | 0.33 | 3.82E+02 | | 7.22E+00 |
| 59 | 16.2 | 4.039 | 41 | 17.3310 | 0.47 | 3.82E+02 | | 1.73E+01 |
| 60 | 19.4 | 0.7032 | 45 | 99.5449 | 0.39 | 3.82E+02 | | 9.95E+01 |
| 61 | 23.5 | 0.8735 | 52 | 80.1374 | 0.36 | 3.82E+02 | | 8.01E+01 |
| 62 | 37 | 0.5387 | 84 | 129.9425 | 0.36 | 3.82E+02 | | 1.30E+02 |
| 63 | 24.2 | 3.191 | 52 | 21.9367 | 0.28 | 3.82E+02 | | 2.19E+01 |
| 64 | 29.8 | 1.556 | 53 | 44.9871 | 0.45 | 3.82E+02 | | 4.50E+01 |
| 65 | 38.4 | 4.126 | 128 | 16.9656 | 0.3 | 3.82E+02 | | 1.70E+01 |
| 66 | 5.13 | 14.18 | 7 | 4.9365 | 0.27 | 3.82E+02 | | 4.94E+00 |
| 67 | 14.2 | 0.08103 | 31 | 863.8776 | 0.48 | 3.82E+02 | SCN>SSL | 3.82E+02 |
| 68 | 25.5 | 0.5391 | 51 | 129.8460 | 0.46 | 3.82E+02 | | 1.30E+02 |
| 69 | 26.1 | 0.3101 | 72 | 225.7336 | 0.36 | 3.82E+02 | | 2.26E+02 |
| 70 | 34 | 3.313 | 86 | 21.1289 | 0.3 | 3.82E+02 | | 2.11E+01 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 2.64E+00 | 2.04E+06 | 1.38E+02 |
| | std. dev. | 3.65E+00 | 1.71E+07 | 1.45E+02 |
| | max | 1.60E+01 | 1.43E+08 | 3.82E+02 |
| | min | 4.90E-07 | 4.37E+00 | 4.37E+00 |
| | median | 8.41E-01 | 8.34E+01 | 8.34E+01 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 8.34E+01 | 8.34E+01 |
| | 55 | 6.49E+01 | 6.49E+01 |
| | 60 | 3.84E+01 | 3.84E+01 |
| | 65 | 3.33E+01 | 3.33E+01 |
| | 70 | 2.53E+01 | 2.53E+01 |
| | 75 | 2.07E+01 | 2.07E+01 |
| | 80 | 1.66E+01 | 1.66E+01 |
| | 85 | 1.32E+01 | 1.32E+01 |
| | **90** | **7.89E+00** | **7.89E+00** |
| | 95 | 6.58E+00 | 6.58E+00 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 2 |
| Bulk density (g/cm^3) | 1.6 |
| Chemical | n-hexane |
| MCL (mg/l) | 0.9 |
| Da (cm^2/sec) | 7.87E-02 |
| Henry's Law Constant (m^3-atm/mole) | 7.70E-01 |
| log Kow | 2.77 |
| Koc (ml/g) | 370.97 |
| Solubility (mg/l) | 18 |
| Chemical Density (g/cm^3) | 0.65 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 1E-11 | 136 | 9.00E+12 | 0.45 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 2 | 17.8 | 1E-11 | 51 | 9.00E+12 | 0.34 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 3 | 13 | 4.25E-07 | 10 | 2.12E+08 | 0.5 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 4 | 51.1 | 1E-11 | 234 | 9.00E+12 | 0.49 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 5 | 32.6 | 1E-11 | 138 | 9.00E+12 | 0.45 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 6 | 39.4 | 1E-11 | 144 | 9.00E+12 | 0.42 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 7 | 34.6 | 1E-11 | 150 | 9.00E+12 | 0.38 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 8 | 32 | 1E-11 | 104 | 9.00E+12 | 0.27 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 9 | 28.1 | 1E-11 | 107 | 9.00E+12 | 0.42 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 10 | 30.6 | 1E-11 | 125 | 9.00E+12 | 0.42 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 11 | 44 | 1E-11 | 243 | 9.00E+12 | 0.46 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 12 | 20.3 | 1E-11 | 104 | 9.00E+12 | 0.42 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 13 | 31.3 | 1E-11 | 104 | 9.00E+12 | 0.42 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 14 | 30.2 | 1E-11 | 118 | 9.00E+12 | 0.49 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 15 | 19.2 | 1E-11 | 78 | 9.00E+12 | 0.46 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 16 | 9 | 1E-11 | 13 | 9.00E+12 | 0.46 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 17 | 21.5 | 1E-11 | 83 | 9.00E+12 | 0.41 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 18 | 15 | 1E-11 | 15 | 9.00E+12 | 0.45 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 19 | 35.2 | 1E-11 | 134 | 9.00E+12 | 0.4 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 20 | 18.7 | 1E-11 | 69 | 9.00E+12 | 0.35 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 21 | 47.4 | 1E-11 | 136 | 9.00E+12 | 0.26 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 22 | 22.1 | 1E-11 | 68 | 9.00E+12 | 0.45 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 23 | 8.15 | 1E-11 | 14 | 9.00E+12 | 0.3 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 24 | 20.2 | 1E-11 | 73 | 9.00E+12 | 0.38 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 25 | 12 | 0.007612 | 7 | 1.18E+04 | 0.35 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 26 | 15.8 | 1E-11 | 76 | 9.00E+12 | 0.49 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 27 | 17.4 | 1E-11 | 70 | 9.00E+12 | 0.5 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 28 | 24.7 | 1E-11 | 89 | 9.00E+12 | 0.4 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 29 | 17 | 1E-11 | 47 | 9.00E+12 | 0.33 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 30 | 21.6 | 1E-11 | 67 | 9.00E+12 | 0.47 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 31 | 21 | 1E-11 | 61 | 9.00E+12 | 0.32 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 32 | 27.6 | 1E-11 | 127 | 9.00E+12 | 0.48 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 33 | 8.63 | 1E-11 | 35 | 9.00E+12 | 0.26 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 34 | 13 | 0.00001103 | 8 | 8.16E+06 | 0.35 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 35 | 15 | 1.835E-08 | 15 | 4.90E+09 | 0.39 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 36 | 27.1 | 1E-11 | 82 | 9.00E+12 | 0.28 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 37 | 18.1 | 1E-11 | 67 | 9.00E+12 | 0.47 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 38 | 11.7 | 1E-11 | 28 | 9.00E+12 | 0.33 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 39 | 42.4 | 1E-11 | 172 | 9.00E+12 | 0.4 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 40 | 29 | 1.00E-11 | 130 | 9.00E+12 | 0.44 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 41 | 59.2 | 1E-11 | 296 | 9.00E+12 | 0.48 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 42 | 22.4 | 1E-11 | 73 | 9.00E+12 | 0.36 | 1.11E+02 | SCN>SSL | 1.11E+02 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 1E-11 | 76 | 9.00E+12 | 0.44 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 44 | 15 | 1.16E-08 | 14 | 7.76E+09 | 0.35 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 45 | 13.2 | 1E-11 | 33 | 9.00E+12 | 0.34 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 46 | 40.5 | 1E-11 | 196 | 9.00E+12 | 0.48 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 47 | 45 | 1E-11 | 160 | 9.00E+12 | 0.26 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 48 | 14.9 | 1E-11 | 58 | 9.00E+12 | 0.49 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 49 | 5 | 1E-11 | 15 | 9.00E+12 | 0.4 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 50 | 26.5 | 1E-11 | 100 | 9.00E+12 | 0.42 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 51 | 9.44 | 1E-11 | 19 | 9.00E+12 | 0.41 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 52 | 15.5 | 1E-11 | 53 | 9.00E+12 | 0.37 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 53 | 36.6 | 1E-11 | 156 | 9.00E+12 | 0.43 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 54 | 33.6 | 1E-11 | 145 | 9.00E+12 | 0.44 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 55 | 41.2 | 1E-11 | 154 | 9.00E+12 | 0.4 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 56 | 52.4 | 1E-11 | 232 | 9.00E+12 | 0.37 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 57 | 23 | 1E-11 | 89 | 9.00E+12 | 0.43 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 58 | 14.7 | 4.064E-06 | 21 | 2.21E+07 | 0.33 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 59 | 16.2 | 1E-11 | 58 | 9.00E+12 | 0.47 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 60 | 19.4 | 1E-11 | 70 | 9.00E+12 | 0.39 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 61 | 23.5 | 1E-11 | 78 | 9.00E+12 | 0.36 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 62 | 37 | 1E-11 | 134 | 9.00E+12 | 0.36 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 63 | 24.2 | 1E-11 | 66 | 9.00E+12 | 0.28 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 64 | 29.8 | 1E-11 | 103 | 9.00E+12 | 0.45 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 65 | 38.4 | 1E-11 | 141 | 9.00E+12 | 0.3 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 66 | 5.13 | 1E-11 | 6 | 9.00E+12 | 0.27 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 67 | 14.2 | 1E-11 | 54 | 9.00E+12 | 0.48 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 68 | 25.5 | 1E-11 | 103 | 9.00E+12 | 0.46 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 69 | 26.1 | 1E-11 | 104 | 9.00E+12 | 0.36 | 1.11E+02 | SCN>SSL | 1.11E+02 |
| 70 | 34 | 1E-11 | 98 | 9.00E+12 | 0.3 | 1.11E+02 | SCN>SSL | 1.11E+02 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 1.09E-04 | 8.23E+12 | 1.11E+02 |
| | std. dev. | 9.10E-04 | 2.54E+12 | 8.59E-14 |
| | max | 7.61E-03 | 9.00E+12 | 1.11E+02 |
| | min | 1.00E-11 | 1.18E+04 | 1.11E+02 |
| | median | 1.00E-11 | 9.00E+12 | 1.11E+02 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 9.00E+12 | 1.11E+02 |
| | 55 | 9.00E+12 | 1.11E+02 |
| | 60 | 9.00E+12 | 1.11E+02 |
| | 65 | 9.00E+12 | 1.11E+02 |
| | 70 | 9.00E+12 | 1.11E+02 |
| | 75 | 9.00E+12 | 1.11E+02 |
| | 80 | 9.00E+12 | 1.11E+02 |
| | 85 | 9.00E+12 | 1.11E+02 |
| | **90** | **9.00E+12** | **1.11E+02** |
| | 95 | 2.32E+09 | 1.11E+02 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 2 |
| Bulk density (g/cm^3) | 1.6 |
| Chemical | Methyl Ethyl Ketone |
| MCL (mg/l) | 8.9 |
| Da (cm^2/sec) | 9.42E-02 |
| Henry's Law Constant (m^3-atm/mole) | 1.05E-05 |
| log Kow | 0.29 |
| Koc (ml/g) | 1.228 |
| Solubility (mg/l) | 239000 |
| Chemical Density (g/cm^3) | 0.8 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 151.9 | 9 | 5.8591 | 0.45 | 2.32E+04 | | 5.86E+00 |
| 2 | 17.8 | 605.6 | 3 | 1.4696 | 0.34 | 2.32E+04 | | 1.47E+00 |
| 3 | 13 | 307.3 | 1 | 2.8962 | 0.5 | 2.32E+04 | | 2.90E+00 |
| 4 | 51.1 | 103.1 | 9 | 8.6324 | 0.49 | 2.32E+04 | | 8.63E+00 |
| 5 | 32.6 | 104.1 | 6 | 8.5495 | 0.45 | 2.32E+04 | | 8.55E+00 |
| 6 | 39.4 | 102.2 | 6 | 8.7084 | 0.42 | 2.32E+04 | | 8.71E+00 |
| 7 | 34.6 | 175.5 | 10 | 5.0712 | 0.38 | 2.32E+04 | | 5.07E+00 |
| 8 | 32 | 83.4 | 6 | 10.6715 | 0.27 | 2.32E+04 | | 1.07E+01 |
| 9 | 28.1 | 198 | 5 | 4.4949 | 0.42 | 2.32E+04 | | 4.49E+00 |
| 10 | 30.6 | 53.47 | 6 | 16.6448 | 0.42 | 2.32E+04 | | 1.66E+01 |
| 11 | 44 | 133.8 | 17 | 6.6517 | 0.46 | 2.32E+04 | | 6.65E+00 |
| 12 | 20.3 | 166.8 | 8 | 5.3357 | 0.42 | 2.32E+04 | | 5.34E+00 |
| 13 | 31.3 | 305.6 | 5 | 2.9123 | 0.42 | 2.32E+04 | | 2.91E+00 |
| 14 | 30.2 | 63.14 | 6 | 14.0957 | 0.49 | 2.32E+04 | | 1.41E+01 |
| 15 | 19.2 | 376.9 | 4 | 2.3614 | 0.46 | 2.32E+04 | | 2.36E+00 |
| 16 | 9 | 451.3 | 2 | 1.9721 | 0.46 | 2.32E+04 | | 1.97E+00 |
| 17 | 21.5 | 269.3 | 5 | 3.3049 | 0.41 | 2.32E+04 | | 3.30E+00 |
| 18 | 15 | 446.9 | 2 | 1.9915 | 0.45 | 2.32E+04 | | 1.99E+00 |
| 19 | 35.2 | 157.5 | 6 | 5.6508 | 0.4 | 2.32E+04 | | 5.65E+00 |
| 20 | 18.7 | 263.1 | 3 | 3.3827 | 0.35 | 2.32E+04 | | 3.38E+00 |
| 21 | 47.4 | 46.45 | 6 | 19.1604 | 0.26 | 2.32E+04 | | 1.92E+01 |
| 22 | 22.1 | 113.6 | 4 | 7.8345 | 0.45 | 2.32E+04 | | 7.83E+00 |
| 23 | 8.15 | 219.4 | 1 | 4.0565 | 0.3 | 2.32E+04 | | 4.06E+00 |
| 24 | 20.2 | 90.75 | 4 | 9.8072 | 0.38 | 2.32E+04 | | 9.81E+00 |
| 25 | 12 | 302.1 | 1 | 2.9460 | 0.35 | 2.32E+04 | | 2.95E+00 |
| 26 | 15.8 | 309.4 | 6 | 2.8765 | 0.49 | 2.32E+04 | | 2.88E+00 |
| 27 | 17.4 | 177.9 | 4 | 5.0028 | 0.5 | 2.32E+04 | | 5.00E+00 |
| 28 | 24.7 | 154.1 | 5 | 5.7755 | 0.4 | 2.32E+04 | | 5.78E+00 |
| 29 | 17 | 246.1 | 2 | 3.6164 | 0.33 | 2.32E+04 | | 3.62E+00 |
| 30 | 21.6 | 93.4 | 4 | 9.5289 | 0.47 | 2.32E+04 | | 9.53E+00 |
| 31 | 21 | 307.8 | 3 | 2.8915 | 0.32 | 2.32E+04 | | 2.89E+00 |
| 32 | 27.6 | 55.71 | 5 | 15.9756 | 0.48 | 2.32E+04 | | 1.60E+01 |
| 33 | 8.63 | 594.6 | 3 | 1.4968 | 0.26 | 2.32E+04 | | 1.50E+00 |
| 34 | 13 | 387.4 | 1 | 2.2974 | 0.35 | 2.32E+04 | | 2.30E+00 |
| 35 | 15 | 491.2 | 2 | 1.8119 | 0.39 | 2.32E+04 | | 1.81E+00 |
| 36 | 27.1 | 107 | 5 | 8.3178 | 0.28 | 2.32E+04 | | 8.32E+00 |
| 37 | 18.1 | 94.23 | 4 | 9.4450 | 0.47 | 2.32E+04 | | 9.44E+00 |
| 38 | 11.7 | 566.2 | 2 | 1.5719 | 0.33 | 2.32E+04 | | 1.57E+00 |
| 39 | 42.4 | 79.38 | 7 | 11.2119 | 0.4 | 2.32E+04 | | 1.12E+01 |
| 40 | 29 | 5.13E+01 | 6 | 17.3354 | 0.44 | 2.32E+04 | | 1.73E+01 |
| 41 | 59.2 | 100 | 12 | 8.9000 | 0.48 | 2.32E+04 | | 8.90E+00 |
| 42 | 22.4 | 445.5 | 6 | 1.9978 | 0.36 | 2.32E+04 | | 2.00E+00 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 271.2 | 4 | 3.2817 | 0.44 | 2.32E+04 | | 3.28E+00 |
| 44 | 15 | 554.2 | 1 | 1.6059 | 0.35 | 2.32E+04 | | 1.61E+00 |
| 45 | 13.2 | 306.7 | 2 | 2.9019 | 0.34 | 2.32E+04 | | 2.90E+00 |
| 46 | 40.5 | 36.52 | 8 | 24.3702 | 0.48 | 2.32E+04 | | 2.44E+01 |
| 47 | 45 | 238.4 | 9 | 3.7332 | 0.26 | 2.32E+04 | | 3.73E+00 |
| 48 | 14.9 | 493.1 | 4 | 1.8049 | 0.49 | 2.32E+04 | | 1.80E+00 |
| 49 | 5 | 592 | 2 | 1.5034 | 0.4 | 2.32E+04 | | 1.50E+00 |
| 50 | 26.5 | 135.9 | 5 | 6.5489 | 0.42 | 2.32E+04 | | 6.55E+00 |
| 51 | 9.44 | 496.4 | 2 | 1.7929 | 0.41 | 2.32E+04 | | 1.79E+00 |
| 52 | 15.5 | 109.6 | 4 | 8.1204 | 0.37 | 2.32E+04 | | 8.12E+00 |
| 53 | 36.6 | 44.07 | 7 | 20.1951 | 0.43 | 2.32E+04 | | 2.02E+01 |
| 54 | 33.6 | 46.04 | 7 | 19.3310 | 0.44 | 2.32E+04 | | 1.93E+01 |
| 55 | 41.2 | 89.98 | 9 | 9.8911 | 0.4 | 2.32E+04 | | 9.89E+00 |
| 56 | 52.4 | 90.64 | 14 | 9.8191 | 0.37 | 2.32E+04 | | 9.82E+00 |
| 57 | 23 | 80.1 | 5 | 11.1111 | 0.43 | 2.32E+04 | | 1.11E+01 |
| 58 | 14.7 | 558.6 | 2 | 1.5933 | 0.33 | 2.32E+04 | | 1.59E+00 |
| 59 | 16.2 | 503.2 | 5 | 1.7687 | 0.47 | 2.32E+04 | | 1.77E+00 |
| 60 | 19.4 | 348.7 | 4 | 2.5523 | 0.39 | 2.32E+04 | | 2.55E+00 |
| 61 | 23.5 | 196.1 | 4 | 4.5385 | 0.36 | 2.32E+04 | | 4.54E+00 |
| 62 | 37 | 151.5 | 6 | 5.8746 | 0.36 | 2.32E+04 | | 5.87E+00 |
| 63 | 24.2 | 269.7 | 3 | 3.3000 | 0.28 | 2.32E+04 | | 3.30E+00 |
| 64 | 29.8 | 210.2 | 5 | 4.2341 | 0.45 | 2.32E+04 | | 4.23E+00 |
| 65 | 38.4 | 200.3 | 8 | 4.4433 | 0.3 | 2.32E+04 | | 4.44E+00 |
| 66 | 5.13 | 408.1 | 1 | 2.1808 | 0.27 | 2.32E+04 | | 2.18E+00 |
| 67 | 14.2 | 221.2 | 3 | 4.0235 | 0.48 | 2.32E+04 | | 4.02E+00 |
| 68 | 25.5 | 278.3 | 5 | 3.1980 | 0.46 | 2.32E+04 | | 3.20E+00 |
| 69 | 26.1 | 315.2 | 6 | 2.8236 | 0.36 | 2.32E+04 | | 2.82E+00 |
| 70 | 34 | 132.6 | 6 | 6.7119 | 0.3 | 2.32E+04 | | 6.71E+00 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 2.42E+02 | 6.40E+00 | 6.40E+00 |
| | std. dev. | 1.65E+02 | 5.25E+00 | 5.25E+00 |
| | max | 6.06E+02 | 2.44E+01 | 2.44E+01 |
| | min | 3.65E+01 | 1.47E+00 | 1.47E+00 |
| | median | 1.99E+02 | 4.47E+00 | 4.47E+00 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 4.47E+00 | 4.47E+00 |
| | 55 | 4.03E+00 | 4.03E+00 |
| | 60 | 3.35E+00 | 3.35E+00 |
| | 65 | 3.21E+00 | 3.21E+00 |
| | 70 | 2.90E+00 | 2.90E+00 |
| | 75 | 2.84E+00 | 2.84E+00 |
| | 80 | 2.27E+00 | 2.27E+00 |
| | 85 | 1.98E+00 | 1.98E+00 |
| | **90** | **1.79E+00** | **1.79E+00** |
| | 95 | 1.58E+00 | 1.58E+00 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 2 |
| Bulk density (g/cm^3) | 1.6 |
| Chemical | Napthalene |
| MCL (mg/l) | 0.067 |
| Da (cm^2/sec) | 7.22E-02 |
| Henry's Law Constant (m^3-atm/mole) | 4.83E-04 |
| log Kow | 3.3 |
| Koc (ml/g) | 1257.01 |
| Solubility (mg/l) | 31.7 |
| Chemical Density (g/cm^3) | 1.16 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 5.823 | 140 | 1.1506 | 0.45 | 1.03E+02 | | 1.15E+00 |
| 2 | 17.8 | 19.69 | 53 | 0.3403 | 0.34 | 1.03E+02 | | 3.40E-01 |
| 3 | 13 | 16.67 | 13 | 0.4019 | 0.5 | 1.03E+02 | | 4.02E-01 |
| 4 | 51.1 | 4.121 | 167 | 1.6258 | 0.49 | 1.03E+02 | | 1.63E+00 |
| 5 | 32.6 | 3.948 | 108 | 1.6971 | 0.45 | 1.03E+02 | | 1.70E+00 |
| 6 | 39.4 | 3.749 | 119 | 1.7871 | 0.42 | 1.03E+02 | | 1.79E+00 |
| 7 | 34.6 | 6.594 | 184 | 1.0161 | 0.38 | 1.03E+02 | | 1.02E+00 |
| 8 | 32 | 2.717 | 152 | 2.4660 | 0.27 | 1.03E+02 | | 2.47E+00 |
| 9 | 28.1 | 7.409 | 90 | 0.9043 | 0.42 | 1.03E+02 | | 9.04E-01 |
| 10 | 30.6 | 1.851 | 106 | 3.6197 | 0.42 | 1.03E+02 | | 3.62E+00 |
| 11 | 44 | 6.962 | 270 | 0.9624 | 0.46 | 1.03E+02 | | 9.62E-01 |
| 12 | 20.3 | 7.675 | 129 | 0.8730 | 0.42 | 1.03E+02 | | 8.73E-01 |
| 13 | 31.3 | 11.08 | 95 | 0.6047 | 0.42 | 1.03E+02 | | 6.05E-01 |
| 14 | 30.2 | 2.437 | 100 | 2.7493 | 0.49 | 1.03E+02 | | 2.75E+00 |
| 15 | 19.2 | 16.38 | 63 | 0.4090 | 0.46 | 1.03E+02 | | 4.09E-01 |
| 16 | 9 | 27.03 | 17 | 0.2479 | 0.46 | 1.03E+02 | | 2.48E-01 |
| 17 | 21.5 | 10.65 | 81 | 0.6291 | 0.41 | 1.03E+02 | | 6.29E-01 |
| 18 | 15 | 23.81 | 16 | 0.2814 | 0.45 | 1.03E+02 | | 2.81E-01 |
| 19 | 35.2 | 5.825 | 117 | 1.1502 | 0.4 | 1.03E+02 | | 1.15E+00 |
| 20 | 18.7 | 8.339 | 67 | 0.8035 | 0.35 | 1.03E+02 | | 8.03E-01 |
| 21 | 47.4 | 1.368 | 178 | 4.8977 | 0.26 | 1.03E+02 | | 4.90E+00 |
| 22 | 22.1 | 3.408 | 58 | 1.9660 | 0.45 | 1.03E+02 | | 1.97E+00 |
| 23 | 8.15 | 12.15 | 21 | 0.5514 | 0.3 | 1.03E+02 | | 5.51E-01 |
| 24 | 20.2 | 3.099 | 70 | 2.1620 | 0.38 | 1.03E+02 | | 2.16E+00 |
| 25 | 12 | 11.84 | 16 | 0.5659 | 0.35 | 1.03E+02 | | 5.66E-01 |
| 26 | 15.8 | 11.21 | 72 | 0.5977 | 0.49 | 1.03E+02 | | 5.98E-01 |
| 27 | 17.4 | 7.376 | 56 | 0.9084 | 0.5 | 1.03E+02 | | 9.08E-01 |
| 28 | 24.7 | 5.829 | 84 | 1.1494 | 0.4 | 1.03E+02 | | 1.15E+00 |
| 29 | 17 | 9.221 | 48 | 0.7266 | 0.33 | 1.03E+02 | | 7.27E-01 |
| 30 | 21.6 | 3.099 | 53 | 2.1620 | 0.47 | 1.03E+02 | | 2.16E+00 |
| 31 | 21 | 11.58 | 69 | 0.5786 | 0.32 | 1.03E+02 | | 5.79E-01 |
| 32 | 27.6 | 1.89 | 94 | 3.5450 | 0.48 | 1.03E+02 | | 3.54E+00 |
| 33 | 8.63 | 16.63 | 58 | 0.4029 | 0.26 | 1.03E+02 | | 4.03E-01 |
| 34 | 13 | 19.35 | 13 | 0.3463 | 0.35 | 1.03E+02 | | 3.46E-01 |
| 35 | 15 | 25.95 | 19 | 0.2582 | 0.39 | 1.03E+02 | | 2.58E-01 |
| 36 | 27.1 | 3.396 | 116 | 1.9729 | 0.28 | 1.03E+02 | | 1.97E+00 |
| 37 | 18.1 | 3.921 | 61 | 1.7087 | 0.47 | 1.03E+02 | | 1.71E+00 |
| 38 | 11.7 | 24.11 | 32 | 0.2779 | 0.33 | 1.03E+02 | | 2.78E-01 |
| 39 | 42.4 | 2.845 | 150 | 2.3550 | 0.4 | 1.03E+02 | | 2.36E+00 |
| 40 | 29 | 7.48E-01 | 106 | 8.9548 | 0.44 | 1.03E+02 | | 8.95E+00 |
| 41 | 59.2 | 4.099 | 220 | 1.6345 | 0.48 | 1.03E+02 | | 1.63E+00 |
| 42 | 22.4 | 15.18 | 95 | 0.4414 | 0.36 | 1.03E+02 | | 4.41E-01 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 9.711 | 59 | 0.6899 | 0.44 | 1.03E+02 | | 6.90E-01 |
| 44 | 15 | 25.68 | 17 | 0.2609 | 0.35 | 1.03E+02 | | 2.61E-01 |
| 45 | 13.2 | 12.99 | 35 | 0.5158 | 0.34 | 1.03E+02 | | 5.16E-01 |
| 46 | 40.5 | 1.262 | 144 | 5.3090 | 0.48 | 1.03E+02 | | 5.31E+00 |
| 47 | 45 | 7.604 | 238 | 0.8811 | 0.26 | 1.03E+02 | | 8.81E-01 |
| 48 | 14.9 | 21.74 | 53 | 0.3082 | 0.49 | 1.03E+02 | | 3.08E-01 |
| 49 | 5 | 29.07 | 20 | 0.2305 | 0.4 | 1.03E+02 | | 2.30E-01 |
| 50 | 26.5 | 5.173 | 87 | 1.2952 | 0.42 | 1.03E+02 | | 1.30E+00 |
| 51 | 9.44 | 24.14 | 25 | 0.2775 | 0.41 | 1.03E+02 | | 2.78E-01 |
| 52 | 15.5 | 4.666 | 62 | 1.4359 | 0.37 | 1.03E+02 | | 1.44E+00 |
| 53 | 36.6 | 1.555 | 134 | 4.3087 | 0.43 | 1.03E+02 | | 4.31E+00 |
| 54 | 33.6 | 1.68 | 121 | 3.9881 | 0.44 | 1.03E+02 | | 3.99E+00 |
| 55 | 41.2 | 3.897 | 163 | 1.7193 | 0.4 | 1.03E+02 | | 1.72E+00 |
| 56 | 52.4 | 4.016 | 279 | 1.6683 | 0.37 | 1.03E+02 | | 1.67E+00 |
| 57 | 23 | 3.094 | 83 | 2.1655 | 0.43 | 1.03E+02 | | 2.17E+00 |
| 58 | 14.7 | 23 | 33 | 0.2913 | 0.33 | 1.03E+02 | | 2.91E-01 |
| 59 | 16.2 | 21.97 | 57 | 0.3050 | 0.47 | 1.03E+02 | | 3.05E-01 |
| 60 | 19.4 | 11.82 | 67 | 0.5668 | 0.39 | 1.03E+02 | | 5.67E-01 |
| 61 | 23.5 | 6.387 | 81 | 1.0490 | 0.36 | 1.03E+02 | | 1.05E+00 |
| 62 | 37 | 5.285 | 130 | 1.2677 | 0.36 | 1.03E+02 | | 1.27E+00 |
| 63 | 24.2 | 9.802 | 81 | 0.6835 | 0.28 | 1.03E+02 | | 6.84E-01 |
| 64 | 29.8 | 7.876 | 80 | 0.8507 | 0.45 | 1.03E+02 | | 8.51E-01 |
| 65 | 38.4 | 7.325 | 188 | 0.9147 | 0.3 | 1.03E+02 | | 9.15E-01 |
| 66 | 5.13 | 24.62 | 11 | 0.2721 | 0.27 | 1.03E+02 | | 2.72E-01 |
| 67 | 14.2 | 9.592 | 43 | 0.6985 | 0.48 | 1.03E+02 | | 6.98E-01 |
| 68 | 25.5 | 10.77 | 77 | 0.6221 | 0.46 | 1.03E+02 | | 6.22E-01 |
| 69 | 26.1 | 9.375 | 115 | 0.7147 | 0.36 | 1.03E+02 | | 7.15E-01 |
| 70 | 34 | 5.062 | 124 | 1.3236 | 0.3 | 1.03E+02 | | 1.32E+00 |

| statistics | | | | |
|---|---|---|---|---|
| | mean | 1.00E+01 | 1.38E+00 | 1.38E+00 |
| | std. dev. | 7.76E+00 | 1.46E+00 | 1.46E+00 |
| | max | 2.91E+01 | 8.95E+00 | 8.95E+00 |
| | min | 7.48E-01 | 2.30E-01 | 2.30E-01 |
| | median | 7.51E+00 | 8.93E-01 | 8.93E-01 |

| percentiles | | | |
|---|---|---|---|
| | 50 | 8.93E-01 | 8.93E-01 |
| | 55 | 8.06E-01 | 8.06E-01 |
| | 60 | 6.95E-01 | 6.95E-01 |
| | 65 | 6.23E-01 | 6.23E-01 |
| | 70 | 5.75E-01 | 5.75E-01 |
| | 75 | 5.25E-01 | 5.25E-01 |
| | 80 | 4.03E-01 | 4.03E-01 |
| | 85 | 3.19E-01 | 3.19E-01 |
| | **90** | **2.81E-01** | **2.81E-01** |
| | 95 | 2.66E-01 | 2.66E-01 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 2 |
| Bulk density (g/cm^3) | 1.6 |
| Chemical | PCE |
| MCL (mg/l) | 0.005 |
| Da (cm^2/sec) | 7.81E-02 |
| Henry's Law Constant (m^3-atm/mole) | 1.49E-02 |
| log Kow | 3.4 |
| Koc (ml/g) | 866.96 |
| Solubility (mg/l) | 150 |
| Chemical Density (g/cm^3) | 1.62 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.001965 | 83 | 254.4529 | 0.45 | 3.54E+02 | | 2.54E+02 |
| 2 | 17.8 | 1.135 | 36 | 0.4405 | 0.34 | 3.54E+02 | | 4.41E-01 |
| 3 | 13 | 3.983 | 9 | 0.1255 | 0.5 | 3.54E+02 | | 1.26E-01 |
| 4 | 51.1 | 0.1159 | 103 | 4.3141 | 0.49 | 3.54E+02 | | 4.31E+00 |
| 5 | 32.6 | 0.008465 | 68 | 59.0667 | 0.45 | 3.54E+02 | | 5.91E+01 |
| 6 | 39.4 | 0.249 | 75 | 2.0080 | 0.42 | 3.54E+02 | | 2.01E+00 |
