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# ERM-MIDWEST, INC., REMEDIAL INVESTIGATION & RISK ASSESSMENT REPORT, PADDYS RUN ROAD SITE, CROSBY TOWNSHIP, HAMILTON, OHIO, REV 1, VOL 4 OF 5, APPENDIX C - (USED AS A REFERENCE IN OU 5 RI REPORT)

05/27/94

ERM-MIDWEST INC
500
REPORT

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# Remedial Investigation and Risk Assessment Report

## *Paddys Run Road Site (PRRS)*
## *Crosby Township, Hamilton, Ohio*

Volume 4 of 5: Appendix C

***Revision 1***
***May 27, 1994***

*Submitted to:*

**The Ohio EPA,**

**Southwest District Office**

401 E. Fifth Street
Dayton, Ohio 45402-2911

*Submitted by:*

**The PRRS Companies**

P.O. Box 26683
Richmond, Virginia 23261-6683

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REV. 1: MAY 1994

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# Remedial Investigation

*Ground Water Flow and Contaminant Transport Modeling Report*
*Paddys Run Road Site*
*Hamilton County, Ohio*

*April 1994*

**ERM-South, Inc.**
9501 Princess Palm Avenue, Suite 100
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*Section 1.0*

*Introduction*

# 1.0 INTRODUCTION

## 1.1 STUDY AREA BACKGROUND

In accordance with an Administrative Order on Consent (AOC) with the Ohio Environmental Protection Agency (Ohio EPA) effective May 30, 1989, Albright & Wilson Americans, Inc. (A&W) and Mobil Mining and Minerals Company, the prior owner of the A&W property, and Ruetgers-Nease Company, Inc. (RNC) (collectively referred to as the Companies) initiated a remedial investigation/feasibility study (RI/FS) at the Paddys Run Road Site (PRRS). The Site is located in the lower Great Miami River Valley approximately 15 miles northwest of Cincinnati, near Fernald, Crosby Township, Hamilton County, Ohio (Figure 1-1 - tables and figures are located in Appendix A). Figure 1-2 shows the PRRS study area, also known as the "Study Area," which encompasses the A&W facility and the RNC facility, and areas adjacent to and south of the Department of Energy (DOE) Fernald Environmental Management Project (FEMP).

Based on analytical results collected during the RI, contaminant plumes containing inorganic (including arsenic, sodium, potassium) and organic (including benzene, ethylbenzene, toluene, xylenes, cumene) chemicals and radionuclides (potassium-40) extend southward from the Companies' properties in the direction of the ground water flow. These assessments were completed from ground water samples collected during several sampling rounds from up to 85 wells, including: wells associated with the PRRS and DOE/FEMP; residential wells; and industrial site wells in the area.

## 1.2 RELATION TO REST OF PROJECT

This document describes the development of ground water flow and solute transport models for the RI and the baseline risk assessment (RA). Model predictions of future contaminant migration under a no action alternative are presented herein. The ground water modeling was conducted in conjunction with Phase II of the RI. The RI and RA are presented in separate documents (ERM, September 1992). Additional ground water modeling will be conducted after the completion of the RI modeling activities to support the development of remedial alternatives and presented separately in the FS report.

## 1.3 PURPOSE AND SCOPE

### 1.3.1 Objectives

The PRRS ground water modeling portion of the RI/FS project resulted in the formulation of Study Area-specific and area hydrogeologic information into a mathematical representation of a physical and chemical ground water system. Modeling was conducted for two primary purposes during the RI:

- To help characterize and interpret ground water flow and contaminant transport; and

- To support the RA development.

In addition, a developed and calibrated model will serve as a tool for the simulation of potential remedial action alternatives incorporating ground water extraction scenarios during the FS. It is important to keep in mind that a model is not an actual representation of a ground water system but, rather, is an estimate based on data collected from the Study Area.

Due to the hydrogeologic complexity of the Study Area and the established modeling objectives, a three-dimensional flow model capable of incorporating solute (contaminant) transport was deemed necessary. After an evaluation of existing, available and proven models was conducted, the numerical heat and solute transport in three-dimensional ground water flow systems model code (the HST3D Code) was selected and utilized. The HST3D Code was developed by the USGS and is described in Kipp (1987). HST3D was chosen over other model codes for the following reasons:

- Similar three-dimensional modeling investigations have been conducted in the area utilizing the SWIFT model code. HST3D and SWIFT are both descendants of a model code developed for the United States Geologic Survey (USGS) in the 1970s. Consequently, models developed using HST3D are easier to compare and use in conjunction with the SWIFT modeling than if another model code was used.

- HST3D is a public domain code which has been used on a number of projects within and outside of the USGS.

HST3D modeling was used to assist in the evaluation of the ground water flow and transport processes at the Study Area to simulate contaminant migration.

### *1.3.2 Scope of Work*

The tasks associated with development of the PRRS models are fully described in the September 1991 Phase II RI/RA Work Plan (ERM, 1991). A detailed discussion of the modeling activities is presented in Sections 2.0 (Regional Ground Water Flow Modeling), 3.0 (Local Ground Water Flow Modeling), and 4.0 (Contaminant Transport Modeling) of this report. The general approach to model selection and development is presented in Figure 1-3 and summarized in the following sections.

#### *1.3.2.1 Model Development*

Model development consisted of assessing the physical and geologic characteristics of the aquifer in the local and regional area of the Study Area, and conceptualizing a mathematical representation of the hydrogeologic flow system. The objective of this task was to create a mathematical representation of the area ground water flow and contaminant transport system so that the Study Area hydrogeologic conditions could be simulated with the modeling code.

Model development consisted of a three-step process:

1. Hydrogeologic and related information (both Study Area-specific and regional) was collected, assembled, and reviewed for applicability.

2. A conceptual model for the Study Area and surrounding area was developed to serve as a foundation for additional model development/data input, and to assist in understanding the principal flow and contaminant transport mechanisms specific to the Study Area.

3. A data set using the data chosen from Step 1 and arranged according to the conceptual model (Step 2) was prepared for input into the modeling code.

The ground water flow modeling addressed local and regional boundary conditions[1]. First, a three-dimensional regional flow model was developed to help refine model parameters. (The regional model covered a large area encompassing the Study Area and several major ground water system stresses including pumping wellfields and streams.) The regional model provided boundary conditions for the more Study Area-specific, higher resolution three-dimensional local model (which primarily encompassed the Study Area). Following local flow model development and calibration, contaminant transport modeling was added to the local model.

### 1.3.2.2 *Model Calibration*

Model calibration is a systematic process through which initial data input is adjusted to obtain a reasonable match (as defined by various calibration criteria in sections 2.4.2, 3.4.3, and 4.4.1) to observed values. Calibration provides a process to evaluate and support the representativeness of both the data input parameters and the conceptual assumptions. The objective of the model calibration was to refine the developed ground water model so that it approximately simulated observed Study Area conditions and, thus, provided a representation of the dynamic, physical, and chemical characteristics of the aquifer system.

Consistent with other modeling conducted in the area (Geotrans, 1985; IT Corp., 1988 and December 1990), the ground water flow model calibration was based on Study Area and regional ground water elevation information. Historical ground water elevation information, both from the PRRS Study Area wells and the FEMP wells, was utilized during model calibration.

Calibration results were evaluated through tabular and graphical means. More specifically, this evaluation included:

- Visual comparison of mapped calibrated model results and the observed data (heads and concentrations); and

- Statistical testing of the match between the model results and observed data (heads and concentrations).

[1]Boundary conditions include various stresses (hydraulic and/or chemical), simplified to a mathematical representation, assigned to portions of the model to realistically simulate site conditions.

*Regional Flow Model Calibration*

The conceptualized three-dimensional regional flow model was calibrated in steady-state[2] mode to correspond to two observed ground water flow conditions in the regional area of the PRRS using regional and Study Area-specific hydrogeologic parameters. To represent average conditions for the area, two sets of observed water level data were used for calibration. The model was initially calibrated to a 1986 set of water level data (obtained from IT, December 1990) which was areally extensive throughout the model area. Additionally, the model was calibrated to a 1991 set of water level data generated during the RI for the PRRS. The primary reasons to calibrate the model to the less areally extensive 1991 data were:

- 1991 data points (wells) were much more densely located at the PRRS;
- 1991 data was collected concurrent with water quality data used for calibration of the contaminant transport model; and
- 1991 data had a higher degree of documented Quality Assurance/Quality Control (QA/QC).

Steady-state calibration runs were conducted until the hydraulic heads computed by the model closely approximated the observed heads. In order to achieve this close approximation, selected hydrogeologic parameters were adjusted within their practical range of values as applicable for the Study Area. Calibration accuracy was assessed by comparing the hydraulic head values and by using statistical testing. Once the regional model was calibrated to the two observed conditions, the boundary conditions for flow were established for the local three-dimensional flow model.

*Local Flow Model Calibration*

The local three-dimensional flow model was calibrated based on the same 1986 and 1991 water level data sets as the regional model calibration. To provide a higher degree of resolution (model problem definition) than in the regional flow modeling, a finer (more dense) grid[3] was used for the local modeling. The three-dimensional local flow model was also calibrated in steady-state mode.

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[2]Steady state is the point at which model variables such as heads (water elevations) and/or chemical concentrations cease to change with time.

[3]The model grid is a series of points which is arranged into an array to form a mathematical representation of the modeled system. The points (nodes) are locations where information about the modeled system is input and at which chemical concentrations and head (water level elevations) are calculated. These points are strategically placed to help best define the modeled system. A denser coverage of points is used in areas where a higher degree of resolution is desired. The area surrounding each point (node) is called the cell. Grid spacing refers to the distance between points (nodes). I, J, K notation is used to identify the location of a node within a model grid based on a cartesian coordinate system where I is the X-axis, J is the Y-axis, and K is the Z-axis.

*Contaminant Transport Model Calibration*

After local flow model calibration was satisfactorily obtained, two local contaminant transport models (an inorganic model and an organic model) were calibrated against average ground water concentration values measured at the PRRS during the RI. These calibrations were conducted by evaluating various transport scenarios and adjusting various transport parameters.

The three-dimensional contaminant transport models were calibrated by using the results of the 1991 three-dimensional steady-state local flow model. Adjustments to the hydraulic parameters of the already calibrated local flow model were minimized. Transport model calibration was performed against the observed concentrations at RI sampling locations (wells).

As defined in the Phase II Work Plan (ERM 1991), the constituents that were considered for calibration were grouped based upon similar chemical properties. These groupings and the associated constituents were as follows:

*Inorganic Chemicals:*

- Total Potassium
- Potassium-40
- Sodium
- Arsenic

*Volatile Organic Chemicals:*

- Benzene
- Toluene
- Ethylbenzene
- Total Xylenes
- Cumene

Each grouping of constituents was calibrated based on one selected indicator constituent. For reasons discussed in Section 4.0 (Contaminant Transport Modeling), sodium was selected to represent the inorganic group and ethylbenzene was selected for the organic group. For other individual chemical constituents that belong to each group, concentrations were estimated from the results of the representative constituent model (sodium or ethylbenzene) for each group. The estimates were made based upon regression analysis of actual measured concentrations which demonstrated the correlation of each group of constituents to the associated representative constituent.

*1.3.2.3* *Sensitivity Testing*

In the above calibration cases, a limited number of runs for sensitivity analysis were performed to assess how variation of select model parameters affected model performance. Sensitivity analysis also assisted in defining the relative effect of uncertainties in the values of parameters used in the model.

As detailed in Section 2.5.2 (Parameters Chosen for Sensitivity Testing), parameters that were considered for sensitivity analyses included: for ground water flow--precipitation recharge, stream depth and leakage, and hydraulic conductivity; for

contaminant transport--dispersivity[4], contaminant mass loading rate, and the chemical attenuation processes of retardation and decay[5].

### 1.3.2.4 *Baseline Risk Assessment Simulation*

An integral part of the RA is to assess the risk associated with the potential exposure to Study Area chemicals. Because one of the exposure pathways to be considered is ground water transport and use, the calibrated ground water models were used to simulate the movement over time of ground water contaminants to estimate the contaminant concentrations at identified exposure locations in the future.

Once the model was developed and calibrated, it was used to simulate future conditions in the vicinity of the Study Area for the modeling constituents identified in Section 1.3.2.2 (Model Calibration). Simulations were used in conjunction with the exposure assessment conducted during the RA to estimate potential receptor concentrations as described in the RA (ERM, September 1992).

### 1.3.2.5 *Modeling QA/QC*

Model QA/QC is an important step in the development and use of the ground water flow and contaminant transport models. QA/QC consisted of a review of the model conceptualization, development, and use to assess and improve model accuracy and defensibility. The objective of this task was to assess and improve the accuracy and reliability of the developed ground water flow and contaminant transport models.

Model QA/QC is related to the entire modeling process and was performed continually throughout the ground water modeling tasks.

QA/QC concentrated on the following areas:

- *Oversensitivity of model to certain estimated input parameters.* If the model reacted unexpectedly to an input parameter that was considered to be realistic based on Study Area conditions, then further assessment was conducted to ensure the unexpected result is not the result of model programming, inaccurate data input, etc.

- *Proper development of conceptual model.* The conceptual model was continually reviewed throughout model development to make sure the model is "well posed." A well posed model should come as close as is feasibly possible to reproducing the modeled system inputs, outputs, and characteristics.

- *Proper data input.* Data input files were independently reviewed throughout the modeling process by multiple project personnel to avoid data input error and to evaluate the suitability of the input data based on observed Study Area-specific conditions.

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[4]Dispersivity is a characteristic property of a porous media (e.g., an aquifer) which describes the mechanical mixing of a dissolved chemical in the porous media.

[5]For the purposes of modeling for this Site, decay is a first-order, irreversible rate reaction (i.e., the rate constant = ln(2) divided by the half-life of the chemical.

- *Proper model use.* The model being developed was compared to the model code's inherent limitations (for HST3D, these are discussed in Kipp, 1987) to ensure that the code was being used consistently within its capabilities (for example, it would be incorrect to conduct multi-phase flow modeling with HST3D).

- *Repeatability of results by a comparable model.* The model results of the current study were compared to model results of a similar study to evaluate the ability of each of the models to perform calculations consistently. This step is particularly valuable when different model codes are used on separate projects. If the different codes are able to arrive at similar answers then the credibility of both investigations and codes are strengthened.

- *Comparability with previous modeling performed for area.* If two different modeling investigations for the same area produce similar results using similar data this lends credibility to both investigations.