| 7 | 34.6 | 0.1263 | 106 | 3.9588 | 0.38 | 3.54E+02 | | 3.96E+00 |
| 8 | 32 | 1.118 | 98 | 0.4472 | 0.27 | 3.54E+02 | | 4.47E-01 |
| 9 | 28.1 | 0.04733 | 57 | 10.5641 | 0.42 | 3.54E+02 | | 1.06E+01 |
| 10 | 30.6 | 0.0005342 | 65 | 935.9790 | 0.42 | 3.54E+02 | SCN>SSL | 3.54E+02 |
| 11 | 44 | 0.7369 | 166 | 0.6785 | 0.46 | 3.54E+02 | | 6.79E-01 |
| 12 | 20.3 | 0.08729 | 77 | 5.7280 | 0.42 | 3.54E+02 | | 5.73E+00 |
| 13 | 31.3 | 1.238 | 61 | 0.4039 | 0.42 | 3.54E+02 | | 4.04E-01 |
| 14 | 30.2 | 0.1103 | 62 | 4.5331 | 0.49 | 3.54E+02 | | 4.53E+00 |
| 15 | 19.2 | 0.03441 | 44 | 14.5307 | 0.46 | 3.54E+02 | | 1.45E+01 |
| 16 | 9 | 9.286 | 11 | 0.0538 | 0.46 | 3.54E+02 | | 5.38E-02 |
| 17 | 21.5 | 0.04387 | 52 | 11.3973 | 0.41 | 3.54E+02 | | 1.14E+01 |
| 18 | 15 | 6.498 | 11 | 0.0769 | 0.45 | 3.54E+02 | | 7.69E-02 |
| 19 | 35.2 | 0.07507 | 73 | 6.6605 | 0.4 | 3.54E+02 | | 6.66E+00 |
| 20 | 18.7 | 0.0002735 | 43 | 1828.1536 | 0.35 | 3.54E+02 | SCN>SSL | 3.54E+02 |
| 21 | 47.4 | 0.3251 | 117 | 1.5380 | 0.26 | 3.54E+02 | | 1.54E+00 |
| 22 | 22.1 | 0.2524 | 39 | 1.9810 | 0.45 | 3.54E+02 | | 1.98E+00 |
| 23 | 8.15 | 1.926 | 15 | 0.2596 | 0.3 | 3.54E+02 | | 2.60E-01 |
| 24 | 20.2 | 0.001049 | 44 | 476.6444 | 0.38 | 3.54E+02 | SCN>SSL | 3.54E+02 |
| 25 | 12 | 3.012 | 11 | 0.1660 | 0.35 | 3.54E+02 | | 1.66E-01 |
| 26 | 15.8 | 0.00045 | 47 | 1111.1111 | 0.49 | 3.54E+02 | SCN>SSL | 3.54E+02 |
| 27 | 17.4 | 0.001701 | 37 | 293.9447 | 0.5 | 3.54E+02 | | 2.94E+02 |
| 28 | 24.7 | 0.0505 | 52 | 9.9010 | 0.4 | 3.54E+02 | | 9.90E+00 |
| 29 | 17 | 0.1572 | 32 | 3.1807 | 0.33 | 3.54E+02 | | 3.18E+00 |
| 30 | 21.6 | 0.1654 | 35 | 3.0230 | 0.47 | 3.54E+02 | | 3.02E+00 |
| 31 | 21 | 0.607 | 44 | 0.8237 | 0.32 | 3.54E+02 | | 8.24E-01 |
| 32 | 27.6 | 0.00002495 | 59 | 20040.0802 | 0.48 | 3.54E+02 | SCN>SSL | 3.54E+02 |
| 33 | 8.63 | 0.03033 | 37 | 16.4853 | 0.26 | 3.54E+02 | | 1.65E+01 |
| 34 | 13 | 4.855 | 9 | 0.1030 | 0.35 | 3.54E+02 | | 1.03E-01 |
| 35 | 15 | 8.389 | 13 | 0.0596 | 0.39 | 3.54E+02 | | 5.96E-02 |
| 36 | 27.1 | 1.243 | 74 | 0.4023 | 0.28 | 3.54E+02 | | 4.02E-01 |
| 37 | 18.1 | 0.02857 | 39 | 17.5009 | 0.47 | 3.54E+02 | | 1.75E+01 |
| 38 | 11.7 | 1.228 | 21 | 0.4072 | 0.33 | 3.54E+02 | | 4.07E-01 |
| 39 | 42.4 | 0.006883 | 92 | 72.6427 | 0.4 | 3.54E+02 | | 7.26E+01 |
| 40 | 29 | 1.00E-11 | 61 | 50000000000.0000 | 0.44 | 3.54E+02 | SCN>SSL | 3.54E+02 |
| 41 | 59.2 | 0.00736 | 134 | 67.9348 | 0.48 | 3.54E+02 | | 6.79E+01 |
| 42 | 22.4 | 2.929 | 62 | 0.1707 | 0.36 | 3.54E+02 | | 1.71E-01 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 0.639 | 40 | 0.7825 | 0.44 | 3.54E+02 | | 7.82E-01 |
| 44 | 15 | 8.319 | 12 | 0.0601 | 0.35 | 3.54E+02 | | 6.01E-02 |
| 45 | 13.2 | 0.531 | 24 | 0.9416 | 0.34 | 3.54E+02 | | 9.42E-01 |
| 46 | 40.5 | 0.00009283 | 88 | 5386.1898 | 0.48 | 3.54E+02 | SCN>SSL | 3.54E+02 |
| 47 | 45 | 4.281 | 157 | 0.1168 | 0.26 | 3.54E+02 | | 1.17E-01 |
| 48 | 14.9 | 0.2115 | 37 | 2.3641 | 0.49 | 3.54E+02 | | 2.36E+00 |
| 49 | 5 | 2.892 | 12 | 0.1729 | 0.4 | 3.54E+02 | | 1.73E-01 |
| 50 | 26.5 | 0.02365 | 55 | 21.1416 | 0.42 | 3.54E+02 | | 2.11E+01 |
| 51 | 9.44 | 4.442 | 16 | 0.1126 | 0.41 | 3.54E+02 | | 1.13E-01 |
| 52 | 15.5 | 0.01948 | 39 | 25.6674 | 0.37 | 3.54E+02 | | 2.57E+01 |
| 53 | 36.6 | 0.001025 | 81 | 487.8049 | 0.43 | 3.54E+02 | SCN>SSL | 3.54E+02 |
| 54 | 33.6 | 0.0005337 | 74 | 936.8559 | 0.44 | 3.54E+02 | SCN>SSL | 3.54E+02 |
| 55 | 41.2 | 0.8138 | 102 | 0.6144 | 0.4 | 3.54E+02 | | 6.14E-01 |
| 56 | 52.4 | 0.8555 | 181 | 0.5845 | 0.37 | 3.54E+02 | | 5.84E-01 |
| 57 | 23 | 0.01353 | 52 | 36.9549 | 0.43 | 3.54E+02 | | 3.70E+01 |
| 58 | 14.7 | 7.542 | 23 | 0.0663 | 0.33 | 3.54E+02 | | 6.63E-02 |
| 59 | 16.2 | 0.8801 | 40 | 0.5681 | 0.47 | 3.54E+02 | | 5.68E-01 |
| 60 | 19.4 | 0.04399 | 44 | 11.3662 | 0.39 | 3.54E+02 | | 1.14E+01 |
| 61 | 23.5 | 0.1296 | 51 | 3.8580 | 0.36 | 3.54E+02 | | 3.86E+00 |
| 62 | 37 | 0.05578 | 80 | 8.9638 | 0.36 | 3.54E+02 | | 8.96E+00 |
| 63 | 24.2 | 0.957 | 51 | 0.5225 | 0.28 | 3.54E+02 | | 5.22E-01 |
| 64 | 29.8 | 0.4244 | 52 | 1.1781 | 0.45 | 3.54E+02 | | 1.18E+00 |
| 65 | 38.4 | 1.753 | 121 | 0.2852 | 0.3 | 3.54E+02 | | 2.85E-01 |
| 66 | 5.13 | 8.103 | 7 | 0.0617 | 0.27 | 3.54E+02 | | 6.17E-02 |
| 67 | 14.2 | 0.001122 | 30 | 445.6328 | 0.48 | 3.54E+02 | SCN>SSL | 3.54E+02 |
| 68 | 25.5 | 0.0317 | 50 | 15.7729 | 0.46 | 3.54E+02 | | 1.58E+01 |
| 69 | 26.1 | 0.01469 | 69 | 34.0368 | 0.36 | 3.54E+02 | | 3.40E+01 |
| 70 | 34 | 2.145 | 82 | 0.2331 | 0.3 | 3.54E+02 | | 2.33E-01 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 1.36E+00 | 7.14E+08 | 6.54E+01 |
| | std. dev. | 2.37E+00 | 5.98E+09 | 1.28E+02 |
| | max | 9.29E+00 | 5.00E+10 | 3.54E+02 |
| | min | 1.00E-11 | 5.38E-02 | 5.38E-02 |
| | median | 1.61E-01 | 3.10E+00 | 3.10E+00 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 3.10E+00 | 3.10E+00 |
| | 55 | 1.98E+00 | 1.98E+00 |
| | 60 | 8.94E-01 | 8.94E-01 |
| | 65 | 6.24E-01 | 6.24E-01 |
| | 70 | 5.00E-01 | 5.00E-01 |
| | 75 | 4.05E-01 | 4.05E-01 |
| | 80 | 2.54E-01 | 2.54E-01 |
| | 85 | 1.68E-01 | 1.68E-01 |
| | **90** | **1.12E-01** | **1.12E-01** |
| | 95 | 6.38E-02 | 6.38E-02 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 2 |
| Bulk density (g/cm^3) | 1.6 |
| Chemical | Phenol |
| MCL (mg/l) | 4.7 |
| Da (cm^2/sec) | 8.75E-02 |
| Henry's Law Constant (m^3-atm/mole) | 3.97E-07 |
| log Kow | 1.46 |
| Koc (ml/g) | 18.16 |
| Solubility (mg/l) | 87000 |
| Chemical Density (g/cm^3) | 1.06 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 120.4 | 11 | 3.9037 | 0.45 | 1.21E+04 | | 3.90E+00 |
| 2 | 17.8 | 464.1 | 4 | 1.0127 | 0.34 | 1.21E+04 | | 1.01E+00 |
| 3 | 13 | 254.6 | 2 | 1.8460 | 0.5 | 1.21E+04 | | 1.85E+00 |
| 4 | 51.1 | 79.6 | 11 | 5.9045 | 0.49 | 1.21E+04 | | 5.90E+00 |
| 5 | 32.6 | 80.25 | 7 | 5.8567 | 0.45 | 1.21E+04 | | 5.86E+00 |
| 6 | 39.4 | 80.06 | 8 | 5.8706 | 0.42 | 1.21E+04 | | 5.87E+00 |
| 7 | 34.6 | 138.6 | 12 | 3.3911 | 0.38 | 1.21E+04 | | 3.39E+00 |
| 8 | 32 | 62.24 | 8 | 7.5514 | 0.27 | 1.21E+04 | | 7.55E+00 |
| 9 | 28.1 | 155 | 6 | 3.0323 | 0.42 | 1.21E+04 | | 3.03E+00 |
| 10 | 30.6 | 42.61 | 7 | 11.0303 | 0.42 | 1.21E+04 | | 1.10E+01 |
| 11 | 44 | 109.4 | 20 | 4.2962 | 0.46 | 1.21E+04 | | 4.30E+00 |
| 12 | 20.3 | 135 | 10 | 3.4815 | 0.42 | 1.21E+04 | | 3.48E+00 |
| 13 | 31.3 | 242.5 | 7 | 1.9381 | 0.42 | 1.21E+04 | | 1.94E+00 |
| 14 | 30.2 | 51.04 | 8 | 9.2085 | 0.49 | 1.21E+04 | | 9.21E+00 |
| 15 | 19.2 | 347.4 | 5 | 1.3529 | 0.46 | 1.21E+04 | | 1.35E+00 |
| 16 | 9 | 380 | 2 | 1.2368 | 0.46 | 1.21E+04 | | 1.24E+00 |
| 17 | 21.5 | 223 | 6 | 2.1076 | 0.41 | 1.21E+04 | | 2.11E+00 |
| 18 | 15 | 391.7 | 2 | 1.1999 | 0.45 | 1.21E+04 | | 1.20E+00 |
| 19 | 35.2 | 119.6 | 7 | 3.9298 | 0.4 | 1.21E+04 | | 3.93E+00 |
| 20 | 18.7 | 236.5 | 4 | 1.9873 | 0.35 | 1.21E+04 | | 1.99E+00 |
| 21 | 47.4 | 32.45 | 9 | 14.4838 | 0.26 | 1.21E+04 | | 1.45E+01 |
| 22 | 22.1 | 88.77 | 5 | 5.2946 | 0.45 | 1.21E+04 | | 5.29E+00 |
| 23 | 8.15 | 210.4 | 2 | 2.2338 | 0.3 | 1.21E+04 | | 2.23E+00 |
| 24 | 20.2 | 70.68 | 5 | 6.6497 | 0.38 | 1.21E+04 | | 6.65E+00 |
| 25 | 12 | 221.6 | 2 | 2.1209 | 0.35 | 1.21E+04 | | 2.12E+00 |
| 26 | 15.8 | 235.4 | 7 | 1.9966 | 0.49 | 1.21E+04 | | 2.00E+00 |
| 27 | 17.4 | 132.9 | 5 | 3.5365 | 0.5 | 1.21E+04 | | 3.54E+00 |
| 28 | 24.7 | 127.6 | 6 | 3.6834 | 0.4 | 1.21E+04 | | 3.68E+00 |
| 29 | 17 | 211.2 | 3 | 2.2254 | 0.33 | 1.21E+04 | | 2.23E+00 |
| 30 | 21.6 | 99.43 | 4 | 4.7269 | 0.47 | 1.21E+04 | | 4.73E+00 |
| 31 | 21 | 271.2 | 4 | 1.7330 | 0.32 | 1.21E+04 | | 1.73E+00 |
| 32 | 27.6 | 45.14 | 7 | 10.4121 | 0.48 | 1.21E+04 | | 1.04E+01 |
| 33 | 8.63 | 406 | 4 | 1.1576 | 0.26 | 1.21E+04 | | 1.16E+00 |
| 34 | 13 | 338.7 | 1 | 1.3877 | 0.35 | 1.21E+04 | | 1.39E+00 |
| 35 | 15 | 446.7 | 2 | 1.0522 | 0.39 | 1.21E+04 | | 1.05E+00 |
| 36 | 27.1 | 77.57 | 6 | 6.0590 | 0.28 | 1.21E+04 | | 6.06E+00 |
| 37 | 18.1 | 73.04 | 5 | 6.4348 | 0.47 | 1.21E+04 | | 6.43E+00 |
| 38 | 11.7 | 447.3 | 2 | 1.0507 | 0.33 | 1.21E+04 | | 1.05E+00 |
| 39 | 42.4 | 62.17 | 9 | 7.5599 | 0.4 | 1.21E+04 | | 7.56E+00 |
| 40 | 29 | 4.14E+01 | 7 | 11.3527 | 0.44 | 1.21E+04 | | 1.14E+01 |
| 41 | 59.2 | 79.73 | 14 | 5.8949 | 0.48 | 1.21E+04 | | 5.89E+00 |
| 42 | 22.4 | 358.6 | 7 | 1.3107 | 0.36 | 1.21E+04 | | 1.31E+00 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 221.3 | 4 | 2.1238 | 0.44 | 1.21E+04 | | 2.12E+00 |
| 44 | 15 | 444.4 | 2 | 1.0576 | 0.35 | 1.21E+04 | | 1.06E+00 |
| 45 | 13.2 | 270.7 | 3 | 1.7362 | 0.34 | 1.21E+04 | | 1.74E+00 |
| 46 | 40.5 | 28.79 | 10 | 16.3251 | 0.48 | 1.21E+04 | | 1.63E+01 |
| 47 | 45 | 170.8 | 12 | 2.7518 | 0.26 | 1.21E+04 | | 2.75E+00 |
| 48 | 14.9 | 394.6 | 5 | 1.1911 | 0.49 | 1.21E+04 | | 1.19E+00 |
| 49 | 5 | 500.7 | 2 | 0.9387 | 0.4 | 1.21E+04 | | 9.39E-01 |
| 50 | 26.5 | 109.9 | 6 | 4.2766 | 0.42 | 1.21E+04 | | 4.28E+00 |
| 51 | 9.44 | 369 | 2 | 1.2737 | 0.41 | 1.21E+04 | | 1.27E+00 |
| 52 | 15.5 | 92.4 | 4 | 5.0866 | 0.37 | 1.21E+04 | | 5.09E+00 |
| 53 | 36.6 | 33.16 | 9 | 14.1737 | 0.43 | 1.21E+04 | | 1.42E+01 |
| 54 | 33.6 | 37.43 | 8 | 12.5568 | 0.44 | 1.21E+04 | | 1.26E+01 |
| 55 | 41.2 | 72.99 | 11 | 6.4392 | 0.4 | 1.21E+04 | | 6.44E+00 |
| 56 | 52.4 | 71.53 | 18 | 6.5707 | 0.37 | 1.21E+04 | | 6.57E+00 |
| 57 | 23 | 65.69 | 6 | 7.1548 | 0.43 | 1.21E+04 | | 7.15E+00 |
| 58 | 14.7 | 458.7 | 3 | 1.0246 | 0.33 | 1.21E+04 | | 1.02E+00 |
| 59 | 16.2 | 427.4 | 5 | 1.0997 | 0.47 | 1.21E+04 | | 1.10E+00 |
| 60 | 19.4 | 246.7 | 5 | 1.9051 | 0.39 | 1.21E+04 | | 1.91E+00 |
| 61 | 23.5 | 146.2 | 5 | 3.2148 | 0.36 | 1.21E+04 | | 3.21E+00 |
| 62 | 37 | 114.3 | 8 | 4.1120 | 0.36 | 1.21E+04 | | 4.11E+00 |
| 63 | 24.2 | 215.3 | 5 | 2.1830 | 0.28 | 1.21E+04 | | 2.18E+00 |
| 64 | 29.8 | 177.1 | 6 | 2.6539 | 0.45 | 1.21E+04 | | 2.65E+00 |
| 65 | 38.4 | 149.5 | 10 | 3.1438 | 0.3 | 1.21E+04 | | 3.14E+00 |
| 66 | 5.13 | 378.6 | 1 | 1.2414 | 0.27 | 1.21E+04 | | 1.24E+00 |
| 67 | 14.2 | 198.4 | 4 | 2.3690 | 0.48 | 1.21E+04 | | 2.37E+00 |
| 68 | 25.5 | 234.4 | 6 | 2.0051 | 0.46 | 1.21E+04 | | 2.01E+00 |
| 69 | 26.1 | 235 | 7 | 2.0000 | 0.36 | 1.21E+04 | | 2.00E+00 |
| 70 | 34 | 105.9 | 7 | 4.4381 | 0.3 | 1.21E+04 | | 4.44E+00 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 1.97E+02 | 4.25E+00 | 4.25E+00 |
| | std. dev. | 1.36E+02 | 3.59E+00 | 3.59E+00 |
| | max | 5.01E+02 | 1.63E+01 | 1.63E+01 |
| | min | 2.88E+01 | 9.39E-01 | 9.39E-01 |
| | median | 1.52E+02 | 3.09E+00 | 3.09E+00 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 3.09E+00 | 3.09E+00 |
| | 55 | 2.38E+00 | 2.38E+00 |
| | 60 | 2.16E+00 | 2.16E+00 |
| | 65 | 2.02E+00 | 2.02E+00 |
| | 70 | 1.97E+00 | 1.97E+00 |
| | 75 | 1.76E+00 | 1.76E+00 |
| | 80 | 1.34E+00 | 1.34E+00 |
| | 85 | 1.24E+00 | 1.24E+00 |
| | **90** | **1.15E+00** | **1.15E+00** |
| | 95 | 1.05E+00 | 1.05E+00 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 2 |
| Bulk density (g/cm^3) | 1.6 |
| Chemical | Styrene |
| MCL (mg/l) | 0.1 |
| Da (cm^2/sec) | 7.21E-02 |
| Henry's Law Constant (m^3-atm/mole) | 2.81E-03 |
| log Kow | 2.95 |
| Koc (ml/g) | 561.48 |
| Solubility (mg/l) | 310 |
| Chemical Density (g/cm^3) | 0.9 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 3.228 | 63 | 3.0979 | 0.45 | 4.70E+02 | | 3.10E+00 |
| 2 | 17.8 | 22.95 | 25 | 0.4357 | 0.34 | 4.70E+02 | | 4.36E-01 |
| 3 | 13 | 12.24 | 6 | 0.8170 | 0.5 | 4.70E+02 | | 8.17E-01 |
| 4 | 51.1 | 4.532 | 77 | 2.2065 | 0.49 | 4.70E+02 | | 2.21E+00 |
| 5 | 32.6 | 3.114 | 49 | 3.2113 | 0.45 | 4.70E+02 | | 3.21E+00 |
| 6 | 39.4 | 4.441 | 55 | 2.2517 | 0.42 | 4.70E+02 | | 2.25E+00 |
| 7 | 34.6 | 7.823 | 83 | 1.2783 | 0.38 | 4.70E+02 | | 1.28E+00 |
| 8 | 32 | 4.315 | 71 | 2.3175 | 0.27 | 4.70E+02 | | 2.32E+00 |
| 9 | 28.1 | 6.972 | 40 | 1.4343 | 0.42 | 4.70E+02 | | 1.43E+00 |
| 10 | 30.6 | 1.009 | 48 | 9.9108 | 0.42 | 4.70E+02 | | 9.91E+00 |
| 11 | 44 | 10.32 | 124 | 0.9690 | 0.46 | 4.70E+02 | | 9.69E-01 |
| 12 | 20.3 | 8.042 | 58 | 1.2435 | 0.42 | 4.70E+02 | | 1.24E+00 |
| 13 | 31.3 | 13.1 | 44 | 0.7634 | 0.42 | 4.70E+02 | | 7.63E-01 |
| 14 | 30.2 | 2.454 | 45 | 4.0750 | 0.49 | 4.70E+02 | | 4.07E+00 |
| 15 | 19.2 | 12.98 | 30 | 0.7704 | 0.46 | 4.70E+02 | | 7.70E-01 |
| 16 | 9 | 40.17 | 8 | 0.2489 | 0.46 | 4.70E+02 | | 2.49E-01 |
| 17 | 21.5 | 9.723 | 36 | 1.0285 | 0.41 | 4.70E+02 | | 1.03E+00 |
| 18 | 15 | 27.04 | 8 | 0.3698 | 0.45 | 4.70E+02 | | 3.70E-01 |
| 19 | 35.2 | 6.305 | 53 | 1.5860 | 0.4 | 4.70E+02 | | 1.59E+00 |
| 20 | 18.7 | 3.343 | 29 | 2.9913 | 0.35 | 4.70E+02 | | 2.99E+00 |
| 21 | 47.4 | 2.34 | 81 | 4.2735 | 0.26 | 4.70E+02 | | 4.27E+00 |
| 22 | 22.1 | 3.276 | 27 | 3.0525 | 0.45 | 4.70E+02 | | 3.05E+00 |
| 23 | 8.15 | 11.47 | 10 | 0.8718 | 0.3 | 4.70E+02 | | 8.72E-01 |
| 24 | 20.2 | 1.846 | 31 | 5.4171 | 0.38 | 4.70E+02 | | 5.42E+00 |
| 25 | 12 | 7.123 | 8 | 1.4039 | 0.35 | 4.70E+02 | | 1.40E+00 |
| 26 | 15.8 | 4.444 | 33 | 2.2502 | 0.49 | 4.70E+02 | | 2.25E+00 |
| 27 | 17.4 | 4.258 | 25 | 2.3485 | 0.5 | 4.70E+02 | | 2.35E+00 |
| 28 | 24.7 | 5.6 | 37 | 1.7857 | 0.4 | 4.70E+02 | | 1.79E+00 |
| 29 | 17 | 9.134 | 22 | 1.0948 | 0.33 | 4.70E+02 | | 1.09E+00 |
| 30 | 21.6 | 2.94 | 24 | 3.4014 | 0.47 | 4.70E+02 | | 3.40E+00 |
| 31 | 21 | 14.1 | 31 | 0.7092 | 0.32 | 4.70E+02 | | 7.09E-01 |
| 32 | 27.6 | 0.6099 | 42 | 16.3961 | 0.48 | 4.70E+02 | | 1.64E+01 |
| 33 | 8.63 | 11.78 | 26 | 0.8489 | 0.26 | 4.70E+02 | | 8.49E-01 |
| 34 | 13 | 15.66 | 6 | 0.6386 | 0.35 | 4.70E+02 | | 6.39E-01 |
| 35 | 15 | 32.46 | 9 | 0.3081 | 0.39 | 4.70E+02 | | 3.08E-01 |
| 36 | 27.1 | 4.893 | 55 | 2.0437 | 0.28 | 4.70E+02 | | 2.04E+00 |
| 37 | 18.1 | 3.316 | 27 | 3.0157 | 0.47 | 4.70E+02 | | 3.02E+00 |
| 38 | 11.7 | 27.67 | 15 | 0.3614 | 0.33 | 4.70E+02 | | 3.61E-01 |
| 39 | 42.4 | 2.358 | 69 | 4.2409 | 0.4 | 4.70E+02 | | 4.24E+00 |
| 40 | 29 | 1.76E-02 | 47 | 568.1818 | 0.44 | 4.70E+02 | SCN>SSL | 4.70E+02 |
| 41 | 59.2 | 3.307 | 101 | 3.0239 | 0.48 | 4.70E+02 | | 3.02E+00 |
| 42 | 22.4 | 16.45 | 45 | 0.6079 | 0.36 | 4.70E+02 | | 6.08E-01 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 9.343 | 27 | 1.0703 | 0.44 | 4.70E+02 | | 1.07E+00 |
| 44 | 15 | 32.05 | 8 | 0.3120 | 0.35 | 4.70E+02 | | 3.12E-01 |
| 45 | 13.2 | 13.01 | 17 | 0.7686 | 0.34 | 4.70E+02 | | 7.69E-01 |
| 46 | 40.5 | 0.5029 | 65 | 19.8847 | 0.48 | 4.70E+02 | | 1.99E+01 |
| 47 | 45 | 13.81 | 109 | 0.7241 | 0.26 | 4.70E+02 | | 7.24E-01 |
| 48 | 14.9 | 19.86 | 26 | 0.5035 | 0.49 | 4.70E+02 | | 5.04E-01 |
| 49 | 5 | 37.52 | 9 | 0.2665 | 0.4 | 4.70E+02 | | 2.67E-01 |
| 50 | 26.5 | 4.532 | 39 | 2.2065 | 0.42 | 4.70E+02 | | 2.21E+00 |
| 51 | 9.44 | 29.53 | 12 | 0.3386 | 0.41 | 4.70E+02 | | 3.39E-01 |
| 52 | 15.5 | 4.098 | 27 | 2.4402 | 0.37 | 4.70E+02 | | 2.44E+00 |
| 53 | 36.6 | 0.9498 | 61 | 10.5285 | 0.43 | 4.70E+02 | | 1.05E+01 |
| 54 | 33.6 | 0.9158 | 54 | 10.9194 | 0.44 | 4.70E+02 | | 1.09E+01 |
| 55 | 41.2 | 5.771 | 76 | 1.7328 | 0.4 | 4.70E+02 | | 1.73E+00 |
| 56 | 52.4 | 6.772 | 130 | 1.4767 | 0.37 | 4.70E+02 | | 1.48E+00 |
| 57 | 23 | 2.551 | 37 | 3.9200 | 0.43 | 4.70E+02 | | 3.92E+00 |
| 58 | 14.7 | 26.84 | 16 | 0.3726 | 0.33 | 4.70E+02 | | 3.73E-01 |
| 59 | 16.2 | 23.07 | 27 | 0.4335 | 0.47 | 4.70E+02 | | 4.33E-01 |
| 60 | 19.4 | 10.76 | 30 | 0.9294 | 0.39 | 4.70E+02 | | 9.29E-01 |
| 61 | 23.5 | 6.981 | 36 | 1.4325 | 0.36 | 4.70E+02 | | 1.43E+00 |
| 62 | 37 | 5.794 | 59 | 1.7259 | 0.36 | 4.70E+02 | | 1.73E+00 |
| 63 | 24.2 | 13.89 | 36 | 0.7199 | 0.28 | 4.70E+02 | | 7.20E-01 |
| 64 | 29.8 | 8.05 | 36 | 1.2422 | 0.45 | 4.70E+02 | | 1.24E+00 |
| 65 | 38.4 | 12.57 | 86 | 0.7955 | 0.3 | 4.70E+02 | | 7.96E-01 |
| 66 | 5.13 | 37.97 | 5 | 0.2634 | 0.27 | 4.70E+02 | | 2.63E-01 |
| 67 | 14.2 | 4.836 | 21 | 2.0678 | 0.48 | 4.70E+02 | | 2.07E+00 |
| 68 | 25.5 | 8.906 | 34 | 1.1228 | 0.46 | 4.70E+02 | | 1.12E+00 |
| 69 | 26.1 | 6.689 | 51 | 1.4950 | 0.36 | 4.70E+02 | | 1.49E+00 |
| 70 | 34 | 8.224 | 58 | 1.2160 | 0.3 | 4.70E+02 | | 1.22E+00 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 1.06E+01 | 1.05E+01 | 9.14E+00 |
| | std. dev. | 9.95E+00 | 6.77E+01 | 5.60E+01 |
| | max | 4.02E+01 | 5.68E+02 | 4.70E+02 |
| | min | 1.76E-02 | 2.49E-01 | 2.49E-01 |
| | median | 7.05E+00 | 1.42E+00 | 1.42E+00 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 1.42E+00 | 1.42E+00 |
| | 55 | 1.24E+00 | 1.24E+00 |
| | 60 | 1.09E+00 | 1.09E+00 |
| | 65 | 9.35E-01 | 9.35E-01 |
| | 70 | 8.11E-01 | 8.11E-01 |
| | 75 | 7.65E-01 | 7.65E-01 |
| | 80 | 6.95E-01 | 6.95E-01 |
| | 85 | 4.59E-01 | 4.59E-01 |
| | **90** | **3.69E-01** | **3.69E-01** |
| | 95 | 3.10E-01 | 3.10E-01 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 2 |
| Bulk density (g/cm^3) | 1.6 |
| Chemical | TCE |
| MCL (mg/l) | 0.005 |
| Da (cm^2/sec) | 8.55E-02 |
| Henry's Law Constant (m^3-atm/mole) | 1.03E-02 |
| log Kow | 2.42 |
| Koc (ml/g) | 170.8 |
| Solubility (mg/l) | 1100 |
| Chemical Density (g/cm^3) | 1.46 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.06559 | 24 | 7.6231 | 0.45 | 6.48E+02 | | 7.62E+00 |
| 2 | 17.8 | 9.441 | 10 | 0.0530 | 0.34 | 6.48E+02 | | 5.30E-02 |
| 3 | 13 | 16.18 | 3 | 0.0309 | 0.5 | 6.48E+02 | | 3.09E-02 |
| 4 | 51.1 | 1.081 | 29 | 0.4625 | 0.49 | 6.48E+02 | | 4.63E-01 |
| 5 | 32.6 | 0.1736 | 19 | 2.8802 | 0.45 | 6.48E+02 | | 2.88E+00 |
| 6 | 39.4 | 1.862 | 21 | 0.2685 | 0.42 | 6.48E+02 | | 2.69E-01 |
| 7 | 34.6 | 1.548 | 29 | 0.3230 | 0.38 | 6.48E+02 | | 3.23E-01 |
| 8 | 32 | 5.907 | 25 | 0.0846 | 0.27 | 6.48E+02 | | 8.46E-02 |
| 9 | 28.1 | 0.6919 | 16 | 0.7226 | 0.42 | 6.48E+02 | | 7.23E-01 |
| 10 | 30.6 | 0.02148 | 18 | 23.2775 | 0.42 | 6.48E+02 | | 2.33E+01 |
| 11 | 44 | 5.379 | 47 | 0.0930 | 0.46 | 6.48E+02 | | 9.30E-02 |
| 12 | 20.3 | 1.129 | 22 | 0.4429 | 0.42 | 6.48E+02 | | 4.43E-01 |
| 13 | 31.3 | 7.856 | 17 | 0.0636 | 0.42 | 6.48E+02 | | 6.36E-02 |
| 14 | 30.2 | 0.8278 | 18 | 0.6040 | 0.49 | 6.48E+02 | | 6.04E-01 |
| 15 | 19.2 | 0.63 | 13 | 0.7937 | 0.46 | 6.48E+02 | | 7.94E-01 |
| 16 | 9 | 40.78 | 4 | 0.0123 | 0.46 | 6.48E+02 | | 1.23E-02 |
| 17 | 21.5 | 0.7108 | 14 | 0.7034 | 0.41 | 6.48E+02 | | 7.03E-01 |
| 18 | 15 | 26.78 | 4 | 0.0187 | 0.45 | 6.48E+02 | | 1.87E-02 |
| 19 | 35.2 | 0.9726 | 20 | 0.5141 | 0.4 | 6.48E+02 | | 5.14E-01 |
| 20 | 18.7 | 0.01612 | 12 | 31.0174 | 0.35 | 6.48E+02 | | 3.10E+01 |
| 21 | 47.4 | 2.233 | 29 | 0.2239 | 0.26 | 6.48E+02 | | 2.24E-01 |
| 22 | 22.1 | 1.644 | 11 | 0.3041 | 0.45 | 6.48E+02 | | 3.04E-01 |
| 23 | 8.15 | 10.4 | 4 | 0.0481 | 0.3 | 6.48E+02 | | 4.81E-02 |
| 24 | 20.2 | 0.04326 | 12 | 11.5580 | 0.38 | 6.48E+02 | | 1.16E+01 |
| 25 | 12 | 11.71 | 3 | 0.0427 | 0.35 | 6.48E+02 | | 4.27E-02 |
| 26 | 15.8 | 0.02499 | 14 | 20.0080 | 0.49 | 6.48E+02 | | 2.00E+01 |
| 27 | 17.4 | 0.06423 | 11 | 7.7845 | 0.5 | 6.48E+02 | | 7.78E+00 |
| 28 | 24.7 | 0.6782 | 15 | 0.7372 | 0.4 | 6.48E+02 | | 7.37E-01 |
| 29 | 17 | 1.694 | 9 | 0.2952 | 0.33 | 6.48E+02 | | 2.95E-01 |
| 30 | 21.6 | 1.149 | 10 | 0.4352 | 0.47 | 6.48E+02 | | 4.35E-01 |
| 31 | 21 | 5.357 | 12 | 0.0933 | 0.32 | 6.48E+02 | | 9.33E-02 |
| 32 | 27.6 | 0.001948 | 17 | 256.6735 | 0.48 | 6.48E+02 | | 2.57E+02 |
| 33 | 8.63 | 0.6639 | 10 | 0.7531 | 0.26 | 6.48E+02 | | 7.53E-01 |
| 34 | 13 | 20.01 | 3 | 0.0250 | 0.35 | 6.48E+02 | | 2.50E-02 |
| 35 | 15 | 36.36 | 4 | 0.0138 | 0.39 | 6.48E+02 | | 1.38E-02 |
| 36 | 27.1 | 6.427 | 19 | 0.0778 | 0.28 | 6.48E+02 | | 7.78E-02 |
| 37 | 18.1 | 0.3649 | 11 | 1.3702 | 0.47 | 6.48E+02 | | 1.37E+00 |
| 38 | 11.7 | 10.19 | 6 | 0.0491 | 0.33 | 6.48E+02 | | 4.91E-02 |
| 39 | 42.4 | 0.1671 | 25 | 2.9922 | 0.4 | 6.48E+02 | | 2.99E+00 |
| 40 | 29 | 4.87E-07 | 18 | 1027538.0189 | 0.44 | 6.48E+02 | SCN>SSL | 6.48E+02 |
| 41 | 59.2 | 0.1525 | 37 | 3.2787 | 0.48 | 6.48E+02 | | 3.28E+00 |
| 42 | 22.4 | 15.12 | 17 | 0.0331 | 0.36 | 6.48E+02 | | 3.31E-02 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 4.197 | 11 | 0.1191 | 0.44 | 6.48E+02 | | 1.19E-01 |
| 44 | 15 | 34.47 | 4 | 0.0145 | 0.35 | 6.48E+02 | | 1.45E-02 |
| 45 | 13.2 | 4.447 | 7 | 0.1124 | 0.34 | 6.48E+02 | | 1.12E-01 |
| 46 | 40.5 | 0.00433 | 24 | 115.4734 | 0.48 | 6.48E+02 | | 1.15E+02 |
| 47 | 45 | 21.92 | 39 | 0.0228 | 0.26 | 6.48E+02 | | 2.28E-02 |
| 48 | 14.9 | 2.602 | 11 | 0.1922 | 0.49 | 6.48E+02 | | 1.92E-01 |
| 49 | 5 | 18.75 | 4 | 0.0267 | 0.4 | 6.48E+02 | | 2.67E-02 |
| 50 | 26.5 | 0.39 | 15 | 1.2821 | 0.42 | 6.48E+02 | | 1.28E+00 |
| 51 | 9.44 | 24.72 | 5 | 0.0202 | 0.41 | 6.48E+02 | | 2.02E-02 |
| 52 | 15.5 | 0.3921 | 11 | 1.2752 | 0.37 | 6.48E+02 | | 1.28E+00 |
| 53 | 36.6 | 0.03151 | 22 | 15.8680 | 0.43 | 6.48E+02 | | 1.59E+01 |
| 54 | 33.6 | 0.02013 | 20 | 24.8385 | 0.44 | 6.48E+02 | | 2.48E+01 |
| 55 | 41.2 | 4.81 | 28 | 0.1040 | 0.4 | 6.48E+02 | | 1.04E-01 |
| 56 | 52.4 | 5.572 | 48 | 0.0897 | 0.37 | 6.48E+02 | | 8.97E-02 |
| 57 | 23 | 0.2183 | 15 | 2.2904 | 0.43 | 6.48E+02 | | 2.29E+00 |
| 58 | 14.7 | 32.17 | 6 | 0.0155 | 0.33 | 6.48E+02 | | 1.55E-02 |
| 59 | 16.2 | 6.704 | 11 | 0.0746 | 0.47 | 6.48E+02 | | 7.46E-02 |
| 60 | 19.4 | 0.8076 | 12 | 0.6191 | 0.39 | 6.48E+02 | | 6.19E-01 |
| 61 | 23.5 | 1.497 | 14 | 0.3340 | 0.36 | 6.48E+02 | | 3.34E-01 |
| 62 | 37 | 0.8518 | 21 | 0.5870 | 0.36 | 6.48E+02 | | 5.87E-01 |
| 63 | 24.2 | 7.658 | 13 | 0.0653 | 0.28 | 6.48E+02 | | 6.53E-02 |
| 64 | 29.8 | 3.035 | 15 | 0.1647 | 0.45 | 6.48E+02 | | 1.65E-01 |
| 65 | 38.4 | 11.52 | 31 | 0.0434 | 0.3 | 6.48E+02 | | 4.34E-02 |
| 66 | 5.13 | 39.53 | 2 | 0.0126 | 0.27 | 6.48E+02 | | 1.26E-02 |
| 67 | 14.2 | 0.04597 | 9 | 10.8767 | 0.48 | 6.48E+02 | | 1.09E+01 |
| 68 | 25.5 | 0.5407 | 14 | 0.9247 | 0.46 | 6.48E+02 | | 9.25E-01 |
| 69 | 26.1 | 0.321 | 19 | 1.5576 | 0.36 | 6.48E+02 | | 1.56E+00 |
| 70 | 34 | 11 | 21 | 0.0455 | 0.3 | 6.48E+02 | | 4.55E-02 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 6.92E+00 | 1.47E+04 | 1.72E+01 |
| | std. dev. | 1.05E+01 | 1.23E+05 | 8.36E+01 |
| | max | 4.08E+01 | 1.03E+06 | 6.48E+02 |
| | min | 4.87E-07 | 1.23E-02 | 1.23E-02 |
| | median | 1.60E+00 | 3.14E-01 | 3.14E-01 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 3.14E-01 | 3.14E-01 |
| | 55 | 2.26E-01 | 2.26E-01 |
| | 60 | 1.16E-01 | 1.16E-01 |
| | 65 | 9.30E-02 | 9.30E-02 |
| | 70 | 7.68E-02 | 7.68E-02 |
| | 75 | 5.56E-02 | 5.56E-02 |
| | 80 | 4.50E-02 | 4.50E-02 |
| | 85 | 3.17E-02 | 3.17E-02 |
| | **90** | **2.26E-02** | **2.26E-02** |
| | 95 | 1.50E-02 | 1.50E-02 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 2 |
| Bulk density (g/cm^3) | 1.6 |
| Chemical | Toluene |
| MCL (mg/l) | 1 |
| Da (cm^2/sec) | 8.26E-02 |
| Henry's Law Constant (m^3-atm/mole) | 5.94E-03 |
| log Kow | 2.73 |
| Koc (ml/g) | 338.3 |
| Solubility (mg/l) | 535 |
| Chemical Density (g/cm^3) | 0.87 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.5833 | 39 | 171.4384 | 0.45 | 5.24E+02 | | 1.71E+02 |
| 2 | 17.8 | 15.66 | 16 | 6.3857 | 0.34 | 5.24E+02 | | 6.39E+00 |
| 3 | 13 | 12.33 | 5 | 8.1103 | 0.5 | 5.24E+02 | | 8.11E+00 |
| 4 | 51.1 | 2.481 | 48 | 40.3063 | 0.49 | 5.24E+02 | | 4.03E+01 |
| 5 | 32.6 | 0.8922 | 30 | 112.0825 | 0.45 | 5.24E+02 | | 1.12E+02 |
| 6 | 39.4 | 3.091 | 34 | 32.3520 | 0.42 | 5.24E+02 | | 3.24E+01 |
| 7 | 34.6 | 4.042 | 51 | 24.7402 | 0.38 | 5.24E+02 | | 2.47E+01 |
| 8 | 32 | 4.871 | 44 | 20.5297 | 0.27 | 5.24E+02 | | 2.05E+01 |
| 9 | 28.1 | 2.686 | 25 | 37.2301 | 0.42 | 5.24E+02 | | 3.72E+01 |
| 10 | 30.6 | 0.1848 | 29 | 541.1255 | 0.42 | 5.24E+02 | SCN>SSL | 5.24E+02 |
| 11 | 44 | 8.228 | 79 | 12.1536 | 0.46 | 5.24E+02 | | 1.22E+01 |
| 12 | 20.3 | 3.614 | 35 | 27.6702 | 0.42 | 5.24E+02 | | 2.77E+01 |
| 13 | 31.3 | 10.47 | 27 | 9.5511 | 0.42 | 5.24E+02 | | 9.55E+00 |
| 14 | 30.2 | 1.53 | 28 | 65.3595 | 0.49 | 5.24E+02 | | 6.54E+01 |
| 15 | 19.2 | 3.71 | 20 | 26.9542 | 0.46 | 5.24E+02 | | 2.70E+01 |
| 16 | 9 | 41.06 | 6 | 2.4355 | 0.46 | 5.24E+02 | | 2.44E+00 |
| 17 | 21.5 | 3.459 | 23 | 28.9101 | 0.41 | 5.24E+02 | | 2.89E+01 |
| 18 | 15 | 24.25 | 5 | 4.1237 | 0.45 | 5.24E+02 | | 4.12E+00 |
| 19 | 35.2 | 2.921 | 33 | 34.2349 | 0.4 | 5.24E+02 | | 3.42E+01 |
| 20 | 18.7 | 0.3405 | 19 | 293.6858 | 0.35 | 5.24E+02 | | 2.94E+02 |
| 21 | 47.4 | 2.339 | 51 | 42.7533 | 0.26 | 5.24E+02 | | 4.28E+01 |
| 22 | 22.1 | 2.396 | 18 | 41.7362 | 0.45 | 5.24E+02 | | 4.17E+01 |
| 23 | 8.15 | 10.66 | 7 | 9.3809 | 0.3 | 5.24E+02 | | 9.38E+00 |
| 24 | 20.2 | 0.3561 | 20 | 280.8200 | 0.38 | 5.24E+02 | | 2.81E+02 |
| 25 | 12 | 8.506 | 5 | 11.7564 | 0.35 | 5.24E+02 | | 1.18E+01 |
| 26 | 15.8 | 0.4641 | 22 | 215.4708 | 0.49 | 5.24E+02 | | 2.15E+02 |
| 27 | 17.4 | 0.6845 | 17 | 146.0920 | 0.5 | 5.24E+02 | | 1.46E+02 |
| 28 | 24.7 | 2.312 | 23 | 43.2526 | 0.4 | 5.24E+02 | | 4.33E+01 |
| 29 | 17 | 4.574 | 14 | 21.8627 | 0.33 | 5.24E+02 | | 2.19E+01 |
| 30 | 21.6 | 1.949 | 16 | 51.3084 | 0.47 | 5.24E+02 | | 5.13E+01 |
| 31 | 21 | 9.541 | 19 | 10.4811 | 0.32 | 5.24E+02 | | 1.05E+01 |
| 32 | 27.6 | 0.05068 | 26 | 1973.1650 | 0.48 | 5.24E+02 | SCN>SSL | 5.24E+02 |
| 33 | 8.63 | 3.396 | 16 | 29.4464 | 0.26 | 5.24E+02 | | 2.94E+01 |
| 34 | 13 | 15.78 | 4 | 6.3371 | 0.35 | 5.24E+02 | | 6.34E+00 |
| 35 | 15 | 31.53 | 6 | 3.1716 | 0.39 | 5.24E+02 | | 3.17E+00 |
| 36 | 27.1 | 5.347 | 34 | 18.7021 | 0.28 | 5.24E+02 | | 1.87E+01 |
| 37 | 18.1 | 1.323 | 18 | 75.5858 | 0.47 | 5.24E+02 | | 7.56E+01 |
| 38 | 11.7 | 17.73 | 10 | 5.6402 | 0.33 | 5.24E+02 | | 5.64E+00 |
| 39 | 42.4 | 0.7027 | 42 | 142.3082 | 0.4 | 5.24E+02 | | 1.42E+02 |
| 40 | 29 | 1.69E-04 | 29 | 592066.3114 | 0.44 | 5.24E+02 | SCN>SSL | 5.24E+02 |
| 41 | 59.2 | 0.8846 | 63 | 113.0454 | 0.48 | 5.24E+02 | | 1.13E+02 |
| 42 | 22.4 | 15.11 | 28 | 6.6181 | 0.36 | 5.24E+02 | | 6.62E+00 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 6.665 | 18 | 15.0038 | 0.44 | 5.24E+02 | | 1.50E+01 |
| 44 | 15 | 29.2 | 5 | 3.4247 | 0.35 | 5.24E+02 | | 3.42E+00 |
| 45 | 13.2 | 8.346 | 11 | 11.9818 | 0.34 | 5.24E+02 | | 1.20E+01 |
| 46 | 40.5 | 0.06317 | 40 | 1583.0299 | 0.48 | 5.24E+02 | SCN>SSL | 5.24E+02 |
| 47 | 45 | 17.1 | 69 | 5.8480 | 0.26 | 5.24E+02 | | 5.85E+00 |
| 48 | 14.9 | 8.43 | 17 | 11.8624 | 0.49 | 5.24E+02 | | 1.19E+01 |
| 49 | 5 | 29.15 | 6 | 3.4305 | 0.4 | 5.24E+02 | | 3.43E+00 |
| 50 | 26.5 | 1.585 | 24 | 63.0915 | 0.42 | 5.24E+02 | | 6.31E+01 |
| 51 | 9.44 | 27.29 | 8 | 3.6643 | 0.41 | 5.24E+02 | | 3.66E+00 |
| 52 | 15.5 | 1.434 | 18 | 69.7350 | 0.37 | 5.24E+02 | | 6.97E+01 |
| 53 | 36.6 | 0.2089 | 37 | 478.6979 | 0.43 | 5.24E+02 | | 4.79E+02 |
| 54 | 33.6 | 0.168 | 33 | 595.2381 | 0.44 | 5.24E+02 | SCN>SSL | 5.24E+02 |
| 55 | 41.2 | 5.326 | 48 | 18.7758 | 0.4 | 5.24E+02 | | 1.88E+01 |
| 56 | 52.4 | 6.533 | 82 | 15.3069 | 0.37 | 5.24E+02 | | 1.53E+01 |
| 57 | 23 | 0.8824 | 24 | 113.3273 | 0.43 | 5.24E+02 | | 1.13E+02 |
| 58 | 14.7 | 26.27 | 10 | 3.8066 | 0.33 | 5.24E+02 | | 3.81E+00 |
| 59 | 16.2 | 14.42 | 18 | 6.9348 | 0.47 | 5.24E+02 | | 6.93E+00 |
| 60 | 19.4 | 3.69 | 20 | 27.1003 | 0.39 | 5.24E+02 | | 2.71E+01 |
| 61 | 23.5 | 3.587 | 23 | 27.8784 | 0.36 | 5.24E+02 | | 2.79E+01 |
| 62 | 37 | 2.521 | 36 | 39.6668 | 0.36 | 5.24E+02 | | 3.97E+01 |
| 63 | 24.2 | 11.09 | 22 | 9.0171 | 0.28 | 5.24E+02 | | 9.02E+00 |
| 64 | 29.8 | 5.357 | 23 | 18.6672 | 0.45 | 5.24E+02 | | 1.87E+01 |
| 65 | 38.4 | 12.7 | 54 | 7.8740 | 0.3 | 5.24E+02 | | 7.87E+00 |
| 66 | 5.13 | 37.32 | 3 | 2.6795 | 0.27 | 5.24E+02 | | 2.68E+00 |
| 67 | 14.2 | 0.6322 | 14 | 158.1778 | 0.48 | 5.24E+02 | | 1.58E+02 |
| 68 | 25.5 | 2.728 | 23 | 36.6569 | 0.46 | 5.24E+02 | | 3.67E+01 |
| 69 | 26.1 | 1.828 | 31 | 54.7046 | 0.36 | 5.24E+02 | | 5.47E+01 |
| 70 | 34 | 9.231 | 37 | 10.8331 | 0.3 | 5.24E+02 | | 1.08E+01 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 7.94E+00 | 8.57E+03 | 8.67E+01 |
| | std. dev. | 9.65E+00 | 7.08E+04 | 1.46E+02 |
| | max | 4.11E+01 | 5.92E+05 | 5.24E+02 |
| | min | 1.69E-04 | 2.44E+00 | 2.44E+00 |
| | median | 3.65E+00 | 2.74E+01 | 2.74E+01 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 2.74E+01 | 2.74E+01 |
| | 55 | 2.20E+01 | 2.20E+01 |
| | 60 | 1.87E+01 | 1.87E+01 |
| | 65 | 1.26E+01 | 1.26E+01 |
| | 70 | 1.15E+01 | 1.15E+01 |
| | 75 | 9.42E+00 | 9.42E+00 |
| | 80 | 7.69E+00 | 7.69E+00 |
| | 85 | 6.35E+00 | 6.35E+00 |
| | **90** | **4.09E+00** | **4.09E+00** |
| | 95 | 3.43E+00 | 3.43E+00 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 2 |
| Bulk density (g/cm^3) | 1.6 |
| Chemical | vinyl chloride |
| MCL (mg/l) | 0.002 |
| Da (cm^2/sec) | 1.13E-01 |
| Henry's Law Constant (m^3-atm/mole) | 1.07E-02 |
| log Kow | 1.38 |
| Koc (ml/g) | 30.45 |
| Solubility (mg/l) | 2763 |
| Chemical Density (g/cm^3) | 0.91 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.02631 | 12 | 7.6017 | 0.45 | 6.66E+02 | | 7.60E+00 |
| 2 | 17.8 | 7.444 | 5 | 0.0269 | 0.34 | 6.66E+02 | | 2.69E-02 |
| 3 | 13 | 24.83 | 2 | 0.0081 | 0.5 | 6.66E+02 | | 8.05E-03 |
| 4 | 51.1 | 0.8017 | 14 | 0.2495 | 0.49 | 6.66E+02 | | 2.49E-01 |
| 5 | 32.6 | 0.07423 | 9 | 2.6943 | 0.45 | 6.66E+02 | | 2.69E+00 |
| 6 | 39.4 | 1.831 | 10 | 0.1092 | 0.42 | 6.66E+02 | | 1.09E-01 |
| 7 | 34.6 | 1.47 | 13 | 0.1361 | 0.38 | 6.66E+02 | | 1.36E-01 |
| 8 | 32 | 11.86 | 10 | 0.0169 | 0.27 | 6.66E+02 | | 1.69E-02 |
| 9 | 28.1 | 0.364 | 7 | 0.5495 | 0.42 | 6.66E+02 | | 5.49E-01 |
| 10 | 30.6 | 0.004026 | 8 | 49.6771 | 0.42 | 6.66E+02 | | 4.97E+01 |
| 11 | 44 | 5.465 | 22 | 0.0366 | 0.46 | 6.66E+02 | | 3.66E-02 |
| 12 | 20.3 | 0.7661 | 10 | 0.2611 | 0.42 | 6.66E+02 | | 2.61E-01 |
| 13 | 31.3 | 9.092 | 8 | 0.0220 | 0.42 | 6.66E+02 | | 2.20E-02 |
| 14 | 30.2 | 0.7037 | 9 | 0.2842 | 0.49 | 6.66E+02 | | 2.84E-01 |
| 15 | 19.2 | 0.2363 | 6 | 0.8464 | 0.46 | 6.66E+02 | | 8.46E-01 |
| 16 | 9 | 56.92 | 2 | 0.0035 | 0.46 | 6.66E+02 | | 3.51E-03 |
| 17 | 21.5 | 0.4567 | 7 | 0.4379 | 0.41 | 6.66E+02 | | 4.38E-01 |
| 18 | 15 | 41.61 | 2 | 0.0048 | 0.45 | 6.66E+02 | | 4.81E-03 |
| 19 | 35.2 | 0.6965 | 9 | 0.2872 | 0.4 | 6.66E+02 | | 2.87E-01 |
| 20 | 18.7 | 0.003862 | 5 | 51.7866 | 0.35 | 6.66E+02 | | 5.18E+01 |
| 21 | 47.4 | 3.862 | 11 | 0.0518 | 0.26 | 6.66E+02 | | 5.18E-02 |
| 22 | 22.1 | 1.52 | 5 | 0.1316 | 0.45 | 6.66E+02 | | 1.32E-01 |
| 23 | 8.15 | 16.01 | 2 | 0.0125 | 0.3 | 6.66E+02 | | 1.25E-02 |
| 24 | 20.2 | 0.01004 | 5 | 19.9203 | 0.38 | 6.66E+02 | | 1.99E+01 |
| 25 | 12 | 25.23 | 2 | 0.0079 | 0.35 | 6.66E+02 | | 7.93E-03 |
| 26 | 15.8 | 0.004239 | 7 | 47.1809 | 0.49 | 6.66E+02 | | 4.72E+01 |
| 27 | 17.4 | 0.01108 | 5 | 18.0505 | 0.5 | 6.66E+02 | | 1.81E+01 |
| 28 | 24.7 | 0.4395 | 7 | 0.4551 | 0.4 | 6.66E+02 | | 4.55E-01 |
| 29 | 17 | 1.432 | 4 | 0.1397 | 0.33 | 6.66E+02 | | 1.40E-01 |
| 30 | 21.6 | 0.9675 | 5 | 0.2067 | 0.47 | 6.66E+02 | | 2.07E-01 |
| 31 | 21 | 5.092 | 5 | 0.0393 | 0.32 | 6.66E+02 | | 3.93E-02 |
| 32 | 27.6 | 0.000176 | 8 | 1136.3636 | 0.48 | 6.66E+02 | SCN>SSL | 6.66E+02 |
| 33 | 8.63 | 0.3543 | 4 | 0.5645 | 0.26 | 6.66E+02 | | 5.64E-01 |
| 34 | 13 | 37.01 | 1 | 0.0054 | 0.35 | 6.66E+02 | | 5.40E-03 |
| 35 | 15 | 60.04 | 2 | 0.0033 | 0.39 | 6.66E+02 | | 3.33E-03 |
| 36 | 27.1 | 12.65 | 8 | 0.0158 | 0.28 | 6.66E+02 | | 1.58E-02 |
| 37 | 18.1 | 0.177 | 6 | 1.1299 | 0.47 | 6.66E+02 | | 1.13E+00 |
| 38 | 11.7 | 7.782 | 3 | 0.0257 | 0.33 | 6.66E+02 | | 2.57E-02 |
| 39 | 42.4 | 0.06371 | 11 | 3.1392 | 0.4 | 6.66E+02 | | 3.14E+00 |
| 40 | 29 | 1.00E-10 | 8 | 2000000000.0000 | 0.44 | 6.66E+02 | SCN>SSL | 6.66E+02 |
| 41 | 59.2 | 0.0723 | 17 | 2.7663 | 0.48 | 6.66E+02 | | 2.77E+00 |
| 42 | 22.4 | 23.08 | 8 | 0.0087 | 0.36 | 6.66E+02 | | 8.67E-03 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 3.535 | 6 | 0.0566 | 0.44 | 6.66E+02 | | 5.66E-02 |
| 44 | 15 | 64.56 | 2 | 0.0031 | 0.35 | 6.66E+02 | | 3.10E-03 |
| 45 | 13.2 | 4.278 | 3 | 0.0468 | 0.34 | 6.66E+02 | | 4.68E-02 |
| 46 | 40.5 | 0.0004481 | 12 | 446.3289 | 0.48 | 6.66E+02 | | 4.46E+02 |
| 47 | 45 | 46.23 | 15 | 0.0043 | 0.26 | 6.66E+02 | | 4.33E-03 |
| 48 | 14.9 | 1.102 | 6 | 0.1815 | 0.49 | 6.66E+02 | | 1.81E-01 |
| 49 | 5 | 16.79 | 2 | 0.0119 | 0.4 | 6.66E+02 | | 1.19E-02 |
| 50 | 26.5 | 0.1987 | 7 | 1.0065 | 0.42 | 6.66E+02 | | 1.01E+00 |
| 51 | 9.44 | 24.75 | 3 | 0.0081 | 0.41 | 6.66E+02 | | 8.08E-03 |
| 52 | 15.5 | 0.2243 | 5 | 0.8917 | 0.37 | 6.66E+02 | | 8.92E-01 |
| 53 | 36.6 | 0.006759 | 11 | 29.5902 | 0.43 | 6.66E+02 | | 2.96E+01 |
| 54 | 33.6 | 0.00376 | 10 | 53.1915 | 0.44 | 6.66E+02 | | 5.32E+01 |
| 55 | 41.2 | 6.74 | 13 | 0.0297 | 0.4 | 6.66E+02 | | 2.97E-02 |
| 56 | 52.4 | 7.876 | 21 | 0.0254 | 0.37 | 6.66E+02 | | 2.54E-02 |
| 57 | 23 | 0.1066 | 7 | 1.8762 | 0.43 | 6.66E+02 | | 1.88E+00 |
| 58 | 14.7 | 65.36 | 3 | 0.0031 | 0.33 | 6.66E+02 | | 3.06E-03 |
| 59 | 16.2 | 5.347 | 6 | 0.0374 | 0.47 | 6.66E+02 | | 3.74E-02 |
| 60 | 19.4 | 0.367 | 6 | 0.5450 | 0.39 | 6.66E+02 | | 5.45E-01 |
| 61 | 23.5 | 1.05 | 6 | 0.1905 | 0.36 | 6.66E+02 | | 1.90E-01 |
| 62 | 37 | 0.6058 | 10 | 0.3301 | 0.36 | 6.66E+02 | | 3.30E-01 |
| 63 | 24.2 | 8.893 | 6 | 0.0225 | 0.28 | 6.66E+02 | | 2.25E-02 |
| 64 | 29.8 | 2.753 | 7 | 0.0726 | 0.45 | 6.66E+02 | | 7.26E-02 |
| 65 | 38.4 | 18.38 | 13 | 0.0109 | 0.3 | 6.66E+02 | | 1.09E-02 |
| 66 | 5.13 | 70.79 | 1 | 0.0028 | 0.27 | 6.66E+02 | | 2.83E-03 |
| 67 | 14.2 | 0.01164 | 4 | 17.1821 | 0.48 | 6.66E+02 | | 1.72E+01 |
| 68 | 25.5 | 0.2223 | 7 | 0.8997 | 0.46 | 6.66E+02 | | 9.00E-01 |
| 69 | 26.1 | 0.1364 | 9 | 1.4663 | 0.36 | 6.66E+02 | | 1.47E+00 |
| 70 | 34 | 21.18 | 9 | 0.0094 | 0.3 | 6.66E+02 | | 9.44E-03 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 1.05E+01 | 2.86E+07 | 2.99E+01 |
| | std. dev. | 1.80E+01 | 2.39E+08 | 1.23E+02 |
| | max | 7.08E+01 | 2.00E+09 | 6.66E+02 |
| | min | 1.00E-10 | 2.83E-03 | 2.83E-03 |
| | median | 1.27E+00 | 1.61E-01 | 1.61E-01 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 1.61E-01 | 1.61E-01 |
| | 55 | 1.10E-01 | 1.10E-01 |
| | 60 | 4.98E-02 | 4.98E-02 |
| | 65 | 3.67E-02 | 3.67E-02 |
| | 70 | 2.56E-02 | 2.56E-02 |
| | 75 | 1.81E-02 | 1.81E-02 |
| | 80 | 1.17E-02 | 1.17E-02 |
| | 85 | 8.29E-03 | 8.29E-03 |
| | **90** | **5.34E-03** | **5.34E-03** |
| | 95 | 3.41E-03 | 3.41E-03 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 2 |
| Bulk density (g/cm^3) | 1.6 |
| Chemical | Xylenes |
| MCL (mg/l) | 10 |
| Da (cm^2/sec) | 7.20E-02 |
| Henry's Law Constant (m^3-atm/mole) | 6.30E-03 |
| log Kow | 3.2 |
| Koc (ml/g) | 998.5 |
| Solubility (mg/l) | 200 |
| Chemical Density (g/cm^3) | 0.87 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.282 | 101 | 3546.0993 | 0.45 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 2 | 17.8 | 6.679 | 41 | 149.7230 | 0.34 | 5.26E+02 | | 1.50E+02 |
| 3 | 13 | 5.313 | 10 | 188.2176 | 0.5 | 5.26E+02 | | 1.88E+02 |
| 4 | 51.1 | 1.079 | 123 | 926.7841 | 0.49 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 5 | 32.6 | 0.4132 | 78 | 2420.1355 | 0.45 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 6 | 39.4 | 1.283 | 88 | 779.4232 | 0.42 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 7 | 34.6 | 1.735 | 132 | 576.3689 | 0.38 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 8 | 32 | 1.852 | 118 | 539.9568 | 0.27 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 9 | 28.1 | 1.21 | 64 | 826.4463 | 0.42 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 10 | 30.6 | 0.0775 | 76 | 12903.2258 | 0.42 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 11 | 44 | 3.473 | 203 | 287.9355 | 0.46 | 5.26E+02 | | 2.88E+02 |
| 12 | 20.3 | 1.6 | 90 | 625.0000 | 0.42 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 13 | 31.3 | 4.3 | 70 | 232.5581 | 0.42 | 5.26E+02 | | 2.33E+02 |
| 14 | 30.2 | 0.6668 | 71 | 1499.7001 | 0.49 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 15 | 19.2 | 1.82 | 50 | 549.4505 | 0.46 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 16 | 9 | 17.71 | 13 | 56.4653 | 0.46 | 5.26E+02 | | 5.65E+01 |
| 17 | 21.5 | 1.598 | 59 | 625.7822 | 0.41 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 18 | 15 | 10.51 | 13 | 95.1475 | 0.45 | 5.26E+02 | | 9.51E+01 |
| 19 | 35.2 | 1.265 | 86 | 790.5138 | 0.4 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 20 | 18.7 | 0.1767 | 48 | 5659.3096 | 0.35 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 21 | 47.4 | 0.8823 | 138 | 1133.4013 | 0.26 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 22 | 22.1 | 1.039 | 44 | 962.4639 | 0.45 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 23 | 8.15 | 4.386 | 17 | 227.9982 | 0.3 | 5.26E+02 | | 2.28E+02 |
| 24 | 20.2 | 0.1551 | 49 | 6447.4533 | 0.38 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 25 | 12 | 3.306 | 13 | 302.4803 | 0.35 | 5.26E+02 | | 3.02E+02 |
| 26 | 15.8 | 0.2541 | 54 | 3935.4585 | 0.49 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 27 | 17.4 | 0.3518 | 41 | 2842.5242 | 0.5 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 28 | 24.7 | 1.032 | 59 | 968.9922 | 0.4 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 29 | 17 | 2.001 | 36 | 499.7501 | 0.33 | 5.26E+02 | | 5.00E+02 |
| 30 | 21.6 | 0.8557 | 40 | 1168.6339 | 0.47 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 31 | 21 | 3.966 | 50 | 252.1432 | 0.32 | 5.26E+02 | | 2.52E+02 |
| 32 | 27.6 | 0.02359 | 66 | 42390.8436 | 0.48 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 33 | 8.63 | 1.541 | 43 | 648.9293 | 0.26 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 34 | 13 | 6.119 | 10 | 163.4254 | 0.35 | 5.26E+02 | | 1.63E+02 |
| 35 | 15 | 12.5 | 15 | 80.0000 | 0.39 | 5.26E+02 | | 8.00E+01 |
| 36 | 27.1 | 2.049 | 91 | 488.0429 | 0.28 | 5.26E+02 | | 4.88E+02 |
| 37 | 18.1 | 0.5932 | 44 | 1685.7721 | 0.47 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 38 | 11.7 | 8.143 | 24 | 122.8049 | 0.33 | 5.26E+02 | | 1.23E+02 |
| 39 | 42.4 | 0.3059 | 111 | 3269.0422 | 0.4 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 40 | 29 | 2.96E-05 | 74 | 33806626.0987 | 0.44 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 41 | 59.2 | 0.4137 | 163 | 2417.2105 | 0.48 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 42 | 22.4 | 6.099 | 70 | 163.9613 | 0.36 | 5.26E+02 | | 1.64E+02 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 2.836 | 45 | 352.6093 | 0.44 | 5.26E+02 | | 3.53E+02 |
| 44 | 15 | 12.22 | 13 | 81.8331 | 0.35 | 5.26E+02 | | 8.18E+01 |
| 45 | 13.2 | 3.516 | 28 | 284.4141 | 0.34 | 5.26E+02 | | 2.84E+02 |
| 46 | 40.5 | 0.02734 | 103 | 36576.4448 | 0.48 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 47 | 45 | 6.475 | 186 | 154.4402 | 0.26 | 5.26E+02 | | 1.54E+02 |
| 48 | 14.9 | 3.91 | 42 | 255.7545 | 0.49 | 5.26E+02 | | 2.56E+02 |
| 49 | 5 | 12.17 | 15 | 82.1693 | 0.4 | 5.26E+02 | | 8.22E+01 |
| 50 | 26.5 | 0.7223 | 62 | 1384.4663 | 0.42 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 51 | 9.44 | 11.35 | 19 | 88.1057 | 0.41 | 5.26E+02 | | 8.81E+01 |
| 52 | 15.5 | 0.6375 | 44 | 1568.6275 | 0.37 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 53 | 36.6 | 0.08671 | 97 | 11532.6952 | 0.43 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 54 | 33.6 | 0.07102 | 87 | 14080.5407 | 0.44 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 55 | 41.2 | 2.156 | 124 | 463.8219 | 0.4 | 5.26E+02 | | 4.64E+02 |
| 56 | 52.4 | 2.621 | 214 | 381.5338 | 0.37 | 5.26E+02 | | 3.82E+02 |
| 57 | 23 | 0.4064 | 59 | 2460.6299 | 0.43 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 58 | 14.7 | 10.43 | 26 | 95.8773 | 0.33 | 5.26E+02 | | 9.59E+01 |
| 59 | 16.2 | 6.325 | 45 | 158.1028 | 0.47 | 5.26E+02 | | 1.58E+02 |
| 60 | 19.4 | 1.685 | 50 | 593.4718 | 0.39 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 61 | 23.5 | 1.556 | 58 | 642.6735 | 0.36 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 62 | 37 | 1.094 | 96 | 914.0768 | 0.36 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 63 | 24.2 | 4.396 | 59 | 227.4795 | 0.28 | 5.26E+02 | | 2.27E+02 |
| 64 | 29.8 | 2.275 | 59 | 439.5604 | 0.45 | 5.26E+02 | | 4.40E+02 |
| 65 | 38.4 | 4.998 | 145 | 200.0800 | 0.3 | 5.26E+02 | | 2.00E+02 |
| 66 | 5.13 | 16.01 | 9 | 62.4610 | 0.27 | 5.26E+02 | | 6.25E+01 |
| 67 | 14.2 | 0.3468 | 34 | 2883.5063 | 0.48 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 68 | 25.5 | 1.31 | 57 | 763.3588 | 0.46 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 69 | 26.1 | 0.8361 | 82 | 1196.0292 | 0.36 | 5.26E+02 | SCN>SSL | 5.26E+02 |
| 70 | 34 | 3.564 | 97 | 280.5836 | 0.3 | 5.26E+02 | | 2.81E+02 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 3.33E+00 | 4.86E+05 | 3.92E+02 |
| | std. dev. | 4.04E+00 | 4.04E+06 | 1.74E+02 |
| | max | 1.77E+01 | 3.38E+07 | 5.26E+02 |
| | min | 2.96E-05 | 5.65E+01 | 5.65E+01 |
| | median | 1.64E+00 | 6.09E+02 | 5.26E+02 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 609 | 5.26E+02 |
| | 55 | 540 | 5.26E+02 |
| | 60 | 454 | 4.54E+02 |
| | 65 | 310 | 3.10E+02 |
| | 70 | 273 | 2.73E+02 |
| | 75 | 229 | 2.29E+02 |
| | 80 | 183 | 1.83E+02 |
| | 85 | 156 | 1.56E+02 |
| | **90** | **96** | **9.58E+01** |
| | 95 | 82 | 8.20E+01 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 3 |
| Bulk density (g/cm^3) | 1.8 |
| Chemical | 1,1,1-TCA |
| MCL (mg/l) | 0.2 |
| Da (cm^2/sec) | 8.39E-02 |
| Henry's Law Constant (m^3-atm/mole) | 8.00E-03 |
| log Kow | 2.49 |
| Koc (ml/g) | 191.77 |
| Solubility (mg/l) | 1495 |
| Chemical Density (g/cm^3) | 1.34 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.1195 | 64 | 167.3640 | 0.54 | 1.06E+03 | | 1.67E+02 |
| 2 | 17.8 | 14.29 | 35 | 1.3996 | 0.4 | 1.06E+03 | | 1.40E+00 |
| 3 | 13 | 15.48 | 9 | 1.2920 | 0.51 | 1.06E+03 | | 1.29E+00 |
| 4 | 51.1 | 5.196 | 103 | 3.8491 | 0.58 | 1.06E+03 | | 3.85E+00 |
| 5 | 32.6 | 3.652 | 69 | 5.4765 | 0.4 | 1.06E+03 | | 5.48E+00 |
| 6 | 39.4 | 6.474 | 83 | 3.0893 | 0.38 | 1.06E+03 | | 3.09E+00 |
| 7 | 34.6 | 2.563 | 81 | 7.8034 | 0.45 | 1.06E+03 | | 7.80E+00 |
| 8 | 32 | 3.097 | 66 | 6.4579 | 0.4 | 1.06E+03 | | 6.46E+00 |
| 9 | 28.1 | 6.564 | 57 | 3.0469 | 0.41 | 1.06E+03 | | 3.05E+00 |
| 10 | 30.6 | 0.454 | 64 | 44.0529 | 0.46 | 1.06E+03 | | 4.41E+01 |
| 11 | 44 | 4.451 | 100 | 4.4934 | 0.55 | 1.06E+03 | | 4.49E+00 |
| 12 | 20.3 | 0.8281 | 41 | 24.1517 | 0.51 | 1.06E+03 | | 2.42E+01 |
| 13 | 31.3 | 11.57 | 61 | 1.7286 | 0.5 | 1.06E+03 | | 1.73E+00 |
| 14 | 30.2 | 1.787 | 58 | 11.1919 | 0.58 | 1.06E+03 | | 1.12E+01 |
| 15 | 19.2 | 3.564 | 38 | 5.6117 | 0.55 | 1.06E+03 | | 5.61E+00 |
| 16 | 9 | 37.31 | 10 | 0.5360 | 0.45 | 1.06E+03 | | 5.36E-01 |
| 17 | 21.5 | 2.072 | 47 | 9.6525 | 0.49 | 1.06E+03 | | 9.65E+00 |
| 18 | 15 | 41.38 | 11 | 0.4833 | 0.37 | 1.06E+03 | | 4.83E-01 |
| 19 | 35.2 | 5.56 | 77 | 3.5971 | 0.42 | 1.06E+03 | | 3.60E+00 |
| 20 | 18.7 | 1.641 | 41 | 12.1877 | 0.3 | 1.06E+03 | | 1.22E+01 |
| 21 | 47.4 | 1.703 | 124 | 11.7440 | 0.32 | 1.06E+03 | | 1.17E+01 |
| 22 | 22.1 | 2.831 | 37 | 7.0646 | 0.54 | 1.06E+03 | | 7.06E+00 |
| 23 | 8.15 | 5.008 | 13 | 3.9936 | 0.36 | 1.06E+03 | | 3.99E+00 |
| 24 | 20.2 | 0.3948 | 40 | 50.6586 | 0.46 | 1.06E+03 | | 5.07E+01 |