## 1.4 REPORT ORGANIZATION

The remainder of this report is primarily separated into three modeling categories: Section 2.0 (Regional Ground Water Flow Modeling); Section 3.0 (Local Ground Water Flow Modeling); Section 4.0 (Contaminant Transport Modeling). Within each of these sections, the following items are discussed as they apply to the respective category of modeling: Data collection and review; model conceptualization; and model calibration. As applicable, sensitivity analysis (Section 2.0, Regional Ground Water Flow Modeling, and Section 4.0, Contaminant Transport Modeling), contaminant mass loading and future contaminant migration predictions (Section 4.0, Contaminant Transport Modeling) are also presented. Section 5.0 (Summary of Modeling Effort) contains the overall summary and conclusions of this work. Section 6.0 (References Reviewed/Cited) contains a list of references. Tables and figures referred to throughout this document are located in Appendix A.

*Section 2.0*

*Regional Ground Water Flow Modeling*

# 2.0 REGIONAL GROUND WATER FLOW MODELING

## 2.1 GENERAL APPROACH

In the first phase of PRRS modeling, a regional ground water flow model was developed, calibrated, and sensitivity tested. The regional flow model output helped to define a set of flow model parameters to be used with the local flow and contaminant transport models. Because flow model sensitivity testing had already been done and there is minimal hydraulic stress to the ground water flow system (e.g., wells pumping at high rates (discharge rates of the A&W wells and the RNC well were insufficient to noticeably affect the hydraulic gradient at the scale of the local model) and large streams) in the PRRS study area, it was resolved not to perform additional sensitivity testing on the local flow model. The regional flow model covers an area which includes several large hydraulic stresses (the Great Miami River and Paddys Run). Calibration and sensitivity testing of the regional flow model provided additional support to the set of parameters chosen for input to the local flow model.

The regional flow model development process is presented graphically in figure 2-1. First, other studies conducted in the area were reviewed. This information, coupled with RI data, permitted development of a conceptual regional flow model and identified an initial set of model parameters for input into the HST3D data files. Review of the existing data suggested that the areally extensive set of water level data collected in April 1986 represented an average ground water flow condition within the regional model area. "Average flow condition" refers to the flow condition for the model areas which were observed most often, including water level elevations typically measured in wells throughout the investigation period. The representation of average ground water flow conditions by the April 1986 and May 1991 ground water level data sets is supported by the similarities observed in ground water levels measured during other months between 1986 and 1992 (see section 3.10.2.2 of the RI report). Consequently, the regional model was calibrated to this 1986 data set. However, to expand upon the 1986 data and to incorporate the data collected during RI activities, it was necessary to also calibrate the model to a May 1991 data set (which represented an average flow condition) collected as part of the RI activities. Calibration to a second data set provided a means to "verify" the calibrated model. The 1986 water level data set (reported by IT, Dec. 1990) contained some data which were approximations of ground water elevations in areas proximal to collector wells (completion depths of the collector wells were unknown, and vertical hydraulic gradients may have influenced the water level elevation). This reported uncertainty provided additional incentive to supplement the initial 1986 data simulation with a 1991 data set for which the data collection procedures were supported with documented QA/QC.

Once the initial data set was developed, an interim process was undertaken to calibrate the model by adjusting of model parameters within reported ranges until an adequate calibration was obtained based on the calibration criteria set forth in the Phase II Work Plan (ERM, 1991). The model was calibrated first to the 1986 data set and sensitivity tested. Following completion of the 1986 calibration, the 1991 calibration was completed and sensitivity testing conducted for the 1991 model. Following completion of calibration to the 1991 data set, local flow model development was

initiated. The model calibration process is detailed in Section 2.4 (Model Calibration) of this report.

## 2.2 *DATA COLLECTION AND REVIEW*

### 2.2.1 *General*

As is discussed in detail in the RI (ERM, September 1992), the PRRS is situated over a buried valley aquifer system. The aquifer is composed primarily of sand and gravel which fills an old stream valley carved into low permeability bedrock. Some thin clay units are present in the aquifer and, generally, the amount of fine-grained material present in the aquifer decreases with depth. The aquifer averages about two miles wide and about one hundred feet thick in the vicinity of PRRS. Important hydraulic stresses to the aquifer near PRRS include: the Paddys Run Stream; the Great Miami River; pumping wells owned by the Southern Ohio Water Company (SOWC) (2 wells), FEMP (1 well), A&W (2 wells), and RNC (1 well); and rainfall recharge.

Extensive ground water assessment work has been conducted by various investigators in the vicinity of PRRS. In the 1950s and 1960s, studies were conducted by the United States Geological Survey (USGS) to assess water resources in the area. Ultimately, SOWC installed wells northeast of PRRS to provide a water source for the area. These large collector wells can pump in excess of 6,000 gallons per minute each and have given rise to a number of water resource related studies which have helped refine the hydraulic parameters for the area. Monitoring of water resource related parameters (e.g., ground water levels, rainfall recharge, etc.) has been ongoing since the 1950s, which has resulted in a large database that extends to the present.

With the FEMP becoming a public environmental concern during the 1980s, the bulk of hydrogeologic investigations conducted in the area in the 1980s have been focused on ground water contamination associated with the FEMP. The USGS and several private consulting firms have conducted numerous studies in the vicinity of the FEMP Study Area. Investigative work is presently ongoing. Much of this work has been in closer proximity to the PRRS than the water resources work conducted near the SOWC wells and is, therefore, more applicable to the understanding of ground water flow in the vicinity of PRRS.

From the late 1980s through the present, investigative work (primarily associated with the FEMP) has been conducted in the vicinity of PRRS. Data provided by the RI for PRRS provides the most comprehensive Study Area-specific database to date for understanding ground water flow in the vicinity of PRRS.

Where possible, model-related data have been taken directly from the RI investigation for PRRS. Otherwise, model parameters have been interpolated from investigations conducted in the vicinity of PRRS. A comprehensive review of ground water flow parameters reported for the area is provided in Table 2-1. This table lists each parameter and the associated test method, test location, constraints on using the parameter, reference, and any comments associated with the parameter. These reported values were used to establish ranges within which model parameter values were selected.

### 2.2.2 *Previous Modeling Studies*

Three other regional ground water flow modeling studies of the buried valley aquifer in the vicinity of PRRS have been conducted. The first was by Spieker (1968c), who developed a two-dimensional analog model. The area covered by this model extended from just east of Fairfield, Ohio (located about eight miles northeast of the PRRS) down to southwest of New Baltimore and west of FEMP. This model, associated with other Spieker studies, provides a comprehensive database for the region in the vicinity of PRRS. Although the modeling did not address the third dimension (i.e., vertical variations in the aquifer), it did address many critical hydrogeologic issues. It defined the dimensions of the aquifer, provided a range of transmissivities and aquifer thicknesses for the area, and gave insight on flow from bedrock walls to the buried valley.

GeoTrans (1985) developed a three-dimensional numerical ground water flow model of the region using a proprietary modeling code known as SWIFT-II. The area covered by this model is similar to that covered by the regional flow model for the PRRS RI. GeoTrans' modeling focused on the FEMP Site. This model relied heavily on Spieker's (1968a) interpretation of the hydrogeology of the area. In addition, GeoTrans' study provides a comprehensive listing of reported hydraulic parameters for the area. The bedrock was treated as a no-flow boundary[1] and the Great Miami River and Paddys Run Stream were treated as constant pressure boundaries[2]. The model was driven by constant pressure nodes at the upgradient boundary. Hydraulic parameters used in the GeoTrans model are summarized in Table 2-1. The GeoTrans model was calibrated to a limited set of water level data. In other words, ground water flow in the region which was modeled had not been fully defined prior to model development. Although this is a drawback to the GeoTrans modeling effort, the sensitivity testing to refine model parameters and the comprehensive data review conducted for the modeling form a sound basis for additional modeling.

The third regional flow modeling study conducted in the vicinity of FEMP was conducted by IT between 1987 and 1990. This numerical model covered approximately the same area as the PRRS regional model. IT's initial focus for model development was the study of FEMP discharge to the Great Miami River. This work was first reported by IT (1987) and again in IT (1988). Later, when IT was developing a ground water contaminant transport model, the regional model developed in 1987 and 1988 was refined and is discussed in several IT reports prepared in 1990. IT's regional model was developed using SWIFT-III, a later version of SWIFT-II, used by GeoTrans (1985).

IT's regional model had the advantage of having a more well-defined ground water flow system within the region as well as an enlarged hydrogeologic database due to a significant amount of hydrogeologic field work which was conducted between 1987 and 1990 for the FEMP. IT initially developed a two-dimensional flow model which was later refined into a three-dimensional flow model. IT's three-dimensional

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[1] A no-flow boundary is a model boundary through which neither water nor contaminant can flow.

[2] A constant pressure boundary (also known as a constant head boundary) is a boundary where pressures (water level elevations) are held constant. If the constant pressure boundary is located in an upgradient portion of the model, it serves as a source of water to the model; conversely, if the constant pressure boundary is located in a downgradient portion of the model, it serves as a water sink.

regional flow model was composed of five layers. It treated the Great Miami River as a leaky boundary[3] and Paddys Run as a recharge boundary[4]. The bedrock walls were allowed to recharge the aquifer and the model was driven by specified pressure boundaries at upgradient and downgradient model boundaries. IT's model was calibrated to the 1986 ground water level data set (the same 1986 data set to which the PRRS model was calibrated). Although IT's model relied heavily on Spieker's (1968a) interpretation of the hydrogeology for the area, IT did use lithologic data collected during the field investigation at the FEMP area to make several modifications to Spieker's interpretation. Most notably, IT greatly reduced the recharge within the FEMP boundaries due to the presence of a thick till over this area. Also, IT reduced hydraulic conductivity in areas near the city of New Baltimore and to the northwest of FEMP (supporting lithologic data for the two reduced hydraulic conductivity areas was not found within the IT model documentation). Another notable feature of IT's model was that sensitivity testing and model calibration caused IT to make the lower portion of its aquifer model have a seemingly high (600 feet/day) hydraulic conductivity, which is outside the range of reported hydraulic conductivities for the area. Model parameters used in IT's regional model are summarized in Table 2-1.

## 2.3 *MODEL CONCEPTUALIZATION*

### 2.3.1 *Discretization*

Figure 2-2 shows the discretization[5] of the regional flow model for PRRS. When interpreting model input and output, it is important to note the HST3D model code employs a mesh-centered grid, which means that the model calculates water level elevations (and solute concentrations) for grid intersections. Grid dimensions range from approximately 2,500 x 2,500 feet down to 500 x 500 feet. The modeled area was more finely discretized in the vicinity of PRRS to help accommodate the transition from the regional to the local model. Moderately fine discretization was also included in the vicinity of the SOWC wells to accommodate the potentially large changes in hydraulic head which can occur in the vicinity of pumping wells with such high pumping rates. Vertically, the model was discretized with four layers of nodes to give three permeable zone layers. Finer vertical discretization, as was conducted in the IT and GeoTrans models, was not appropriate because this regional model was being used as an intermediate step to developing a localized model for more detailed interpretation. The upper permeable zone extended from the water table to an elevation of 455 feet above mean sea level (FAMSL) which is approximately concurrent with the top of the clay unit observed beneath FEMP. The middle permeable zone extended from an elevation of 455 to 445 FAMSL which

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[3]A leaky boundary is a condition where water is allowed to leak through a boundary in response to: head differentials on either side of the boundary; the hydraulic conductivity of the material through which leakage is occurring; and the thickness of the material through which leakage is occurring. An example of a leaky boundary is a stream bed.

[4]A recharge boundary is a condition where water is supplied to the model at a constant rate (e.g., such as the application of rainfall).

[5]Discretization refers to the division of the modeled system with a grid. Model parameter assignments (e.g., aquifer properties) and model calculations are executed at the grid intersections.

approximately corresponds to the thickness of the aquitard clay unit observed beneath FEMP (IT, 1990). The lower permeable zone extended from 445 to 380 FAMSL which corresponds to the approximate contact between the aquifer and the bedrock. A generalized north-south geologic cross section from FEMP to the Great Miami River is provided in Figure 2-3 for comparison purposes. A more complete discussion of Study Area-specific hydrogeology, including additional cross sections and RI findings, is presented in the RI (ERM, September 1992).

### 2.3.2 *Hydrogeologic Characterization*

Summarized in Table 2-2 are the reported ranges for different model parameters and the chosen parameter values used for modeling. The following hydrogeologic assumptions apply for the regional ground water flow model (also, please refer to the inherent assumptions for the HST3D model code which are discussed by Kipp, 1987):

a. Ground water flow is not influenced by density differences due to changes in water temperature, fluid density, and flow viscosity (i.e., fluid temperature, density, and viscosity were held constant).

b. Hydraulic conductivity is heterogeneous[6] and isotropic[7] within each permeability zone (refer to Figure 2-4). The aquifer hydraulic conductivity of the lower portion of the model is about 30 percent higher than the upper portion. This assumption is supported by GeoTrans (1985), IT (December, 1990) (an independent evaluation of the data suitability was made by ERM), and a review of lithologies presented in ERM (September, 1992) which suggest a decrease in fine-grained material with depth. Note that the bedrock above 380 FAMSL is treated as a permeable zone.

c. Porosity is held constant throughout the model. The porosity used is representative of the aquifer. Use of the same porosity for the bedrock has a negligible effect on ground water flow (and transport) in the model because a comparatively small quantity of ground water and contaminant pass through the bedrock portion of the model due to its low hydraulic conductivity.

d. Bedrock and aquifer are incompressible.

e. Water table recharge due to precipitation is variable throughout the modeled area (refer to Figure 2-5) depending, in part, on the presence of clay within the unsaturated zone (the lower the reported amount of clay, the more recharge which was applied).

f. Ground water pumping occurs at two SOWC wells, an FEMP well, and the two A&W wells at rates and at the screened elevations reported in Table 2-2. These well locations are shown in Figure 2-6. The RNCC well (not shown in

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[6]Heterogeneous means that a modeled system property can change throughout the modeled area. Conversely, homogeneous means that a modeled system property is constant throughout the modeled domain.

[7]Isotropic means that a modeled system property is the same in all directions. Conversely, anisotropic means that a property may change, depending on direction.

Figure 2-6) has a negligible effect on ground water flow due to its relatively low pumping rate (less than five gpm).

g. Stream leakage[8] occurs through the Great Miami River stream bed and the Paddys Run stream bed at the locations shown in Figure 2-6. On the average, Paddys Run Stream north of Willey Road has a negligible effect on ground water flow (this portion of the stream bed is generally above the water table and does not normally contain water throughout the year (IT, December, 1990). The hydraulic parameters associated with the leakage through these two streams are presented in Table 2-2.

### 2.3.3 *Boundary Conditions*

Specified pressure boundaries were used to drive ground water flow in the model. For simplicity and because most wells used for calibration were relatively far away from model boundaries, specified pressures were only assigned in the top node layer (layer 4). Where the bedrock coincided with an exterior model boundary in layer 4, this boundary was defined as a no-flow boundary. All other exterior model boundaries in the lower three layers were no-flow boundaries. Specified boundary conditions for layer 4 are shown in Figure 2-6.

During calibration of the model to 1986 and 1991 conditions, it was found that, in general, water levels were approximately 1 foot lower for 1991 than for 1986. Consequently, two sets of boundary conditions were modified from the 1986 model calibration to achieve calibration to 1991 data (these boundary conditions were (1) specified pressure and (2) depth of flow in the Great Miami River and Paddys Run Stream). Generally, the specified pressure boundary nodes were decreased by an amount approximately equal to 1 foot, of head, and the depth of flow in the Great Miami River and Paddys Run Stream were decreased by approximately 1 foot and 0.5 foot, respectively, for calibration to 1991 data.

## 2.4 *MODEL CALIBRATION*

### 2.4.1 *General*

Model calibration is an important step in the development and application of ground water models (flow and solute transport). The representativeness of both the model conceptualization and data input parameter values are confirmed if calibration is achieved. The process of calibration consists of adjusting the developed model parameters to accurately represent actual Study Area conditions. To obtain realistic predictions for the baseline RA and FS, a calibrated model that realistically represents the dynamic, physical, and chemical characteristics of the ground water system is required.

Model calibration is a systematic process through which data input is adjusted within the range of reported regional or Study Area-specific data to obtain an approximate

[8]Stream leakage refers to the transmission of water between a stream and the ground water system through the stream bed. The leakage is controlled by the water levels in the stream and the ground water system and the thickness and vertical hydraulic conductivity of the stream bed.

match to the observed values of hydraulic head or solute concentrations. The primary input data adjusted during calibration included:

- Specified pressure boundary conditions (Figure 2-6);
- Depth of flow in Paddys Run Stream and Great Miami River (Table 2-2);
- River leakances for Paddys Run Stream and Great Miami River (Table 2-2 and Figure 2-6);
- Rainfall recharge (Table 2-2 and Figure 2-5);
- Hydraulic conductivities (both horizontal and vertical) for the four layers (Table 2-2 and Figure 2-4);
- Grid size (Figure 2-2); and
- Computational model time step[9] (refer to Kipp, 1987).

To support prediction capabilities of the modeling, it is important to obtain good calibration results that correspond to parameter values which may be expected at the Study Area based on either the Study Area-specific or regional data. This was accomplished for the PRRS modeling study. Good calibration results that are obtained by using abnormal parameter values are as unreliable for prediction as are uncalibrated models.

In the regional flow modeling, the objective of calibration was to accurately match the computed hydraulic heads and the corresponding observed heads. The HST3D model code calculates head values at the grid intersections whereas the actual observation point (well location) may not be exactly coincident with the grid intersection. This discrepancy can affect the ability to accurately match computed and observed heads.

The three-dimensional regional flow model was calibrated in steady-state mode to correspond to the observed ground water flow conditions in the PRRS area using regional and Study Area-specific hydrogeologic parameters or input data mentioned earlier. The model was calibrated to April 1986 and May 1991 observed ground water level data which respectively correspond to average conditions.

### 2.4.2 *Calibration Criteria*

The flow model calibration evaluation criteria used in this study (introduced in the RI Phase II Work Plan (ERM, 1991)) are presented in Table 2-3. In addition to these nine primary calibration criteria (Table 2-3), six statistical tests of hypothesis were

[9]The computational time step is the time increment from one point in time in the model run to another point in time in the model run during which calculations are performed to estimate the ground water flow and/or contaminant transport conditions which take place between the two points in time. The length of time stepping used during modeling can have a direct effect on the accuracy of model computations. Two large a time step can cause numerical inaccuracies. The shorter the time step, the better. However, a short time step leads to a longer run time. Optimum time stepping is typically determined by trial and error (and review of model-supplied mass balance information) and is specific to each model run.

used to further assess calibration accuracy. A detailed description of the six statistical tests of hypothesis is presented in Appendix B.

### 2.4.3 *Observed Data Used in Calibration*

The regional model was first calibrated to the water level elevations observed in 55 wells (see section 2.1, General Approach) in April 1986. The observed 1986 flow condition and the locations of data points (wells) are shown in Figure 2-7. The model was also calibrated to the May 1991 data from 67 data points (wells). The observed 1991 flow condition is shown in Figure 2-8 (associated data locations are presented in Section 3.0 (Local Ground Water Flow Modeling)). Each data point was assigned model grid coordinates based on the location of the data point and the elevation of the top of well screen. This facilitated comparison of computed to observed water level elevations.

### 2.4.4 *Results*

#### 2.4.4.1 *1986 Model*

Calibration was accomplished by varying several hydrogeologic parameters. The parameters used for calibration are specified in Section 2.4.1 (General) and were adjusted within the reported range of values for the parameters. The reported ranges and calibration value of the parameters are summarized in Table 2-2.

The model was run until a steady state ground water flow condition was reached. Comparison of observed water level data to computed water level data was made once the steady state condition was reached. The modeled water levels reached steady state in less than three years. The computed 1986 ground water elevations for the uppermost model layer are shown in Figure 2-9. These computed values were compared with the observed elevations shown in Figure 2-7. A visual comparison indicates a close match between the observed and computed values. Further results of the April 1986 calibration are summarized in Table 2-4. In this table, well identification, model cell/node (i, j, k) coordinates, observed heads, and computed heads are given. Also, Table 2-4 provides a summary of the primary calibration criteria results. The results for the six statistical tests of hypothesis are given in Appendix B. All predetermined statistical test criteria were met or exceeded. Based on a comparison of graphical, tabular, and the various statistical tests, it is concluded that the model has been extensively well-calibrated to the 1986 data, which represents average flow conditions, for an areally extensive data set.

#### 2.4.4.2 *1991 Model*

As with the 1986 model, the 1991 model was run to steady-state which was reached in less than three years. The 1991 calibration results and primary calibration criteria are summarized in Table 2-5. The observed and computed hydraulic heads are respectively shown in Figures 2-8 and 2-10. A close match between the observed and computed values is evident from a comparison of these figures and the modeling results tabulated in Table 2-5. The results of six statistical tests of hypothesis are summarized in Appendix B. Again, based on graphical and tabular comparison and the various statistical analyses of the computed and observed 1991 data, the model calibrates well for the 1991 data (which correspond to an average flow condition with a dense distribution of data in PRRS). As previously mentioned, only the boundary

conditions and stream flow depths were changed in the 1991 model in comparison with the 1986 model. Thus, the calibration of the 1991 model can be considered as a "verification" of the regional model for a different time period and hydrologic conditions.

## 2.5 *SENSITIVITY ANALYSIS*

### 2.5.1 *General*

The 1986 and 1991 calibrated models were used to investigate the effect of varying the input parameters upon the hydraulic head computed by the model. The 1991 model was chosen in addition to the 1986 model for sensitivity testing because the 1991 model was calibrated to a more recent data set. Also, the 1991 well data are more concentrated in the vicinity of the PRRS whereas the 1986 well data was spread throughout the region. Thus, using the 1991 data enabled the evaluation of sensitivity of the model to changes close to the PRRS. Such a choice also minimized the need for conducting sensitivity analysis of the local flow model.

By definition, sensitivity analysis indicates the comparison of changes in the model output (hydraulic head) due to incremental or unit change in one parameter while keeping all other parameters the same as in the calibration run. The change in output and input parameter values are referenced to calibration output and parameter values. Sensitivity analysis results are useful to denote changes in hydraulic heads that can be expected as a result of change in parameter values. This relationship is helpful when interpreting prediction results. Parameter values vary naturally as a result of heterogeneity of the ground water system. Most parameters vary spatio-temporally in nature. Typically, in modeling, average values (out of a practical range of values reported in literature or Study Area-specific range) are utilized. This range should encompass the heterogeneity. Thus, in sensitivity analysis, a parameter can be altered to bracket the expected range of variation to analyze "what if" scenarios due to variation of the parameter value.

### 2.5.2 *Parameters Chosen for Sensitivity Testing*

For the 1986 and 1991 models, the sensitivity analysis was performed on each of the following parameters.

- Recharge;
- River leakance;
- Horizontal hydraulic conductivities of layers;
- Vertical hydraulic conductivities of layers; and
- Depth of flow in streams.

These parameters were chosen because, during model calibration, they appeared to have the greatest influence on modeled heads. Additionally, parameters such as hydraulic conductivity will have a large influence on contaminant transport. Previous investigators (IT, December 1990 and GeoTrans, 1985) noted that their models were sensitive to variations in some of these parameters.

### 2.5.3 *Results*

The above parameters were generally changed within their reported ranges (some were tested outside of their reported ranges). The results are summarized in Tables 2-6 and 2-7. Sensitivity results are expressed as change in maximum head increase and maximum head decrease in comparison with observed heads and mean and standard deviation of computed heads. The same statistics are also expressed as percentage of change in the maximum increase, maximum decrease, mean and standard deviation of residuals from the corresponding calibration output. Tables 2-6 and 2-7 list the parameters changed, reported range of parameters, parameter values in sensitivity analysis, and percentage of change in parameter values from calibration. This information is followed by calibration output (maximum increase, maximum decrease, mean value, and standard deviation of model hydraulic head), corresponding sensitivity output, and finally percent change from calibration results.

While specified pressure cells were varied to achieve model calibration, they were not sensitivity-tested since they essentially "drive" most of the flow through the model and, therefore, are inherently a very sensitive model parameter. Model calibration also showed the River Stages and associated leakages chosen for the Great Miami River and Paddys Run Streams had the majority of control over computed heads in the vicinity of the streams throughout the model. As a result, it is not surprising that River Stage and Leakage were very sensitive. Generally, a higher set of horizontal hydraulic conductivity values (the high end of the reported range for this parameter) resulted in better calibration of the regional models. Also, an increase in horizontal hydraulic conductivity with depth assisted in improving the calibration. The ratio of vertical to horizontal hydraulic conductivity range which was sensitivity tested, did not have much affect on computed heads. However, a lower ratio of vertical to horizontal hydraulic conductivity did slightly improve calibration criteria statistics. Generally, it was observed that a reduction in recharge had less effect on computed heads than an increase (above chosen recharge values) had on computed heads. The increase in recharge above the chosen recharge values for modeling resulted in a notable rise in computed heads in the flow models. Results of this sensitivity testing exercise show the relative importance of various ground water flow related parameters.

The results of model sensitivity testing can be compared to IT and GeoTrans results which generally are as listed below:

- IT (1990) stated that variation in vertical hydraulic conductivity and recharge did not change the heads significantly, but a large variation in horizontal hydraulic conductivity did affect heads in the lower portion of the aquifer. A 30% reduction in river leakance had some effect on the head.

- GeoTrans (1985) conducted sensitivity analysis by reducing horizontal and vertical hydraulic conductivity and modifying one boundary condition (located outside the PRRS model study area--therefore, not discussed here). GeoTrans reported that the lowering of the hydraulic conductivities did not greatly affect the heads in the upper portion of the aquifer. However, they noted increased drawdowns in the lower portion of the aquifer due to use of lower hydraulic conductivities.

The regional ground water flow model was successfully calibrated to two sets of water level data (1986 and 1991) which are generally representative average ground water flow conditions (sample input and output files presented in Appendix C). Calibration criteria set prior to modeling were satisfied. Development of the regional model and the sensitivity testing resulted in a refined set of data for input to the local ground water flow model. Sensitivity testing of selected model input parameters within reported ranges indicated the model was most sensitive to changes in specified boundary conditions, fluctuations in depth of flow in the Great Miami River and Paddys Run Stream, and hydraulic conductivity.

Comparing the modeling to other modeling investigations helps support the results of this investigation. This model is comparable to IT's (December 1990) regional flow model because approximately the same amount of hydrogeologic data (e.g., lithologic data, ground water level data, etc.) was available to develop each model. A direct comparison to earlier modeling efforts is generally not applicable because less data was available during development of those models. Differences between IT's model and the PRRS regional model are as follows:

1. IT used a horizontal hydraulic conductivity of 120 ft/day in the northwestern portion of their regional model and 60 ft/day in the southeastern portion of their regional model (New Baltimore area) based on lithologic data reportedly collected for their investigation. Lithologic data, water level data, and hydraulic conductivity information assimilated through field work for the PRRS RI and through review of literature for the area did not support the inclusion of these two low hydraulic conductivity zones. Therefore, these lower hydraulic conductivities were not used. Exclusion of these lower hydraulic conductivities in the regional model had virtually no affect on PRRS contaminant transport modeling since these two zones are outside of the area where PRRS contaminant transport takes place.

2. ERM chose a hydraulic conductivity for the upper portion of the aquifer to be 350 ft/day and for the lower portion to be 450 ft/day. This range of hydraulic conductivity is at the high end of the reported range of hydraulic conductivities for the aquifer and allowed the model to calibrate better based on designated criteria. The maximum reported hydraulic conductivity for the aquifer (except for IT's report) is 402 ft/day. IT's model generally used 450 ft/day for the upper portion of the aquifer and 600 ft/day for the lower portion. IT apparently chose these values to help improve model calibration. ERM felt that these hydraulic conductivities were inconsistent with the reported range for the aquifer and thus chose to use hydraulic conductivities that were more consistent with the reported range.

3. The PRRS model simulated Paddys Run Stream as a leaky stream, whereas IT modeled this stream as a recharge boundary. During the PRRS RI, water levels in Paddys Run were observed to fluctuate widely throughout the hydrologic year in response to precipitation and seasonal variability. IT shows that Paddys Run stream bed is generally within the water table (when there is water in Paddys Run) south of the FEMP Site. Modeling Paddys Run (from the south portion of FEMP down to the Greater Miami River) as a leaky boundary rather than a recharge boundary is considered a more realistic way to simulate stream

interaction with the aquifer stream. By simulating Paddys Run this way, the leaky boundary may be a losing stream or a gaining stream in response to hydrologic conditions. When the stream is modeled as a recharge boundary, it is always a losing stream. ERM utilized the more "realistic" simulation of Paddys Run because of the close proximity of the stream to PRRS and the potential interaction between the stream and contaminant transport.