| 25 | 12 | 6.934 | 8 | 2.8843 | 0.6 | 1.06E+03 | | 2.88E+00 |
| 26 | 15.8 | 0.0444 | 36 | 450.4505 | 0.59 | 1.06E+03 | | 4.50E+02 |
| 27 | 17.4 | 0.4673 | 33 | 42.7991 | 0.6 | 1.06E+03 | | 4.28E+01 |
| 28 | 24.7 | 2.604 | 50 | 7.6805 | 0.47 | 1.06E+03 | | 7.68E+00 |
| 29 | 17 | 8.405 | 31 | 2.3795 | 0.32 | 1.06E+03 | | 2.38E+00 |
| 30 | 21.6 | 2.926 | 33 | 6.8353 | 0.56 | 1.06E+03 | | 6.84E+00 |
| 31 | 21 | 8.233 | 44 | 2.4292 | 0.38 | 1.06E+03 | | 2.43E+00 |
| 32 | 27.6 | 0.9003 | 57 | 22.2148 | 0.37 | 1.06E+03 | | 2.22E+01 |
| 33 | 8.63 | 0.008826 | 19 | 2266.0322 | 0.5 | 1.06E+03 | SCN>SSL | 1.06E+03 |
| 34 | 13 | 16.38 | 9 | 1.2210 | 0.49 | 1.06E+03 | | 1.22E+00 |
| 35 | 15 | 32.23 | 13 | 0.6205 | 0.47 | 1.06E+03 | | 6.21E-01 |
| 36 | 27.1 | 2.528 | 51 | 7.9114 | 0.5 | 1.06E+03 | | 7.91E+00 |
| 37 | 18.1 | 0.6324 | 36 | 31.6256 | 0.56 | 1.06E+03 | | 3.16E+01 |
| 38 | 11.7 | 15.91 | 20 | 1.2571 | 0.4 | 1.06E+03 | | 1.26E+00 |
| 39 | 42.4 | 2.315 | 104 | 8.6393 | 0.35 | 1.06E+03 | | 8.64E+00 |
| 40 | 29 | 3.66E-04 | 60 | 54704.5952 | 0.52 | 1.06E+03 | SCN>SSL | 1.06E+03 |
| 41 | 59.2 | 2.633 | 133 | 7.5959 | 0.57 | 1.06E+03 | | 7.60E+00 |
| 42 | 22.4 | 7.896 | 39 | 2.5329 | 0.6 | 1.06E+03 | | 2.53E+00 |
| 43 | 24.9 | 12.95 | 39 | 1.5444 | 0.43 | 1.06E+03 | | 1.54E+00 |
| 44 | 15 | 29.73 | 12 | 0.6727 | 0.54 | 1.06E+03 | | 6.73E-01 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 45 | 13.2 | 6.021 | 23 | 3.3217 | 0.41 | 1.06E+03 | | 3.32E+00 |
| 46 | 40.5 | 1.028 | 91 | 19.4553 | 0.34 | 1.06E+03 | | 1.95E+01 |
| 47 | 45 | 7.235 | 93 | 2.7643 | 0.6 | 1.06E+03 | | 2.76E+00 |
| 48 | 14.9 | 2.76 | 31 | 7.2464 | 0.59 | 1.06E+03 | | 7.25E+00 |
| 49 | 5 | 2.935 | 12 | 6.8143 | 0.6 | 1.06E+03 | | 6.81E+00 |
| 50 | 26.5 | 2.297 | 52 | 8.7070 | 0.5 | 1.06E+03 | | 8.71E+00 |
| 51 | 9.44 | 9.535 | 13 | 2.0975 | 0.6 | 1.06E+03 | | 2.10E+00 |
| 52 | 15.5 | 0.1096 | 33 | 182.4818 | 0.55 | 1.06E+03 | | 1.82E+02 |
| 53 | 36.6 | 0.3195 | 82 | 62.5978 | 0.51 | 1.06E+03 | | 6.26E+01 |
| 54 | 33.6 | 0.2971 | 72 | 67.3174 | 0.52 | 1.06E+03 | | 6.73E+01 |
| 55 | 41.2 | 4.573 | 89 | 4.3735 | 0.47 | 1.06E+03 | | 4.37E+00 |
| 56 | 52.4 | 4.314 | 126 | 4.6361 | 0.44 | 1.06E+03 | | 4.64E+00 |
| 57 | 23 | 0.7349 | 47 | 27.2146 | 0.52 | 1.06E+03 | | 2.72E+01 |
| 58 | 14.7 | 15.93 | 16 | 1.2555 | 0.6 | 1.06E+03 | | 1.26E+00 |
| 59 | 16.2 | 5.644 | 32 | 3.5436 | 0.6 | 1.06E+03 | | 3.54E+00 |
| 60 | 19.4 | 2.943 | 40 | 6.7958 | 0.46 | 1.06E+03 | | 6.80E+00 |
| 61 | 23.5 | 3.318 | 49 | 6.0277 | 0.42 | 1.06E+03 | | 6.03E+00 |
| 62 | 37 | 4 | 88 | 5.0000 | 0.38 | 1.06E+03 | | 5.00E+00 |
| 63 | 24.2 | 4.139 | 49 | 4.8321 | 0.5 | 1.06E+03 | | 4.83E+00 |
| 64 | 29.8 | 9.534 | 52 | 2.0978 | 0.48 | 1.06E+03 | | 2.10E+00 |
| 65 | 38.4 | 2.216 | 84 | 9.0253 | 0.6 | 1.06E+03 | | 9.03E+00 |
| 66 | 5.13 | 5.672 | 6 | 3.5261 | 0.6 | 1.06E+03 | | 3.53E+00 |
| 67 | 14.2 | 0.6648 | 25 | 30.0842 | 0.57 | 1.06E+03 | | 3.01E+01 |
| 68 | 25.5 | 13.69 | 47 | 1.4609 | 0.38 | 1.06E+03 | | 1.46E+00 |
| 69 | 26.1 | 0.2714 | 56 | 73.6920 | 0.6 | 1.06E+03 | | 7.37E+01 |
| 70 | 34 | 3.53 | 66 | 5.6657 | 0.6 | 1.06E+03 | | 5.67E+00 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 6.36E+00 | 8.36E+02 | 5.22E+01 |
| | std. dev. | 8.43E+00 | 6.54E+03 | 1.84E+02 |
| | max | 4.14E+01 | 5.47E+04 | 1.06E+03 |
| | min | 3.66E-04 | 4.83E-01 | 4.83E-01 |
| | median | 3.42E+00 | 5.85E+00 | 5.85E+00 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 5.85E+00 | 5.85E+00 |
| | 55 | 5.02E+00 | 5.02E+00 |
| | 60 | 4.45E+00 | 4.45E+00 |
| | 65 | 3.63E+00 | 3.63E+00 |
| | 70 | 3.25E+00 | 3.25E+00 |
| | 75 | 2.79E+00 | 2.79E+00 |
| | 80 | 2.32E+00 | 2.32E+00 |
| | 85 | 1.61E+00 | 1.61E+00 |
| | **90** | **1.29E+00** | **1.29E+00** |
| | 95 | 9.19E-01 | 9.19E-01 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 3 |
| Bulk density (g/cm^3) | 1.8 |
| Chemical | 1,2-DCA |
| MCL (mg/l) | 0.005 |
| Da (cm^2/sec) | 9.38E-02 |
| Henry's Law Constant (m^3-atm/mole) | 9.77E-04 |
| log Kow | 1.48 |
| Koc (ml/g) | 35.94 |
| Solubility (mg/l) | 8524 |
| Chemical Density (g/cm^3) | 1.25 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 40.97 | 32 | 0.0122 | 0.54 | 1.68E+03 | | 1.22E-02 |
| 2 | 17.8 | 204.8 | 14 | 0.0024 | 0.4 | 1.68E+03 | | 2.44E-03 |
| 3 | 13 | 104.2 | 4 | 0.0048 | 0.51 | 1.68E+03 | | 4.80E-03 |
| 4 | 51.1 | 45.16 | 47 | 0.0111 | 0.58 | 1.68E+03 | | 1.11E-02 |
| 5 | 32.6 | 53.85 | 28 | 0.0093 | 0.4 | 1.68E+03 | | 9.29E-03 |
| 6 | 39.4 | 52.63 | 32 | 0.0095 | 0.38 | 1.68E+03 | | 9.50E-03 |
| 7 | 34.6 | 67.53 | 35 | 0.0074 | 0.45 | 1.68E+03 | | 7.40E-03 |
| 8 | 32 | 30.1 | 27 | 0.0166 | 0.4 | 1.68E+03 | | 1.66E-02 |
| 9 | 28.1 | 95.35 | 24 | 0.0052 | 0.41 | 1.68E+03 | | 5.24E-03 |
| 10 | 30.6 | 21.67 | 28 | 0.0231 | 0.46 | 1.68E+03 | | 2.31E-02 |
| 11 | 44 | 67.93 | 46 | 0.0074 | 0.55 | 1.68E+03 | | 7.36E-03 |
| 12 | 20.3 | 61.57 | 19 | 0.0081 | 0.51 | 1.68E+03 | | 8.12E-03 |
| 13 | 31.3 | 114.4 | 29 | 0.0044 | 0.5 | 1.68E+03 | | 4.37E-03 |
| 14 | 30.2 | 23.12 | 30 | 0.0216 | 0.58 | 1.68E+03 | | 2.16E-02 |
| 15 | 19.2 | 133.7 | 18 | 0.0037 | 0.55 | 1.68E+03 | | 3.74E-03 |
| 16 | 9 | 264.2 | 5 | 0.0019 | 0.45 | 1.68E+03 | | 1.89E-03 |
| 17 | 21.5 | 98.03 | 22 | 0.0051 | 0.49 | 1.68E+03 | | 5.10E-03 |
| 18 | 15 | 255 | 4 | 0.0020 | 0.37 | 1.68E+03 | | 1.96E-03 |
| 19 | 35.2 | 74.97 | 32 | 0.0067 | 0.42 | 1.68E+03 | | 6.67E-03 |
| 20 | 18.7 | 114.1 | 16 | 0.0044 | 0.3 | 1.68E+03 | | 4.38E-03 |
| 21 | 47.4 | 20.76 | 45 | 0.0241 | 0.32 | 1.68E+03 | | 2.41E-02 |
| 22 | 22.1 | 30.07 | 18 | 0.0166 | 0.54 | 1.68E+03 | | 1.66E-02 |
| 23 | 8.15 | 84.42 | 6 | 0.0059 | 0.36 | 1.68E+03 | | 5.92E-03 |
| 24 | 20.2 | 31.63 | 18 | 0.0158 | 0.46 | 1.68E+03 | | 1.58E-02 |
| 25 | 12 | 29.42 | 4 | 0.0170 | 0.6 | 1.68E+03 | | 1.70E-02 |
| 26 | 15.8 | 56.15 | 17 | 0.0089 | 0.59 | 1.68E+03 | | 8.90E-03 |
| 27 | 17.4 | 58.69 | 16 | 0.0085 | 0.6 | 1.68E+03 | | 8.52E-03 |
| 28 | 24.7 | 62.65 | 23 | 0.0080 | 0.47 | 1.68E+03 | | 7.98E-03 |
| 29 | 17 | 121.8 | 12 | 0.0041 | 0.32 | 1.68E+03 | | 4.11E-03 |
| 30 | 21.6 | 29.18 | 16 | 0.0171 | 0.56 | 1.68E+03 | | 1.71E-02 |
| 31 | 21 | 136.7 | 18 | 0.0037 | 0.38 | 1.68E+03 | | 3.66E-03 |
| 32 | 27.6 | 28.72 | 23 | 0.0174 | 0.37 | 1.68E+03 | | 1.74E-02 |
| 33 | 8.63 | 58.77 | 9 | 0.0085 | 0.5 | 1.68E+03 | | 8.51E-03 |
| 34 | 13 | 109.8 | 4 | 0.0046 | 0.49 | 1.68E+03 | | 4.55E-03 |
| 35 | 15 | 203.3 | 6 | 0.0025 | 0.47 | 1.68E+03 | | 2.46E-03 |
| 36 | 27.1 | 28.71 | 24 | 0.0174 | 0.5 | 1.68E+03 | | 1.74E-02 |
| 37 | 18.1 | 32.29 | 17 | 0.0155 | 0.56 | 1.68E+03 | | 1.55E-02 |
| 38 | 11.7 | 257.9 | 8 | 0.0019 | 0.4 | 1.68E+03 | | 1.94E-03 |
| 39 | 42.4 | 42.42 | 40 | 0.0118 | 0.35 | 1.68E+03 | | 1.18E-02 |
| 40 | 29 | 7.04E+00 | 28 | 0.0710 | 0.52 | 1.68E+03 | | 7.10E-02 |
| 41 | 59.2 | 45.7 | 61 | 0.0109 | 0.57 | 1.68E+03 | | 1.09E-02 |
| 42 | 22.4 | 88.99 | 18 | 0.0056 | 0.6 | 1.68E+03 | | 5.62E-03 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 115.6 | 16 | 0.0043 | 0.43 | 1.68E+03 | | 4.33E-03 |
| 44 | 15 | 193.4 | 5 | 0.0026 | 0.54 | 1.68E+03 | | 2.59E-03 |
| 45 | 13.2 | 123.7 | 10 | 0.0040 | 0.41 | 1.68E+03 | | 4.04E-03 |
| 46 | 40.5 | 21.05 | 33 | 0.0238 | 0.34 | 1.68E+03 | | 2.38E-02 |
| 47 | 45 | 69.07 | 44 | 0.0072 | 0.6 | 1.68E+03 | | 7.24E-03 |
| 48 | 14.9 | 148.2 | 15 | 0.0034 | 0.59 | 1.68E+03 | | 3.37E-03 |
| 49 | 5 | 151.3 | 6 | 0.0033 | 0.6 | 1.68E+03 | | 3.30E-03 |
| 50 | 26.5 | 55.19 | 24 | 0.0091 | 0.5 | 1.68E+03 | | 9.06E-03 |
| 51 | 9.44 | 149.1 | 6 | 0.0034 | 0.6 | 1.68E+03 | | 3.35E-03 |
| 52 | 15.5 | 32.01 | 16 | 0.0156 | 0.55 | 1.68E+03 | | 1.56E-02 |
| 53 | 36.6 | 16.8 | 38 | 0.0298 | 0.51 | 1.68E+03 | | 2.98E-02 |
| 54 | 33.6 | 17.78 | 34 | 0.0281 | 0.52 | 1.68E+03 | | 2.81E-02 |
| 55 | 41.2 | 43.57 | 39 | 0.0115 | 0.47 | 1.68E+03 | | 1.15E-02 |
| 56 | 52.4 | 49.08 | 51 | 0.0102 | 0.44 | 1.68E+03 | | 1.02E-02 |
| 57 | 23 | 28.23 | 23 | 0.0177 | 0.52 | 1.68E+03 | | 1.77E-02 |
| 58 | 14.7 | 112.5 | 7 | 0.0044 | 0.6 | 1.68E+03 | | 4.44E-03 |
| 59 | 16.2 | 145.7 | 15 | 0.0034 | 0.6 | 1.68E+03 | | 3.43E-03 |
| 60 | 19.4 | 113.5 | 18 | 0.0044 | 0.46 | 1.68E+03 | | 4.41E-03 |
| 61 | 23.5 | 72.27 | 22 | 0.0069 | 0.42 | 1.68E+03 | | 6.92E-03 |
| 62 | 37 | 71.85 | 35 | 0.0070 | 0.38 | 1.68E+03 | | 6.96E-03 |
| 63 | 24.2 | 94.49 | 23 | 0.0053 | 0.5 | 1.68E+03 | | 5.29E-03 |
| 64 | 29.8 | 89.48 | 23 | 0.0056 | 0.48 | 1.68E+03 | | 5.59E-03 |
| 65 | 38.4 | 66.52 | 42 | 0.0075 | 0.6 | 1.68E+03 | | 7.52E-03 |
| 66 | 5.13 | 139.7 | 4 | 0.0036 | 0.6 | 1.68E+03 | | 3.58E-03 |
| 67 | 14.2 | 73.76 | 13 | 0.0068 | 0.57 | 1.68E+03 | | 6.78E-03 |
| 68 | 25.5 | 152.4 | 19 | 0.0033 | 0.38 | 1.68E+03 | | 3.28E-03 |
| 69 | 26.1 | 59.98 | 29 | 0.0083 | 0.6 | 1.68E+03 | | 8.34E-03 |
| 70 | 34 | 42.47 | 33 | 0.0118 | 0.6 | 1.68E+03 | | 1.18E-02 |
| | | | | | | 1.68E+03 | | |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 8.48E+01 | 1.02E-02 | 1.02E-02 |
| | std. dev. | 6.02E+01 | 9.93E-03 | 9.93E-03 |
| | max | 2.64E+02 | 7.10E-02 | 7.10E-02 |
| | min | 7.04E+00 | 1.89E-03 | 1.89E-03 |
| | median | 6.77E+01 | 7.38E-03 | 7.38E-03 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 7.38E-03 | 7.38E-03 |
| | 55 | 6.92E-03 | 6.92E-03 |
| | 60 | 5.80E-03 | 5.80E-03 |
| | 65 | 5.25E-03 | 5.25E-03 |
| | 70 | 4.52E-03 | 4.52E-03 |
| | 75 | 4.37E-03 | 4.37E-03 |
| | 80 | 3.98E-03 | 3.98E-03 |
| | 85 | 3.48E-03 | 3.48E-03 |
| | **90** | **3.30E-03** | **3.30E-03** |
| | 95 | 2.45E-03 | 2.45E-03 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 3 |
| Bulk density (g/cm^3) | 1.8 |
| Chemical | 1,1-DCE |
| MCL (mg/l) | 0.007 |
| Da (cm^2/sec) | 9.60E-02 |
| Henry's Law Constant (m^3-atm/mole) | 3.01E-02 |
| log Kow | 2.13 |
| Koc (ml/g) | 105.58 |
| Solubility (mg/l) | 3344 |
| Chemical Density (g/cm^3) | 1.22 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 1E-10 | 44 | 7000000000.0000 | 0.54 | 1.93E+03 | SCN>SSL | 1.93E+03 |
| 2 | 17.8 | 0.07151 | 25 | 9.7888 | 0.4 | 1.93E+03 | | 9.79E+00 |
| 3 | 13 | 7.05 | 6 | 0.0993 | 0.51 | 1.93E+03 | | 9.93E-02 |
| 4 | 51.1 | 0.1018 | 71 | 6.8762 | 0.58 | 1.93E+03 | | 6.88E+00 |
| 5 | 32.6 | 0.0131 | 46 | 53.4351 | 0.4 | 1.93E+03 | | 5.34E+01 |
| 6 | 39.4 | 0.4169 | 54 | 1.6791 | 0.38 | 1.93E+03 | | 1.68E+00 |
| 7 | 34.6 | 0.0008189 | 55 | 854.8052 | 0.45 | 1.93E+03 | | 8.55E+02 |
| 8 | 32 | 0.1432 | 45 | 4.8883 | 0.4 | 1.93E+03 | | 4.89E+00 |
| 9 | 28.1 | 0.02159 | 40 | 32.4224 | 0.41 | 1.93E+03 | | 3.24E+01 |
| 10 | 30.6 | 0.00005773 | 45 | 12125.4114 | 0.46 | 1.93E+03 | SCN>SSL | 1.93E+03 |
| 11 | 44 | 0.006415 | 69 | 109.1193 | 0.55 | 1.93E+03 | | 1.09E+02 |
| 12 | 20.3 | 0.000004579 | 31 | 152871.8061 | 0.51 | 1.93E+03 | SCN>SSL | 1.93E+03 |
| 13 | 31.3 | 0.3518 | 45 | 1.9898 | 0.5 | 1.93E+03 | | 1.99E+00 |
| 14 | 30.2 | 0.01846 | 45 | 37.9198 | 0.58 | 1.93E+03 | | 3.79E+01 |
| 15 | 19.2 | 0.0002341 | 29 | 2990.1751 | 0.55 | 1.93E+03 | SCN>SSL | 1.93E+03 |
| 16 | 9 | 3.638 | 6 | 0.1924 | 0.45 | 1.93E+03 | | 1.92E-01 |
| 17 | 21.5 | 0.00005916 | 34 | 11832.3191 | 0.49 | 1.93E+03 | SCN>SSL | 1.93E+03 |
| 18 | 15 | 20.89 | 8 | 0.0335 | 0.37 | 1.93E+03 | | 3.35E-02 |
| 19 | 35.2 | 0.02072 | 52 | 33.7838 | 0.42 | 1.93E+03 | | 3.38E+01 |
| 20 | 18.7 | 0.00003885 | 28 | 18018.0180 | 0.3 | 1.93E+03 | SCN>SSL | 1.93E+03 |
| 21 | 47.4 | 0.02364 | 74 | 29.6108 | 0.32 | 1.93E+03 | | 2.96E+01 |
| 22 | 22.1 | 0.08071 | 28 | 8.6730 | 0.54 | 1.93E+03 | | 8.67E+00 |
| 23 | 8.15 | 0.06763 | 8 | 10.3504 | 0.36 | 1.93E+03 | | 1.04E+01 |
| 24 | 20.2 | 0.000005479 | 29 | 127760.5402 | 0.46 | 1.93E+03 | SCN>SSL | 1.93E+03 |
| 25 | 12 | 3.129 | 5 | 0.2237 | 0.6 | 1.93E+03 | | 2.24E-01 |
| 26 | 15.8 | 1E-10 | 25 | 7000000000.0000 | 0.59 | 1.93E+03 | SCN>SSL | 1.93E+03 |
| 27 | 17.4 | 0.000000247 | 25 | 2834008.0972 | 0.6 | 1.93E+03 | SCN>SSL | 1.93E+03 |
| 28 | 24.7 | 0.00141 | 37 | 496.4539 | 0.47 | 1.93E+03 | | 4.96E+02 |
| 29 | 17 | 0.06331 | 21 | 11.0567 | 0.32 | 1.93E+03 | | 1.11E+01 |
| 30 | 21.6 | 0.09903 | 25 | 7.0686 | 0.56 | 1.93E+03 | | 7.07E+00 |
| 31 | 21 | 0.02342 | 31 | 29.8890 | 0.38 | 1.93E+03 | | 2.99E+01 |
| 32 | 27.6 | 0.0004685 | 38 | 1494.1302 | 0.37 | 1.93E+03 | | 1.49E+03 |
| 33 | 8.63 | 1E-10 | 13 | 7000000000.0000 | 0.5 | 1.93E+03 | SCN>SSL | 1.93E+03 |
| 34 | 13 | 8.008 | 6 | 0.0874 | 0.49 | 1.93E+03 | | 8.74E-02 |
| 35 | 15 | 12.15 | 9 | 0.0576 | 0.47 | 1.93E+03 | | 5.76E-02 |
| 36 | 27.1 | 0.05888 | 38 | 11.8886 | 0.5 | 1.93E+03 | | 1.19E+01 |
| 37 | 18.1 | 0.00003032 | 27 | 23087.0712 | 0.56 | 1.93E+03 | SCN>SSL | 1.93E+03 |
| 38 | 11.7 | 0.04931 | 14 | 14.1959 | 0.4 | 1.93E+03 | | 1.42E+01 |
| 39 | 42.4 | 0.00492 | 64 | 142.2764 | 0.35 | 1.93E+03 | | 1.42E+02 |
| 40 | 29 | 1.00E-10 | 40 | 7000000000.0000 | 0.52 | 1.93E+03 | SCN>SSL | 1.93E+03 |
| 41 | 59.2 | 0.002863 | 88 | 244.4988 | 0.57 | 1.93E+03 | | 2.44E+02 |
| 42 | 22.4 | 0.1699 | 29 | 4.1201 | 0.6 | 1.93E+03 | | 4.12E+00 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 1.015 | 29 | 0.6897 | 0.43 | 1.93E+03 | | 6.90E-01 |
| 44 | 15 | 10.3 | 8 | 0.0680 | 0.54 | 1.93E+03 | | 6.80E-02 |
| 45 | 13.2 | 0.01514 | 16 | 46.2351 | 0.41 | 1.93E+03 | | 4.62E+01 |
| 46 | 40.5 | 0.003416 | 56 | 204.9180 | 0.34 | 1.93E+03 | | 2.05E+02 |
| 47 | 45 | 0.1084 | 66 | 6.4576 | 0.6 | 1.93E+03 | | 6.46E+00 |
| 48 | 14.9 | 0.00006765 | 23 | 10347.3762 | 0.59 | 1.93E+03 | SCN>SSL | 1.93E+03 |
| 49 | 5 | 0.0001771 | 8 | 3952.5692 | 0.6 | 1.93E+03 | SCN>SSL | 1.93E+03 |
| 50 | 26.5 | 0.001115 | 38 | 627.8027 | 0.5 | 1.93E+03 | | 6.28E+02 |
| 51 | 9.44 | 0.04576 | 9 | 15.2972 | 0.6 | 1.93E+03 | | 1.53E+01 |
| 52 | 15.5 | 1E-10 | 22 | 7000000000.0000 | 0.55 | 1.93E+03 | SCN>SSL | 1.93E+03 |
| 53 | 36.6 | 0.00003433 | 56 | 20390.3292 | 0.51 | 1.93E+03 | SCN>SSL | 1.93E+03 |
| 54 | 33.6 | 0.00001856 | 51 | 37715.5172 | 0.52 | 1.93E+03 | SCN>SSL | 1.93E+03 |
| 55 | 41.2 | 0.1234 | 61 | 5.6726 | 0.47 | 1.93E+03 | | 5.67E+00 |
| 56 | 52.4 | 0.02723 | 79 | 25.7069 | 0.44 | 1.93E+03 | | 2.57E+01 |
| 57 | 23 | 0.00008769 | 35 | 7982.6662 | 0.52 | 1.93E+03 | SCN>SSL | 1.93E+03 |
| 58 | 14.7 | 2.924 | 11 | 0.2394 | 0.6 | 1.93E+03 | | 2.39E-01 |
| 59 | 16.2 | 0.002106 | 23 | 332.3837 | 0.6 | 1.93E+03 | | 3.32E+02 |
| 60 | 19.4 | 0.000191 | 29 | 3664.9215 | 0.46 | 1.93E+03 | SCN>SSL | 1.93E+03 |
| 61 | 23.5 | 0.002978 | 36 | 235.0571 | 0.42 | 1.93E+03 | | 2.35E+02 |
| 62 | 37 | 0.00589 | 57 | 118.8455 | 0.38 | 1.93E+03 | | 1.19E+02 |
| 63 | 24.2 | 0.002161 | 37 | 323.9241 | 0.5 | 1.93E+03 | | 3.24E+02 |
| 64 | 29.8 | 0.4041 | 38 | 1.7322 | 0.48 | 1.93E+03 | | 1.73E+00 |
| 65 | 38.4 | 0.0002733 | 61 | 2561.2880 | 0.6 | 1.93E+03 | SCN>SSL | 1.93E+03 |
| 66 | 5.13 | 0.01405 | 4 | 49.8221 | 0.6 | 1.93E+03 | | 4.98E+01 |
| 67 | 14.2 | 9.674E-07 | 19 | 723589.0014 | 0.57 | 1.93E+03 | SCN>SSL | 1.93E+03 |
| 68 | 25.5 | 0.1449 | 33 | 4.8309 | 0.38 | 1.93E+03 | | 4.83E+00 |
| 69 | 26.1 | 1E-10 | 40 | 7000000000.0000 | 0.6 | 1.93E+03 | SCN>SSL | 1.93E+03 |
| 70 | 34 | 0.03866 | 50 | 18.1066 | 0.6 | 1.93E+03 | | 1.81E+01 |
| | | | | | | 1.93E+03 | | |

| statistics | | | | |
|---|---|---|---|---|
| | mean | 1.03E+00 | 6.00E+08 | 6.89E+02 |
| | std. dev. | 3.33E+00 | 1.97E+09 | 8.77E+02 |
| | max | 2.09E+01 | 7.00E+09 | 1.93E+03 |
| | min | 1.00E-10 | 3.35E-02 | 3.35E-02 |
| | median | 1.36E-02 | 5.16E+01 | 5.16E+01 |

| percentiles | | | |
|---|---|---|---|
| | 50 | 5.16E+01 | 5.16E+01 |
| | 55 | 3.40E+01 | 3.40E+01 |
| | 60 | 2.80E+01 | 2.80E+01 |
| | 65 | 1.44E+01 | 1.44E+01 |
| | 70 | 1.02E+01 | 1.02E+01 |
| | 75 | 6.92E+00 | 6.92E+00 |
| | 80 | 4.88E+00 | 4.88E+00 |
| | 85 | 1.82E+00 | 1.82E+00 |
| | **90** | **2.38E-01** | **2.38E-01** |
| | 95 | 9.28E-02 | 9.28E-02 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 3 |
| Bulk density (g/cm^3) | 1.8 |
| Chemical | cis-1,2-DCE |
| MCL (mg/l) | 0.07 |
| Da (cm^2/sec) | 7.91E-02 |
| Henry's Law Constant (m^3-atm/mole) | 3.37E-03 |
| log Kow | 1.86 |
| Koc (ml/g) | 67.48 |
| Solubility (mg/l) | 3500 |
| Chemical Density (g/cm^3) | 1.28 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 6.698 | 38 | 1.0451 | 0.54 | 1.07E+03 | | 1.05E+00 |
| 2 | 17.8 | 85.25 | 18 | 0.0821 | 0.4 | 1.07E+03 | | 8.21E-02 |
| 3 | 13 | 42.02 | 5 | 0.1666 | 0.51 | 1.07E+03 | | 1.67E-01 |
| 4 | 51.1 | 23.11 | 59 | 0.3029 | 0.58 | 1.07E+03 | | 3.03E-01 |
| 5 | 32.6 | 23.91 | 37 | 0.2928 | 0.4 | 1.07E+03 | | 2.93E-01 |
| 6 | 39.4 | 26.56 | 43 | 0.2636 | 0.38 | 1.07E+03 | | 2.64E-01 |
| 7 | 34.6 | 25.8 | 45 | 0.2713 | 0.45 | 1.07E+03 | | 2.71E-01 |
| 8 | 32 | 13.88 | 36 | 0.5043 | 0.4 | 1.07E+03 | | 5.04E-01 |
| 9 | 28.1 | 42.07 | 31 | 0.1664 | 0.41 | 1.07E+03 | | 1.66E-01 |
| 10 | 30.6 | 6.764 | 36 | 1.0349 | 0.46 | 1.07E+03 | | 1.03E+00 |
| 11 | 44 | 30.61 | 58 | 0.2287 | 0.55 | 1.07E+03 | | 2.29E-01 |
| 12 | 20.3 | 16.97 | 23 | 0.4125 | 0.51 | 1.07E+03 | | 4.12E-01 |
| 13 | 31.3 | 52.35 | 35 | 0.1337 | 0.5 | 1.07E+03 | | 1.34E-01 |
| 14 | 30.2 | 9.591 | 36 | 0.7299 | 0.58 | 1.07E+03 | | 7.30E-01 |
| 15 | 19.2 | 43.85 | 21 | 0.1596 | 0.55 | 1.07E+03 | | 1.60E-01 |
| 16 | 9 | 140.2 | 6 | 0.0499 | 0.45 | 1.07E+03 | | 4.99E-02 |
| 17 | 21.5 | 30.65 | 26 | 0.2284 | 0.49 | 1.07E+03 | | 2.28E-01 |
| 18 | 15 | 133.5 | 6 | 0.0524 | 0.37 | 1.07E+03 | | 5.24E-02 |
| 19 | 35.2 | 34.45 | 42 | 0.2032 | 0.42 | 1.07E+03 | | 2.03E-01 |
| 20 | 18.7 | 30.09 | 21 | 0.2326 | 0.3 | 1.07E+03 | | 2.33E-01 |
| 21 | 47.4 | 9.671 | 62 | 0.7238 | 0.32 | 1.07E+03 | | 7.24E-01 |
| 22 | 22.1 | 12.6 | 21 | 0.5556 | 0.54 | 1.07E+03 | | 5.56E-01 |
| 23 | 8.15 | 31.22 | 7 | 0.2242 | 0.36 | 1.07E+03 | | 2.24E-01 |
| 24 | 20.2 | 8.502 | 22 | 0.8233 | 0.46 | 1.07E+03 | | 8.23E-01 |
| 25 | 12 | 17.38 | 5 | 0.4028 | 0.6 | 1.07E+03 | | 4.03E-01 |
| 26 | 15.8 | 6.179 | 20 | 1.1329 | 0.59 | 1.07E+03 | | 1.13E+00 |
| 27 | 17.4 | 13.66 | 18 | 0.5124 | 0.6 | 1.07E+03 | | 5.12E-01 |
| 28 | 24.7 | 23.38 | 29 | 0.2994 | 0.47 | 1.07E+03 | | 2.99E-01 |
| 29 | 17 | 50.6 | 16 | 0.1383 | 0.32 | 1.07E+03 | | 1.38E-01 |
| 30 | 21.6 | 12.45 | 18 | 0.5622 | 0.56 | 1.07E+03 | | 5.62E-01 |
| 31 | 21 | 55.84 | 23 | 0.1254 | 0.38 | 1.07E+03 | | 1.25E-01 |
| 32 | 27.6 | 10.17 | 30 | 0.6883 | 0.37 | 1.07E+03 | | 6.88E-01 |
| 33 | 8.63 | 3.879 | 11 | 1.8046 | 0.5 | 1.07E+03 | | 1.80E+00 |
| 34 | 13 | 44.54 | 5 | 0.1572 | 0.49 | 1.07E+03 | | 1.57E-01 |
| 35 | 15 | 102.8 | 7 | 0.0681 | 0.47 | 1.07E+03 | | 6.81E-02 |
| 36 | 27.1 | 12.24 | 30 | 0.5719 | 0.5 | 1.07E+03 | | 5.72E-01 |
| 37 | 18.1 | 9.17 | 20 | 0.7634 | 0.56 | 1.07E+03 | | 7.63E-01 |
| 38 | 11.7 | 102 | 11 | 0.0686 | 0.4 | 1.07E+03 | | 6.86E-02 |
| 39 | 42.4 | 18.02 | 53 | 0.3885 | 0.35 | 1.07E+03 | | 3.88E-01 |
| 40 | 29 | 4.55E-01 | 35 | 15.3948 | 0.52 | 1.07E+03 | | 1.54E+01 |
| 41 | 59.2 | 19.99 | 76 | 0.3502 | 0.57 | 1.07E+03 | | 3.50E-01 |
| 42 | 22.4 | 36.31 | 22 | 0.1928 | 0.6 | 1.07E+03 | | 1.93E-01 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 51.28 | 21 | 0.1365 | 0.43 | 1.07E+03 | | 1.37E-01 |
| 44 | 15 | 89.05 | 6 | 0.0786 | 0.54 | 1.07E+03 | | 7.86E-02 |
| 45 | 13.2 | 45.93 | 12 | 0.1524 | 0.41 | 1.07E+03 | | 1.52E-01 |
| 46 | 40.5 | 8.487 | 46 | 0.8248 | 0.34 | 1.07E+03 | | 8.25E-01 |
| 47 | 45 | 33.98 | 55 | 0.2060 | 0.6 | 1.07E+03 | | 2.06E-01 |
| 48 | 14.9 | 42.48 | 18 | 0.1648 | 0.59 | 1.07E+03 | | 1.65E-01 |
| 49 | 5 | 41.01 | 7 | 0.1707 | 0.6 | 1.07E+03 | | 1.71E-01 |
| 50 | 26.5 | 20.8 | 30 | 0.3365 | 0.5 | 1.07E+03 | | 3.37E-01 |
| 51 | 9.44 | 60.18 | 8 | 0.1163 | 0.6 | 1.07E+03 | | 1.16E-01 |
| 52 | 15.5 | 5.737 | 18 | 1.2201 | 0.55 | 1.07E+03 | | 1.22E+00 |
| 53 | 36.6 | 5.026 | 47 | 1.3928 | 0.51 | 1.07E+03 | | 1.39E+00 |
| 54 | 33.6 | 5.123 | 42 | 1.3664 | 0.52 | 1.07E+03 | | 1.37E+00 |
| 55 | 41.2 | 21.04 | 50 | 0.3327 | 0.47 | 1.07E+03 | | 3.33E-01 |
| 56 | 52.4 | 24.07 | 67 | 0.2908 | 0.44 | 1.07E+03 | | 2.91E-01 |
| 57 | 23 | 8.981 | 27 | 0.7794 | 0.52 | 1.07E+03 | | 7.79E-01 |
| 58 | 14.7 | 50.28 | 9 | 0.1392 | 0.6 | 1.07E+03 | | 1.39E-01 |
| 59 | 16.2 | 51.53 | 18 | 0.1358 | 0.6 | 1.07E+03 | | 1.36E-01 |
| 60 | 19.4 | 37.47 | 22 | 0.1868 | 0.46 | 1.07E+03 | | 1.87E-01 |
| 61 | 23.5 | 27.59 | 27 | 0.2537 | 0.42 | 1.07E+03 | | 2.54E-01 |
| 62 | 37 | 30.68 | 46 | 0.2282 | 0.38 | 1.07E+03 | | 2.28E-01 |
| 63 | 24.2 | 35.81 | 28 | 0.1955 | 0.5 | 1.07E+03 | | 1.95E-01 |
| 64 | 29.8 | 41.33 | 29 | 0.1694 | 0.48 | 1.07E+03 | | 1.69E-01 |
| 65 | 38.4 | 24.51 | 51 | 0.2856 | 0.6 | 1.07E+03 | | 2.86E-01 |
| 66 | 5.13 | 43.9 | 4 | 0.1595 | 0.6 | 1.07E+03 | | 1.59E-01 |
| 67 | 14.2 | 17.91 | 14 | 0.3908 | 0.57 | 1.07E+03 | | 3.91E-01 |
| 68 | 25.5 | 71.23 | 25 | 0.0983 | 0.38 | 1.07E+03 | | 9.83E-02 |
| 69 | 26.1 | 11.2 | 34 | 0.6250 | 0.6 | 1.07E+03 | | 6.25E-01 |
| 70 | 34 | 18.47 | 40 | 0.3790 | 0.6 | 1.07E+03 | | 3.79E-01 |
| | | | | | | 1.07E+03 | | |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 3.35E+01 | 6.19E-01 | 6.19E-01 |
| | std. dev. | 2.88E+01 | 1.83E+00 | 1.83E+00 |
| | max | 1.40E+02 | 1.54E+01 | 1.54E+01 |
| | min | 4.55E-01 | 4.99E-02 | 4.99E-02 |
| | median | 2.62E+01 | 2.67E-01 | 2.67E-01 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 2.67E-01 | 2.67E-01 |
| | 55 | 2.29E-01 | 2.29E-01 |
| | 60 | 2.17E-01 | 2.17E-01 |
| | 65 | 1.93E-01 | 1.93E-01 |
| | 70 | 1.69E-01 | 1.69E-01 |
| | 75 | 1.61E-01 | 1.61E-01 |
| | 80 | 1.50E-01 | 1.50E-01 |
| | 85 | 1.36E-01 | 1.36E-01 |