4. Other minor differences between the PRRS regional model and IT's model include distribution of permeable zones, precipitation recharge zonation, porosity, hydraulic conductivity of the clay unit below FEMP, placement of stream nodes for the Great Miami River, etc. In general, these changes do not represent major differences between the two flow models.

*Section 3.0*

*Local Ground Water Flow Modeling*

## 3.0 LOCAL GROUND WATER FLOW MODELING

### 3.1 GENERAL APPROACH

Upon completion of the calibration and sensitivity testing of the regional model, a local ground water flow model was developed. This model was developed for the RI to assist with the characterization of local flow processes and support contaminant transport modeling. Greater attention to detail was given to model conceptualization and the use of Study Area-specific data (due to its finer discretization/higher resolution). This model was created with the primary intent of simulating contaminant transport from the PRRS to areas downgradient of the Study Area.

The general procedure for developing the local flow model is illustrated in Figure 3-1. Generally, the approach for developing the local model was consistent with the procedures used for the regional model development, except that much of the data review for ground water flow had already been completed. The local flow model was calibrated to the same water level data sets (1986 and 1991) as the regional model, as indicated in Section 2.0 (Regional Ground Water Flow Modeling). Calibration criteria for the local model were also the same as for the regional model. Because sensitivity analysis had already been conducted for the regional flow model, additional testing on the local flow model was not required.

### 3.2 DATA COLLECTION AND REVIEW

#### 3.2.1 General

As described in Section 2.0 (Regional Ground Water Flow Modeling), a large volume of data has been collected for water resource investigations and contamination assessment purposes in the vicinity of the PRRS by other investigators. Generally, the focus of most of this work was outside of the local model area. Consequently, much data for the area which was not obtained during the RI activities (e.g., infiltration, rainfall, conductivities, etc.) has been extrapolated from nearby sites. The most complete database for lithologies and local water levels was the PRRS RI database. In addition to the PRRS RI data, lithologic information within the local model area was supported by information contained within IT and USGS documents. Besides the PRRS RI, Study Area-specific water level data is available from IT's work (IT, December 1990). Table 2-1 provides a comprehensive review of ground water flow parameters for the area in the vicinity of PRRS.

#### 3.2.2 Previous Modeling Studies

One other localized ground water flow modeling study was conducted in the vicinity of the PRRS. IT (December 1990) discusses the development of a local ground water flow model which was developed primarily for contaminant transport purposes to simulate uranium migration in the ground water from FEMP. The IT model extends from FEMP down to just east and south of the PRRS. As with IT's regional flow model, IT started with development of a two-dimensional model and later converted it to a three-dimensional model. This IT model was developed using the SWIFT III code and had a higher resolution (denser grid spacing) than did IT's regional models).

The model utilized similar boundary conditions, hydraulic parameters, and hydraulic heads as those used in IT's regional ground water flow model.

## 3.3 MODEL CONCEPTUALIZATION

### 3.3.1 Discretization

Figure 3-2 shows the discretization of the local flow model for the PRRS. A regularly spaced grid of 100 ft by 100 ft was used for this model. The regular grid spacing was utilized to minimize the potential for numerical errors in the contaminant transport model. This higher resolution model (in comparison to the regional model) allowed for a more realistic definition of boundary conditions including streams and bedrock locations. The grid boundaries were located far enough away from the observed PRRS contaminant plumes so that model boundaries would not interfere with contaminant transport.

Vertically, the model was developed with four layers of nodes, which allows for three permeable zone layers. A geologic cross section through the Study Area is presented in Figure 2-3. The three permeable zone layers of the model correspond to the hydrogeologic interpretation of the area and to screened intervals for PRRS and FEMP monitoring wells. The upper permeable zone layer corresponds to the screened zone for water table wells; the middle permeable zone layer corresponds to the screened zone for intermediate monitoring wells; and the lower permeable zone layer corresponds to the screened zone for deep monitoring wells. The upper permeable zone extended from the water table to an elevation of 478 FAMSL. The middle permeable zone extended from an elevation of 478 to 450 FAMSL, and the elevation of the bottom of the lower permeable zone was 400 FAMSL. The clay aquitard unit, which was simulated in the regional model to extend from an elevation of 455 to 445 FAMSL (northeastern portion of the regional model - beneath FEMP) is not present within the local model area and, therefore, did not need to be considered when developing the vertical discretization. It should be noted that discontinuous clay units were encountered near the water table (primarily above the water table) in some areas of the Study Area. These units are relatively thin and not considered to have a significant effect on heads. Consequently, they were not included in the flow modeling.

### 3.3.2 Hydrogeologic Characterization

Summarized in Table 2-2 are the reported ranges for different model parameters and chosen parameter values used for regional flow modeling. Minor differences between the parameters used in the regional and local models are discussed later in this Section. The following hydrogeologic assumptions apply to the local ground water flow model (also, please refer to the inherent assumptions for the HST3D model code which are discussed by Kipp, 1987):

- Ground water flow is not influenced by density differences due to changes in water table. Flow density and flow viscosity (i.e., fluid temperature, density, and viscosity) were held constant.

- Hydraulic conductivity is heterogenous and isotropic within each permeability zone (refer to Figure 3-3). Note that the bedrock above 400 FAMSL is a permeable zone.

- Porosity is held constant throughout the model.

- Bedrock and aquifer are incompressible.

- Water table recharge due to precipitation is variable throughout the model area depending in part on the presence of clay within the unsaturated zone (the lower the reported amount of clay, the more recharge which was applied) and the presence of paved areas (less recharge was applied to paved areas) (refer to Figure 3-4).

- Ground water pumping occurs at the two A&W wells and the RNCC well at pumping rates and at the screened elevations reported in Table 2-2. Well locations are shown in Figure 3-5.

- Stream leakage occurs through the Great Miami River stream bed and Paddys Run stream bed at the locations shown in Figure 3-5. Hydraulic parameters associated with leakage to these two streams are presented in Table 2-2.

### *3.3.3 Boundary Conditions*

Specified pressure boundaries were developed based on the results of regional flow modeling. These boundaries were used to help drive ground water flow in the model. Specified pressures were assigned to the northern and southern western boundary nodes in all four node layers (layer 4). All other exterior model boundaries were defined as no-flow boundaries. Specified boundary conditions are shown in Figure 3-5.

During calibration of the model to 1986 and 1991 conditions, it was found that in general water levels were approximately one-foot lower for 1991 than for 1986. Consequently, two sets of boundary conditions (specified pressure boundaries and depth of flow in the Great Miami River and Paddys Run stream) were modified from the 1986 model calibration to achieve calibration in 1991 data. Consistent with the regional model, specific pressure boundary nodes were decreased by an amount equivalent to one foot of head, and the depth of flow in the Great Miami River and Paddys Run Stream were decreased by approximately one foot and 0.5 foot, respectively, to achieve to 1991 data.

## *3.4 MODEL CALIBRATION*

### *3.4.1 General*

Careful calibration of the local flow model was very important because it was with this model that the contaminant transport model was developed. As in the regional models, the local flow model was calibrated by adjusting several hydrogeologic parameters within their reported ranges for the PRRS area. With few exceptions (discussed in Section 3.5 (Conclusions)) local modeling used the same parameters as

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those used in regional modeling. Some of the parameters varied to achieve calibration included:

- Specified pressure boundary conditions (Figure 3-5). Specified pressure boundaries were adjusted within the ranges of heads computed in the regional model for the areas corresponding to local model specified pressure boundaries.

- Rainfall recharge (Table 2-2 and Figure 3-4). The recharge distribution used for local modeling is more refined than the distribution used for the regional modeling and is based on the acquisition of information (areal photographs and discussions with PRRS facility employees) during model development that better defined surface areas of the local model domain covered by pavement.

- Hydraulic conductivities (Figure 3-3). Hydraulic conductivity distributions were slightly refined in local modeling to take advantage of the dense grid spacing. A lower vertical hydraulic conductivity (than used in regional modeling) was used which slightly improved calibration of flow and transport models (to be discussed later in this section).

- Grid size/model domain (Figure 3-2). A smaller portion of aquifer was modeled for the local modeling than for the regional modeling.

### 3.4.2 *Observed Data Used in Calibration*

Consistent with the regional flow modeling, water table elevations measured in April 1986 and May 1991 were used as two sets of observed data for calibration. The observed 1986 and 1991 data are respectively shown in Figures 3-6 and 3-7. Water elevation data from 8 and 63 wells were used for calibrating the 1986 and the 1991 models, respectively.

### 3.4.3 *Calibration Criteria*

The methods and criteria for evaluating calibration accuracy were the same as those used for regional flow model calibration presented in Section 2.4.3 (Observed Data Used in Calibration).

### 3.4.4 *Results*

#### 3.4.4.1 *1986 Model*

The results of calibration of the 1986 local flow model (a steady-state run) are summarized in Table 3-1. Contours of computed hydraulic heads in Layer 4 are shown in Figure 3-8. A comparison of Figure 3-8 with the observed heads shown in Figure 3-6, as well as the tabular comparison of observed and computed heads in Table 3-1 suggests a close agreement between the observed and computed heads. The results of the six statistical tests of hypothesis are presented in Appendix B. The various calibration evaluation procedures indicate that the pre-established calibration criteria were met or exceeded, that residuals are relatively small, and that the computed heads closely match the observed heads.

### 3.4.4.2 *1991 Model*

The results of calibration of the 1991 local flow model (a steady-state run) for the 1991 data are summarized in Table 3-2. Contour plots of computed hydraulic heads (Layer 4) are shown in Figure 3-9. For comparison purposes, observed head contours are shown in Figure 3-7. Observed and computed heads can also be compared using Table 3-2. The graphical and tabular comparison indicates a close match between the observed and computed heads. The results of six statistical tests of hypothesis are in Appendix B. The calibration evaluation performed indicates that all pre-established calibration criteria were met or exceeded. The statistical comparisons indicate that the residuals are small in comparison with the observed heads. Generally, the computed heads closely match the observed heads.

## 3.5 *CONCLUSIONS*

The local ground water flow model was successfully calibrated to two sets of water level data (1986 and 1991), which generally represent average ground water flow conditions. Pre-established calibration criteria were met or exceeded. Calibration of the two local models was accomplished by slightly varying the pressures at specified pressure boundaries within the ranges predicted by the regional models for corresponding areas.

Rainfall recharge for the local models was refined and slightly revised from the regional model recharge. Recharge in some areas in the vicinity of and just south of the PRRS of the local model was reduced in comparison to the regional model (compare Figure 2-5 with Figure 3-4). This reduction was based on the finding of an abundance of fine-grained materials in the unsaturated zone and the presence of pavement at A&W and RNC sites. Generally, this reduction had a negligible effect on ground water level elevations in the local models. Sensitivity testing with the regional model also shows that a reduction in recharge of this magnitude has only a small effect on ground water elevations (and, consequently, ground water flow).

To support solute transport model calibration, the ratio of vertical to horizontal hydraulic conductivity (Kv/Kh) was increased from 1/10 (regional model) to 1/100 (local model). Kh's of 350 f/d and 450 f/d were retained. A Kv/Kh of 1/10 was originally chosen based on similar values being suggested for the area in other modeling investigations (GeoTrans (1985) and IT (December 1990)). However, sensitivity testing with the regional model suggested that a Kv/Kh of 1/100 provided slightly better calibration. Also, this higher value assisted in calibration of the transport model. Since there were no Study Area-specific field measurements that supported a Kv/Kh of 1/10 over 1/100 and since 1/100 yielded a better overall calibration, a Kv/Kh of 1/100 was used. It should be noted that it is typical to use Kv/Kh in the range of 1/10 to 1/100 in modeling efforts where field measurements are unavailable.

The northern portion of the PRRS local model partially overlaps the southern portion of IT's (December 1990) flow/transport model. A comparison of the differences between the models can be made for those overlapping portions:

- As mentioned in Section 2.0 (Regional Ground Water Flow Modeling), Paddys Run stream is simulated as a leaky stream in PRRS modeling, whereas it is

modeled as a recharge boundary by IT. ERM felt that the leaky stream approach was more realistic, especially with the potential for contaminant plume interaction with Paddys Run during transport modeling.

- As with the regional model, the PRRS model used lower horizontal hydraulic conductivities (more within the reported range for the area) than were used in IT's model. Also, as discussed earlier in this section, the Kv/Kh in the PRRS local model was 1/100, while the IT model used 1/10. Again, based on regional model sensitivity testing, this higher value appears to provide for better flow model calibration.

- Other small differences between the two models include distributions of: permeability zones; rainfall recharge; porosity; and stream nodes. These differences by themselves do not appear to have a major impact on the final results of these two modeling studies.

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*Section 4.0*

*Contaminant Transport Modeling*

# 4.0 CONTAMINANT TRANSPORT MODELING

## 4.1 APPROACH

Contaminant transport models were developed during the RI to:

- Evaluate and refine parameters which control ground water contaminant migration at PRRS;
- Support exposure assessment and risk characterization for the RA; and
- Assist with the remedial alternative development during the FS.

Because the contaminant transport processes are, in part, different from the processes which strictly govern ground water flow, the contaminant transport models were added onto the local flow model following calibration of the local flow model. The calibrated May 1991 local flow model was utilized for transport model development: because of the better distribution of water level data (than 1986 data) over the model area; for consistency with the chemical data, which was collected from the same wells as water level data between 1990 and 1992; and because it appeared to best represent the average ground water flow condition for the area. This section addresses the development and calibration of the contaminant transport model including the general approach, review of data, estimation of contaminant mass loading rates from potential source areas, conceptualization and formulation of the models, and calibration of the models.

### 4.1.1 General Procedure

The first part of the contaminant transport modeling process involved evaluating which chemicals could be best modeled to most adequately represent the PRRS. As was identified in the RI Phase II Work Plan (ERM, 1991), nine "modeling" chemicals (five organic chemicals and four inorganic chemicals) were considered for contaminant transport modeling. Based on chemical nature, typical behavior within an aquifer environment, and the potential chemical source areas at PRRS, the modeling chemicals were placed into two groups for contaminant transport model calibration: organic group (consisting of benzene, ethylbenzene, toluene, xylenes, and cumene) and an inorganic group (consisting of sodium, potassium, arsenic, and potassium-40). A statistical evaluation was conducted to estimate the predictive capability of each chemical within its group. This evaluation showed how well the detection of a particular chemical could be used to predict the presence of another chemical within its group. This was a very important factor in choosing which chemicals to model. Additionally, a similar analysis was conducted to evaluate how well total inorganic chemical concentrations could be predicted from dissolved inorganic chemical concentrations. Based on the results of the evaluation of chemicals within their respective two groups, one chemical was chosen from each group for development of a calibrated contaminant transport model. Based on the results of the separate group model calibrations, provisions were made for the prediction of ground water chemical concentrations for the nine chemicals. A more detailed discussion of this process is provided in Section 4.1.2 (Selection of Modeling Constituents).