| | **90** | **1.15E-01** | **1.15E-01** |
| | 95 | 7.31E-02 | 7.31E-02 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 3 |
| Bulk density (g/cm^3) | 1.8 |
| Chemical | trans-1,2-DCE |
| MCL (mg/l) | 0.1 |
| Da (cm^2/sec) | 9.60E-02 |
| Henry's Law Constant (m^3-atm/mole) | 6.72E-03 |
| log Kow | 2.06 |
| Koc (ml/g) | 94.01 |
| Solubility (mg/l) | 6300 |
| Chemical Density (g/cm^3) | 1.26 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.2382 | 41 | 41.9815 | 0.54 | 2.55E+03 | | 4.20E+01 |
| 2 | 17.8 | 24.75 | 21 | 0.4040 | 0.4 | 2.55E+03 | | 4.04E-01 |
| 3 | 13 | 25.12 | 6 | 0.3981 | 0.51 | 2.55E+03 | | 3.98E-01 |
| 4 | 51.1 | 8.561 | 67 | 1.1681 | 0.58 | 2.55E+03 | | 1.17E+00 |
| 5 | 32.6 | 6.542 | 42 | 1.5286 | 0.4 | 2.55E+03 | | 1.53E+00 |
| 6 | 39.4 | 11.22 | 50 | 0.8913 | 0.38 | 2.55E+03 | | 8.91E-01 |
| 7 | 34.6 | 4.689 | 50 | 2.1327 | 0.45 | 2.55E+03 | | 2.13E+00 |
| 8 | 32 | 5.361 | 41 | 1.8653 | 0.4 | 2.55E+03 | | 1.87E+00 |
| 9 | 28.1 | 11.72 | 35 | 0.8532 | 0.41 | 2.55E+03 | | 8.53E-01 |
| 10 | 30.6 | 0.8815 | 40 | 11.3443 | 0.46 | 2.55E+03 | | 1.13E+01 |
| 11 | 44 | 7.635 | 64 | 1.3098 | 0.55 | 2.55E+03 | | 1.31E+00 |
| 12 | 20.3 | 1.519 | 26 | 6.5833 | 0.51 | 2.55E+03 | | 6.58E+00 |
| 13 | 31.3 | 19.42 | 38 | 0.5149 | 0.5 | 2.55E+03 | | 5.15E-01 |
| 14 | 30.2 | 2.956 | 38 | 3.3829 | 0.58 | 2.55E+03 | | 3.38E+00 |
| 15 | 19.2 | 6.233 | 25 | 1.6044 | 0.55 | 2.55E+03 | | 1.60E+00 |
| 16 | 9 | 61.51 | 7 | 0.1626 | 0.45 | 2.55E+03 | | 1.63E-01 |
| 17 | 21.5 | 3.769 | 30 | 2.6532 | 0.49 | 2.55E+03 | | 2.65E+00 |
| 18 | 15 | 70.19 | 7 | 0.1425 | 0.37 | 2.55E+03 | | 1.42E-01 |
| 19 | 35.2 | 9.863 | 48 | 1.0139 | 0.42 | 2.55E+03 | | 1.01E+00 |
| 20 | 18.7 | 3.276 | 25 | 3.0525 | 0.3 | 2.55E+03 | | 3.05E+00 |
| 21 | 47.4 | 3.146 | 74 | 3.1786 | 0.32 | 2.55E+03 | | 3.18E+00 |
| 22 | 22.1 | 4.632 | 24 | 2.1589 | 0.54 | 2.55E+03 | | 2.16E+00 |
| 23 | 8.15 | 8.924 | 8 | 1.1206 | 0.36 | 2.55E+03 | | 1.12E+00 |
| 24 | 20.2 | 0.8015 | 25 | 12.4766 | 0.46 | 2.55E+03 | | 1.25E+01 |
| 25 | 12 | 10.96 | 6 | 0.9124 | 0.6 | 2.55E+03 | | 9.12E-01 |
| 26 | 15.8 | 0.09196 | 24 | 108.7429 | 0.59 | 2.55E+03 | | 1.09E+02 |
| 27 | 17.4 | 0.8629 | 21 | 11.5888 | 0.6 | 2.55E+03 | | 1.16E+01 |
| 28 | 24.7 | 4.608 | 32 | 2.1701 | 0.47 | 2.55E+03 | | 2.17E+00 |
| 29 | 17 | 15.07 | 19 | 0.6636 | 0.32 | 2.55E+03 | | 6.64E-01 |
| 30 | 21.6 | 4.712 | 21 | 2.1222 | 0.56 | 2.55E+03 | | 2.12E+00 |
| 31 | 21 | 14.76 | 27 | 0.6775 | 0.38 | 2.55E+03 | | 6.78E-01 |
| 32 | 27.6 | 1.764 | 34 | 5.6689 | 0.37 | 2.55E+03 | | 5.67E+00 |
| 33 | 8.63 | 0.02095 | 12 | 477.3270 | 0.5 | 2.55E+03 | | 4.77E+02 |
| 34 | 13 | 26.51 | 6 | 0.3772 | 0.49 | 2.55E+03 | | 3.77E-01 |
| 35 | 15 | 52.95 | 8 | 0.1889 | 0.47 | 2.55E+03 | | 1.89E-01 |
| 36 | 27.1 | 4.255 | 33 | 2.3502 | 0.5 | 2.55E+03 | | 2.35E+00 |
| 37 | 18.1 | 1.139 | 23 | 8.7796 | 0.56 | 2.55E+03 | | 8.78E+00 |
| 38 | 11.7 | 27.29 | 12 | 0.3664 | 0.4 | 2.55E+03 | | 3.66E-01 |
| 39 | 42.4 | 4.324 | 62 | 2.3127 | 0.35 | 2.55E+03 | | 2.31E+00 |
| 40 | 29 | 2.89E-03 | 38 | 3456.6194 | 0.52 | 2.55E+03 | SCN>SSL | 2.55E+03 |
| 41 | 59.2 | 4.561 | 86 | 2.1925 | 0.57 | 2.55E+03 | | 2.19E+00 |
| 42 | 22.4 | 12.92 | 25 | 0.7740 | 0.6 | 2.55E+03 | | 7.74E-01 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 21.73 | 25 | 0.4602 | 0.43 | 2.55E+03 | | 4.60E-01 |
| 44 | 15 | 47 | 8 | 0.2128 | 0.54 | 2.55E+03 | | 2.13E-01 |
| 45 | 13.2 | 10.33 | 14 | 0.9681 | 0.41 | 2.55E+03 | | 9.68E-01 |
| 46 | 40.5 | 1.977 | 54 | 5.0582 | 0.34 | 2.55E+03 | | 5.06E+00 |
| 47 | 45 | 11.87 | 60 | 0.8425 | 0.6 | 2.55E+03 | | 8.42E-01 |
| 48 | 14.9 | 4.783 | 21 | 2.0907 | 0.59 | 2.55E+03 | | 2.09E+00 |
| 49 | 5 | 4.995 | 8 | 2.0020 | 0.6 | 2.55E+03 | | 2.00E+00 |
| 50 | 26.5 | 4.042 | 33 | 2.4740 | 0.5 | 2.55E+03 | | 2.47E+00 |
| 51 | 9.44 | 15.35 | 9 | 0.6515 | 0.6 | 2.55E+03 | | 6.51E-01 |
| 52 | 15.5 | 0.2211 | 22 | 45.2284 | 0.55 | 2.55E+03 | | 4.52E+01 |
| 53 | 36.6 | 0.6138 | 52 | 16.2920 | 0.51 | 2.55E+03 | | 1.63E+01 |
| 54 | 33.6 | 0.5746 | 46 | 17.4034 | 0.52 | 2.55E+03 | | 1.74E+01 |
| 55 | 41.2 | 7.775 | 56 | 1.2862 | 0.47 | 2.55E+03 | | 1.29E+00 |
| 56 | 52.4 | 7.555 | 78 | 1.3236 | 0.44 | 2.55E+03 | | 1.32E+00 |
| 57 | 23 | 1.324 | 30 | 7.5529 | 0.52 | 2.55E+03 | | 7.55E+00 |
| 58 | 14.7 | 24.86 | 11 | 0.4023 | 0.6 | 2.55E+03 | | 4.02E-01 |
| 59 | 16.2 | 9.614 | 21 | 1.0401 | 0.6 | 2.55E+03 | | 1.04E+00 |
| 60 | 19.4 | 5.354 | 25 | 1.8678 | 0.46 | 2.55E+03 | | 1.87E+00 |
| 61 | 23.5 | 5.923 | 31 | 1.6883 | 0.42 | 2.55E+03 | | 1.69E+00 |
| 62 | 37 | 7.329 | 54 | 1.3644 | 0.38 | 2.55E+03 | | 1.36E+00 |
| 63 | 24.2 | 7.257 | 32 | 1.3780 | 0.5 | 2.55E+03 | | 1.38E+00 |
| 64 | 29.8 | 16.04 | 32 | 0.6234 | 0.48 | 2.55E+03 | | 6.23E-01 |
| 65 | 38.4 | 3.882 | 55 | 2.5760 | 0.6 | 2.55E+03 | | 2.58E+00 |
| 66 | 5.13 | 9.369 | 4 | 1.0673 | 0.6 | 2.55E+03 | | 1.07E+00 |
| 67 | 14.2 | 1.204 | 17 | 8.3056 | 0.57 | 2.55E+03 | | 8.31E+00 |
| 68 | 25.5 | 24.23 | 29 | 0.4127 | 0.38 | 2.55E+03 | | 4.13E-01 |
| 69 | 26.1 | 0.5105 | 37 | 19.5886 | 0.6 | 2.55E+03 | | 1.96E+01 |
| 70 | 34 | 5.815 | 43 | 1.7197 | 0.6 | 2.55E+03 | | 1.72E+00 |
| | | | | | | 2.55E+03 | | |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 1.07E+01 | 6.19E+01 | 4.90E+01 |
| | std. dev. | 1.39E+01 | 4.16E+02 | 3.09E+02 |
| | max | 7.02E+01 | 3.46E+03 | 2.55E+03 |
| | min | 2.89E-03 | 1.42E-01 | 1.42E-01 |
| | median | 5.87E+00 | 1.70E+00 | 1.70E+00 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 1.70E+00 | 1.70E+00 |
| | 55 | 1.39E+00 | 1.39E+00 |
| | 60 | 1.30E+00 | 1.30E+00 |
| | 65 | 1.08E+00 | 1.08E+00 |
| | 70 | 9.51E-01 | 9.51E-01 |
| | 75 | 8.45E-01 | 8.45E-01 |
| | 80 | 6.61E-01 | 6.61E-01 |
| | 85 | 4.79E-01 | 4.79E-01 |
| | **90** | **4.02E-01** | **4.02E-01** |
| | 95 | 2.82E-01 | 2.82E-01 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 3 |
| Bulk density (g/cm^3) | 1.8 |
| Chemical | Benzene |
| MCL (mg/l) | 0.005 |
| Da (cm^2/sec) | 9.18E-02 |
| Henry's Law Constant (m^3-atm/mole) | 5.43E-03 |
| log Kow | 2.13 |
| Koc (ml/g) | 84.98 |
| Solubility (mg/l) | 1791 |
| Chemical Density (g/cm^3) | 0.88 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.832 | 40 | 0.6010 | 0.54 | 6.63E+02 | | 6.01E-01 |
| 2 | 17.8 | 39.83 | 19 | 0.0126 | 0.4 | 6.63E+02 | | 1.26E-02 |
| 3 | 13 | 29.71 | 6 | 0.0168 | 0.51 | 6.63E+02 | | 1.68E-02 |
| 4 | 51.1 | 12.33 | 65 | 0.0406 | 0.58 | 6.63E+02 | | 4.06E-02 |
| 5 | 32.6 | 10.63 | 39 | 0.0470 | 0.4 | 6.63E+02 | | 4.70E-02 |
| 6 | 39.4 | 15.27 | 48 | 0.0327 | 0.38 | 6.63E+02 | | 3.27E-02 |
| 7 | 34.6 | 8.96 | 49 | 0.0558 | 0.45 | 6.63E+02 | | 5.58E-02 |
| 8 | 32 | 7.5 | 39 | 0.0667 | 0.4 | 6.63E+02 | | 6.67E-02 |
| 9 | 28.1 | 18.93 | 34 | 0.0264 | 0.41 | 6.63E+02 | | 2.64E-02 |
| 10 | 30.6 | 1.89 | 39 | 0.2646 | 0.46 | 6.63E+02 | | 2.65E-01 |
| 11 | 44 | 12.95 | 62 | 0.0386 | 0.55 | 6.63E+02 | | 3.86E-02 |
| 12 | 20.3 | 3.83 | 26 | 0.1305 | 0.51 | 6.63E+02 | | 1.31E-01 |
| 13 | 31.3 | 27.56 | 37 | 0.0181 | 0.5 | 6.63E+02 | | 1.81E-02 |
| 14 | 30.2 | 4.49 | 37 | 0.1114 | 0.58 | 6.63E+02 | | 1.11E-01 |
| 15 | 19.2 | 12.95 | 23 | 0.0386 | 0.55 | 6.63E+02 | | 3.86E-02 |
| 16 | 9 | 81.62 | 6 | 0.0061 | 0.45 | 6.63E+02 | | 6.13E-03 |
| 17 | 21.5 | 8.48 | 28 | 0.0590 | 0.49 | 6.63E+02 | | 5.90E-02 |
| 18 | 15 | 82.89 | 7 | 0.0060 | 0.37 | 6.63E+02 | | 6.03E-03 |
| 19 | 35.2 | 15.8 | 46 | 0.0316 | 0.42 | 6.63E+02 | | 3.16E-02 |
| 20 | 18.7 | 7.54 | 23 | 0.0663 | 0.3 | 6.63E+02 | | 6.63E-02 |
| 21 | 47.4 | 4.77 | 70 | 0.1048 | 0.32 | 6.63E+02 | | 1.05E-01 |
| 22 | 22.1 | 6.53 | 24 | 0.0766 | 0.54 | 6.63E+02 | | 7.66E-02 |
| 23 | 8.15 | 13.81 | 8 | 0.0362 | 0.36 | 6.63E+02 | | 3.62E-02 |
| 24 | 20.2 | 1.92 | 24 | 0.2604 | 0.46 | 6.63E+02 | | 2.60E-01 |
| 25 | 12 | 12.77 | 6 | 0.0392 | 0.6 | 6.63E+02 | | 3.92E-02 |
| 26 | 15.8 | 0.455 | 23 | 1.0989 | 0.59 | 6.63E+02 | | 1.10E+00 |
| 27 | 17.4 | 2.5 | 20 | 0.2000 | 0.6 | 6.63E+02 | | 2.00E-01 |
| 28 | 24.7 | 8.46 | 30 | 0.0591 | 0.47 | 6.63E+02 | | 5.91E-02 |
| 29 | 17 | 23.52 | 18 | 0.0213 | 0.32 | 6.63E+02 | | 2.13E-02 |
| 30 | 21.6 | 6.69 | 20 | 0.0747 | 0.56 | 6.63E+02 | | 7.47E-02 |
| 31 | 21 | 24.12 | 25 | 0.0207 | 0.38 | 6.63E+02 | | 2.07E-02 |
| 32 | 27.6 | 3.4 | 33 | 0.1471 | 0.37 | 6.63E+02 | | 1.47E-01 |
| 33 | 8.63 | 0.149 | 12 | 3.3557 | 0.5 | 6.63E+02 | | 3.36E+00 |
| 34 | 13 | 30.02 | 6 | 0.0167 | 0.49 | 6.63E+02 | | 1.67E-02 |
| 35 | 15 | 64.3 | 8 | 0.0078 | 0.47 | 6.63E+02 | | 7.78E-03 |
| 36 | 27.1 | 6.16 | 31 | 0.0812 | 0.5 | 6.63E+02 | | 8.12E-02 |
| 37 | 18.1 | 2.48 | 22 | 0.2016 | 0.56 | 6.63E+02 | | 2.02E-01 |
| 38 | 11.7 | 45.25 | 12 | 0.0110 | 0.4 | 6.63E+02 | | 1.10E-02 |
| 39 | 42.4 | 7.42 | 60 | 0.0674 | 0.35 | 6.63E+02 | | 6.74E-02 |
| 40 | 29 | 1.96E-02 | 37 | 25.5102 | 0.52 | 6.63E+02 | | 2.55E+01 |
| 41 | 59.2 | 8.01 | 83 | 0.0624 | 0.57 | 6.63E+02 | | 6.24E-02 |
| 42 | 22.4 | 18.67 | 24 | 0.0268 | 0.6 | 6.63E+02 | | 2.68E-02 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 29.33 | 23 | 0.0170 | 0.43 | 6.63E+02 | | 1.70E-02 |
| 44 | 15 | 58.23 | 7 | 0.0086 | 0.54 | 6.63E+02 | | 8.59E-03 |
| 45 | 13.2 | 17.8 | 14 | 0.0281 | 0.41 | 6.63E+02 | | 2.81E-02 |
| 46 | 40.5 | 3.39 | 51 | 0.1475 | 0.34 | 6.63E+02 | | 1.47E-01 |
| 47 | 45 | 17.47 | 58 | 0.0286 | 0.6 | 6.63E+02 | | 2.86E-02 |
| 48 | 14.9 | 11 | 20 | 0.0455 | 0.59 | 6.63E+02 | | 4.55E-02 |
| 49 | 5 | 10.77 | 8 | 0.0464 | 0.6 | 6.63E+02 | | 4.64E-02 |
| 50 | 26.5 | 7.5 | 32 | 0.0667 | 0.5 | 6.63E+02 | | 6.67E-02 |
| 51 | 9.44 | 24.65 | 8 | 0.0203 | 0.6 | 6.63E+02 | | 2.03E-02 |
| 52 | 15.5 | 0.764 | 20 | 0.6545 | 0.55 | 6.63E+02 | | 6.54E-01 |
| 53 | 36.6 | 1.34 | 51 | 0.3731 | 0.51 | 6.63E+02 | | 3.73E-01 |
| 54 | 33.6 | 1.29 | 45 | 0.3876 | 0.52 | 6.63E+02 | | 3.88E-01 |
| 55 | 41.2 | 11.12 | 55 | 0.0450 | 0.47 | 6.63E+02 | | 4.50E-02 |
| 56 | 52.4 | 11.7 | 70 | 0.0427 | 0.44 | 6.63E+02 | | 4.27E-02 |
| 57 | 23 | 2.68 | 29 | 0.1866 | 0.52 | 6.63E+02 | | 1.87E-01 |
| 58 | 14.7 | 32.07 | 10 | 0.0156 | 0.6 | 6.63E+02 | | 1.56E-02 |
| 59 | 16.2 | 18.07 | 20 | 0.0277 | 0.6 | 6.63E+02 | | 2.77E-02 |
| 60 | 19.4 | 11.18 | 24 | 0.0447 | 0.46 | 6.63E+02 | | 4.47E-02 |
| 61 | 23.5 | 10.54 | 29 | 0.0474 | 0.42 | 6.63E+02 | | 4.74E-02 |
| 62 | 37 | 12.62 | 52 | 0.0396 | 0.38 | 6.63E+02 | | 3.96E-02 |
| 63 | 24.2 | 13.23 | 30 | 0.0378 | 0.5 | 6.63E+02 | | 3.78E-02 |
| 64 | 29.8 | 22.31 | 31 | 0.0224 | 0.48 | 6.63E+02 | | 2.24E-02 |
| 65 | 38.4 | 7.83 | 54 | 0.0639 | 0.6 | 6.63E+02 | | 6.39E-02 |
| 66 | 5.13 | 16.25 | 4 | 0.0308 | 0.6 | 6.63E+02 | | 3.08E-02 |
| 67 | 14.2 | 3.11 | 17 | 0.1608 | 0.57 | 6.63E+02 | | 1.61E-01 |
| 68 | 25.5 | 36.02 | 28 | 0.0139 | 0.38 | 6.63E+02 | | 1.39E-02 |
| 69 | 26.1 | 1.63 | 35 | 0.3067 | 0.6 | 6.63E+02 | | 3.07E-01 |
| 70 | 34 | 8.8 | 42 | 0.0568 | 0.6 | 6.63E+02 | | 5.68E-02 |
| | | | | | | 6.63E+02 | | |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 1.57E+01 | 5.16E-01 | 5.16E-01 |
| | std. dev. | 1.73E+01 | 3.06E+00 | 3.06E+00 |
| | max | 8.29E+01 | 2.55E+01 | 2.55E+01 |
| | min | 1.96E-02 | 6.03E-03 | 6.03E-03 |
| | median | 1.09E+01 | 4.59E-02 | 4.59E-02 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 4.59E-02 | 4.59E-02 |
| | 55 | 4.28E-02 | 4.28E-02 |
| | 60 | 3.89E-02 | 3.89E-02 |
| | 65 | 3.64E-02 | 3.64E-02 |
| | 70 | 3.01E-02 | 3.01E-02 |
| | 75 | 2.70E-02 | 2.70E-02 |
| | 80 | 2.12E-02 | 2.12E-02 |
| | 85 | 1.74E-02 | 1.74E-02 |
| | **90** | **1.54E-02** | **1.54E-02** |
| | 95 | 9.70E-03 | 9.70E-03 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 3 |
| Bulk density (g/cm^3) | 1.8 |
| Chemical | Carbon Tetrachloride |
| MCL (mg/l) | 0.005 |
| Da (cm^2/sec) | 8.40E-02 |
| Henry's Law Constant (m^3-atm/mole) | 3.04E-02 |
| log Kow | 2.83 |
| Koc (ml/g) | 336.97 |
| Solubility (mg/l) | 805 |
| Chemical Density (g/cm^3) | 1.59 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 1E-10 | 90 | 5000000000.0000 | 0.54 | 1.03E+03 | SCN>SSL | 1.03E+03 |
| 2 | 17.8 | 0.07395 | 54 | 6.7613 | 0.4 | 1.03E+03 | | 6.76E+00 |
| 3 | 13 | 3.837 | 13 | 0.1303 | 0.51 | 1.03E+03 | | 1.30E-01 |
| 4 | 51.1 | 0.09028 | 145 | 5.5383 | 0.58 | 1.03E+03 | | 5.54E+00 |
| 5 | 32.6 | 0.0135 | 102 | 37.0370 | 0.4 | 1.03E+03 | | 3.70E+01 |
| 6 | 39.4 | 0.2842 | 121 | 1.7593 | 0.38 | 1.03E+03 | | 1.76E+00 |
| 7 | 34.6 | 0.001143 | 119 | 437.4453 | 0.45 | 1.03E+03 | | 4.37E+02 |
| 8 | 32 | 0.1034 | 100 | 4.8356 | 0.4 | 1.03E+03 | | 4.84E+00 |
| 9 | 28.1 | 0.02286 | 88 | 21.8723 | 0.41 | 1.03E+03 | | 2.19E+01 |
| 10 | 30.6 | 0.00006778 | 96 | 7376.8073 | 0.46 | 1.03E+03 | SCN>SSL | 1.03E+03 |
| 11 | 44 | 0.008236 | 142 | 60.7091 | 0.55 | 1.03E+03 | | 6.07E+01 |
| 12 | 20.3 | 0.00001225 | 64 | 40816.3265 | 0.51 | 1.03E+03 | SCN>SSL | 1.03E+03 |
| 13 | 31.3 | 0.288 | 94 | 1.7361 | 0.5 | 1.03E+03 | | 1.74E+00 |
| 14 | 30.2 | 0.01807 | 91 | 27.6702 | 0.58 | 1.03E+03 | | 2.77E+01 |
| 15 | 19.2 | 0.0004645 | 59 | 1076.4263 | 0.55 | 1.03E+03 | SCN>SSL | 1.03E+03 |
| 16 | 9 | 2.415 | 14 | 0.2070 | 0.45 | 1.03E+03 | | 2.07E-01 |
| 17 | 21.5 | 0.0001243 | 73 | 4022.5261 | 0.49 | 1.03E+03 | SCN>SSL | 1.03E+03 |
| 18 | 15 | 10.45 | 17 | 0.0478 | 0.37 | 1.03E+03 | | 4.78E-02 |
| 19 | 35.2 | 0.02164 | 114 | 23.1054 | 0.42 | 1.03E+03 | | 2.31E+01 |
| 20 | 18.7 | 0.00007539 | 67 | 6632.1793 | 0.3 | 1.03E+03 | SCN>SSL | 1.03E+03 |
| 21 | 47.4 | 0.01813 | 177 | 27.5786 | 0.32 | 1.03E+03 | | 2.76E+01 |
| 22 | 22.1 | 0.06587 | 58 | 7.5907 | 0.54 | 1.03E+03 | | 7.59E+00 |
| 23 | 8.15 | 0.0541 | 18 | 9.2421 | 0.36 | 1.03E+03 | | 9.24E+00 |
| 24 | 20.2 | 0.00000846 | 63 | 59101.6548 | 0.46 | 1.03E+03 | SCN>SSL | 1.03E+03 |
| 25 | 12 | 1.76 | 11 | 0.2841 | 0.6 | 1.03E+03 | | 2.84E-01 |
| 26 | 15.8 | 1E-10 | 49 | 5000000000.0000 | 0.59 | 1.03E+03 | SCN>SSL | 1.03E+03 |
| 27 | 17.4 | 0.000001253 | 50 | 399042.2985 | 0.6 | 1.03E+03 | SCN>SSL | 1.03E+03 |
| 28 | 24.7 | 0.001975 | 79 | 253.1646 | 0.47 | 1.03E+03 | | 2.53E+02 |
| 29 | 17 | 0.05584 | 50 | 8.9542 | 0.32 | 1.03E+03 | | 8.95E+00 |
| 30 | 21.6 | 0.08053 | 51 | 6.2089 | 0.56 | 1.03E+03 | | 6.21E+00 |
| 31 | 21 | 0.02476 | 69 | 20.1939 | 0.38 | 1.03E+03 | | 2.02E+01 |
| 32 | 27.6 | 0.0004675 | 86 | 1069.5187 | 0.37 | 1.03E+03 | SCN>SSL | 1.03E+03 |
| 33 | 8.63 | 1E-10 | 25 | 5000000000.0000 | 0.5 | 1.03E+03 | SCN>SSL | 1.03E+03 |
| 34 | 13 | 4.286 | 12 | 0.1167 | 0.49 | 1.03E+03 | | 1.17E-01 |
| 35 | 15 | 6.596 | 19 | 0.0758 | 0.47 | 1.03E+03 | | 7.58E-02 |
| 36 | 27.1 | 0.04929 | 80 | 10.1440 | 0.5 | 1.03E+03 | | 1.01E+01 |
| 37 | 18.1 | 0.0000615 | 54 | 8130.0813 | 0.56 | 1.03E+03 | SCN>SSL | 1.03E+03 |
| 38 | 11.7 | 0.05282 | 30 | 9.4661 | 0.4 | 1.03E+03 | | 9.47E+00 |
| 39 | 42.4 | 0.004903 | 148 | 101.9784 | 0.35 | 1.03E+03 | | 1.02E+02 |
| 40 | 29 | 1.00E-10 | 82 | 5000000000.0000 | 0.52 | 1.03E+03 | SCN>SSL | 1.03E+03 |
| 41 | 59.2 | 0.003648 | 183 | 137.0614 | 0.57 | 1.03E+03 | | 1.37E+02 |
| 42 | 22.4 | 0.1535 | 59 | 3.2573 | 0.6 | 1.03E+03 | | 3.26E+00 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 0.6957 | 63 | 0.7187 | 0.43 | 1.03E+03 | | 7.19E-01 |
| 44 | 15 | 5.899 | 17 | 0.0848 | 0.54 | 1.03E+03 | | 8.48E-02 |
| 45 | 13.2 | 0.01566 | 35 | 31.9285 | 0.41 | 1.03E+03 | | 3.19E+01 |
| 46 | 40.5 | 0.002612 | 131 | 191.4242 | 0.34 | 1.03E+03 | | 1.91E+02 |
| 47 | 45 | 0.1026 | 134 | 4.8733 | 0.6 | 1.03E+03 | | 4.87E+00 |
| 48 | 14.9 | 0.0001495 | 46 | 3344.4816 | 0.59 | 1.03E+03 | SCN>SSL | 1.03E+03 |
| 49 | 5 | 0.0003899 | 17 | 1282.3801 | 0.6 | 1.03E+03 | SCN>SSL | 1.03E+03 |
| 50 | 26.5 | 0.00162 | 81 | 308.6420 | 0.5 | 1.03E+03 | | 3.09E+02 |
| 51 | 9.44 | 0.05006 | 18 | 9.9880 | 0.6 | 1.03E+03 | | 9.99E+00 |
| 52 | 15.5 | 1E-10 | 44 | 5000000000.0000 | 0.55 | 1.03E+03 | SCN>SSL | 1.03E+03 |
| 53 | 36.6 | 0.00004076 | 119 | 12266.9284 | 0.51 | 1.03E+03 | SCN>SSL | 1.03E+03 |
| 54 | 33.6 | 0.00002356 | 107 | 21222.4109 | 0.52 | 1.03E+03 | SCN>SSL | 1.03E+03 |
| 55 | 41.2 | 0.1006 | 130 | 4.9702 | 0.47 | 1.03E+03 | | 4.97E+00 |
| 56 | 52.4 | 0.02574 | 175 | 19.4250 | 0.44 | 1.03E+03 | | 1.94E+01 |
| 57 | 23 | 0.0001479 | 74 | 3380.6626 | 0.52 | 1.03E+03 | SCN>SSL | 1.03E+03 |
| 58 | 14.7 | 1.853 | 22 | 0.2698 | 0.6 | 1.03E+03 | | 2.70E-01 |
| 59 | 16.2 | 0.003476 | 47 | 143.8435 | 0.6 | 1.03E+03 | | 1.44E+02 |
| 60 | 19.4 | 0.0003439 | 63 | 1453.9110 | 0.46 | 1.03E+03 | SCN>SSL | 1.03E+03 |
| 61 | 23.5 | 0.003844 | 78 | 130.0728 | 0.42 | 1.03E+03 | | 1.30E+02 |
| 62 | 37 | 0.006547 | 127 | 76.3709 | 0.38 | 1.03E+03 | | 7.64E+01 |
| 63 | 24.2 | 0.003078 | 78 | 162.4431 | 0.5 | 1.03E+03 | | 1.62E+02 |
| 64 | 29.8 | 0.3088 | 81 | 1.6192 | 0.48 | 1.03E+03 | | 1.62E+00 |
| 65 | 38.4 | 0.0004995 | 123 | 1001.0010 | 0.6 | 1.03E+03 | | 1.00E+03 |
| 66 | 5.13 | 0.01498 | 8 | 33.3778 | 0.6 | 1.03E+03 | | 3.34E+01 |
| 67 | 14.2 | 0.000003052 | 38 | 163826.9987 | 0.57 | 1.03E+03 | SCN>SSL | 1.03E+03 |
| 68 | 25.5 | 0.1282 | 74 | 3.9002 | 0.38 | 1.03E+03 | | 3.90E+00 |
| 69 | 26.1 | 1E-10 | 79 | 5000000000.0000 | 0.6 | 1.03E+03 | SCN>SSL | 1.03E+03 |
| 70 | 34 | 0.0382 | 100 | 13.0890 | 0.6 | 1.03E+03 | | 1.31E+01 |
| | | | | | | 1.03E+03 | | |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 5.73E-01 | 4.29E+08 | 3.70E+02 |
| | std. dev. | 1.75E+00 | 1.41E+09 | 4.67E+02 |
| | max | 1.05E+01 | 5.00E+09 | 1.03E+03 |
| | min | 1.00E-10 | 4.78E-02 | 4.78E-02 |
| | median | 1.42E-02 | 3.52E+01 | 3.52E+01 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 3.52E+01 | 3.52E+01 |
| | 55 | 2.76E+01 | 2.76E+01 |
| | 60 | 1.99E+01 | 1.99E+01 |
| | 65 | 1.00E+01 | 1.00E+01 |
| | 70 | 8.55E+00 | 8.55E+00 |
| | 75 | 5.71E+00 | 5.71E+00 |
| | 80 | 4.65E+00 | 4.65E+00 |
| | 85 | 1.74E+00 | 1.74E+00 |
| | **90** | **2.83E-01** | **2.83E-01** |
| | 95 | 1.23E-01 | 1.23E-01 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 3 |
| Bulk density (g/cm^3) | 1.8 |
| Chemical | Ethylbenzene |
| MCL (mg/l) | 0.7 |
| Da (cm^2/sec) | 7.56E-02 |
| Henry's Law Constant (m^3-atm/mole) | 8.44E-03 |
| log Kow | 3.15 |
| Koc (ml/g) | 889.9 |
| Solubility (mg/l) | 161 |
| Chemical Density (g/cm^3) | 0.87 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.04155 | 230 | 1684.7172 | 0.54 | 4.51E+02 | SCN>SSL | 451.28572 |
| 2 | 17.8 | 4.137 | 130 | 16.9205 | 0.4 | 4.51E+02 | | 16.920474 |
| 3 | 13 | 4.383 | 33 | 15.9708 | 0.51 | 4.51E+02 | | 15.970796 |
| 4 | 51.1 | 1.543 | 359 | 45.3662 | 0.58 | 4.51E+02 | | 45.36617 |
| 5 | 32.6 | 1.034 | 256 | 67.6983 | 0.4 | 4.51E+02 | | 67.698259 |
| 6 | 39.4 | 1.751 | 314 | 39.9772 | 0.38 | 4.51E+02 | | 39.977156 |
| 7 | 34.6 | 0.7682 | 299 | 91.1221 | 0.45 | 4.51E+02 | | 91.122104 |
| 8 | 32 | 0.8548 | 251 | 81.8905 | 0.4 | 4.51E+02 | | 81.890501 |
| 9 | 28.1 | 1.883 | 215 | 37.1747 | 0.41 | 4.51E+02 | | 37.174721 |
| 10 | 30.6 | 0.1324 | 234 | 528.7009 | 0.46 | 4.51E+02 | SCN>SSL | 451.28572 |
| 11 | 44 | 1.357 | 351 | 51.5844 | 0.55 | 4.51E+02 | | 51.584377 |
| 12 | 20.3 | 0.2693 | 147 | 259.9332 | 0.51 | 4.51E+02 | | 259.93316 |
| 13 | 31.3 | 3.382 | 219 | 20.6978 | 0.5 | 4.51E+02 | | 20.697812 |
| 14 | 30.2 | 0.5441 | 206 | 128.6528 | 0.58 | 4.51E+02 | | 128.65282 |
| 15 | 19.2 | 1.167 | 135 | 59.9829 | 0.55 | 4.51E+02 | | 59.982862 |
| 16 | 9 | 10.74 | 36 | 6.5177 | 0.45 | 4.51E+02 | | 6.5176909 |
| 17 | 21.5 | 0.6657 | 168 | 105.1525 | 0.49 | 4.51E+02 | | 105.15247 |
| 18 | 15 | 10.98 | 41 | 6.3752 | 0.37 | 4.51E+02 | | 6.3752277 |
| 19 | 35.2 | 1.586 | 286 | 44.1362 | 0.42 | 4.51E+02 | | 44.136192 |
| 20 | 18.7 | 0.4827 | 160 | 145.0176 | 0.3 | 4.51E+02 | | 145.01761 |
| 21 | 47.4 | 0.4537 | 486 | 154.2870 | 0.32 | 4.51E+02 | | 154.28697 |
| 22 | 22.1 | 0.8382 | 130 | 83.5123 | 0.54 | 4.51E+02 | | 83.512288 |
| 23 | 8.15 | 1.383 | 49 | 50.6146 | 0.36 | 4.51E+02 | | 50.614606 |
| 24 | 20.2 | 0.1227 | 144 | 570.4971 | 0.46 | 4.51E+02 | SCN>SSL | 451.28572 |
| 25 | 12 | 2.056 | 28 | 34.0467 | 0.6 | 4.51E+02 | | 34.046693 |
| 26 | 15.8 | 0.01734 | 125 | 4036.9089 | 0.59 | 4.51E+02 | SCN>SSL | 451.28572 |
| 27 | 17.4 | 0.1632 | 112 | 428.9216 | 0.6 | 4.51E+02 | | 428.92157 |
| 28 | 24.7 | 0.7891 | 180 | 88.7087 | 0.47 | 4.51E+02 | | 88.708655 |
| 29 | 17 | 2.338 | 119 | 29.9401 | 0.32 | 4.51E+02 | | 29.94012 |
| 30 | 21.6 | 0.882 | 114 | 79.3651 | 0.56 | 4.51E+02 | | 79.365079 |
| 31 | 21 | 2.37 | 164 | 29.5359 | 0.38 | 4.51E+02 | | 29.535865 |
| 32 | 27.6 | 0.2522 | 217 | 277.5575 | 0.37 | 4.51E+02 | | 277.55749 |
| 33 | 8.63 | 0.003538 | 67 | 19785.1894 | 0.5 | 4.51E+02 | SCN>SSL | 451.28572 |
| 34 | 13 | 4.569 | 31 | 15.3206 | 0.49 | 4.51E+02 | | 15.320639 |
| 35 | 15 | 9.001 | 45 | 7.7769 | 0.47 | 4.51E+02 | | 7.7769137 |
| 36 | 27.1 | 0.7398 | 182 | 94.6202 | 0.5 | 4.51E+02 | | 94.620168 |
| 37 | 18.1 | 0.2066 | 125 | 338.8190 | 0.56 | 4.51E+02 | | 338.81897 |
| 38 | 11.7 | 4.624 | 74 | 15.1384 | 0.4 | 4.51E+02 | | 15.138408 |
| 39 | 42.4 | 0.6431 | 402 | 108.8478 | 0.35 | 4.51E+02 | | 108.84777 |
| 40 | 29 | 1.43E-04 | 214 | 489853.0441 | 0.52 | 4.51E+02 | SCN>SSL | 451.28572 |
| 41 | 59.2 | 0.8146 | 470 | 85.9317 | 0.57 | 4.51E+02 | | 85.931746 |
| 42 | 22.4 | 2.444 | 133 | 28.6416 | 0.6 | 4.51E+02 | | 28.641571 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 3.628 | 143 | 19.2944 | 0.43 | 4.51E+02 | | 19.294377 |
| 44 | 15 | 8.62 | 39 | 8.1206 | 0.54 | 4.51E+02 | | 8.1206497 |
| 45 | 13.2 | 1.777 | 87 | 39.3922 | 0.41 | 4.51E+02 | | 39.392234 |