The procedure followed for developing the two contaminant transport models for the PRRS is shown in figure 3-1. The approach for developing the transport portion of the local model was similar to that followed for development of the regional and local flow models. First, data collection and review (specific to contaminant transport) was conducted. This involved a review of other similar studies including those conducted in the area for nearby sites. The bulk of the data available for contaminant transport parameter definition was collected during the RI by ERM (September 1992). Next, a conceptual model was developed for each of the two transport models (inorganic and organic chemical groups). This included the development of a separate conceptual analytical contaminant mass loading approach (i.e., a procedure for introducing contaminant mass into the aquifer system) as well as a separate HST3D numerical transport model data set for both inorganic and organic chemical models. The two transport models were developed to calibrate to the chemical concentrations observed in ground water monitoring wells during the RI using data collected between 1990 and 1992. Sensitivity testing of selected transport model parameters was conducted to further define model parameter values. Calibrated models were used to predict contaminant concentration distributions in ground water under a no action scenario for the RA. FS modeling was not conducted in this portion of the investigation and will be presented in a separate document in the future.

The development of a contaminant transport model is generally more difficult and not as straight forward as the development of a ground water flow model. This is due to the typical variability of concentration data and the larger number of parameters which control contaminant transport processes. Additionally, there are relatively few chemicals for which contaminant transport processes are well understood. There is no standard methodology for modeling the transport of a specific chemical. The methods used are dictated by the amount of available data, past studies on the chemical, and the complexity of modeling which is desired. In the development of the two contaminant transport models for this study, an effort has been made to incorporate as much of the Study Area-specific data collected during the RI as possible. The following discussion is presented as an overview of some of the specific techniques used to model contaminant transport at the Study Area. Specific details and the techniques used are discussed later in this section.

- Contaminant source area delineation was a two-step process. First, a review of historical information was conducted and potential source areas identified. Next, RI sample data was overlain onto a map showing potential source areas. A composite source area delineation was thereby achieved utilizing historical information on the Study Area and soil and ground water data.

- A generally accepted modeling approach is to develop a contaminant transport model under conditions which are most frequently observed. Throughout the development of ground water flow modeling an emphasis was placed on calibration to average observed ground water flow conditions using average values for hydrogeologic and hydrologic parameters. With this rationale in mind, and to smooth out perturbations in the data (typical of chemical related data), and to utilize as much as the RI data as possible, contaminant related data was averaged for use in contaminant transport modeling. For each boring an average soil concentration was calculated from sample data. Similarly for each monitoring well, an average observed floating hydrocarbon thickness and ground water concentration was calculated from the multiple rounds of monitoring data collected during the RI. Additionally, for observed ground water concentration

data, vertical concentration gradients observed at the Study Area were used to standardize the concentration data to a common plane which could be directly compared to model computed concentrations.

- A time had to be estimated for when chemicals entered the ground water system. Using the dates when it was estimated that the modeling chemicals were initially put into use at the PRRS, and knowledge of the geology of the unsaturated zone at the Study Area, calculations were used to estimate the time which chemicals could be expected to first reach the water table at the Study Area. Two techniques used in other studies were employed to estimate the travel time for a chemical to reach the water table.

- For the purposes of this study, the four major contaminant transport parameters are: dispersivity, distribution (sorption) coefficient (Kd); decay (organic chemicals only); and contaminant loading rate. Typically, the first three transport parameters are not measured directly in the field but rather are chosen based on the findings of other studies for similar environments and by trial and error during model calibration. For dispersivity, several studies have been conducted in the area which put a reasonable bracket on the range of dispersivities which could be used. The Kd was estimated through a review of the organic carbon content (organic chemicals) and of the partitioning between soil and water (for inorganic chemicals). Organic chemical decay was estimated by a review of literature sources and through trial and error during model calibration.

  As is typical of sites such as the PRRS, limited information on contaminant mass loading rates was available (e.g., information such as time, duration, concentration, and location of chemical discharges). The most reliable information on contaminant mass loading rates is the "snapshot in time" of sample data provided by the RI. The RI data provides the only substantial information on contaminant mass loading at the PRRS. This data set provides a good indication of the mass loading occurring during the period of time that the RI was conducted. However, from this data it is not possible to accurately estimate the loading which occurred prior to the RI. However, for model calibration purposes, an estimate of the loading rate prior to the RI was required. For simplification, an exponential increase in the contaminant mass loading rate from the time which chemicals were estimated to enter the water table to the present was used. An exponential approach was used (instead of a different one such as linear) to ensure that the amount of chemical dissolved into the ground water was reasonable based on PRRS companies' estimates of chemical usage (a linear approach would have introduced an unreasonably large amount of chemical into the ground water). Since plant practices have been upgraded to minimize chemical losses, the amount of mass estimated to exist in the source area using the RI data was allowed to deplete in model runs predicting future conditions. Factors such as volatilization and biodegradation were not considered for simplification and conservativeness. Source areas were divided into several zones based on RI data. For the inorganic model, an above water table and below water table source area was defined. For the organic model, an above water table, below water table, and floating hydrocarbon source area were defined. Chemical mass loading rates were dependent on rainfall infiltration (which varied dependent on if an area was paved or unpaved), the rise and fall

of the water table, and direct dissolution into the ground water flow near the water table.

### 4.1.2 *Selection of Modeling Constituents*

The nine model chemicals were identified and grouped in the RI Phase II Work Plan (ERM, 1991). To develop and calibrate a separate transport model for each of these nine chemicals would have been excessively time-consuming considering the schedule for the RI established in the Work Plan. Consequently, the Work Plan (ERM, 1991) specified that one calibrated model would be developed for a constituent out of each group (organic and inorganic) and that the concentration estimates of the other group constituents would be based on the two calibrated models.

To identify which constituent from each group should be used for transport model calibration, six qualitative criteria were established and evaluated for each chemical. The nine chemicals were ranked (table 4-1) based on these six criteria:

- *Predictive Capability*

  To evaluate the "predictive capability" (i.e., how well each chemical correlated to the other chemicals in the specific modeling groups), a logarithmic regression analysis was conducted using CSS:Statistica statistical software developed by Statsoft, Inc. (1991). Observed ground water chemical concentrations were generally found to follow a logarithmic relationship. A logarithmic regression analysis is a mathematical procedure that obtains a "best fit" for two sets of data assuming that the data is directly and logarithmically related. The results of this analysis are presented in appendix D. The regression analysis showed how well the presence of each chemical in ground water could be used to predict the presence of other chemicals in ground water by calculating a regression coefficient. For example, if benzene is detected in ground water at a well at a certain concentration, how well can one predict the cumene concentration in the well based on the detected benzene concentration? For a complete correlation (e.g., using benzene concentrations to predict benzene concentrations), the regression coefficient is equal to one; whereas, for no correlation at all, the regression coefficient approaches zero. Ultimately, the regression analysis was used to provide equations which allowed the prediction of each group (organic or inorganic) chemical concentration from the modeled chemical concentration. These equations are presented in appendix D.

- *Availability of Fate and Transport Information*

  Literature sources were reviewed for the nine chemicals to evaluate the availability of model-related information on each of the chemicals. Among other fate and transport parameters, literature sources were sought to supply information on physical and chemical processes (e.g., solubility, sorption, and decay properties) of the chemicals.

- *Relative Mobility*

  Previous studies (if available) were reviewed to assess the relative expected mobility of the nine chemicals in a ground water system. The more mobile a

chemical was expected to be (in comparison to the other eight chemicals), the higher the rank it was given.

- *Relative Toxicity to Human Health and the Environment*

  Toxicity documentation was reviewed to evaluate the relative toxicity of the nine chemicals. A more toxic chemical was ranked higher.

- *Extent Identified in RI Ground Water Samples*

  Chemical specific information collected during the RI was evaluated. The evaluation consisted of a review of the ground water information collected in the RI to estimate which of the modeling chemicals was most "extensive" (i.e., which chemical exhibited measurable concentrations the greatest distance downgradient, south, of the PRRS property). The more extensive the chemical was in the aquifer, the higher the rank it was given.

- *Potential Source Complexity*

  A review of the RI sampling results and facility histories was made to evaluate the "complexity" (i.e., extent, number of locations, available release information, etc.) of the potential sources for each chemical. The chemicals with simpler source areas were given higher rankings.

As a result of an evaluation of these criteria, ethylbenzene was chosen to represent the organic group because:

- Regression analysis showed it to be the best predictor of the other organic chemicals of concern when it was detected in a monitoring well;

- Its physical and chemical characteristics are well documented;

- Although previous studies suggest it is one of the less mobile chemicals, it appears to be one of the most extensive chemicals in ground water at PRRS, based upon the apparent distribution of each of the five organic chemicals; and

- The history of potential discharges of the chemical is relatively simple (the chemical is an impurity in xylene which has been used at the Study Area since late 1963).

Sodium was chosen to represent the inorganic group of chemicals because:

- Based on the regression analysis, it appeared to be the best predictor of the other three inorganic chemicals when detected in a monitoring well;

- It appears to be one of the most mobile and extensive of the four inorganic modeling chemicals, due to its apparent relatively low retardation characteristics and its distribution in ground water in the vicinity of PRRS in comparison to the other chemicals; and

- Sodium sources are relatively well known (in comparison to the other inorganics) with regard to the location of discharges.

It is important to note that, although toxicity was considered as one of the criteria in choosing two chemicals to model, chemicals of higher toxicity than sodium and ethylbenzene were not chosen primarily due to their poor correlation to the other modeling chemicals and, consequently, low ability to predict concentrations of other modeling chemicals when detected.

As a final clarification on the modeling of contaminant transport for the PRRS, HST3D simulates contaminant transport of "dissolved" chemicals. The model code cannot predict "total" chemical concentrations (i.e., as associated with unfiltered samples). Consequently, only dissolved chemical concentrations were considered for model calibration. For the inorganic group, the model was calibrated to dissolved sodium concentrations. Linear regression (appendix D) was conducted to evaluate predictive capabilities between different chemicals for the PRRS RI of total versus dissolved inorganic chemical concentration. The evaluation of total versus dissolved inorganic chemical concentrations has indicated good correlation between total and dissolved concentrations. Consequently, if total (unfiltered) concentrations are desired (e.g. for risk assessment purposes), they may be estimated from the model-predicted dissolved chemical concentrations based on the linear regression analysis presented in appendix D.

## *4.2 DATA COLLECTION AND REVIEW*

### *4.2.1 General*

As discussed in Sections 2.0 (Regional Ground Water Flow Modeling) and 3.0 (Local Ground Water Flow Modeling), previous hydrogeologic studies have been conducted in the vicinity of the PRRS. The bulk of the data generated from these investigations is ground water flow-related. Contaminant transport-related data are less abundant and are primarily related to monitoring of the radiological chemical ground water plumes associated with FEMP. FEMP studies (e.g., IT, December 1990 and GeoTrans, 1985) have produced some contaminant migration data that is relevant to the PRRS modeling effort. In particular, information on the organic carbon content of the aquifer (which relates to the ability of the aquifer to retard organic chemical migration), aquifer dispersivity, and aquifer porosity are important contributions from FEMP work which can be used for the PRRS.

Due to the Study Area-specific nature of contaminant transport as it relates to both chemical and physical characteristics, one of the objectives of the Phase II field activities (ERM, 1991) was to collect the necessary information for the development and calibration of contaminant transport models. PRRS RI data which were collected and are integral to modeling contaminant transport include:

- Soil concentrations and floating hydrocarbon concentrations in PRRS chemical source areas;
- Ground water concentrations in monitoring wells to delineate contaminant plumes; and
- Aquifer characteristic data such as organic carbon content, density, and porosity.

A comprehensive review of the contaminant transport parameters reported for the area by other investigators and from the PRRS RI is summarized in table 4-2. This table lists each parameter and the associated test method, test location, constraints on using the parameter, reference, and other pertinent comments associated with the parameter. In some cases, such as for adsorption-related parameters and contaminant mass loading values, supporting tables and figures are referenced from table 4-2 to provide additional information on how parameters were estimated. Summarized in table 4-3 are the reported ranges for different transport model parameters and the chosen parameter values used for modeling.

### 4.2.2 *Previous Modeling Studies*

Two contaminant transport-related studies have been conducted in the vicinity of the PRRS. The first was by GeoTrans (1985), which tracked particles based on the ground water flow modeling. This study focused on the FEMP area and did not consider either adsorption or dispersion. Flow paths were outlined from the FEMP to various potential receptors. Modeling was performed using the SWIFT II three-dimensional flow model code, (a proprietary code which GeoTrans developed).

The second contaminant transport-related modeling effort was conducted in the vicinity of FEMP by IT (December 1990). Following completion of a ground water flow model development and calibration, IT tracked particles from the FEMP in a manner similar to the particle tracking conducted by GeoTrans (1985). However, IT also conducted geochemical modeling to evaluate the transport processes associated with uranium. The geochemical modeling provided information on the adsorptive characteristics of uranium in the vicinity of FEMP. IT also developed a three-dimensional local flow and transport model using the SWIFT III model code to simulate the migration of uranium in the ground water from FEMP. A high-resolution (dense) grid was developed by IT (described in Section 3.2.2 (Previous Modeling Studies) of this report). The model was calibrated to observed uranium concentrations in ground water.

## 4.3 *MODEL CONCEPTUALIZATION AND FORMULATION*

### 4.3.1 *Discretization*

Figure 3-2 shows the discretization of the local flow and transport model for the PRRS. A regularly spaced grid of 100 feet by 100 feet was used to:

- Minimize the potential for numerical errors in the transport model; and
- Provide a high degree of resolution at the PRRS companies facility boundaries. A finer discretization was not warranted based upon the spacing of monitoring wells and because a 100-foot by 100-foot grid was adequate to characterize contaminant mass loading areas at the PRRS. Other details on the discretization of the local flow and transport model are discussed in Section 3.3.1 (Discretization).

### 4.3.2 *Hydrogeologic and Geochemical Characterization*

The following assumptions were applied to the local contaminant transport modeling (also, please refer to the inherent assumptions of the HST3D model code, which are discussed by Kipp (1987) and the assumptions for the local flow model discussed in Section 3.3.2 (Hydrogeologic Characterization)):

- Observed ground water concentrations for the nine modeling chemicals are assumed to be directly and logarithmically related within their respective chemical groups (inorganic and organic groups). (This is supported by appendix D).