| 46 | 40.5 | 0.2769 | 352 | 252.7988 | 0.34 | 4.51E+02 | | 252.79884 |
| 47 | 45 | 2.198 | 322 | 31.8471 | 0.6 | 4.51E+02 | | 31.847134 |
| 48 | 14.9 | 0.9331 | 107 | 75.0188 | 0.59 | 4.51E+02 | | 75.018755 |
| 49 | 5 | 1.027 | 40 | 68.1597 | 0.6 | 4.51E+02 | | 68.159688 |
| 50 | 26.5 | 0.7016 | 188 | 99.7719 | 0.5 | 4.51E+02 | | 99.77195 |
| 51 | 9.44 | 3.008 | 43 | 23.2713 | 0.6 | 4.51E+02 | | 23.271277 |
| 52 | 15.5 | 0.03759 | 116 | 1862.1974 | 0.55 | 4.51E+02 | SCN>SSL | 451.28572 |
| 53 | 36.6 | 0.09499 | 295 | 736.9197 | 0.51 | 4.51E+02 | SCN>SSL | 451.28572 |
| 54 | 33.6 | 0.08954 | 260 | 781.7735 | 0.52 | 4.51E+02 | SCN>SSL | 451.28572 |
| 55 | 41.2 | 1.291 | 324 | 54.2215 | 0.47 | 4.51E+02 | | 54.221534 |
| 56 | 52.4 | 1.213 | 462 | 57.7082 | 0.44 | 4.51E+02 | | 57.708162 |
| 57 | 23 | 0.2317 | 168 | 302.1148 | 0.52 | 4.51E+02 | | 302.1148 |
| 58 | 14.7 | 4.761 | 53 | 14.7028 | 0.6 | 4.51E+02 | | 14.702794 |
| 59 | 16.2 | 1.842 | 109 | 38.0022 | 0.6 | 4.51E+02 | | 38.002172 |
| 60 | 19.4 | 0.9185 | 146 | 76.2112 | 0.46 | 4.51E+02 | | 76.211214 |
| 61 | 23.5 | 0.9765 | 182 | 71.6846 | 0.42 | 4.51E+02 | | 71.684588 |
| 62 | 37 | 1.128 | 335 | 62.0567 | 0.38 | 4.51E+02 | | 62.056738 |
| 63 | 24.2 | 1.285 | 177 | 54.4747 | 0.5 | 4.51E+02 | | 54.474708 |
| 64 | 29.8 | 2.742 | 187 | 25.5288 | 0.48 | 4.51E+02 | | 25.528811 |
| 65 | 38.4 | 0.7186 | 295 | 97.4116 | 0.6 | 4.51E+02 | | 97.411634 |
| 66 | 5.13 | 1.877 | 21 | 37.2936 | 0.6 | 4.51E+02 | | 37.293554 |
| 67 | 14.2 | 0.2274 | 88 | 307.8276 | 0.57 | 4.51E+02 | | 307.82762 |
| 68 | 25.5 | 3.838 | 179 | 18.2387 | 0.38 | 4.51E+02 | | 18.238666 |
| 69 | 26.1 | 0.09707 | 194 | 721.1291 | 0.6 | 4.51E+02 | SCN>SSL | 451.28572 |
| 70 | 34 | 1.079 | 228 | 64.8749 | 0.6 | 4.51E+02 | | 64.874884 |
| | | | | | | 4.51E+02 | | |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 1.84E+00 | 7.51E+03 | 1.37E+02 |
| | std. dev. | 2.36E+00 | 5.85E+04 | 1.54E+02 |
| | max | 1.10E+01 | 4.90E+05 | 4.51E+02 |
| | min | 1.43E-04 | 6.38E+00 | 6.38E+00 |
| | median | 1.03E+00 | 6.79E+01 | 6.79E+01 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 6.79E+01 | 6.79E+01 |
| | 55 | 6.01E+01 | 6.01E+01 |
| | 60 | 5.32E+01 | 5.32E+01 |
| | 65 | 4.43E+01 | 4.43E+01 |
| | 70 | 3.78E+01 | 3.78E+01 |
| | 75 | 3.24E+01 | 3.24E+01 |
| | 80 | 2.80E+01 | 2.80E+01 |
| | 85 | 1.98E+01 | 1.98E+01 |
| | **90** | **1.59E+01** | **1.59E+01** |
| | 95 | 1.11E+01 | 1.11E+01 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 3 |
| Bulk density (g/cm^3) | 1.8 |
| Chemical | n-hexane |
| MCL (mg/l) | 0.84 |
| Da (cm^2/sec) | 7.87E-02 |
| Henry's Law Constant (m^3-atm/mole) | 7.70E-01 |
| log Kow | 2.77 |
| Koc (ml/g) | 370.97 |
| Solubility (mg/l) | 18 |
| Chemical Density (g/cm^3) | 0.65 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 1E-11 | 281 | 8.40E+12 | 0.54 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 2 | 17.8 | 1E-11 | 126 | 8.40E+12 | 0.4 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 3 | 13 | 4.426E-07 | 22 | 1.90E+08 | 0.51 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 4 | 51.1 | 1E-11 | 442 | 8.40E+12 | 0.58 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 5 | 32.6 | 1E-11 | 253 | 8.40E+12 | 0.4 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 6 | 39.4 | 1E-11 | 294 | 8.40E+12 | 0.38 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 7 | 34.6 | 1E-11 | 310 | 8.40E+12 | 0.45 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 8 | 32 | 1E-11 | 244 | 8.40E+12 | 0.4 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 9 | 28.1 | 1E-11 | 217 | 8.40E+12 | 0.41 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 10 | 30.6 | 1E-11 | 254 | 8.40E+12 | 0.46 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 11 | 44 | 1E-11 | 415 | 8.40E+12 | 0.55 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 12 | 20.3 | 1E-11 | 171 | 8.40E+12 | 0.51 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 13 | 31.3 | 1E-11 | 252 | 8.40E+12 | 0.5 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 14 | 30.2 | 1E-11 | 262 | 8.40E+12 | 0.58 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 15 | 19.2 | 1E-11 | 162 | 8.40E+12 | 0.55 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 16 | 9 | 1E-11 | 26 | 8.40E+12 | 0.45 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 17 | 21.5 | 1E-11 | 191 | 8.40E+12 | 0.49 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 18 | 15 | 1.288E-06 | 31 | 6.52E+07 | 0.37 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 19 | 35.2 | 1E-11 | 288 | 8.40E+12 | 0.42 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 20 | 18.7 | 1E-11 | 142 | 8.40E+12 | 0.3 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 21 | 47.4 | 1E-11 | 393 | 8.40E+12 | 0.32 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 22 | 22.1 | 1E-11 | 153 | 8.40E+12 | 0.54 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 23 | 8.15 | 1E-11 | 36 | 8.40E+12 | 0.36 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 24 | 20.2 | 1E-11 | 159 | 8.40E+12 | 0.46 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 25 | 12 | 2.706E-06 | 16 | 3.10E+07 | 0.6 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 26 | 15.8 | 1E-11 | 156 | 8.40E+12 | 0.59 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 27 | 17.4 | 1E-11 | 142 | 8.40E+12 | 0.6 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 28 | 24.7 | 1E-11 | 204 | 8.40E+12 | 0.47 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 29 | 17 | 1E-11 | 105 | 8.40E+12 | 0.32 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 30 | 21.6 | 1E-11 | 138 | 8.40E+12 | 0.56 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 31 | 21 | 1E-11 | 160 | 8.40E+12 | 0.38 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 32 | 27.6 | 1E-11 | 204 | 8.40E+12 | 0.37 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 33 | 8.63 | 1E-11 | 72 | 8.40E+12 | 0.5 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 34 | 13 | 1.423E-06 | 21 | 5.90E+07 | 0.49 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 35 | 15 | 1E-11 | 34 | 8.40E+12 | 0.47 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 36 | 27.1 | 1E-11 | 212 | 8.40E+12 | 0.5 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 37 | 18.1 | 1E-11 | 149 | 8.40E+12 | 0.56 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 38 | 11.7 | 1E-11 | 68 | 8.40E+12 | 0.4 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 39 | 42.4 | 1E-11 | 348 | 8.40E+12 | 0.35 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 40 | 29 | 1.00E-11 | 253 | 8.40E+12 | 0.52 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 41 | 59.2 | 1E-11 | 547 | 8.40E+12 | 0.57 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 42 | 22.4 | 1E-11 | 165 | 8.40E+12 | 0.6 | 1.04E+02 | SCN>SSL | 1.04E+02 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 1E-11 | 152 | 8.40E+12 | 0.43 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 44 | 15 | 1E-11 | 32 | 8.40E+12 | 0.54 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 45 | 13.2 | 1E-11 | 80 | 8.40E+12 | 0.41 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 46 | 40.5 | 1E-11 | 305 | 8.40E+12 | 0.34 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 47 | 45 | 1E-11 | 408 | 8.40E+12 | 0.6 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 48 | 14.9 | 1E-11 | 128 | 8.40E+12 | 0.59 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 49 | 5 | 1E-11 | 45 | 8.40E+12 | 0.6 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 50 | 26.5 | 1E-11 | 218 | 8.40E+12 | 0.5 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 51 | 9.44 | 1E-11 | 44 | 8.40E+12 | 0.6 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 52 | 15.5 | 1E-11 | 134 | 8.40E+12 | 0.55 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 53 | 36.6 | 1E-11 | 330 | 8.40E+12 | 0.51 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 54 | 33.6 | 1E-11 | 299 | 8.40E+12 | 0.52 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 55 | 41.2 | 1E-11 | 349 | 8.40E+12 | 0.47 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 56 | 52.4 | 1E-11 | 456 | 8.40E+12 | 0.44 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 57 | 23 | 1E-11 | 199 | 8.40E+12 | 0.52 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 58 | 14.7 | 1E-11 | 48 | 8.40E+12 | 0.6 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 59 | 16.2 | 1E-11 | 130 | 8.40E+12 | 0.6 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 60 | 19.4 | 1E-11 | 159 | 8.40E+12 | 0.46 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 61 | 23.5 | 1E-11 | 191 | 8.40E+12 | 0.42 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 62 | 37 | 1E-11 | 310 | 8.40E+12 | 0.38 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 63 | 24.2 | 1E-11 | 206 | 8.40E+12 | 0.5 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 64 | 29.8 | 1E-11 | 212 | 8.40E+12 | 0.48 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 65 | 38.4 | 1E-11 | 372 | 8.40E+12 | 0.6 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 66 | 5.13 | 1E-11 | 19 | 8.40E+12 | 0.6 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 67 | 14.2 | 1E-11 | 105 | 8.40E+12 | 0.57 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 68 | 25.5 | 1E-11 | 176 | 8.40E+12 | 0.38 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 69 | 26.1 | 1E-11 | 261 | 8.40E+12 | 0.6 | 1.04E+02 | SCN>SSL | 1.04E+02 |
| 70 | 34 | 1E-11 | 296 | 8.40E+12 | 0.6 | 1.04E+02 | SCN>SSL | 1.04E+02 |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 8.37E-08 | 7.92E+12 | 1.04E+02 |
| | std. dev. | 3.94E-07 | 1.96E+12 | 0.00E+00 |
| | max | 2.71E-06 | 8.40E+12 | 1.04E+02 |
| | min | 1.00E-11 | 3.10E+07 | 1.04E+02 |
| | median | 1.00E-11 | 8.40E+12 | 1.04E+02 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 8.40E+12 | 1.04E+02 |
| | 55 | 8.40E+12 | 1.04E+02 |
| | 60 | 8.40E+12 | 1.04E+02 |
| | 65 | 8.40E+12 | 1.04E+02 |
| | 70 | 8.40E+12 | 1.04E+02 |
| | 75 | 8.40E+12 | 1.04E+02 |
| | 80 | 8.40E+12 | 1.04E+02 |
| | 85 | 8.40E+12 | 1.04E+02 |
| | **90** | **8.40E+12** | **1.04E+02** |
| | 95 | 3.78E+12 | 1.04E+02 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 3 |
| Bulk density (g/cm^3) | 1.8 |
| Chemical | Methyl Ethyl Ketone |
| MCL (mg/l) | 8.9 |
| Da (cm^2/sec) | 9.42E-02 |
| Henry's Law Constant (m^3-atm/mole) | 1.05E-05 |
| log Kow | 0.29 |
| Koc (ml/g) | 1.228 |
| Solubility (mg/l) | 239000 |
| Chemical Density (g/cm^3) | 0.8 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 156.2 | 23 | 5.6978 | 0.54 | 2.08E+04 | | 5.70E+00 |
| 2 | 17.8 | 571.8 | 10 | 1.5565 | 0.4 | 2.08E+04 | | 1.56E+00 |
| 3 | 13 | 407.2 | 3 | 2.1857 | 0.51 | 2.08E+04 | | 2.19E+00 |
| 4 | 51.1 | 87.55 | 34 | 10.1656 | 0.58 | 2.08E+04 | | 1.02E+01 |
| 5 | 32.6 | 119.4 | 18 | 7.4539 | 0.4 | 2.08E+04 | | 7.45E+00 |
| 6 | 39.4 | 116.7 | 20 | 7.6264 | 0.38 | 2.08E+04 | | 7.63E+00 |
| 7 | 34.6 | 154.4 | 24 | 5.7642 | 0.45 | 2.08E+04 | | 5.76E+00 |
| 8 | 32 | 74.66 | 17 | 11.9207 | 0.4 | 2.08E+04 | | 1.19E+01 |
| 9 | 28.1 | 217.3 | 16 | 4.0957 | 0.41 | 2.08E+04 | | 4.10E+00 |
| 10 | 30.6 | 52.35 | 19 | 17.0010 | 0.46 | 2.08E+04 | | 1.70E+01 |
| 11 | 44 | 140.1 | 33 | 6.3526 | 0.55 | 2.08E+04 | | 6.35E+00 |
| 12 | 20.3 | 168.2 | 14 | 5.2913 | 0.51 | 2.08E+04 | | 5.29E+00 |
| 13 | 31.3 | 289.6 | 19 | 3.0732 | 0.5 | 2.08E+04 | | 3.07E+00 |
| 14 | 30.2 | 61.15 | 22 | 14.5544 | 0.58 | 2.08E+04 | | 1.46E+01 |
| 15 | 19.2 | 359.9 | 14 | 2.4729 | 0.55 | 2.08E+04 | | 2.47E+00 |
| 16 | 9 | 621.6 | 4 | 1.4318 | 0.45 | 2.08E+04 | | 1.43E+00 |
| 17 | 21.5 | 262.6 | 16 | 3.3892 | 0.49 | 2.08E+04 | | 3.39E+00 |
| 18 | 15 | 629.9 | 3 | 1.4129 | 0.37 | 2.08E+04 | | 1.41E+00 |
| 19 | 35.2 | 163.8 | 21 | 5.4335 | 0.42 | 2.08E+04 | | 5.43E+00 |
| 20 | 18.7 | 388.6 | 9 | 2.2903 | 0.3 | 2.08E+04 | | 2.29E+00 |
| 21 | 47.4 | 47.38 | 26 | 18.7843 | 0.32 | 2.08E+04 | | 1.88E+01 |
| 22 | 22.1 | 105 | 12 | 8.4762 | 0.54 | 2.08E+04 | | 8.48E+00 |
| 23 | 8.15 | 418.3 | 4 | 2.1277 | 0.36 | 2.08E+04 | | 2.13E+00 |
| 24 | 20.2 | 85.16 | 13 | 10.4509 | 0.46 | 2.08E+04 | | 1.05E+01 |
| 25 | 12 | 263 | 3 | 3.3840 | 0.6 | 2.08E+04 | | 3.38E+00 |
| 26 | 15.8 | 288.2 | 14 | 3.0881 | 0.59 | 2.08E+04 | | 3.09E+00 |
| 27 | 17.4 | 171.1 | 12 | 5.2016 | 0.6 | 2.08E+04 | | 5.20E+00 |
| 28 | 24.7 | 153.1 | 16 | 5.8132 | 0.47 | 2.08E+04 | | 5.81E+00 |
| 29 | 17 | 343.9 | 7 | 2.5880 | 0.32 | 2.08E+04 | | 2.59E+00 |
| 30 | 21.6 | 100.9 | 11 | 8.8206 | 0.56 | 2.08E+04 | | 8.82E+00 |
| 31 | 21 | 358.3 | 12 | 2.4840 | 0.38 | 2.08E+04 | | 2.48E+00 |
| 32 | 27.6 | 68.57 | 14 | 12.9794 | 0.37 | 2.08E+04 | | 1.30E+01 |
| 33 | 8.63 | 446.8 | 7 | 1.9919 | 0.5 | 2.08E+04 | | 1.99E+00 |
| 34 | 13 | 420 | 3 | 2.1190 | 0.49 | 2.08E+04 | | 2.12E+00 |
| 35 | 15 | 527.3 | 4 | 1.6878 | 0.47 | 2.08E+04 | | 1.69E+00 |
| 36 | 27.1 | 81.2 | 17 | 10.9606 | 0.5 | 2.08E+04 | | 1.10E+01 |
| 37 | 18.1 | 96.23 | 13 | 9.2487 | 0.56 | 2.08E+04 | | 9.25E+00 |
| 38 | 11.7 | 731.4 | 6 | 1.2168 | 0.4 | 2.08E+04 | | 1.22E+00 |
| 39 | 42.4 | 95.37 | 24 | 9.3321 | 0.35 | 2.08E+04 | | 9.33E+00 |
| 40 | 29 | 4.67E+01 | 20 | 19.0456 | 0.52 | 2.08E+04 | | 1.90E+01 |
| 41 | 59.2 | 88.81 | 43 | 10.0214 | 0.57 | 2.08E+04 | | 1.00E+01 |
| 42 | 22.4 | 315.6 | 14 | 2.8200 | 0.6 | 2.08E+04 | | 2.82E+00 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 325.7 | 11 | 2.7326 | 0.43 | 2.08E+04 | | 2.73E+00 |
| 44 | 15 | 455.4 | 4 | 1.9543 | 0.54 | 2.08E+04 | | 1.95E+00 |
| 45 | 13.2 | 390.1 | 6 | 2.2815 | 0.41 | 2.08E+04 | | 2.28E+00 |
| 46 | 40.5 | 48.18 | 20 | 18.4724 | 0.34 | 2.08E+04 | | 1.85E+01 |
| 47 | 45 | 142.5 | 32 | 6.2456 | 0.6 | 2.08E+04 | | 6.25E+00 |
| 48 | 14.9 | 485.7 | 12 | 1.8324 | 0.59 | 2.08E+04 | | 1.83E+00 |
| 49 | 5 | 507.2 | 6 | 1.7547 | 0.6 | 2.08E+04 | | 1.75E+00 |
| 50 | 26.5 | 129.9 | 17 | 6.8514 | 0.5 | 2.08E+04 | | 6.85E+00 |
| 51 | 9.44 | 553.4 | 5 | 1.6082 | 0.6 | 2.08E+04 | | 1.61E+00 |
| 52 | 15.5 | 107.5 | 12 | 8.2791 | 0.55 | 2.08E+04 | | 8.28E+00 |
| 53 | 36.6 | 40.6 | 27 | 21.9212 | 0.51 | 2.08E+04 | | 2.19E+01 |
| 54 | 33.6 | 43.69 | 24 | 20.3708 | 0.52 | 2.08E+04 | | 2.04E+01 |
| 55 | 41.2 | 95.58 | 26 | 9.3116 | 0.47 | 2.08E+04 | | 9.31E+00 |
| 56 | 52.4 | 99.03 | 34 | 8.9872 | 0.44 | 2.08E+04 | | 8.99E+00 |
| 57 | 23 | 75.04 | 17 | 11.8603 | 0.52 | 2.08E+04 | | 1.19E+01 |
| 58 | 14.7 | 463.4 | 6 | 1.9206 | 0.6 | 2.08E+04 | | 1.92E+00 |
| 59 | 16.2 | 472.3 | 12 | 1.8844 | 0.6 | 2.08E+04 | | 1.88E+00 |
| 60 | 19.4 | 303.9 | 13 | 2.9286 | 0.46 | 2.08E+04 | | 2.93E+00 |
| 61 | 23.5 | 181 | 15 | 4.9171 | 0.42 | 2.08E+04 | | 4.92E+00 |
| 62 | 37 | 161.3 | 22 | 5.5177 | 0.38 | 2.08E+04 | | 5.52E+00 |
| 63 | 24.2 | 234.4 | 17 | 3.7969 | 0.5 | 2.08E+04 | | 3.80E+00 |
| 64 | 29.8 | 221.6 | 16 | 4.0162 | 0.48 | 2.08E+04 | | 4.02E+00 |
| 65 | 38.4 | 145.9 | 31 | 6.1001 | 0.6 | 2.08E+04 | | 6.10E+00 |
| 66 | 5.13 | 405.9 | 4 | 2.1927 | 0.6 | 2.08E+04 | | 2.19E+00 |
| 67 | 14.2 | 229.2 | 9 | 3.8831 | 0.57 | 2.08E+04 | | 3.88E+00 |
| 68 | 25.5 | 349.7 | 12 | 2.5450 | 0.38 | 2.08E+04 | | 2.55E+00 |
| 69 | 26.1 | 215.2 | 22 | 4.1357 | 0.6 | 2.08E+04 | | 4.14E+00 |
| 70 | 34 | 100.9 | 24 | 8.8206 | 0.6 | 2.08E+04 | | 8.82E+00 |
| | | | | | | 2.08E+04 | | |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 2.47E+02 | 6.41E+00 | 6.41E+00 |
| | std. dev. | 1.75E+02 | 5.17E+00 | 5.17E+00 |
| | max | 7.31E+02 | 2.19E+01 | 2.19E+01 |
| | min | 4.06E+01 | 1.22E+00 | 1.22E+00 |
| | median | 1.76E+02 | 5.06E+00 | 5.06E+00 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 5.06E+00 | 5.06E+00 |
| | 55 | 4.02E+00 | 4.02E+00 |
| | 60 | 3.39E+00 | 3.39E+00 |
| | 65 | 2.95E+00 | 2.95E+00 |
| | 70 | 2.58E+00 | 2.58E+00 |
| | 75 | 2.34E+00 | 2.34E+00 |
| | 80 | 2.17E+00 | 2.17E+00 |
| | 85 | 1.97E+00 | 1.97E+00 |
| | **90** | **1.82E+00** | **1.82E+00** |
| | 95 | 1.58E+00 | 1.58E+00 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 3 |
| Bulk density (g/cm^3) | 1.8 |
| Chemical | Napthalene |
| MCL (mg/l) | 0.067 |
| Da (cm^2/sec) | 7.22E-02 |
| Henry's Law Constant (m^3-atm/mole) | 4.83E-04 |
| log Kow | 3.3 |
| Koc (ml/g) | 1257.01 |
| Solubility (mg/l) | 31.7 |
| Chemical Density (g/cm^3) | 1.16 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 5.434 | 395 | 1.2330 | 0.54 | 1.22E+02 | | 1.23E+00 |
| 2 | 17.8 | 17.74 | 207 | 0.3777 | 0.4 | 1.22E+02 | | 3.78E-01 |
| 3 | 13 | 14.1 | 48 | 0.4752 | 0.51 | 1.22E+02 | | 4.75E-01 |
| 4 | 51.1 | 4.259 | 562 | 1.5731 | 0.58 | 1.22E+02 | | 1.57E+00 |
| 5 | 32.6 | 4.159 | 410 | 1.6110 | 0.4 | 1.22E+02 | | 1.61E+00 |
| 6 | 39.4 | 3.875 | 484 | 1.7290 | 0.38 | 1.22E+02 | | 1.73E+00 |
| 7 | 34.6 | 5.761 | 488 | 1.1630 | 0.45 | 1.22E+02 | | 1.16E+00 |
| 8 | 32 | 2.413 | 399 | 2.7766 | 0.4 | 1.22E+02 | | 2.78E+00 |
| 9 | 28.1 | 7.617 | 347 | 0.8796 | 0.41 | 1.22E+02 | | 8.80E-01 |
| 10 | 30.6 | 1.966 | 388 | 3.4079 | 0.46 | 1.22E+02 | | 3.41E+00 |
| 11 | 44 | 6.368 | 572 | 1.0521 | 0.55 | 1.22E+02 | | 1.05E+00 |
| 12 | 20.3 | 6.524 | 248 | 1.0270 | 0.51 | 1.22E+02 | | 1.03E+00 |
| 13 | 31.3 | 10.91 | 351 | 0.6141 | 0.5 | 1.22E+02 | | 6.14E-01 |
| 14 | 30.2 | 2.52 | 350 | 2.6587 | 0.58 | 1.22E+02 | | 2.66E+00 |
| 15 | 19.2 | 14.54 | 220 | 0.4608 | 0.55 | 1.22E+02 | | 4.61E-01 |
| 16 | 9 | 23.96 | 60 | 0.2796 | 0.45 | 1.22E+02 | | 2.80E-01 |
| 17 | 21.5 | 9.789 | 287 | 0.6844 | 0.49 | 1.22E+02 | | 6.84E-01 |
| 18 | 15 | 22.27 | 60 | 0.3009 | 0.37 | 1.22E+02 | | 3.01E-01 |
| 19 | 35.2 | 5.902 | 459 | 1.1352 | 0.42 | 1.22E+02 | | 1.14E+00 |
| 20 | 18.7 | 9.207 | 267 | 0.7277 | 0.3 | 1.22E+02 | | 7.28E-01 |
| 21 | 47.4 | 1.306 | 735 | 5.1302 | 0.32 | 1.22E+02 | | 5.13E+00 |
| 22 | 22.1 | 3.433 | 213 | 1.9516 | 0.54 | 1.22E+02 | | 1.95E+00 |
| 23 | 8.15 | 9.183 | 76 | 0.7296 | 0.36 | 1.22E+02 | | 7.30E-01 |
| 24 | 20.2 | 3.105 | 244 | 2.1578 | 0.46 | 1.22E+02 | | 2.16E+00 |
| 25 | 12 | 4.608 | 46 | 1.4540 | 0.6 | 1.22E+02 | | 1.45E+00 |
| 26 | 15.8 | 9.622 | 207 | 0.6963 | 0.59 | 1.22E+02 | | 6.96E-01 |
| 27 | 17.4 | 7.391 | 183 | 0.9065 | 0.6 | 1.22E+02 | | 9.07E-01 |
| 28 | 24.7 | 5.8 | 307 | 1.1552 | 0.47 | 1.22E+02 | | 1.16E+00 |
| 29 | 17 | 9.084 | 190 | 0.7376 | 0.32 | 1.22E+02 | | 7.38E-01 |
| 30 | 21.6 | 3.426 | 183 | 1.9556 | 0.56 | 1.22E+02 | | 1.96E+00 |
| 31 | 21 | 10.94 | 268 | 0.6124 | 0.38 | 1.22E+02 | | 6.12E-01 |
| 32 | 27.6 | 2.206 | 348 | 3.0372 | 0.37 | 1.22E+02 | | 3.04E+00 |
| 33 | 8.63 | 11.03 | 106 | 0.6074 | 0.5 | 1.22E+02 | | 6.07E-01 |
| 34 | 13 | 14.64 | 45 | 0.4577 | 0.49 | 1.22E+02 | | 4.58E-01 |
| 35 | 15 | 21.33 | 67 | 0.3141 | 0.47 | 1.22E+02 | | 3.14E-01 |
| 36 | 27.1 | 2.889 | 309 | 2.3191 | 0.5 | 1.22E+02 | | 2.32E+00 |
| 37 | 18.1 | 3.772 | 206 | 1.7762 | 0.56 | 1.22E+02 | | 1.78E+00 |
| 38 | 11.7 | 23.22 | 114 | 0.2885 | 0.4 | 1.22E+02 | | 2.89E-01 |
| 39 | 42.4 | 2.965 | 620 | 2.2597 | 0.35 | 1.22E+02 | | 2.26E+00 |
| 40 | 29 | 1.14E+00 | 360 | 5.8927 | 0.52 | 1.22E+02 | | 5.89E+00 |
| 41 | 59.2 | 4.286 | 728 | 1.5632 | 0.57 | 1.22E+02 | | 1.56E+00 |
| 42 | 22.4 | 11.29 | 204 | 0.5934 | 0.6 | 1.22E+02 | | 5.93E-01 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 10.61 | 224 | 0.6315 | 0.43 | 1.22E+02 | | 6.31E-01 |
| 44 | 15 | 20.84 | 57 | 0.3215 | 0.54 | 1.22E+02 | | 3.21E-01 |
| 45 | 13.2 | 11.84 | 129 | 0.5659 | 0.41 | 1.22E+02 | | 5.66E-01 |
| 46 | 40.5 | 1.445 | 545 | 4.6367 | 0.34 | 1.22E+02 | | 4.64E+00 |
| 47 | 45 | 6.892 | 515 | 0.9721 | 0.6 | 1.22E+02 | | 9.72E-01 |
| 48 | 14.9 | 18.7 | 175 | 0.3583 | 0.59 | 1.22E+02 | | 3.58E-01 |
| 49 | 5 | 21.4 | 69 | 0.3131 | 0.6 | 1.22E+02 | | 3.13E-01 |
| 50 | 26.5 | 5.22 | 313 | 1.2835 | 0.5 | 1.22E+02 | | 1.28E+00 |
| 51 | 9.44 | 19.1 | 69 | 0.3508 | 0.6 | 1.22E+02 | | 3.51E-01 |
| 52 | 15.5 | 4.097 | 193 | 1.6353 | 0.55 | 1.22E+02 | | 1.64E+00 |
| 53 | 36.6 | 1.631 | 481 | 4.1079 | 0.51 | 1.22E+02 | | 4.11E+00 |
| 54 | 33.6 | 1.78 | 426 | 3.7640 | 0.52 | 1.22E+02 | | 3.76E+00 |
| 55 | 41.2 | 3.679 | 520 | 1.8211 | 0.47 | 1.22E+02 | | 1.82E+00 |
| 56 | 52.4 | 3.79 | 716 | 1.7678 | 0.44 | 1.22E+02 | | 1.77E+00 |
| 57 | 23 | 2.964 | 286 | 2.2605 | 0.52 | 1.22E+02 | | 2.26E+00 |
| 58 | 14.7 | 15.47 | 78 | 0.4331 | 0.6 | 1.22E+02 | | 4.33E-01 |
| 59 | 16.2 | 18.24 | 173 | 0.3673 | 0.6 | 1.22E+02 | | 3.67E-01 |
| 60 | 19.4 | 10.84 | 241 | 0.6181 | 0.46 | 1.22E+02 | | 6.18E-01 |
| 61 | 23.5 | 6.221 | 309 | 1.0770 | 0.42 | 1.22E+02 | | 1.08E+00 |
| 62 | 37 | 5.313 | 533 | 1.2611 | 0.38 | 1.22E+02 | | 1.26E+00 |
| 63 | 24.2 | 9.18 | 299 | 0.7298 | 0.5 | 1.22E+02 | | 7.30E-01 |
| 64 | 29.8 | 8.358 | 298 | 0.8016 | 0.48 | 1.22E+02 | | 8.02E-01 |
| 65 | 38.4 | 6.946 | 487 | 0.9646 | 0.6 | 1.22E+02 | | 9.65E-01 |
| 66 | 5.13 | 17.94 | 45 | 0.3735 | 0.6 | 1.22E+02 | | 3.73E-01 |
| 67 | 14.2 | 9.219 | 139 | 0.7268 | 0.57 | 1.22E+02 | | 7.27E-01 |
| 68 | 25.5 | 11.44 | 284 | 0.5857 | 0.38 | 1.22E+02 | | 5.86E-01 |
| 69 | 26.1 | 8.331 | 337 | 0.8042 | 0.6 | 1.22E+02 | | 8.04E-01 |
| 70 | 34 | 4.59 | 378 | 1.4597 | 0.6 | 1.22E+02 | | 1.46E+00 |
| | | | | | | 1.22E+02 | | |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 8.74E+00 | 1.37E+00 | 1.37E+00 |
| | std. dev. | 6.22E+00 | 1.19E+00 | 1.19E+00 |
| | max | 2.40E+01 | 5.89E+00 | 5.89E+00 |
| | min | 1.14E+00 | 2.80E-01 | 2.80E-01 |
| | median | 6.92E+00 | 9.68E-01 | 9.68E-01 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 9.68E-01 | 9.68E-01 |
| | 55 | 8.08E-01 | 8.08E-01 |
| | 60 | 7.30E-01 | 7.30E-01 |
| | 65 | 7.01E-01 | 7.01E-01 |
| | 70 | 6.17E-01 | 6.17E-01 |
| | 75 | 5.97E-01 | 5.97E-01 |
| | 80 | 4.72E-01 | 4.72E-01 |
| | 85 | 3.97E-01 | 3.97E-01 |
| | **90** | **3.58E-01** | **3.58E-01** |
| | 95 | 3.14E-01 | 3.14E-01 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 3 |
| Bulk density (g/cm^3) | 1.8 |
| Chemical | PCE |
| MCL (mg/l) | 0.005 |
| Da (cm^2/sec) | 7.81E-02 |
| Henry's Law Constant (m^3-atm/mole) | 1.49E-02 |
| log Kow | 3.4 |
| Koc (ml/g) | 866.96 |
| Solubility (mg/l) | 150 |
| Chemical Density (g/cm^3) | 1.62 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.0006215 | 217 | 804.5052 | 0.54 | 4.16E+02 | SCN>SSL | 4.16E+02 |
| 2 | 17.8 | 1.073 | 126 | 0.4660 | 0.4 | 4.16E+02 | | 4.66E-01 |
| 3 | 13 | 3.33 | 29 | 0.1502 | 0.51 | 4.16E+02 | | 1.50E-01 |
| 4 | 51.1 | 0.5559 | 333 | 0.8994 | 0.58 | 4.16E+02 | | 8.99E-01 |
| 5 | 32.6 | 0.2431 | 236 | 2.0568 | 0.4 | 4.16E+02 | | 2.06E+00 |
| 6 | 39.4 | 0.8177 | 289 | 0.6115 | 0.38 | 4.16E+02 | | 6.11E-01 |
| 7 | 34.6 | 0.0975 | 271 | 5.1282 | 0.45 | 4.16E+02 | | 5.13E+00 |
| 8 | 32 | 0.3701 | 226 | 1.3510 | 0.4 | 4.16E+02 | | 1.35E+00 |
| 9 | 28.1 | 0.4478 | 198 | 1.1166 | 0.41 | 4.16E+02 | | 1.12E+00 |
| 10 | 30.6 | 0.01178 | 213 | 42.4448 | 0.46 | 4.16E+02 | | 4.24E+01 |
| 11 | 44 | 0.2627 | 321 | 1.9033 | 0.55 | 4.16E+02 | | 1.90E+00 |
| 12 | 20.3 | 0.01275 | 142 | 39.2157 | 0.51 | 4.16E+02 | | 3.92E+01 |
| 13 | 31.3 | 1.358 | 207 | 0.3682 | 0.5 | 4.16E+02 | | 3.68E-01 |
| 14 | 30.2 | 0.1686 | 198 | 2.9656 | 0.58 | 4.16E+02 | | 2.97E+00 |
| 15 | 19.2 | 0.1045 | 129 | 4.7847 | 0.55 | 4.16E+02 | | 4.78E+00 |
| 16 | 9 | 5.496 | 33 | 0.0910 | 0.45 | 4.16E+02 | | 9.10E-02 |
| 17 | 21.5 | 0.04801 | 163 | 10.4145 | 0.49 | 4.16E+02 | | 1.04E+01 |
| 18 | 15 | 8.164 | 40 | 0.0612 | 0.37 | 4.16E+02 | | 6.12E-02 |
| 19 | 35.2 | 0.3833 | 264 | 1.3045 | 0.42 | 4.16E+02 | | 1.30E+00 |
| 20 | 18.7 | 0.03322 | 156 | 15.0512 | 0.3 | 4.16E+02 | | 1.51E+01 |
| 21 | 47.4 | 0.1396 | 442 | 3.5817 | 0.32 | 4.16E+02 | | 3.58E+00 |
| 22 | 22.1 | 0.3245 | 127 | 1.5408 | 0.54 | 4.16E+02 | | 1.54E+00 |
| 23 | 8.15 | 0.4228 | 44 | 1.1826 | 0.36 | 4.16E+02 | | 1.18E+00 |
| 24 | 20.2 | 0.006422 | 141 | 77.8574 | 0.46 | 4.16E+02 | | 7.79E+01 |
| 25 | 12 | 1.568 | 25 | 0.3189 | 0.6 | 4.16E+02 | | 3.19E-01 |
| 26 | 15.8 | 0.006 | 90 | 83.3333 | 0.59 | 4.16E+02 | | 8.33E+01 |
| 27 | 17.4 | 0.004706 | 107 | 106.2473 | 0.6 | 4.16E+02 | | 1.06E+02 |
| 28 | 24.7 | 0.1196 | 176 | 4.1806 | 0.47 | 4.16E+02 | | 4.18E+00 |
| 29 | 17 | 0.6518 | 117 | 0.7671 | 0.32 | 4.16E+02 | | 7.67E-01 |
| 30 | 21.6 | 0.3562 | 112 | 1.4037 | 0.56 | 4.16E+02 | | 1.40E+00 |
| 31 | 21 | 0.5382 | 160 | 0.9290 | 0.38 | 4.16E+02 | | 9.29E-01 |
| 32 | 27.6 | 0.0326 | 198 | 15.3374 | 0.37 | 4.16E+02 | | 1.53E+01 |
| 33 | 8.63 | 0.00000436 | 63 | 114678.8991 | 0.5 | 4.16E+02 | SCN>SSL | 4.16E+02 |
| 34 | 13 | 3.532 | 28 | 0.1416 | 0.49 | 4.16E+02 | | 1.42E-01 |
| 35 | 15 | 6.416 | 42 | 0.0779 | 0.47 | 4.16E+02 | | 7.79E-02 |
| 36 | 27.1 | 0.2772 | 178 | 1.8038 | 0.5 | 4.16E+02 | | 1.80E+00 |
| 37 | 18.1 | 0.01646 | 119 | 30.3767 | 0.56 | 4.16E+02 | | 3.04E+01 |
| 38 | 11.7 | 1.038 | 69 | 0.4817 | 0.4 | 4.16E+02 | | 4.82E-01 |
| 39 | 42.4 | 0.1235 | 364 | 4.0486 | 0.35 | 4.16E+02 | | 4.05E+00 |
| 40 | 29 | 1.00E-11 | 176 | 50000000000.0000 | 0.52 | 4.16E+02 | SCN>SSL | 4.16E+02 |
| 41 | 59.2 | 0.1382 | 424 | 3.6179 | 0.57 | 4.16E+02 | | 3.62E+00 |
| 42 | 22.4 | 0.8822 | 128 | 0.5668 | 0.6 | 4.16E+02 | | 5.67E-01 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 1.809 | 140 | 0.2764 | 0.43 | 4.16E+02 | | 2.76E-01 |
| 44 | 15 | 6.081 | 37 | 0.0822 | 0.54 | 4.16E+02 | | 8.22E-02 |
| 45 | 13.2 | 0.3643 | 81 | 1.3725 | 0.41 | 4.16E+02 | | 1.37E+00 |
| 46 | 40.5 | 0.05532 | 326 | 9.0383 | 0.34 | 4.16E+02 | | 9.04E+00 |
| 47 | 45 | 0.7409 | 296 | 0.6749 | 0.6 | 4.16E+02 | | 6.75E-01 |
| 48 | 14.9 | 0.06469 | 102 | 7.7292 | 0.59 | 4.16E+02 | | 7.73E+00 |
| 49 | 5 | 0.0873 | 37 | 5.7274 | 0.6 | 4.16E+02 | | 5.73E+00 |
| 50 | 26.5 | 0.1042 | 178 | 4.7985 | 0.5 | 4.16E+02 | | 4.80E+00 |
| 51 | 9.44 | 0.7355 | 40 | 0.6798 | 0.6 | 4.16E+02 | | 6.80E-01 |
| 52 | 15.5 | 0.0006069 | 110 | 823.8590 | 0.55 | 4.16E+02 | SCN>SSL | 4.16E+02 |
| 53 | 36.6 | 0.00785 | 267 | 63.6943 | 0.51 | 4.16E+02 | | 6.37E+01 |
| 54 | 33.6 | 0.006526 | 235 | 76.6166 | 0.52 | 4.16E+02 | | 7.66E+01 |
| 55 | 41.2 | 0.497 | 299 | 1.0060 | 0.47 | 4.16E+02 | | 1.01E+00 |
| 56 | 52.4 | 0.3301 | 425 | 1.5147 | 0.44 | 4.16E+02 | | 1.51E+00 |
| 57 | 23 | 0.02337 | 163 | 21.3950 | 0.52 | 4.16E+02 | | 2.14E+01 |
| 58 | 14.7 | 2.894 | 49 | 0.1728 | 0.6 | 4.16E+02 | | 1.73E-01 |
| 59 | 16.2 | 0.2544 | 103 | 1.9654 | 0.6 | 4.16E+02 | | 1.97E+00 |
| 60 | 19.4 | 0.08082 | 142 | 6.1866 | 0.46 | 4.16E+02 | | 6.19E+00 |
| 61 | 23.5 | 0.1677 | 178 | 2.9815 | 0.42 | 4.16E+02 | | 2.98E+00 |
| 62 | 37 | 0.2106 | 305 | 2.3742 | 0.38 | 4.16E+02 | | 2.37E+00 |
| 63 | 24.2 | 0.1938 | 173 | 2.5800 | 0.5 | 4.16E+02 | | 2.58E+00 |
| 64 | 29.8 | 1.185 | 177 | 0.4219 | 0.48 | 4.16E+02 | | 4.22E-01 |
| 65 | 38.4 | 0.07504 | 268 | 6.6631 | 0.6 | 4.16E+02 | | 6.66E+00 |
| 66 | 5.13 | 0.3481 | 19 | 1.4364 | 0.6 | 4.16E+02 | | 1.44E+00 |
| 67 | 14.2 | 0.007597 | 84 | 65.8155 | 0.57 | 4.16E+02 | | 6.58E+01 |
| 68 | 25.5 | 1.22 | 168 | 0.4098 | 0.38 | 4.16E+02 | | 4.10E-01 |
| 69 | 26.1 | 0.001972 | 190 | 253.5497 | 0.6 | 4.16E+02 | | 2.54E+02 |
| 70 | 34 | 0.3435 | 214 | 1.4556 | 0.6 | 4.16E+02 | | 1.46E+00 |
| | | | | | | 4.16E+02 | | |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 8.21E-01 | 7.14E+08 | 3.82E+01 |
| | std. dev. | 1.61E+00 | 5.98E+09 | 1.01E+02 |
| | max | 8.16E+00 | 5.00E+10 | 4.16E+02 |
| | min | 1.00E-11 | 6.12E-02 | 6.12E-02 |
| | median | 2.49E-01 | 2.01E+00 | 2.01E+00 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 2.01E+00 | 2.01E+00 |
| | 55 | 1.55E+00 | 1.55E+00 |
| | 60 | 1.42E+00 | 1.42E+00 |
| | 65 | 1.31E+00 | 1.31E+00 |
| | 70 | 9.83E-01 | 9.83E-01 |
| | 75 | 7.02E-01 | 7.02E-01 |
| | 80 | 5.50E-01 | 5.50E-01 |
| | 85 | 4.14E-01 | 4.14E-01 |
| | **90** | **2.66E-01** | **2.66E-01** |
| | 95 | 1.14E-01 | 1.14E-01 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 3 |
| Bulk density (g/cm^3) | 1.8 |
| Chemical | Phenol |
| MCL (mg/l) | 4.7 |
| Da (cm^2/sec) | 8.75E-02 |
| Henry's Law Constant (m^3-atm/mole) | 3.97E-07 |
| log Kow | 1.46 |
| Koc (ml/g) | 18.16 |
| Solubility (mg/l) | 87000 |
| Chemical Density (g/cm^3) | 1.06 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 128.1 | 29 | 3.6690 | 0.54 | 1.20E+04 | | 3.67E+00 |
| 2 | 17.8 | 441 | 12 | 1.0658 | 0.4 | 1.20E+04 | | 1.07E+00 |
| 3 | 13 | 333.8 | 4 | 1.4080 | 0.51 | 1.20E+04 | | 1.41E+00 |
| 4 | 51.1 | 71.91 | 42 | 6.5359 | 0.58 | 1.20E+04 | | 6.54E+00 |
| 5 | 32.6 | 90.22 | 24 | 5.2095 | 0.4 | 1.20E+04 | | 5.21E+00 |
| 6 | 39.4 | 87.8 | 26 | 5.3531 | 0.38 | 1.20E+04 | | 5.35E+00 |
| 7 | 34.6 | 120.3 | 30 | 3.9069 | 0.45 | 1.20E+04 | | 3.91E+00 |
| 8 | 32 | 57.2 | 23 | 8.2168 | 0.4 | 1.20E+04 | | 8.22E+00 |
| 9 | 28.1 | 165.9 | 20 | 2.8330 | 0.41 | 1.20E+04 | | 2.83E+00 |
| 10 | 30.6 | 41.3 | 25 | 11.3801 | 0.46 | 1.20E+04 | | 1.14E+01 |
| 11 | 44 | 114.2 | 41 | 4.1156 | 0.55 | 1.20E+04 | | 4.12E+00 |
| 12 | 20.3 | 134.1 | 18 | 3.5048 | 0.51 | 1.20E+04 | | 3.50E+00 |
| 13 | 31.3 | 231.8 | 24 | 2.0276 | 0.5 | 1.20E+04 | | 2.03E+00 |
| 14 | 30.2 | 50.51 | 27 | 9.3051 | 0.58 | 1.20E+04 | | 9.31E+00 |
| 15 | 19.2 | 293.3 | 17 | 1.6025 | 0.55 | 1.20E+04 | | 1.60E+00 |
| 16 | 9 | 497.1 | 5 | 0.9455 | 0.45 | 1.20E+04 | | 9.45E-01 |
| 17 | 21.5 | 208.2 | 20 | 2.2574 | 0.49 | 1.20E+04 | | 2.26E+00 |
| 18 | 15 | 482.9 | 4 | 0.9733 | 0.37 | 1.20E+04 | | 9.73E-01 |
| 19 | 35.2 | 125.8 | 27 | 3.7361 | 0.42 | 1.20E+04 | | 3.74E+00 |
| 20 | 18.7 | 277.8 | 13 | 1.6919 | 0.3 | 1.20E+04 | | 1.69E+00 |
| 21 | 47.4 | 33.81 | 36 | 13.9012 | 0.32 | 1.20E+04 | | 1.39E+01 |
| 22 | 22.1 | 85.99 | 15 | 5.4658 | 0.54 | 1.20E+04 | | 5.47E+00 |
| 23 | 8.15 | 328.3 | 5 | 1.4316 | 0.36 | 1.20E+04 | | 1.43E+00 |
| 24 | 20.2 | 66.78 | 16 | 7.0380 | 0.46 | 1.20E+04 | | 7.04E+00 |
| 25 | 12 | 236 | 4 | 1.9915 | 0.6 | 1.20E+04 | | 1.99E+00 |
| 26 | 15.8 | 243 | 17 | 1.9342 | 0.59 | 1.20E+04 | | 1.93E+00 |
| 27 | 17.4 | 138.9 | 15 | 3.3837 | 0.6 | 1.20E+04 | | 3.38E+00 |
| 28 | 24.7 | 121.2 | 20 | 3.8779 | 0.47 | 1.20E+04 | | 3.88E+00 |
| 29 | 17 | 241.5 | 10 | 1.9462 | 0.32 | 1.20E+04 | | 1.95E+00 |
| 30 | 21.6 | 84.84 | 13 | 5.5398 | 0.56 | 1.20E+04 | | 5.54E+00 |
| 31 | 21 | 269.2 | 15 | 1.7459 | 0.38 | 1.20E+04 | | 1.75E+00 |
| 32 | 27.6 | 51.25 | 19 | 9.1707 | 0.37 | 1.20E+04 | | 9.17E+00 |
| 33 | 8.63 | 362 | 8 | 1.2983 | 0.5 | 1.20E+04 | | 1.30E+00 |
| 34 | 13 | 334.2 | 4 | 1.4063 | 0.49 | 1.20E+04 | | 1.41E+00 |
| 35 | 15 | 417 | 5 | 1.1271 | 0.47 | 1.20E+04 | | 1.13E+00 |
| 36 | 27.1 | 64.73 | 21 | 7.2609 | 0.5 | 1.20E+04 | | 7.26E+00 |
| 37 | 18.1 | 78.73 | 16 | 5.9698 | 0.56 | 1.20E+04 | | 5.97E+00 |
| 38 | 11.7 | 576.2 | 7 | 0.8157 | 0.4 | 1.20E+04 | | 8.16E-01 |
| 39 | 42.4 | 70.15 | 32 | 6.6999 | 0.35 | 1.20E+04 | | 6.70E+00 |
| 40 | 29 | 3.80E+01 | 25 | 12.3652 | 0.52 | 1.20E+04 | | 1.24E+01 |
| 41 | 59.2 | 72.65 | 53 | 6.4694 | 0.57 | 1.20E+04 | | 6.47E+00 |
| 42 | 22.4 | 263.6 | 16 | 1.7830 | 0.6 | 1.20E+04 | | 1.78E+00 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 254.7 | 14 | 1.8453 | 0.43 | 1.20E+04 | | 1.85E+00 |
| 44 | 15 | 372.7 | 5 | 1.2611 | 0.54 | 1.20E+04 | | 1.26E+00 |
| 45 | 13.2 | 307.9 | 8 | 1.5265 | 0.41 | 1.20E+04 | | 1.53E+00 |
| 46 | 40.5 | 35 | 27 | 13.4286 | 0.34 | 1.20E+04 | | 1.34E+01 |
| 47 | 45 | 117.9 | 39 | 3.9864 | 0.6 | 1.20E+04 | | 3.99E+00 |
| 48 | 14.9 | 402.6 | 14 | 1.1674 | 0.59 | 1.20E+04 | | 1.17E+00 |
| 49 | 5 | 411.2 | 7 | 1.1430 | 0.6 | 1.20E+04 | | 1.14E+00 |
| 50 | 26.5 | 103.8 | 21 | 4.5279 | 0.5 | 1.20E+04 | | 4.53E+00 |
| 51 | 9.44 | 452.2 | 6 | 1.0394 | 0.6 | 1.20E+04 | | 1.04E+00 |
| 52 | 15.5 | 89.15 | 15 | 5.2720 | 0.55 | 1.20E+04 | | 5.27E+00 |
| 53 | 36.6 | 32.6 | 33 | 14.4172 | 0.51 | 1.20E+04 | | 1.44E+01 |
| 54 | 33.6 | 35.15 | 30 | 13.3713 | 0.52 | 1.20E+04 | | 1.34E+01 |
| 55 | 41.2 | 75.16 | 33 | 6.2533 | 0.47 | 1.20E+04 | | 6.25E+00 |
| 56 | 52.4 | 76.99 | 43 | 6.1047 | 0.44 | 1.20E+04 | | 6.10E+00 |
| 57 | 23 | 60.9 | 21 | 7.7176 | 0.52 | 1.20E+04 | | 7.72E+00 |
| 58 | 14.7 | 391.6 | 7 | 1.2002 | 0.6 | 1.20E+04 | | 1.20E+00 |
| 59 | 16.2 | 400.4 | 14 | 1.1738 | 0.6 | 1.20E+04 | | 1.17E+00 |
| 60 | 19.4 | 237.9 | 16 | 1.9756 | 0.46 | 1.20E+04 | | 1.98E+00 |
| 61 | 23.5 | 140.3 | 19 | 3.3500 | 0.42 | 1.20E+04 | | 3.35E+00 |
| 62 | 37 | 121 | 29 | 3.8843 | 0.38 | 1.20E+04 | | 3.88E+00 |
| 63 | 24.2 | 188.6 | 21 | 2.4920 | 0.5 | 1.20E+04 | | 2.49E+00 |
| 64 | 29.8 | 175.3 | 20 | 2.6811 | 0.48 | 1.20E+04 | | 2.68E+00 |
| 65 | 38.4 | 120.9 | 38 | 3.8875 | 0.6 | 1.20E+04 | | 3.89E+00 |
| 66 | 5.13 | 343.5 | 4 | 1.3683 | 0.6 | 1.20E+04 | | 1.37E+00 |
| 67 | 14.2 | 187.7 | 11 | 2.5040 | 0.57 | 1.20E+04 | | 2.50E+00 |
| 68 | 25.5 | 264.7 | 16 | 1.7756 | 0.38 | 1.20E+04 | | 1.78E+00 |
| 69 | 26.1 | 178.7 | 27 | 2.6301 | 0.6 | 1.20E+04 | | 2.63E+00 |
| 70 | 34 | 84.08 | 29 | 5.5899 | 0.6 | 1.20E+04 | | 5.59E+00 |
| | | | | | | 1.20E+04 | | |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 1.97E+02 | 4.28E+00 | 4.28E+00 |
| | std. dev. | 1.40E+02 | 3.52E+00 | 3.52E+00 |
| | max | 5.76E+02 | 1.44E+01 | 1.44E+01 |
| | min | 3.26E+01 | 8.16E-01 | 8.16E-01 |
| | median | 1.40E+02 | 3.37E+00 | 3.37E+00 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 3.37E+00 | 3.37E+00 |
| | 55 | 2.63E+00 | 2.63E+00 |
| | 60 | 2.17E+00 | 2.17E+00 |
| | 65 | 1.95E+00 | 1.95E+00 |
| | 70 | 1.78E+00 | 1.78E+00 |
| | 75 | 1.62E+00 | 1.62E+00 |
| | 80 | 1.41E+00 | 1.41E+00 |
| | 85 | 1.27E+00 | 1.27E+00 |
| | **90** | **1.16E+00** | **1.16E+00** |
| | 95 | 1.05E+00 | 1.05E+00 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 3 |
| Bulk density (g/cm^3) | 1.8 |
| Chemical | Styrene |
| MCL (mg/l) | 0.1 |
| Da (cm^2/sec) | 7.21E-02 |
| Henry's Law Constant (m^3-atm/mole) | 2.81E-03 |
| log Kow | 2.95 |
| Koc (ml/g) | 561.48 |
| Solubility (mg/l) | 310 |
| Chemical Density (g/cm^3) | 0.9 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 2.51 | 173 | 3.9841 | 0.54 | 5.53E+02 | | 3.98E+00 |
| 2 | 17.8 | 20.23 | 89 | 0.4943 | 0.4 | 5.53E+02 | | 4.94E-01 |
| 3 | 13 | 10.38 | 23 | 0.9634 | 0.51 | 5.53E+02 | | 9.63E-01 |
| 4 | 51.1 | 6.049 | 260 | 1.6532 | 0.58 | 5.53E+02 | | 1.65E+00 |
| 5 | 32.6 | 5.61 | 184 | 1.7825 | 0.4 | 5.53E+02 | | 1.78E+00 |
| 6 | 39.4 | 5.784 | 221 | 1.7289 | 0.38 | 5.53E+02 | | 1.73E+00 |
| 7 | 34.6 | 6.737 | 218 | 1.4843 | 0.45 | 5.53E+02 | | 1.48E+00 |
| 8 | 32 | 3.149 | 182 | 3.1756 | 0.4 | 5.53E+02 | | 3.18E+00 |
| 9 | 28.1 | 10 | 154 | 1.0000 | 0.41 | 5.53E+02 | | 1.00E+00 |
| 10 | 30.6 | 1.831 | 172 | 5.4615 | 0.46 | 5.53E+02 | | 5.46E+00 |
| 11 | 44 | 8.251 | 260 | 1.2120 | 0.55 | 5.53E+02 | | 1.21E+00 |
| 12 | 20.3 | 5.262 | 108 | 1.9004 | 0.51 | 5.53E+02 | | 1.90E+00 |
| 13 | 31.3 | 13.13 | 160 | 0.7616 | 0.5 | 5.53E+02 | | 7.62E-01 |
| 14 | 30.2 | 2.66 | 157 | 3.7594 | 0.58 | 5.53E+02 | | 3.76E+00 |
| 15 | 19.2 | 13.22 | 95 | 0.7564 | 0.55 | 5.53E+02 | | 7.56E-01 |
| 16 | 9 | 32.84 | 28 | 0.3045 | 0.45 | 5.53E+02 | | 3.05E-01 |
| 17 | 21.5 | 8.949 | 124 | 1.1174 | 0.49 | 5.53E+02 | | 1.12E+00 |
| 18 | 15 | 30.51 | 28 | 0.3278 | 0.37 | 5.53E+02 | | 3.28E-01 |
| 19 | 35.2 | 8.165 | 207 | 1.2247 | 0.42 | 5.53E+02 | | 1.22E+00 |
| 20 | 18.7 | 7.528 | 116 | 1.3284 | 0.3 | 5.53E+02 | | 1.33E+00 |
| 21 | 47.4 | 1.993 | 334 | 5.0176 | 0.32 | 5.53E+02 | | 5.02E+00 |
| 22 | 22.1 | 3.332 | 95 | 3.0012 | 0.54 | 5.53E+02 | | 3.00E+00 |
| 23 | 8.15 | 7.497 | 35 | 1.3339 | 0.36 | 5.53E+02 | | 1.33E+00 |
| 24 | 20.2 | 2.428 | 106 | 4.1186 | 0.46 | 5.53E+02 | | 4.12E+00 |
| 25 | 12 | 4.425 | 22 | 2.2599 | 0.6 | 5.53E+02 | | 2.26E+00 |
| 26 | 15.8 | 2.849 | 85 | 3.5100 | 0.59 | 5.53E+02 | | 3.51E+00 |
| 27 | 17.4 | 4.899 | 75 | 2.0412 | 0.6 | 5.53E+02 | | 2.04E+00 |
| 28 | 24.7 | 6.278 | 136 | 1.5929 | 0.47 | 5.53E+02 | | 1.59E+00 |
| 29 | 17 | 11.11 | 82 | 0.9001 | 0.32 | 5.53E+02 | | 9.00E-01 |
| 30 | 21.6 | 3.334 | 83 | 2.9994 | 0.56 | 5.53E+02 | | 3.00E+00 |
| 31 | 21 | 13.11 | 118 | 0.7628 | 0.38 | 5.53E+02 | | 7.63E-01 |
| 32 | 27.6 | 2.43 | 155 | 4.1152 | 0.37 | 5.53E+02 | | 4.12E+00 |
| 33 | 8.63 | 1.935 | 49 | 5.1680 | 0.5 | 5.53E+02 | | 5.17E+00 |
| 34 | 13 | 10.89 | 21 | 0.9183 | 0.49 | 5.53E+02 | | 9.18E-01 |
| 35 | 15 | 25.08 | 31 | 0.3987 | 0.47 | 5.53E+02 | | 3.99E-01 |
| 36 | 27.1 | 3.137 | 140 | 3.1878 | 0.5 | 5.53E+02 | | 3.19E+00 |
| 37 | 18.1 | 2.865 | 88 | 3.4904 | 0.56 | 5.53E+02 | | 3.49E+00 |
| 38 | 11.7 | 26.05 | 49 | 0.3839 | 0.4 | 5.53E+02 | | 3.84E-01 |
| 39 | 42.4 | 4.044 | 281 | 2.4728 | 0.35 | 5.53E+02 | | 2.47E+00 |
| 40 | 29 | 1.46E-01 | 158 | 68.6342 | 0.52 | 5.53E+02 | | 6.86E+01 |
| 41 | 59.2 | 5.526 | 335 | 1.8096 | 0.57 | 5.53E+02 | | 1.81E+00 |
| 42 | 22.4 | 10.17 | 93 | 0.9833 | 0.6 | 5.53E+02 | | 9.83E-01 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 12.1 | 104 | 0.8264 | 0.43 | 5.53E+02 | | 8.26E-01 |
| 44 | 15 | 23.95 | 27 | 0.4175 | 0.54 | 5.53E+02 | | 4.18E-01 |
| 45 | 13.2 | 11.61 | 57 | 0.8613 | 0.41 | 5.53E+02 | | 8.61E-01 |
| 46 | 40.5 | 1.869 | 245 | 5.3505 | 0.34 | 5.53E+02 | | 5.35E+00 |
| 47 | 45 | 9.156 | 237 | 1.0922 | 0.6 | 5.53E+02 | | 1.09E+00 |
| 48 | 14.9 | 14.38 | 74 | 0.6954 | 0.59 | 5.53E+02 | | 6.95E-01 |
| 49 | 5 | 14.46 | 29 | 0.6916 | 0.6 | 5.53E+02 | | 6.92E-01 |
| 50 | 26.5 | 5.706 | 139 | 1.7525 | 0.5 | 5.53E+02 | | 1.75E+00 |
| 51 | 9.44 | 17.84 | 33 | 0.5605 | 0.6 | 5.53E+02 | | 5.61E-01 |
| 52 | 15.5 | 2.082 | 78 | 4.8031 | 0.55 | 5.53E+02 | | 4.80E+00 |
| 53 | 36.6 | 1.435 | 216 | 6.9686 | 0.51 | 5.53E+02 | | 6.97E+00 |
| 54 | 33.6 | 1.497 | 192 | 6.6800 | 0.52 | 5.53E+02 | | 6.68E+00 |
| 55 | 41.2 | 5.08 | 236 | 1.9685 | 0.47 | 5.53E+02 | | 1.97E+00 |
| 56 | 52.4 | 5.671 | 327 | 1.7634 | 0.44 | 5.53E+02 | | 1.76E+00 |
| 57 | 23 | 2.624 | 125 | 3.8110 | 0.52 | 5.53E+02 | | 3.81E+00 |
| 58 | 14.7 | 13.47 | 37 | 0.7424 | 0.6 | 5.53E+02 | | 7.42E-01 |
| 59 | 16.2 | 16.03 | 74 | 0.6238 | 0.6 | 5.53E+02 | | 6.24E-01 |
| 60 | 19.4 | 10.44 | 104 | 0.9579 | 0.46 | 5.53E+02 | | 9.58E-01 |
| 61 | 23.5 | 6.987 | 136 | 1.4312 | 0.42 | 5.53E+02 | | 1.43E+00 |
| 62 | 37 | 7.16 | 239 | 1.3966 | 0.38 | 5.53E+02 | | 1.40E+00 |
| 63 | 24.2 | 9.838 | 132 | 1.0165 | 0.5 | 5.53E+02 | | 1.02E+00 |
| 64 | 29.8 | 10.16 | 137 | 0.9843 | 0.48 | 5.53E+02 | | 9.84E-01 |
| 65 | 38.4 | 7.419 | 220 | 1.3479 | 0.6 | 5.53E+02 | | 1.35E+00 |
| 66 | 5.13 | 14.52 | 17 | 0.6887 | 0.6 | 5.53E+02 | | 6.89E-01 |
| 67 | 14.2 | 6.3 | 59 | 1.5873 | 0.57 | 5.53E+02 | | 1.59E+00 |
| 68 | 25.5 | 15.99 | 127 | 0.6254 | 0.38 | 5.53E+02 | | 6.25E-01 |
| 69 | 26.1 | 4.267 | 147 | 2.3436 | 0.6 | 5.53E+02 | | 2.34E+00 |
| 70 | 34 | 5.185 | 172 | 1.9286 | 0.6 | 5.53E+02 | | 1.93E+00 |
| | | | | | | 5.53E+02 | | |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 8.76E+00 | 2.96E+00 | 2.96E+00 |
| | std. dev. | 7.00E+00 | 8.12E+00 | 8.12E+00 |
| | max | 3.28E+01 | 6.86E+01 | 6.86E+01 |
| | min | 1.46E-01 | 3.05E-01 | 3.05E-01 |
| | median | 6.86E+00 | 1.46E+00 | 1.46E+00 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 1.46E+00 | 1.46E+00 |
| | 55 | 1.33E+00 | 1.33E+00 |
| | 60 | 1.17E+00 | 1.17E+00 |
| | 65 | 1.00E+00 | 1.00E+00 |
| | 70 | 9.62E-01 | 9.62E-01 |
| | 75 | 8.71E-01 | 8.71E-01 |
| | 80 | 7.61E-01 | 7.61E-01 |
| | 85 | 6.93E-01 | 6.93E-01 |
| | **90** | **6.18E-01** | **6.18E-01** |
| | 95 | 4.07E-01 | 4.07E-01 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 3 |
| Bulk density (g/cm^3) | 1.8 |
| Chemical | TCE |
| MCL (mg/l) | 0.005 |
| Da (cm^2/sec) | 8.55E-02 |
| Henry's Law Constant (m^3-atm/mole) | 1.03E-02 |
| log Kow | 2.42 |
| Koc (ml/g) | 170.8 |
| Solubility (mg/l) | 1100 |
| Chemical Density (g/cm^3) | 1.46 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.029 | 59 | 17.2414 | 0.54 | 7.22E+02 | | 1.72E+01 |
| 2 | 17.8 | 9.07 | 32 | 0.0551 | 0.4 | 7.22E+02 | | 5.51E-02 |
| 3 | 13 | 14.62 | 9 | 0.0342 | 0.51 | 7.22E+02 | | 3.42E-02 |
| 4 | 51.1 | 3.64 | 94 | 0.1374 | 0.58 | 7.22E+02 | | 1.37E-01 |
| 5 | 32.6 | 2.19 | 62 | 0.2283 | 0.4 | 7.22E+02 | | 2.28E-01 |
| 6 | 39.4 | 5.09 | 73 | 0.0982 | 0.38 | 7.22E+02 | | 9.82E-02 |
| 7 | 34.6 | 1.21 | 73 | 0.4132 | 0.45 | 7.22E+02 | | 4.13E-01 |
| 8 | 32 | 2.35 | 59 | 0.2128 | 0.4 | 7.22E+02 | | 2.13E-01 |
| 9 | 28.1 | 3.96 | 52 | 0.1263 | 0.41 | 7.22E+02 | | 1.26E-01 |
| 10 | 30.6 | 0.188 | 58 | 2.6596 | 0.46 | 7.22E+02 | | 2.66E+00 |
| 11 | 44 | 2.45 | 89 | 0.2041 | 0.55 | 7.22E+02 | | 2.04E-01 |
| 12 | 20.3 | 0.265 | 38 | 1.8868 | 0.51 | 7.22E+02 | | 1.89E+00 |
| 13 | 31.3 | 8.55 | 55 | 0.0585 | 0.5 | 7.22E+02 | | 5.85E-02 |
| 14 | 30.2 | 1.18 | 54 | 0.4237 | 0.58 | 7.22E+02 | | 4.24E-01 |
| 15 | 19.2 | 1.43 | 36 | 0.3497 | 0.55 | 7.22E+02 | | 3.50E-01 |
| 16 | 9 | 30.65 | 9 | 0.0163 | 0.45 | 7.22E+02 | | 1.63E-02 |
| 17 | 21.5 | 0.784 | 43 | 0.6378 | 0.49 | 7.22E+02 | | 6.38E-01 |
| 18 | 15 | 38.1 | 10 | 0.0131 | 0.37 | 7.22E+02 | | 1.31E-02 |
| 19 | 35.2 | 3.37 | 70 | 0.1484 | 0.42 | 7.22E+02 | | 1.48E-01 |
| 20 | 18.7 | 0.611 | 37 | 0.8183 | 0.3 | 7.22E+02 | | 8.18E-01 |
| 21 | 47.4 | 1.15 | 112 | 0.4348 | 0.32 | 7.22E+02 | | 4.35E-01 |
| 22 | 22.1 | 2.01 | 35 | 0.2488 | 0.54 | 7.22E+02 | | 2.49E-01 |
| 23 | 8.15 | 3.26 | 13 | 0.1534 | 0.36 | 7.22E+02 | | 1.53E-01 |
| 24 | 20.2 | 0.135 | 38 | 3.7037 | 0.46 | 7.22E+02 | | 3.70E+00 |
| 25 | 12 | 6.58 | 8 | 0.0760 | 0.6 | 7.22E+02 | | 7.60E-02 |
| 26 | 15.8 | 0.0053 | 34 | 94.3396 | 0.59 | 7.22E+02 | | 9.43E+01 |
| 27 | 17.4 | 0.122 | 30 | 4.0984 | 0.6 | 7.22E+02 | | 4.10E+00 |
| 28 | 24.7 | 1.32 | 46 | 0.3788 | 0.47 | 7.22E+02 | | 3.79E-01 |
| 29 | 17 | 5.36 | 28 | 0.0933 | 0.32 | 7.22E+02 | | 9.33E-02 |
| 30 | 21.6 | 2.13 | 31 | 0.2347 | 0.56 | 7.22E+02 | | 2.35E-01 |
| 31 | 21 | 4.96 | 40 | 0.1008 | 0.38 | 7.22E+02 | | 1.01E-01 |
| 32 | 27.6 | 0.435 | 51 | 1.1494 | 0.37 | 7.22E+02 | | 1.15E+00 |
| 33 | 8.63 | 0.00065 | 17 | 769.2308 | 0.5 | 7.22E+02 | SCN>SSL | 7.22E+02 |
| 34 | 13 | 15.73 | 8 | 0.0318 | 0.49 | 7.22E+02 | | 3.18E-02 |
| 35 | 15 | 29.72 | 12 | 0.0168 | 0.47 | 7.22E+02 | | 1.68E-02 |
| 36 | 27.1 | 1.81 | 47 | 0.2762 | 0.5 | 7.22E+02 | | 2.76E-01 |
| 37 | 18.1 | 0.244 | 33 | 2.0492 | 0.56 | 7.22E+02 | | 2.05E+00 |
| 38 | 11.7 | 9.33 | 18 | 0.0536 | 0.4 | 7.22E+02 | | 5.36E-02 |
| 39 | 42.4 | 1.29 | 90 | 0.3876 | 0.35 | 7.22E+02 | | 3.88E-01 |
| 40 | 29 | 2.53E-05 | 54 | 19762.8458 | 0.52 | 7.22E+02 | SCN>SSL | 7.22E+02 |
| 41 | 59.2 | 1.38 | 119 | 0.3623 | 0.57 | 7.22E+02 | | 3.62E-01 |
| 42 | 22.4 | 5.58 | 36 | 0.0896 | 0.6 | 7.22E+02 | | 8.96E-02 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 10.24 | 37 | 0.0488 | 0.43 | 7.22E+02 | | 4.88E-02 |
| 44 | 15 | 27.33 | 11 | 0.0183 | 0.54 | 7.22E+02 | | 1.83E-02 |
| 45 | 13.2 | 3.4 | 21 | 0.1471 | 0.41 | 7.22E+02 | | 1.47E-01 |
| 46 | 40.5 | 0.59 | 81 | 0.8475 | 0.34 | 7.22E+02 | | 8.47E-01 |
| 47 | 45 | 4.94 | 83 | 0.1012 | 0.6 | 7.22E+02 | | 1.01E-01 |
| 48 | 14.9 | 0.99 | 30 | 0.5051 | 0.59 | 7.22E+02 | | 5.05E-01 |
| 49 | 5 | 1.17 | 11 | 0.4274 | 0.6 | 7.22E+02 | | 4.27E-01 |