- A clayey loam soil is assumed to be the dominant soil type in the unsaturated zone beneath the PRRS companies property (based on the RI findings (ERM, September 1992).

- The vertical transport rate of chemicals through the unsaturated zone is assumed to be the same for organic and inorganic chemicals and is conservatively assumed to be unaffected by volatilization, degradation, and sorption.

- As is typically done in transport modeling: dispersivity is assumed to be homogeneous and anisotropic; adsorption-related parameters are assumed to be homogeneous and isotropic; organic chemicals dissolved in ground water may decay (decay related parameters are assumed to be homogeneous and isotropic).

- Aside from decay (to account for biodegradation and chemical transformation for the organic chemicals only) and adsorption, no chemical reactions are conservatively assumed to occur which affect the transport of chemicals once they enter the aquifer.

- Average chemical concentrations observed in the ground water throughout the PRRS RI (1990 to 1992) are assumed to represent the average chemical concentration distribution present in the aquifer in 1991.

- The average chemical concentration distributions observed in 1991 were assumed to be principally developed under average ground water flow conditions. May 1991 flow conditions (figure 3-7) are assumed to represent average flow conditions at the Study Area. This is supported by the similarities observed in ground water flow conditions measured in 1986 and at different times during the PRRS RI (ERM, September 1992).

- The PRRS contaminant source areas delineated later in this section of this report are assumed to be the only sources of the modeling chemicals which are elevated above background average concentrations. This becomes a very conservative modeling assumption if other source areas independent of the PRRS are present.

- Based on RI data (ERM, September 1992), for the sodium model, it is assumed that sodium enters the ground water system from two sources: the unsaturated zone beneath part of the PRRS; and a small portion of the saturated zone just below the water table beneath part of the PRRS. It is assumed that the areal extent and concentrations of the above water table source equals is the same for the below water table source.

- Based on RI data (ERM, September 1992), for the ethylbenzene model, it is assumed that ethylbenzene enters the ground water system from three sources: floating hydrocarbon; the unsaturated zone beneath part of the PRRS; and a relatively small portion of the saturated zone just below the water table beneath part of the PRRS.

- Modeling assumed (based on PRRS company records) that the current paved areas at RNC were completely constructed at the end of 1979; and at A&W were completely constructed at the end of 1984. Modeling assumed that when an area became paved that the amount of rainfall recharge was reduced 80 percent for that area to account for holes, cracks, and infiltration through the pavement.

- All water passing through a source area was assumed to become saturated at the solubility of the chemical. The solubility of ethylbenzene is assumed to be 0.152 mg/L (literature value of its solubility in pure water--see table 4-2). The solubility of sodium can be variable, depending on the type of compound with which the sodium ion is associated. As a result, the assumed solubility of sodium was set equal to the average observed dissolved sodium concentration in ground water at well MW-6S during the PRRS RI which was 2.1 gm/L (table 4-2). Water from MW-6S consistently had the highest observed dissolved sodium concentrations during the PRRS RI.

- Contaminant mass loading is dependent on the solubility of the chemical, the ground water flow rate just below the water table at the Study Area, the average observed 1990 to 1992 fluctuation of the water table, and the net precipitation recharge rate.

- The size of the source areas (as represented by the number of source nodes) at the PRRS increase exponentially from the time that chemicals first enter the water table (as predicted later in this section) to the end of 1991. This approach was deemed necessary based on initial attempts at model calibration using a constant contaminant mass input throughout the calibration. In order to achieve calibration through the constant input approach, an unrealistic amount (based on historical chemical usage) of mass was input to the model. Additionally, it is more realistic to assume that mass input changed over time (plant practices changed over time; and source areas probably expanded with time as controlled by advection and dispersion of chemicals between land surface and the aquifer).

- The maximum source, extent, and contaminant mass loading is assumed to occur in 1991. After 1991, no more chemical releases are assumed to occur thereby allowing the depletion of contaminant mass from the source areas due to natural processes. Mass depletion from source areas is assumed to occur only through the dissolution of the chemicals into the ground water and rainfall infiltration, and through the rise and fall of the water table.

### 4.3.3 *Delineation of Source Areas*

A primary focus of the Phase II RI activities was to identify and evaluate potential contaminant source areas which may be causing ground water impacts. Details of the source investigation program are discussed in the Phase II Work Plan (ERM, 1991) and the RI Report (ERM; September 1992). Source area delineation for the transport modeling relied on the data gathered during the RI field investigations and

concentrated primarily on sodium and ethylbenzene, the chemicals for which the inorganic and organic models were calibrated. In addition, and to support the estimation of group chemical concentrations from the calibrated chemical, a qualitative review of the source areas for the other seven modeling chemicals was conducted to evaluate how well sodium's source areas corresponded with the other three inorganics and how well ethylbenzene's source areas corresponded with the other four organics.

Source area delineation was a two part process. First, locations of source areas were preliminarily identified independent of a review of sampling results. Sampling was targeted for these areas. After sampling results were received, source areas were refined to take into account the presence of floating hydrocarbon and chemicals detected in soil and ground water. Upon completion, source areas for the sodium and ethylbenzene and seven other chemicals were delineated based on:

- Operation history of RNC and A&W facilities;
- Reported spills;
- Interviews of facility personnel conducted during the PRRS RI;
- Review of historical aerial photographs of the PRRS;
- Chemical concentrations detected in soil and ground water samples collected during the PRRS RI; and
- Presence of floating hydrocarbons on the water table.

Based upon review of historical facility operations, reported spills, facility personnel interviews, and review of historical aerial photographs of the PRRS potential apparent source areas were delineated. The results of this study are presented in table 4-4 (a correlation of apparent source areas and associated modeling chemicals) and in corresponding figure 4-1.

Independent of sample results, the apparent source areas for sodium were estimated to consist of (Note: Corresponding RI (ERM, September 1992) area designations are in parenthesis):

| Area Designation | Description |
|---|---|
| Area 1 (F) | A&W's former production, storage loadout area. |
| Area 2 | Discolored area (as seen in historical aerial photographs) due to past air emissions. |
| Area 3 (L) | Sodium chemical and hydrotope storage area. |
| Area 6 (G) | A&W's process water discharge area. |
| Area 8 (H) | A&W's former sludge holding area. |
| Area 10 (I) | Former drum storage area. |

The modeling chemicals which may be specifically related to these areas are identified in table 4-4 and the location of the areas are illustrated in figure 4-1. Source areas for

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the three other inorganic modeling chemicals are approximately the same as those for sodium, with the exceptions shown on table 4-4 and figure 4-1.

Independent of sample results, the apparent ethylbenzene source areas were estimated to be confined to RNC and consist of:

| Area Designation | Description |
|---|---|
| Area 3 (L) | Hydrotope storage area. |
| Area 9 (T) | Process building. |
| Area 11 (N) | Former sludge lagoon. |
| Area 12 (R) | Existing non-operational non-contact cooling water discharge pond. |
| Area 13 (S) | Former non-contact cooling water pond. |
| Area 14 (K) | Former truck wash down area. |
| Area 15 (U) | Former underground storage tank. |
| Area 16 (Q) | Former non-contact cooling pond and soil pile. |
| Area 17 (M) | Raw product tank farm. |

These areas are also further defined in table 4-4 and illustrated in figure 4-1. Source areas for the four other organic modeling chemicals are generally the same as those for ethylbenzene.

To further assist in source area delineation, sodium and ethylbenzene concentrations observed in soil boring samples collected during the PRRS RI were evaluated. Concentrations were depth-averaged based on the methodology shown in figure 4-2. The averaging technique was employed to utilize all the samples from each boring to develop a representative average concentration for each boring. As shown in figure 4-2, in this averaging technique the concentration in each sample from one boring was weighted by multiplying the length of the sample interval by the concentration. These weighted concentrations were summed for the boring and divided by the sum of the lengths of the sampled intervals for the boring. A depth-averaged concentration was calculated for each boring from the analytical results for the samples from each boring. Note that the modeling simulates contaminants as a source to the aquifer system and thus only models concentrations above background. Therefore, the average background soil concentration (taken from ERM, March 1992) was subtracted from the depth-averaged soil concentrations (table 4-5).

Table 4-6 and figures 4-3A and 4-3B show 1990 to 1991 depth-averaged sodium concentrations (for locations which exhibited concentrations above the background comparison standard) in soil above the water table. Observed 1990 to 1991 depth-averaged ethylbenzene concentrations (for locations which exhibited concentrations above the method detection limit) in soil above the water table are shown in table 4-7 and figure 4-4 and below the water table are shown in table 4-7 and figure 4-5.

The thickness of floating hydrocarbons on the water table at the PRRS was measured in wells several times during the PRRS RI (see ERM, September, 1992). Floating hydrocarbon thicknesses were found to be variable in individual wells throughout the RI. As a result, to minimize variability and be consistent with averaging conducted done for the flow modeling, an average set of floating hydrocarbon thicknesses was calculated from the liquid level data collected during the RI. The average observed (otherwise termed "apparent") product thicknesses are shown in figure 4-6 and table 4-8.

The final delineation of source areas involved a comprehensive comparison of: apparent source areas (chosen independently of sample results); the detection of chemical distributions in soil and ground water; and the presence of floating hydrocarbon (organic model only). In the final analysis, apparent source areas were refined to account for detected chemicals and the presence of floating hydrocarbons. Where possible, source area delineation relied most heavily on detected chemicals. In some cases, where data was sparse (such as the sodium source area east of A&W property), the original apparent source area delineation was used. In most cases final source area delineation was well supported by chemical data. The delineation procedures and chemical and floating hydrocarbon data provided in this section was utilized in choosing source model cells and source input rates for the ethylbenzene and sodium models. The culmination of the source delineation effort for modeling purposes is presented in Sections 4.3.6 (Calculation of Mass Present) and 4.3.7 (Model Boundary Conditions).

### *4.3.4 Estimated Time for Contaminants to Reach the Water Table*

Contaminants introduced at or just below the ground surface must travel through the unsaturated zone before reaching the water table. The time required to migrate from the release point, vertically to the water table is referred to here as the "unsaturated zone travel time." The estimate of travel time is important because it identifies the time after a presumed release began when contaminants are actually introduced into the ground water system during the transport model simulations. The unsaturated zone travel time for PRRS was calculated assuming a clayey loam soil (based on lithologies reported in ERM (September, 1992)) and the methodology found in EPA (1988a). This methodology utilizes advective transport only and considers the effects of adsorption, dispersion, and diffusion to be negligible. Details of these calculations are summarized in table 4-9. For comparability, two methods (from EPA, 1988a and Hern & Melancon, 1987) were employed to estimate the travel time. These methods take into account such factors as hydraulic conductivity, moisture content, rainfall infiltration, rate, etc. Both methods yielded approximately the same travel time. The time required for a contaminant to reach the water table (after a surface discharge) was estimated to be approximately six years and is assumed to apply to both organic and inorganic model chemicals.

Various source areas were operational at different times and durations, but insufficient information is available to determine exactly when these time periods occurred or the nature and extent of the contaminant mass loading. Therefore, the initiation of loading was modeled based on the following:

- Facility operations at the PRRS started in 1954 at the A&W property and 1959 at the RNC property.

- Use of sodium at the A&W property began in early 1955.
- Use of ethylbenzene at the RNC property began in late 1963.

Consequently, for modeling, sodium loading to ground water was assumed to begin in January 1961 (e.g., early 1955+6 years) and ethylbenzene loading to ground water was assumed to begin in January 1970 (e.g., late 1963+6 years).

### 4.3.5 *Estimation of Chemical Sorption and Decay*

Because inorganic chemicals can exhibit a wide range of retardation factors, depending upon several Study Area-specific soil (e.g., pH, redox potential, mineralogy) and contaminant characteristics (e.g., cation/anion interaction) the calculation of retardation factors (Rfs) for sodium was not conducted in the same manner as for ethylbenzene. Literature values of Rfs for sodium are very sparse and typically site-specific. A usable literature Rf for the sodium was not found. However, the literature (Ceazan et al., 1989, Sayin et al., 1990, and others (see Section 6.0 (References)) suggests that sodium has low sorption characteristics and a correspondingly low Rf (in comparison to the organics). The Rf for sodium was calculated by first estimating the Kd from soil and ground water concentrations measured during the RI source identification soil boring program. Soil concentrations were compared to ground water concentrations for samples collected from the same borehole (appendix E). A linear isotherm was assumed and, as a result, a Kd for sodium was estimated using concentration data from boreholes where soil samples and ground water samples were both collected. The Rf was then calculated using the estimated Kd value, bulk density, and effective porosity (table 4-3). Kd and Rf calculations for sodium are shown in table 4-10.

The Kd and associated Rf for ethylbenzene was calculated, using readily available methods (Freeze & Cherry, 1979), based on the total organic carbon content of the aquifer (table 4-3). The details of these calculations are shown in table 4-11.

Decay was assumed to affect only the organic transport model. Simple first order irreversible rate reaction (decay) was included in the ethylbenzene model to account for the effects of biodegradation and chemical transformation. No decay values have been measured at the Study Area, but literature sources were available to guide the selection of decay parameters. Reported ethylbenzene and benzene (for comparison purposes) decay constants (see table 4-2) range from approximately 0.1 to 1 x $10^{-7}$ $day^{-1}$.

### 4.3.6 *Calculation of Mass Present*

The history of contaminant release events at the PRRS is not well known. Information provided from interviewing facility personnel, reviewing aerial photographs, and reviewing details on facility operations offers some insight as to when releases could have occurred. However, the mass of chemical discharged and the duration and location of each discharge event are not documented. For specific situations (i.e., for Area 2, a sodium source area), a time frame can be placed on when discharges to land surface ceased (in 1980). However, overall, for the source areas indicated in Section 4.3.3 (Delineation of Source Areas), pertinent information on discharge events is not sufficiently detailed to simulate each specific discharge event in the contaminant transport modeling. Soil sampling and analysis conducted

during the PRRS RI provides a "snapshot in time" of the type and amount of chemicals present in source areas at the PRRS. For the purpose of modeling, this snapshot is assumed to represent the amount of chemicals present at the end of 1991. After 1991, the modeling assumed that releases no longer occurred which resulted in the addition of chemicals to the subsurface.

Figure 4-3A figure 4-3B, and table 4-6 show the observed depth-averaged sodium concentration distributions (the background average concentration has been subtracted from the reported results) at the PRRS based on the soil data collected during the Phase I and Phase II RI investigations. Based on the depth-averaged concentrations, grid-averaged sodium soil concentrations were estimated for each model cell (the 100' x 100' area surrounding each grid intersection) by averaging the depth-averaged concentrations for PRRS RI borings which were located within the cell. Using these grid-averaged concentrations for each model cell (table 4-12) and soil bulk density (table 4-3), the mass of undissolved sodium present in each cell in 1991 was estimated (table 4-13).

The estimation of ethylbenzene mass present in the unsaturated and saturated zones was conducted in a manner similar to sodium with the exception that the additional mass present due to floating hydrocarbon on the water table was also considered. Figures 4-4 and 4-5 show the observed depth-averaged ethylbenzene concentrations in the soil above and below the water table, respectively, for the PRRS RI. Figure 4-6 and table 4-8 show the average observed (apparent) floating hydrocarbon extent and thickness. The average ethylbenzene soil concentration was calculated for each model cell (surrounding each grid intersection) using the same method followed for sodium (table 4-14). The average floating hydrocarbon thickness across each cell was estimated by interpolation between well locations using the contours shown in figure 4-6. Consequently, the amount of undissolved ethylbenzene present in each cell (table 4-15) was calculated from: estimated average unsaturated and saturated zone soil concentrations for each cell; the average estimated floating hydrocarbon thickness for each cell; the average measured ethylbenzene concentration from two floating hydrocarbon samples collected from the Study Area (ERM, September 1992); the bulk density of the soil; the density of ethylbenzene; and the effective porosity of the aquifer (table 4-3).

### 4.3.7 *Model Boundary Conditions*

As discussed in Sections 2.0 (Regional Ground Water Flow Modeling) and 3.0 (Local Ground Water Flow Modeling), boundary conditions are mathematical constraints placed on the model to make it represent the physical and hydrogeologic conditions being modeled. To maintain consistency and reliability, boundary conditions associated with the flow model were preserved for the transport model, with the exception of contaminant mass loading. Based on the discussion presented earlier in this section, contaminant mass loading rates were estimated and model loading nodes identified for the sodium and ethylbenzene models.

#### *Calculation of Contaminant Mass Loading Rates*

For simplification purposes the year 1991 is assumed to be the year of peak loading of contaminant mass. The year 1991 was chosen as the peak year because it provides the first comprehensive "snapshot" of chemical concentrations at the Study Area. There is evidence that loading rates may have peaked in the past (e.g., the discharge

of sodium into the field east of A&W property reportedly ceased over 10 years ago) but without historical soil and ground water chemical data it was not possible and reasonable to attempt to simulate a peak in loading prior to 1991. However, up until the end of 1991, it was assumed for modeling that chemicals were available for dissolution into the ground water and that this mass of chemicals does not decrease. The modeling assumed that depletion of contaminants from source areas did not begin to occur until after the end of 1991. After 1991 it is assumed that plant practices have been upgraded to prevent the addition of any additional chemicals into the subsurface. Thus, the existing chemical mass was allowed to decrease for modeling purposes.

To account for contaminant mass loading rates to the aquifer system, two scenarios were developed using the conceptualization shown in figure 4-7: Pre-January 1992 Scenario, where undissolved chemical is continually present in the source area independent of length and duration of a potential release; and Post-December 1991 Scenario, where the source of undissolved contaminant to the subsurface has been eliminated and thus the undissolved mass remaining is allowed to deplete via natural mechanisms (i.e., dissolution due to rainfall infiltration, ground water flow, water table rise and fall).

*Loading Scenario 1 - Pre-January 1992*

From the time which chemicals were estimated to reach the water table (January 1961 for sodium and January 1970 for ethylbenzene), the extent of source areas (and consequently the mass of chemicals entering the ground water) were assumed to grow exponentially until the end of 1991. Contaminant mass was assumed to enter the ground water from a source above and a source below the water table (the areas for which were assumed to grow exponentially). The maximum extent of these source areas was assumed to exist in 1991.

For sodium, the areal extent and concentration of the above water table source was based on chemical concentrations detected in soil as discussed in Section 4.3.3 (Delineation of Source Areas). The extent and concentration of the below water table source was assumed to be equal to the above water table source. The presence and characterization of a below water table source was assumed based on Study Area water table fluctuations observed during the RI and limited soil data. For 1991, the source areas were estimated to cover 34 model cells (340,000 square feet) (see figure 4-8) based on the findings presented in Section 4.3.3 (Delineation of Source Areas). For modeling, the extent of these two source areas (above and below water table) in January 1961 was assumed to be zero, while at the end of 1991 these two source areas covered 340,000 square feet (having both grown exponentially in size). A graph depicting this exponential growth for sodium is presented in appendix F.

For ethylbenzene, the extent of the above water table source area in 1991 was estimated to cover 34 model cells (340,000 square feet) (figure 4-9). This is approximately equivalent to the area estimated to be covered by floating hydrocarbons floating on the water table in 1991 based on the evaluation presented in Section 4.3.3 (Delineation of Source Areas). The extent of the below water table source area was estimated to cover 9 model cells (90,000 square feet) (a subset within the source area shown in figure 4-9) based on the findings presented in Section 4.3.3 (Delineation of Source Areas). For modeling, the size of these two source areas in January 1970 was assumed to be zero while at the end of 1991 the above water table source covered

340,000 square feet in area and the below water table source covered 90,000 square feet in area (both source areas having grown exponentially in size). Graphs depicting this exponential growth for ethylbenzene are presented in appendix F.

For both sodium and ethylbenzene (refer to figure 4-9), the thickness of the above water table source (the unsaturated zone) was taken to be 13 feet which is equal to the average depth to water table at the PRRS property observed during the RI. The thickness of the below water table source was estimated to be five feet and extended from the water table to five feet below the water table. The thickness of the below water table source was set at five feet based on review of soil quality data collected for the RI which suggested the average thickness of this source was about five feet.

In addition to the areal extent of source areas, contaminant mass loading rates were considered to be dependant on (see figure 4-7 for a conceptualization): dissolution of chemicals above the water table due to rainfall recharge; and dissolution of chemicals present below the water table due to ground water flow. Although rainfall was considered constant, rainfall recharge rates through the soil at the PRRS were varied over time, depending upon when RNC and A&W paved various portions of their respective properties. This affected contaminant mass loading to the models. Based upon discussion with facility personnel, modeling assumed that the paved portion of RNC was completely constructed at the end of 1979, and the paved portion of A&W was completely constructed at the end of 1984. The areas that were paved are approximately delineated in figure 3-4 (the areas on the PRRS that receive two inches of rainfall recharge per year). Modeling assumed that when an area became paved, the amount of recharge was reduced from 10 inches per year to 2 inches per year. Two inches per year was chosen to account for holes, cracks and infiltration through the pavement.

A contaminant mass loading rate was initially estimated as follows. All water flowing through the above and below water table source areas was assumed to become saturated at the solubility of the chemical. The amount of water flowing through an above water table source cell was dependent on the i,j dimensions of the cell and on whether it was paved (these cells received ten inches per year of recharge) or unpaved (these cells received two inches per year of recharge). Water flow rates through the below water table source were controlled by an assumed horizontal hydraulic conductivity (Kh) of 35 feet/year and a water table gradient of 0.003. A Kh of 35 feet/day contrasts with the 350 feet/day chosen for the upper layer of the numerical model. This lower Kh was chosen because of the elevated clay content found during drilling for the RI in the vicinity of the water table at the PRRS company property. [While the lower Kh of 35 feet/day, compared to a Kh of 350 feet/day, has a larger affect on dissolution of chemicals from the below water table source, the overall impact of a five-foot-thick portion of aquifer with a Kh of 35 feet/day was considered to be negligible on the overall flow and transport numerical modeling (because the five-foot portion makes up a small percentage of the total aquifer thickness). Additionally, this clay was not found to be extensive throughout the model area. Consequently, the 35 feet/day portion of aquifer was not incorporated into the numerical model.] The 0.003 gradient utilized was the average observed water table gradient at the PRRS property during the RI.

Based on the previously described approach, initial estimates of contaminant mass loading rates for each model source cell were calculated as shown as follows:

*Sodium*:

Using a sodium solubility of 2.1 gm/l and the conceptualization shown in figure 4-7, initial sodium loading rates were estimated to be:

- above water table source cell (paved) 0.60 lb/day
- above water table source cell (unpaved) 2.99 lb/day
- below water table source cell 6.88 lb/day

*Ethylbenzene*:

Using an ethylbenzene solubility of 0.152 gm/l and the conceptualization shown in figure 4-7, initial ethylbenzene loading rates were estimated to be:

- above water table source cell (paved) 0.0433 lb/day
- above water table source cell (unpaved) 0.2165 lb/day
- below water table source cell 0.4980 lb/day

As the extent of the source areas expanded exponentially (according to the graphs in appendix F) with time, inactive source cells became active and the corresponding contaminant mass loading rate was applied until, in 1991, all designated source cells were actively introducing mass into the model.

The initial estimates of contaminant mass loading for sodium and ethylbenzene were used as a basis to start model calibration. These initial estimates of contaminant mass loading were found to produce modeled plumes which were too dilute (for sodium) and too concentrated (for ethylbenzene) in comparison to observed concentrations. To achieve model calibration, the contaminant mass loading rates were incrementally increased (sodium) and decreased (ethylbenzene) (in addition to adjustment of other model parameters such as dispersivity, decay, and retardation) to produce model plumes that were similar to observed plumes. The resulting loading rates used in the calibrated models are provided in tables 4-16 and 4-17.

Using the initial contaminant mass loading rate estimates and the source cell activation scheme set up in table 4-16, a total of 718,000 pounds of sodium was initially estimated for input into the calibration run (to calibrate the model the loading rates were increased to yield a total mass input of 1,330,000 pounds of sodium which is 85% higher than the initial estimated contaminant mass loading).

Using the initial contaminant mass loading rate estimates and the source cell activation scheme set up in table 4-17, a total of 20,580 pounds of ethylbenzene was initially estimated for input into the calibration run (to calibrate the model the contaminant mass loading rates were varied to yield a total mass input of 20,500 pounds of ethylbenzene which is less than 1% lower than the initial estimated mass).

***Loading Scenario 2 - Post 1991***

After 1991, the extent of each source area was assumed to not grow larger. The amount of mass calculated to be present in 1991 was allowed to decrease, thus, resulting in a decrease over time in the contaminant mass loading rate of chemicals to the transport models. Mass depletion was allowed to proceed exponentially according to estimated decay constants presented in this section.

For the above water table and below water table sources, a depletion rate constant (k) was employed to calculate the depletion rate. The k controls the rate at which the source depletes in an exponential manner. Exponential depletion is based on the theory of first order rate depletion (Baes and Sharp, 1983; Wanielista, 1979), and are commonly used in ground water and chemical cleanup time estimates and in calculations of pollutant removal in watershed simulations.

For depletion of the source above the water table, the k was obtained as the ratio of rainfall recharge flow rate (Q) and volume of water in the soil voids (V*Ne, where V is the soil volume and Ne is the effective porosity). Retardation of depleted chemical in soil as it moves through the soil to the water table can be incorporated into the equation by dividing Q by the retardation factor (Rf). To be conservative, the retardation effect was not included and the Rf set equal to 1. The equation k = Q/(V*Ne) can be found in Baes and Sharp (1983).

For depletion of the source below the water table, the calculation of k by using the flow rate as above was found to not be feasible. This was because the large ground water flow rate through this source area (as a result of the relatively high hydraulic conductivity value for the area) resulted in an unreasonably high k value which would deplete the source in a few months. This was not supported by the RI (significant chemical concentrations were detected below the water table throughout the two year RI). Methodologies used to address sourcing are typically site-specific (no standard methodology currently exists). Consequently, after considerable investigation of this problem, a Study Area-specific method was formulated in which the depletion rate was computed by dividing the mass release rate of contaminant per year by the mass of contaminant in the source area. The mass release rate was calculated by multiplying the contaminant solubility (Cs) in water and ground water flow rate (Q). The total mass of contaminant was calculated by multiplying the contaminant concentration in soil and soil source bulk density (DB). Thus, the k is given by (Cs*Q)/(V*Ne*DB). This equation is dimensionally correct (i.e., the unit of k is 1/year) and still has the term (Q/V*Ne) used in k calculations for the above water table source.

After 1991, sodium mass was assumed to enter the ground water in the model from the same source nodes presented for sodium in Scenario 1–Pre January 1992. Mass was depleted (as discussed above) from the below water table source by dissolution into ground water flowing through that source area as presented in table 4-18. Mass was depleted (as previously discussed) from the above water table source by dissolution into infiltrating rainfall flowing through the source area according to the methodology in table 4-19.

After 1991, ethylbenzene mass was assumed to enter the ground water in the model from three sources: dissolution of ethylbenzene present below the water table; dissolution of the ethylbenzene from the floating hydrocarbon; and dissolution of ethylbenzene from the unsaturated zone above the floating hydrocarbon. The extent of the area covered by the hydrocarbon floating on the water table at the end of 1991 was estimated to be 340,000 square feet. The extent of the source area below the water table at the end of 1991 was 90,000 square feet. The extent of the source area above the undissolved hydrocarbon in the unsaturated zone was covered by 9 cells (90,000 square feet) based on soil sampling above the water table for the PRRS RI (ERM, September 1992) (see figure 4-4).

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The mass of ethylbenzene below the water table was depleted (as previously discussed) by dissolution due to ground water flowing through the source area (table 4-20). The mass of ethylbenzene in the unsaturated zone above the floating hydrocarbons was depleted (as discussed above) due to dissolution of ethylbenzene into infiltrating rainfall recharge (table 4-21). Depletion of ethylbenzene from the hydrocarbons floating on the water table was simulated to occur as a result of smearing of the floating hydrocarbons onto the soil below the water table (due to the rising and falling of the water table) and consequential dissolution of the ethylbenzene from the hydrocarbons left below the water table when the water table rises (table 4-22).

## 4.4 *MODEL CALIBRATION*

### 4.4.1 *Calibration Criteria*

Several methods and criteria were used to support contaminant transport model calibration for the ethylbenzene and sodium models. As can be seen in Section 4.4.2 (Observed Data), observed ethylbenzene and sodium ground water concentrations vary considerably for individual wells throughout the PRRS RI database which spans 1990 through 1992. Data variability at wells throughout the RI can be attributable to a number of possible reasons which are difficult to account for in modeling:

- Seasonal variability;
- Variable biodegradation and/or decay;
- The introduction of contaminant from sources not associated with the PRRS;
- Heterogeneities in the subsurface such as varying amounts of clay and organic carbon, spatially varying decay, etc.;
- Inconsistencies typically associated with laboratory analysis including holding times prior to analysis, laboratory instrumentation, and analytical methodology; and
- Variabilities which typically occur in sampling as a result of differing levels of turbidity in the sample, volatilization of organics during sampling, and different methodologies and possibly different levels of QA/QC by different samplers.