| 50 | 26.5 | 1.14 | 48 | 0.4386 | 0.5 | 7.22E+02 | | 4.39E-01 |
| 51 | 9.44 | 5.69 | 12 | 0.0879 | 0.6 | 7.22E+02 | | 8.79E-02 |
| 52 | 15.5 | 0.0226 | 31 | 22.1239 | 0.55 | 7.22E+02 | | 2.21E+01 |
| 53 | 36.6 | 0.128 | 71 | 3.9063 | 0.51 | 7.22E+02 | | 3.91E+00 |
| 54 | 33.6 | 0.113 | 62 | 4.4248 | 0.52 | 7.22E+02 | | 4.42E+00 |
| 55 | 41.2 | 3.3 | 81 | 0.1515 | 0.47 | 7.22E+02 | | 1.52E-01 |
| 56 | 52.4 | 2.72 | 110 | 0.1838 | 0.44 | 7.22E+02 | | 1.84E-01 |
| 57 | 23 | 0.315 | 45 | 1.5873 | 0.52 | 7.22E+02 | | 1.59E+00 |
| 58 | 14.7 | 13.69 | 14 | 0.0365 | 0.6 | 7.22E+02 | | 3.65E-02 |
| 59 | 16.2 | 2.72 | 29 | 0.1838 | 0.6 | 7.22E+02 | | 1.84E-01 |
| 60 | 19.4 | 1.2 | 37 | 0.4167 | 0.46 | 7.22E+02 | | 4.17E-01 |
| 61 | 23.5 | 1.74 | 45 | 0.2874 | 0.42 | 7.22E+02 | | 2.87E-01 |
| 62 | 37 | 2.19 | 76 | 0.2283 | 0.38 | 7.22E+02 | | 2.28E-01 |
| 63 | 24.2 | 2.09 | 46 | 0.2392 | 0.5 | 7.22E+02 | | 2.39E-01 |
| 64 | 29.8 | 7.24 | 47 | 0.0691 | 0.48 | 7.22E+02 | | 6.91E-02 |
| 65 | 38.4 | 0.954 | 76 | 0.5241 | 0.6 | 7.22E+02 | | 5.24E-01 |
| 66 | 5.13 | 3.02 | 6 | 0.1656 | 0.6 | 7.22E+02 | | 1.66E-01 |
| 67 | 14.2 | 0.182 | 24 | 2.7473 | 0.57 | 7.22E+02 | | 2.75E+00 |
| 68 | 25.5 | 9.29 | 43 | 0.0538 | 0.38 | 7.22E+02 | | 5.38E-02 |
| 69 | 26.1 | 0.06 | 53 | 8.3333 | 0.6 | 7.22E+02 | | 8.33E+00 |
| 70 | 34 | 2.34 | 60 | 0.2137 | 0.6 | 7.22E+02 | | 2.14E-01 |
| | | | | | | 7.22E+02 | | |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 4.73E+00 | 2.96E+02 | 2.32E+01 |
| | std. dev. | 7.58E+00 | 2.36E+03 | 1.21E+02 |
| | max | 3.81E+01 | 1.98E+04 | 7.22E+02 |
| | min | 2.53E-05 | 1.31E-02 | 1.31E-02 |
| | median | 2.11E+00 | 2.37E-01 | 2.37E-01 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 2.37E-01 | 2.37E-01 |
| | 55 | 2.14E-01 | 2.14E-01 |
| | 60 | 1.84E-01 | 1.84E-01 |
| | 65 | 1.52E-01 | 1.52E-01 |
| | 70 | 1.34E-01 | 1.34E-01 |
| | 75 | 9.89E-02 | 9.89E-02 |
| | 80 | 8.55E-02 | 8.55E-02 |
| | 85 | 5.63E-02 | 5.63E-02 |
| | **90** | **4.76E-02** | **4.76E-02** |
| | 95 | 2.44E-02 | 2.44E-02 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 3 |
| Bulk density (g/cm^3) | 1.8 |
| Chemical | Toluene |
| MCL (mg/l) | 1 |
| Da (cm^2/sec) | 8.26E-02 |
| Henry's Law Constant (m^3-atm/mole) | 5.94E-03 |
| log Kow | 2.73 |
| Koc (ml/g) | 338.3 |
| Solubility (mg/l) | 535 |
| Chemical Density (g/cm^3) | 0.87 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.3355 | 103 | 298.0626 | 0.54 | 6.06E+02 | | 2.98E+02 |
| 2 | 17.8 | 14.55 | 54 | 6.8729 | 0.4 | 6.06E+02 | | 6.87E+00 |
| 3 | 13 | 11.41 | 15 | 8.7642 | 0.51 | 6.06E+02 | | 8.76E+00 |
| 4 | 51.1 | 4.958 | 161 | 20.1694 | 0.58 | 6.06E+02 | | 2.02E+01 |
| 5 | 32.6 | 3.849 | 111 | 25.9808 | 0.4 | 6.06E+02 | | 2.60E+01 |
| 6 | 39.4 | 5.448 | 135 | 18.3554 | 0.38 | 6.06E+02 | | 1.84E+01 |
| 7 | 34.6 | 3.353 | 130 | 29.8240 | 0.45 | 6.06E+02 | | 2.98E+01 |
| 8 | 32 | 2.71 | 107 | 36.9004 | 0.4 | 6.06E+02 | | 3.69E+01 |
| 9 | 28.1 | 6.92 | 93 | 14.4509 | 0.41 | 6.06E+02 | | 1.45E+01 |
| 10 | 30.6 | 0.6666 | 104 | 150.0150 | 0.46 | 6.06E+02 | | 1.50E+02 |
| 11 | 44 | 5.158 | 158 | 19.3874 | 0.55 | 6.06E+02 | | 1.94E+01 |
| 12 | 20.3 | 1.511 | 63 | 66.1813 | 0.51 | 6.06E+02 | | 6.62E+01 |
| 13 | 31.3 | 10.61 | 97 | 9.4251 | 0.5 | 6.06E+02 | | 9.43E+00 |
| 14 | 30.2 | 1.814 | 92 | 55.1268 | 0.58 | 6.06E+02 | | 5.51E+01 |
| 15 | 19.2 | 5.393 | 58 | 18.5426 | 0.55 | 6.06E+02 | | 1.85E+01 |
| 16 | 9 | 31.48 | 16 | 3.1766 | 0.45 | 6.06E+02 | | 3.18E+00 |
| 17 | 21.5 | 3.298 | 72 | 30.3214 | 0.49 | 6.06E+02 | | 3.03E+01 |
| 18 | 15 | 30.48 | 18 | 3.2808 | 0.37 | 6.06E+02 | | 3.28E+00 |
| 19 | 35.2 | 5.811 | 125 | 17.2087 | 0.42 | 6.06E+02 | | 1.72E+01 |
| 20 | 18.7 | 2.553 | 68 | 39.1696 | 0.3 | 6.06E+02 | | 3.92E+01 |
| 21 | 47.4 | 1.589 | 202 | 62.9327 | 0.32 | 6.06E+02 | | 6.29E+01 |
| 22 | 22.1 | 2.608 | 57 | 38.3436 | 0.54 | 6.06E+02 | | 3.83E+01 |
| 23 | 8.15 | 4.906 | 21 | 20.3832 | 0.36 | 6.06E+02 | | 2.04E+01 |
| 24 | 20.2 | 0.686 | 62 | 145.7726 | 0.46 | 6.06E+02 | | 1.46E+02 |
| 25 | 12 | 5.221 | 13 | 19.1534 | 0.6 | 6.06E+02 | | 1.92E+01 |
| 26 | 15.8 | 0.1941 | 55 | 515.1984 | 0.59 | 6.06E+02 | | 5.15E+02 |
| 27 | 17.4 | 1.051 | 49 | 95.1475 | 0.6 | 6.06E+02 | | 9.51E+01 |
| 28 | 24.7 | 3.244 | 80 | 30.8261 | 0.47 | 6.06E+02 | | 3.08E+01 |
| 29 | 17 | 8.181 | 50 | 12.2234 | 0.32 | 6.06E+02 | | 1.22E+01 |
| 30 | 21.6 | 2.677 | 50 | 37.3552 | 0.56 | 6.06E+02 | | 3.74E+01 |
| 31 | 21 | 8.731 | 69 | 11.4534 | 0.38 | 6.06E+02 | | 1.15E+01 |
| 32 | 27.6 | 1.138 | 92 | 87.8735 | 0.37 | 6.06E+02 | | 8.79E+01 |
| 33 | 8.63 | 0.05877 | 30 | 1701.5484 | 0.5 | 6.06E+02 | SCN>SSL | 6.06E+02 |
| 34 | 13 | 11.89 | 14 | 8.4104 | 0.49 | 6.06E+02 | | 8.41E+00 |
| 35 | 15 | 24.43 | 19 | 4.0933 | 0.47 | 6.06E+02 | | 4.09E+00 |
| 36 | 27.1 | 2.376 | 81 | 42.0875 | 0.5 | 6.06E+02 | | 4.21E+01 |
| 37 | 18.1 | 1.008 | 54 | 99.2063 | 0.56 | 6.06E+02 | | 9.92E+01 |
| 38 | 11.7 | 16.96 | 31 | 5.8962 | 0.4 | 6.06E+02 | | 5.90E+00 |
| 39 | 42.4 | 2.553 | 170 | 39.1696 | 0.35 | 6.06E+02 | | 3.92E+01 |
| 40 | 29 | 3.62E-03 | 95 | 27631.9425 | 0.52 | 6.06E+02 | SCN>SSL | 6.06E+02 |
| 41 | 59.2 | 3.19 | 209 | 31.3480 | 0.57 | 6.06E+02 | | 3.13E+01 |
| 42 | 22.4 | 7.688 | 58 | 13.0073 | 0.6 | 6.06E+02 | | 1.30E+01 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 10.79 | 62 | 9.2678 | 0.43 | 6.06E+02 | | 9.27E+00 |
| 44 | 15 | 23.11 | 17 | 4.3271 | 0.54 | 6.06E+02 | | 4.33E+00 |
| 45 | 13.2 | 6.79 | 37 | 14.7275 | 0.41 | 6.06E+02 | | 1.47E+01 |
| 46 | 40.5 | 1.115 | 149 | 89.6861 | 0.34 | 6.06E+02 | | 8.97E+01 |
| 47 | 45 | 7.11 | 145 | 14.0647 | 0.6 | 6.06E+02 | | 1.41E+01 |
| 48 | 14.9 | 4.685 | 48 | 21.3447 | 0.59 | 6.06E+02 | | 2.13E+01 |
| 49 | 5 | 4.876 | 18 | 20.5086 | 0.6 | 6.06E+02 | | 2.05E+01 |
| 50 | 26.5 | 2.903 | 83 | 34.4471 | 0.5 | 6.06E+02 | | 3.44E+01 |
| 51 | 9.44 | 10.57 | 20 | 9.4607 | 0.6 | 6.06E+02 | | 9.46E+00 |
| 52 | 15.5 | 0.2985 | 51 | 335.0084 | 0.55 | 6.06E+02 | | 3.35E+02 |
| 53 | 36.6 | 0.4869 | 130 | 205.3810 | 0.51 | 6.06E+02 | | 2.05E+02 |
| 54 | 33.6 | 0.4732 | 115 | 211.3271 | 0.52 | 6.06E+02 | | 2.11E+02 |
| 55 | 41.2 | 4.205 | 143 | 23.7812 | 0.47 | 6.06E+02 | | 2.38E+01 |
| 56 | 52.4 | 4.343 | 201 | 23.0256 | 0.44 | 6.06E+02 | | 2.30E+01 |
| 57 | 23 | 1.054 | 72 | 94.8767 | 0.52 | 6.06E+02 | | 9.49E+01 |
| 58 | 14.7 | 12.97 | 24 | 7.7101 | 0.6 | 6.06E+02 | | 7.71E+00 |
| 59 | 16.2 | 7.624 | 48 | 13.1165 | 0.6 | 6.06E+02 | | 1.31E+01 |
| 60 | 19.4 | 4.338 | 62 | 23.0521 | 0.46 | 6.06E+02 | | 2.31E+01 |
| 61 | 23.5 | 3.898 | 80 | 25.6542 | 0.42 | 6.06E+02 | | 2.57E+01 |
| 62 | 37 | 4.509 | 144 | 22.1779 | 0.38 | 6.06E+02 | | 2.22E+01 |
| 63 | 24.2 | 5.178 | 76 | 19.3125 | 0.5 | 6.06E+02 | | 1.93E+01 |
| 64 | 29.8 | 8.498 | 83 | 11.7675 | 0.48 | 6.06E+02 | | 1.18E+01 |
| 65 | 38.4 | 3.215 | 133 | 31.1042 | 0.6 | 6.06E+02 | | 3.11E+01 |
| 66 | 5.13 | 7.211 | 10 | 13.8677 | 0.6 | 6.06E+02 | | 1.39E+01 |
| 67 | 14.2 | 1.426 | 39 | 70.1262 | 0.57 | 6.06E+02 | | 7.01E+01 |
| 68 | 25.5 | 12.92 | 77 | 7.7399 | 0.38 | 6.06E+02 | | 7.74E+00 |
| 69 | 26.1 | 0.6895 | 88 | 145.0326 | 0.6 | 6.06E+02 | | 1.45E+02 |
| 70 | 34 | 3.6 | 103 | 27.7778 | 0.6 | 6.06E+02 | | 2.78E+01 |
| | | | | | | 6.06E+02 | | |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 6.02E+00 | 4.72E+02 | 7.05E+01 |
| | std. dev. | 6.59E+00 | 3.30E+03 | 1.26E+02 |
| | max | 3.15E+01 | 2.76E+04 | 6.06E+02 |
| | min | 3.62E-03 | 3.18E+00 | 3.18E+00 |
| | median | 4.27E+00 | 2.34E+01 | 2.34E+01 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 2.34E+01 | 2.34E+01 |
| | 55 | 2.14E+01 | 2.14E+01 |
| | 60 | 1.99E+01 | 1.99E+01 |
| | 65 | 1.86E+01 | 1.86E+01 |
| | 70 | 1.46E+01 | 1.46E+01 |
| | 75 | 1.33E+01 | 1.33E+01 |
| | 80 | 1.17E+01 | 1.17E+01 |
| | 85 | 9.32E+00 | 9.32E+00 |
| | **90** | **7.74E+00** | **7.74E+00** |
| | 95 | 5.03E+00 | 5.03E+00 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 3 |
| Bulk density (g/cm^3) | 1.8 |
| Chemical | vinyl chloride |
| MCL (mg/l) | 0.002 |
| Da (cm^2/sec) | 1.13E-01 |
| Henry's Law Constant (m^3-atm/mole) | 1.07E-02 |
| log Kow | 1.38 |
| Koc (ml/g) | 30.45 |
| Solubility (mg/l) | 2763 |
| Chemical Density (g/cm^3) | 0.91 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.004982 | 27 | 40.1445 | 0.54 | 6.58E+02 | | 4.01E+01 |
| 2 | 17.8 | 9.763 | 13 | 0.0205 | 0.4 | 6.58E+02 | | 2.05E-02 |
| 3 | 13 | 27.67 | 4 | 0.0072 | 0.51 | 6.58E+02 | | 7.23E-03 |
| 4 | 51.1 | 4.174 | 42 | 0.0479 | 0.58 | 6.58E+02 | | 4.79E-02 |
| 5 | 32.6 | 2.364 | 24 | 0.0846 | 0.4 | 6.58E+02 | | 8.46E-02 |
| 6 | 39.4 | 8.211 | 28 | 0.0244 | 0.38 | 6.58E+02 | | 2.44E-02 |
| 7 | 34.6 | 0.8792 | 29 | 0.2275 | 0.45 | 6.58E+02 | | 2.27E-01 |
| 8 | 32 | 3.508 | 24 | 0.0570 | 0.4 | 6.58E+02 | | 5.70E-02 |
| 9 | 28.1 | 4.078 | 21 | 0.0490 | 0.41 | 6.58E+02 | | 4.90E-02 |
| 10 | 30.6 | 0.1243 | 24 | 1.6090 | 0.46 | 6.58E+02 | | 1.61E+00 |
| 11 | 44 | 1.959 | 39 | 0.1021 | 0.55 | 6.58E+02 | | 1.02E-01 |
| 12 | 20.3 | 0.1073 | 17 | 1.8639 | 0.51 | 6.58E+02 | | 1.86E+00 |
| 13 | 31.3 | 10.8 | 24 | 0.0185 | 0.5 | 6.58E+02 | | 1.85E-02 |
| 14 | 30.2 | 1.198 | 25 | 0.1669 | 0.58 | 6.58E+02 | | 1.67E-01 |
| 15 | 19.2 | 0.7178 | 16 | 0.2786 | 0.55 | 6.58E+02 | | 2.79E-01 |
| 16 | 9 | 47.62 | 4 | 0.0042 | 0.45 | 6.58E+02 | | 4.20E-03 |
| 17 | 21.5 | 0.3682 | 19 | 0.5432 | 0.49 | 6.58E+02 | | 5.43E-01 |
| 18 | 15 | 78.01 | 4 | 0.0026 | 0.37 | 6.58E+02 | | 2.56E-03 |
| 19 | 35.2 | 3.499 | 27 | 0.0572 | 0.42 | 6.58E+02 | | 5.72E-02 |
| 20 | 18.7 | 0.3712 | 14 | 0.5388 | 0.3 | 6.58E+02 | | 5.39E-01 |
| 21 | 47.4 | 1.623 | 39 | 0.1232 | 0.32 | 6.58E+02 | | 1.23E-01 |
| 22 | 22.1 | 2.466 | 16 | 0.0811 | 0.54 | 6.58E+02 | | 8.11E-02 |
| 23 | 8.15 | 3.904 | 5 | 0.0512 | 0.36 | 6.58E+02 | | 5.12E-02 |
| 24 | 20.2 | 0.06555 | 16 | 3.0511 | 0.46 | 6.58E+02 | | 3.05E+00 |
| 25 | 12 | 11.59 | 4 | 0.0173 | 0.6 | 6.58E+02 | | 1.73E-02 |
| 26 | 15.8 | 0.0004591 | 16 | 435.6349 | 0.59 | 6.58E+02 | | 4.36E+02 |
| 27 | 17.4 | 0.03179 | 15 | 6.2913 | 0.6 | 6.58E+02 | | 6.29E+00 |
| 28 | 24.7 | 0.9824 | 20 | 0.2036 | 0.47 | 6.58E+02 | | 2.04E-01 |
| 29 | 17 | 6.772 | 11 | 0.0295 | 0.32 | 6.58E+02 | | 2.95E-02 |
| 30 | 21.6 | 2.605 | 14 | 0.0768 | 0.56 | 6.58E+02 | | 7.68E-02 |
| 31 | 21 | 5.012 | 16 | 0.0399 | 0.38 | 6.58E+02 | | 3.99E-02 |
| 32 | 27.6 | 0.3894 | 20 | 0.5136 | 0.37 | 6.58E+02 | | 5.14E-01 |
| 33 | 8.63 | 0.00002498 | 8 | 8006.4051 | 0.5 | 6.58E+02 | SCN>SSL | 6.58E+02 |
| 34 | 13 | 30.08 | 4 | 0.0066 | 0.49 | 6.58E+02 | | 6.65E-03 |
| 35 | 15 | 53.35 | 5 | 0.0037 | 0.47 | 6.58E+02 | | 3.75E-03 |
| 36 | 27.1 | 2.217 | 21 | 0.0902 | 0.5 | 6.58E+02 | | 9.02E-02 |
| 37 | 18.1 | 0.1172 | 15 | 1.7065 | 0.56 | 6.58E+02 | | 1.71E+00 |
| 38 | 11.7 | 8.396 | 8 | 0.0238 | 0.4 | 6.58E+02 | | 2.38E-02 |
| 39 | 42.4 | 1.464 | 34 | 0.1366 | 0.35 | 6.58E+02 | | 1.37E-01 |
| 40 | 29 | 1.74E-05 | 24 | 11514.1048 | 0.52 | 6.58E+02 | SCN>SSL | 6.58E+02 |
| 41 | 59.2 | 1.041 | 53 | 0.1921 | 0.57 | 6.58E+02 | | 1.92E-01 |
| 42 | 22.4 | 6.25 | 17 | 0.0320 | 0.6 | 6.58E+02 | | 3.20E-02 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 16.02 | 15 | 0.0125 | 0.43 | 6.58E+02 | | 1.25E-02 |
| 44 | 15 | 47.52 | 5 | 0.0042 | 0.54 | 6.58E+02 | | 4.21E-03 |
| 45 | 13.2 | 3.155 | 9 | 0.0634 | 0.41 | 6.58E+02 | | 6.34E-02 |
| 46 | 40.5 | 0.682 | 30 | 0.2933 | 0.34 | 6.58E+02 | | 2.93E-01 |
| 47 | 45 | 5.387 | 38 | 0.0371 | 0.6 | 6.58E+02 | | 3.71E-02 |
| 48 | 14.9 | 0.3821 | 14 | 0.5234 | 0.59 | 6.58E+02 | | 5.23E-01 |
| 49 | 5 | 0.4671 | 5 | 0.4282 | 0.6 | 6.58E+02 | | 4.28E-01 |
| 50 | 26.5 | 0.8305 | 21 | 0.2408 | 0.5 | 6.58E+02 | | 2.41E-01 |
| 51 | 9.44 | 4.547 | 6 | 0.0440 | 0.6 | 6.58E+02 | | 4.40E-02 |
| 52 | 15.5 | 0.005618 | 14 | 35.5999 | 0.55 | 6.58E+02 | | 3.56E+01 |
| 53 | 36.6 | 0.07687 | 31 | 2.6018 | 0.51 | 6.58E+02 | | 2.60E+00 |
| 54 | 33.6 | 0.06276 | 28 | 3.1867 | 0.52 | 6.58E+02 | | 3.19E+00 |
| 55 | 41.2 | 4.313 | 33 | 0.0464 | 0.47 | 6.58E+02 | | 4.64E-02 |
| 56 | 52.4 | 3.001 | 45 | 0.0666 | 0.44 | 6.58E+02 | | 6.66E-02 |
| 57 | 23 | 0.1781 | 20 | 1.1230 | 0.52 | 6.58E+02 | | 1.12E+00 |
| 58 | 14.7 | 21.16 | 7 | 0.0095 | 0.6 | 6.58E+02 | | 9.45E-03 |
| 59 | 16.2 | 1.614 | 14 | 0.1239 | 0.6 | 6.58E+02 | | 1.24E-01 |
| 60 | 19.4 | 0.6484 | 16 | 0.3085 | 0.46 | 6.58E+02 | | 3.08E-01 |
| 61 | 23.5 | 1.482 | 19 | 0.1350 | 0.42 | 6.58E+02 | | 1.35E-01 |
| 62 | 37 | 2.124 | 30 | 0.0942 | 0.38 | 6.58E+02 | | 9.42E-02 |
| 63 | 24.2 | 1.437 | 20 | 0.1392 | 0.5 | 6.58E+02 | | 1.39E-01 |
| 64 | 29.8 | 9.715 | 21 | 0.0206 | 0.48 | 6.58E+02 | | 2.06E-02 |
| 65 | 38.4 | 0.5117 | 35 | 0.3909 | 0.6 | 6.58E+02 | | 3.91E-01 |
| 66 | 5.13 | 2.443 | 3 | 0.0819 | 0.6 | 6.58E+02 | | 8.19E-02 |
| 67 | 14.2 | 0.05576 | 11 | 3.5868 | 0.57 | 6.58E+02 | | 3.59E+00 |
| 68 | 25.5 | 11.61 | 17 | 0.0172 | 0.38 | 6.58E+02 | | 1.72E-02 |
| 69 | 26.1 | 0.01176 | 25 | 17.0068 | 0.6 | 6.58E+02 | | 1.70E+01 |
| 70 | 34 | 2.427 | 28 | 0.0824 | 0.6 | 6.58E+02 | | 8.24E-02 |
| | | | | | | 6.58E+02 | | |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 6.94E+00 | 2.87E+02 | 2.68E+01 |
| | std. dev. | 1.40E+01 | 1.66E+03 | 1.21E+02 |
| | max | 7.80E+01 | 1.15E+04 | 6.58E+02 |
| | min | 1.74E-05 | 2.56E-03 | 2.56E-03 |
| | median | 2.04E+00 | 9.81E-02 | 9.81E-02 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 9.81E-02 | 9.81E-02 |
| | 55 | 8.25E-02 | 8.25E-02 |
| | 60 | 7.27E-02 | 7.27E-02 |
| | 65 | 5.70E-02 | 5.70E-02 |
| | 70 | 4.75E-02 | 4.75E-02 |
| | 75 | 3.78E-02 | 3.78E-02 |
| | 80 | 2.43E-02 | 2.43E-02 |
| | 85 | 1.92E-02 | 1.92E-02 |
| | **90** | **1.22E-02** | **1.22E-02** |
| | 95 | 5.31E-03 | 5.31E-03 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.

**SESOIL RUN SUMMARY** Revised Soil Sat equation

| | |
|---|---|
| Soil type | 3 |
| Bulk density (g/cm^3) | 1.8 |
| Chemical | Xylenes |
| MCL (mg/l) | 10 |
| Da (cm^2/sec) | 7.20E-02 |
| Henry's Law Constant (m^3-atm/mole) | 6.30E-03 |
| log Kow | 3.2 |
| Koc (ml/g) | 998.5 |
| Solubility (mg/l) | 200 |
| Chemical Density (g/cm^3) | 0.87 |
| Pollutant Loading Conc. in Layer 2 (mg/kg) | 100 |

MCL = Maximum Contaminant Level
Cmax = Maximum Soil Moisture Concentration
SCN = Soil Cleanup Number
SSL = Soil Saturation Limit
PLC = Pollutant Loading Concentration

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.6 | 0.1707 | 267 | 5858.2308 | 0.54 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 2 | 17.8 | 6.033 | 144 | 165.7550 | 0.4 | 6.23E+02 | | 1.66E+02 |
| 3 | 13 | 4.503 | 38 | 222.0742 | 0.51 | 6.23E+02 | | 2.22E+02 |
| 4 | 51.1 | 2.043 | 414 | 489.4763 | 0.58 | 6.23E+02 | | 4.89E+02 |
| 5 | 32.6 | 1.571 | 295 | 636.5372 | 0.4 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 6 | 39.4 | 2.116 | 361 | 472.5898 | 0.38 | 6.23E+02 | | 4.73E+02 |
| 7 | 34.6 | 1.434 | 343 | 697.3501 | 0.45 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 8 | 32 | 1.065 | 285 | 938.9671 | 0.4 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 9 | 28.1 | 2.852 | 246 | 350.6311 | 0.41 | 6.23E+02 | | 3.51E+02 |
| 10 | 30.6 | 0.2953 | 273 | 3386.3867 | 0.46 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 11 | 44 | 2.206 | 407 | 453.3092 | 0.55 | 6.23E+02 | | 4.53E+02 |
| 12 | 20.3 | 0.7096 | 164 | 1409.2446 | 0.51 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 13 | 31.3 | 4.366 | 253 | 229.0426 | 0.5 | 6.23E+02 | | 2.29E+02 |
| 14 | 30.2 | 0.7704 | 239 | 1298.0270 | 0.58 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 15 | 19.2 | 2.471 | 150 | 404.6945 | 0.55 | 6.23E+02 | | 4.05E+02 |
| 16 | 9 | 12.6 | 41 | 79.3651 | 0.45 | 6.23E+02 | | 7.94E+01 |
| 17 | 21.5 | 1.499 | 187 | 667.1114 | 0.49 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 18 | 15 | 11.8 | 46 | 84.7458 | 0.37 | 6.23E+02 | | 8.47E+01 |
| 19 | 35.2 | 2.381 | 331 | 419.9916 | 0.42 | 6.23E+02 | | 4.20E+02 |
| 20 | 18.7 | 1.114 | 184 | 897.6661 | 0.3 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 21 | 47.4 | 0.6261 | 555 | 1597.1889 | 0.32 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 22 | 22.1 | 1.086 | 145 | 920.8103 | 0.54 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 23 | 8.15 | 2.005 | 57 | 498.7531 | 0.36 | 6.23E+02 | | 4.99E+02 |
| 24 | 20.2 | 0.3176 | 160 | 3148.6146 | 0.46 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 25 | 12 | 2.091 | 32 | 478.2401 | 0.6 | 6.23E+02 | | 4.78E+02 |
| 26 | 15.8 | 0.1117 | 142 | 8952.5515 | 0.59 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 27 | 17.4 | 0.5251 | 125 | 1904.3992 | 0.6 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 28 | 24.7 | 1.397 | 212 | 715.8196 | 0.47 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 29 | 17 | 3.33 | 133 | 300.3003 | 0.32 | 6.23E+02 | | 3.00E+02 |
| 30 | 21.6 | 1.121 | 127 | 892.0607 | 0.56 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 31 | 21 | 3.606 | 182 | 277.3156 | 0.38 | 6.23E+02 | | 2.77E+02 |
| 32 | 27.6 | 0.4842 | 249 | 2065.2623 | 0.37 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 33 | 8.63 | 0.03586 | 77 | 27886.2242 | 0.5 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 34 | 13 | 4.663 | 36 | 214.4542 | 0.49 | 6.23E+02 | | 2.14E+02 |
| 35 | 15 | 9.667 | 50 | 103.4447 | 0.47 | 6.23E+02 | | 1.03E+02 |
| 36 | 27.1 | 0.9765 | 214 | 1024.0655 | 0.5 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 37 | 18.1 | 0.4685 | 139 | 2134.4717 | 0.56 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 38 | 11.7 | 7.156 | 83 | 139.7429 | 0.4 | 6.23E+02 | | 1.40E+02 |
| 39 | 42.4 | 1.033 | 454 | 968.0542 | 0.35 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 40 | 29 | 1.79E-03 | 247 | 559284.1163 | 0.52 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 41 | 59.2 | 1.357 | 531 | 736.9197 | 0.57 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 42 | 22.4 | 3.256 | 148 | 307.1253 | 0.6 | 6.23E+02 | | 3.07E+02 |

| Random Set Number | Depth to GW (ft) | Cmax in Layer 4 (mg/l) (1) | # of years to achieve Cmax (1) | Soil Cleanup Number (mg/kg) (2) | Porosity | Soil Sat. Limit (mg/kg) (3) | If SCN>SSL, then increase PLC | Final SCN (mg/kg) (4) |
|---|---|---|---|---|---|---|---|---|
| 43 | 24.9 | 4.311 | 166 | 231.9647 | 0.43 | 6.23E+02 | | 2.32E+02 |
| 44 | 15 | 9.269 | 44 | 107.8865 | 0.54 | 6.23E+02 | | 1.08E+02 |
| 45 | 13.2 | 2.894 | 97 | 345.5425 | 0.41 | 6.23E+02 | | 3.46E+02 |
| 46 | 40.5 | 0.4574 | 405 | 2186.2702 | 0.34 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 47 | 45 | 2.989 | 372 | 334.5601 | 0.6 | 6.23E+02 | | 3.35E+02 |
| 48 | 14.9 | 2.227 | 123 | 449.0346 | 0.59 | 6.23E+02 | | 4.49E+02 |
| 49 | 5 | 2.303 | 45 | 434.2162 | 0.6 | 6.23E+02 | | 4.34E+02 |
| 50 | 26.5 | 1.258 | 218 | 794.9126 | 0.5 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 51 | 9.44 | 4.625 | 50 | 216.2162 | 0.6 | 6.23E+02 | | 2.16E+02 |
| 52 | 15.5 | 0.1524 | 131 | 6561.6798 | 0.55 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 53 | 36.6 | 0.2172 | 339 | 4604.0516 | 0.51 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 54 | 33.6 | 0.2141 | 299 | 4670.7146 | 0.52 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 55 | 41.2 | 1.679 | 375 | 595.5926 | 0.47 | 6.23E+02 | | 5.96E+02 |
| 56 | 52.4 | 1.742 | 526 | 574.0528 | 0.44 | 6.23E+02 | | 5.74E+02 |
| 57 | 23 | 0.474 | 186 | 2109.7046 | 0.52 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 58 | 14.7 | 5.316 | 61 | 188.1114 | 0.6 | 6.23E+02 | | 1.88E+02 |
| 59 | 16.2 | 3.454 | 123 | 289.5194 | 0.6 | 6.23E+02 | | 2.90E+02 |
| 60 | 19.4 | 1.942 | 163 | 514.9331 | 0.46 | 6.23E+02 | | 5.15E+02 |
| 61 | 23.5 | 1.646 | 211 | 607.5334 | 0.42 | 6.23E+02 | | 6.08E+02 |
| 62 | 37 | 1.847 | 386 | 541.4185 | 0.38 | 6.23E+02 | | 5.41E+02 |
| 63 | 24.2 | 2.254 | 204 | 443.6557 | 0.5 | 6.23E+02 | | 4.44E+02 |
| 64 | 29.8 | 3.458 | 216 | 289.1845 | 0.48 | 6.23E+02 | | 2.89E+02 |
| 65 | 38.4 | 1.447 | 340 | 691.0850 | 0.6 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 66 | 5.13 | 3.212 | 25 | 311.3325 | 0.6 | 6.23E+02 | | 3.11E+02 |
| 67 | 14.2 | 0.7028 | 99 | 1422.8799 | 0.57 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 68 | 25.5 | 5.222 | 206 | 191.4975 | 0.38 | 6.23E+02 | | 1.91E+02 |
| 69 | 26.1 | 0.3529 | 226 | 2833.6639 | 0.6 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| 70 | 34 | 1.519 | 263 | 658.3278 | 0.6 | 6.23E+02 | SCN>SSL | 6.23E+02 |
| | | | | | | 6.23E+02 | | |

| | | | | |
|---|---|---|---|---|
| statistics | mean | 2.49E+00 | 9.53E+03 | 4.70E+02 |
| | std. dev. | 2.62E+00 | 6.68E+04 | 1.83E+02 |
| | max | 1.26E+01 | 5.59E+05 | 6.23E+02 |
| | min | 1.79E-03 | 7.94E+01 | 7.94E+01 |
| | median | 1.71E+00 | 5.85E+02 | 5.85E+02 |

| | | | |
|---|---|---|---|
| percentiles | 50 | 585 | 5.85E+02 |
| | 55 | 500 | 5.00E+02 |
| | 60 | 465 | 4.65E+02 |
| | 65 | 436 | 4.36E+02 |
| | 70 | 349 | 3.49E+02 |
| | 75 | 308 | 3.08E+02 |
| | 80 | 287 | 2.87E+02 |
| | 85 | 225 | 2.25E+02 |
| | **90** | **191** | **1.91E+02** |
| | 95 | 122 | 1.22E+02 |

(1) results from SESOIL modeling
(2) SCN calculated from (PLC*MCL)/Cmax
(3) Soil saturation limit calculated from (porosity*chemical density)/soil bulk density
(4) In all cases where SCN>SSL, increasing the PLC resulted in SCN>SSL (see attached run summary spreadsheets).
Therefore, final SCN was taken as SSL in these cases.