Some of the evaluation methods used in flow model calibration that were expected to be reasonably applicable were also used for transport model calibration. Additionally, other methods were employed to evaluate transport model calibration. Because of the wide variation in observed concentrations throughout the PRRS RI, calibration criteria were relaxed in comparison with the criteria used for flow model calibration evaluation (the ERM 1991 Work Plan allowed for this flexibility). Primary evaluation methods used to support transport model calibration are presented in table 4-23. For a supplemental analysis, the six statistical tests of hypothesis on the equality of means and variances of the observed and computed values were conducted according to the methodology in appendix B.

### 4.4.2 *Observed Data*

PRRS RI ground water quality data collected between 1990 and 1992 (reported in ERM, September 1992) was reviewed to develop a set of observed data for use in calibration of the sodium and ethylbenzene models. Selected data from RI sampling rounds 1 through 6 were chosen to be the observed data set used for comparison to computed values in model calibration. Due to perceived QA/QC problems with round 4 data, it was not included in the data set used for comparison to modeled concentrations (this omission was approved by the Ohio Environmental Protection Agency in early 1992). The average ground water concentration observed at each well for rounds 1 through 6 (excluding round 4) was used to compare to the computed values for the following reasons:

- To "smooth out" the variability of the data into one data set representative of average Study Area conditions observed during the RI;
- To remain consistent with flow model development (i.e., the flow model was calibrated to average ground water flow conditions); and
- To allow the incorporation of up to six rounds of chemical concentration data collected at various times.

Table 4-24 (sodium) and table 4-25 (ethylbenzene) provide observed ground water data including maximum, minimum, and average concentrations detected at each monitoring well for the RI.

Well MW-11S consistently provided anomalously high ethylbenzene concentrations (generally greater than the solubility of ethylbenzene (table 4-3)). This could be attributed to cosolvency[1] and/or the presence of floating hydrocarbon in the well. Well MW-6S consistently provided unusually high sodium concentrations (usually an order of magnitude greater than other monitoring wells at the PRRS). This could be due to anomalous pH/Eh conditions in the vicinity of this well and/or the well may be in direct contact with a highly concentrated source area. The high concentrations observed in MW-6S and MW-11S were identified to be statistical outliers, and thus were not representative of the statistical distribution of the observed contaminant concentrations. Because the objective of calibration is to best represent the overall concentration distribution, the data from MW-6S (sodium data) and MW-11S (ethylbenzene data) were not considered for calibration evaluation.

HST3D computes a concentration for a model cell that is the average concentration present in the cell. For purposes of comparison to observed concentration data, it was assumed that the average concentration computed by HST3D for a model cell was located at the midpoint of the saturated portion of the model cell.

For the purpose of comparison to computed concentration data, it was assumed that concentrations detected in monitoring wells were detected at the midpoint of the saturated portion of the well screen for each monitoring well. In many cases, the elevation of the midpoint of the well screen did not correspond to the elevation of the

[1]Cosolvency refers to the ability of a solute (chemical) to be more or less soluble in a solution due to the presence of one or more other solutes.

midpoint for the corresponding model cell. Review of observed data showed concentrations to generally decrease logarithmically with depth throughout the model area. Consequently, it was not appropriate to compare a concentration observed in a monitoring well with a computed concentration for a corresponding model cell when the elevation of the midpoint of the well was not at the same elevation as the midpoint of the saturated corresponding model cell. As a result, a technique was employed to standardize observed concentrations so that they could be directly compared to computed concentrations.

The standardization process involved semilogarithmic graphing of well screen midpoint elevations (x axis-arithmetic) versus average observed concentrations (y axis-logarithmic) for well clusters to evaluate vertical concentration gradients (appendix G). For ethylbenzene, average observed concentrations at well clusters MW-14, MW-15, MW-21, MW-24, and MW-31 were considered. Except for the well cluster MW-21, the deeper wells in the well clusters did not have detectable ethylbenzene concentrations. Therefore, a vertical concentration gradient was measurable only at well MW-21.

For sodium, average observed concentrations for well clusters MW-1, MW-14, MW-15, MW-18, MW-20, MW-24, MW-30, and MW-31 were considered to evaluate concentration gradients. For sodium, it was found that the gradient observed at well cluster MW-14 did not follow the same trend as the gradients observed at other well clusters. Therefore, data from well cluster MW-14 was not considered in evaluation of vertical concentration gradients for sodium.

Generally, the sodium concentration gradients observed in the monitoring well clusters were similar. It was observed that ethylbenzene had a different vertical gradient from sodium. For calibration comparison purposes, the vertical gradient observed at MW-21 for ethylbenzene and the average vertical gradient for wells MW-1, MW-15, MW-18, MW-20, MW-24, MW-30, and MW-31 for sodium computed from the semi-logarithmic plots of well cluster concentrations were used.

For each well, the observed concentration was standardized (reduced or increased) based on the average observed vertical concentration gradient to calculate a concentration which would be expected to be observed at the midpoint of the saturated corresponding model cell. For example, if the elevation of the midpoint of a well screen was above the elevation of midpoint of the corresponding model cell, the average vertical gradient was applied to reduce the observed concentration to a concentration that would expected to be detected at the midpoint of the saturated model cell. Inversely, if the elevation of the midpoint of the monitoring well was lower than the elevation of the midpoint of the saturated model cell, the average observed gradient was applied to increase the observed concentration to the concentration which would be expected to be detected at the midpoint of the corresponding saturated model cell.

Semi-logarithmic plots of observed concentrations for well clusters, including average gradients, are provided in appendix G. Standardized observed concentrations for the RI wells are provided in table 4-24 and figure 4-10 (sodium) and table 4-25 and figure 4-11 (ethylbenzene). Standardized observed concentrations were used for comparison to computed concentrations for the purposes of calibration evaluation.

### 4.4.3 *Results*

*Calibration Results for the Sodium Model*

Calibration was accomplished primarily by adjusting several key transport-related parameters (e.g., Kd, dispersivity, etc.). The parameters used to achieve calibration are presented in table 4-3. The results of 1991 sodium model calibration are depicted in the concentration distribution map for layer 4 shown in figure 4-12 (compare this to observed concentrations in figure 4-10). Observed and calibrated concentration values along with the primary statistical evaluations are presented in table 4-26. Statistical hypothesis testing results are summarized in appendix B.

The HST3D model code was set up adequately to allow accurate computation of concentrations. Due to the variability of concentration data and primarily the unknowns associated with sodium sourcing (e.g., the sodium source area east of A&W property) and geochemistry of the area, the computed sodium plume is slightly shifted to the west of the observed sodium plume. The relative shapes and concentration distributions of the plumes are very similar. The difference in observed and computed plume longitudinal axes gives rise to a model which is calibrated (from the statistical view point), not as well as the flow models which is typical of most modeling efforts. Nevertheless, because the shape and relative distribution of concentrations within the computed plume is similar to that of the observed plume, the calibrated sodium model should be quite adequate in predictions for RA and FS purposes. An example of a solute transport model run is provided in appendix H (input and output files).

*Calibration Results for the Ethylbenzene Model*

Calibration of the ethylbenzene model was accomplished primarily by varying the Kd and decay half-life. Longitudinal and transverse dispersivity had already been established for calibration of the sodium model (these parameters are not contaminant specific). The results of 1991 ethylbenzene model calibration are shown graphically as an ethylbenzene concentration distribution map for the top model layer in figure 4-13 (compare this to observed values in figure 4-11). Observed and computed concentrations and associated primary calibration evaluation results are summarized in table 4-27. Statistical hypothesis testing results are presented in appendix B.

Calibration of the ethylbenzene model was complex given the inherent uncertainties of model input parameter values available for adjustment to achieve calibration. This is particularly true for the simulation of ethylbenzene biodegradation. The ethylbenzene model assumes a constant first-order biodegradation decay rate throughout the plume. The degree to which biodegradation of ethylbenzene (simulated by the decay constant) occurs at the site is variable depending upon a number of factors such as the heterogeneous organic plume composition, dissolved oxygen content distribution, ground water pH, nutrient concentrations, and the species and densities of the organisms present. Although the decay function is in reality quite complex, it is not feasible with the HST3D model to incorporate these complexities and, therefore, biodegradation is simply modeled using a uniform first order decay rate. Most current modeling codes only allow a similar simplified simulation of decay.

After testing the ethylbenzene model with a number of different decay rates, a relatively low decay rate ($5 \times 10^{-10}$ day$^{-1}$, which has a minimal effect on the modeled

plume) was conservatively chosen. Then the ethylbenzene model was calibrated to reflect the observed plume location and dissolved concentrations primarily through variation of the retardation factor variable.

The resulting predictions with the ethylbenzene model may be worst-case estimates of the future migration of the organic plume front. Benzene, toluene, ethylbenzene, and xylenes are found to biodegrade significantly in shallow ground water systems. The range of decay constants reported in the literature for ethylbenzene is much higher than the value used in the model. It is possible that if a greater degree of biodegradation is occurring (than is implied by the use of the low decay rate in the ethylbenzene model), then the leading edge of the organic plume may actually be migrating much more slowly than predicted by the model to occur in the future or, in fact, not be moving at all (i.e., the plume may be at steady-state).

The level of significance that biodegradation plays in controlling ethylbenzene plume migration will be further evaluated during the FS process.

The observed ethylbenzene plume has a notable eastward jog in its main axis which cannot be explained by the ground water flow data collected during the RI. This may be caused by undefined geochemical mechanisms and/or sources located outside of the PRRS property boundary. Therefore, an effort was made to calibrate the ethylbenzene model by making the computed concentrations have approximately the same concentration distribution and extent as observed concentrations without forcing the main axis of the plume to the east. Forcing the main axis of the computed plume to the east would have required modification of the model using unrealistic parameters based on knowledge gained from the RI. As a result, the computed plume is slightly shifted to the west of the observed plume but has the same approximate concentration size and extent. From a qualitative view point, and for the purposes of the RA and FS predictions, the model is adequately calibrated. As future Study Area-specific data become available, the model may be validated and refined. An example of a solute transport model run is provided in appendix H (input and output files).

## 4.5 *MODEL SENSITIVITY ANALYSIS*

### 4.5.1 *General*

The calibrated ethylbenzene and sodium models were used in sensitivity testing analysis to investigate the effect of varying transport input parameters on computed concentrations. Both models were used in the sensitivity testing, because sodium and ethylbenzene each have chemical-specific transport parameters. Sensitivity testing enabled the evaluation of sensitivity of the models to transport parameter changes.

Sensitivity analysis indicates that comparison of changes in the model output (concentration) due to incremental or unit changes in one parameter while keeping all other parameters the same as in the calibration run. Sensitivity analysis results are useful to denote changes in concentrations that can be expected as a result of the change of a parameter value. Sensitivity analysis allows the analysis of "what if" scenarios due to variation of parameter values. This is helpful when interpreting prediction results, especially if more data becomes available after the modeling is completed.

For transport models sensitivity testing, statistical comparisons were not made since they would be of little use given the lower degree of calibration (from the statistical view point) than for the flow modeling. As a result, sensitivity testing for transport modeling was more qualitative than for flow modeling.

### 4.5.2 *Parameters Chosen for Sensitivity Testing*

For the sodium and ethylbenzene transport models, sensitivity analysis was performed on the following parameters: longitudinal and transverse dispersivity; decay half-life (ethylbenzene model only); contaminant mass loading rate; and chemical distribution coefficient (Kd). These are the primary transport specific parameters used in the modeling, not including contaminant mass loading rates (which can have an obvious effect on modeling results). Previous investigators (IT, December 1990 and GeoTrans, 1985) also conducted some sensitivity testing on these parameters.

For the sensitivity testing, transport parameter values were generally chosen within a reported/calculated range for the PRRS area. However, some parameters were tested outside of their reported ranges (see table 4-28). The contaminant mass loading rate did not have a "reported range" to test within. However, variation of the contaminant mass loading rate in model development and calibration allowed for a reasonable sensitivity test of this parameter.

### 4.5.3 *Results*

Through model development and calibration, it was found that the most sensitive transport parameter was the contaminant mass loading rate. The choice of the contaminant mass loading rate controls the overall transport migration. Ultimately, the choice of a loading rate was guided by review of the amount of chemicals used at the Study Area and initial loading rate estimates (Section 4.3.7--Model Boundary Conditions).

The distribution coefficient was the next most sensitive parameter. The distribution coefficient has a direct effect on the retardation of the contaminant migration. For both sodium and ethylbenzene, the range of distribution coefficients tested did not prevent contaminant from migrating to the Great Miami River for the calibration runs. Primarily what the distribution coefficient effected was the migration distance of the higher concentrations within the computed plumes. The higher the distribution coefficient, the slower the high concentrations migrated.

The next most sensitive parameter was longitudinal dispersivity. Generally, a lower dispersivity resulted in a more compact and concentrated plume. However, below 50 feet, variation of longitudinal dispersivity did not have a very noticeable effect on computed concentrations. Although, for longitudinal dispersivities greater than 50 feet, the plume became much more diluted and spread out.

Variation of the transverse dispersivity within the range noted in table 4-28 had little effect on contaminant transport. Primarily, a reduction in the transverse dispersivity had the effect of slightly increasing the higher concentrations near the source area of the model. An increase in the transverse dispersivity had the effect of slightly increasing the dissolved chemical concentration in the second layer of the model.

For the ethylbenzene model, decay half-life within the range tested had little effect on the plume size and concentration distribution. It was noted that use of a half-life greater than the range tested had a very significant impact on computed concentrations. In some cases, (i.e., with a half-life of $1 \times 10^{-3}$ $day^{-1}$), all of the contaminant was decayed out of the model.

## 4.6 *MODEL PREDICTION*

### 4.6.1 *Inorganic Modeling Chemicals*

Once the sodium model was calibrated to 1991 conditions, provisions were made to predict sodium and other inorganic model chemical concentrations for future dates. Concentrations were predicted 15 years into the future since by that time a trend was established which could be used to extrapolate to dates beyond 15 years. Scenario 2, Loading Rates (Section 4.3 (Model Conceptualization and Formulation)) were used in the prediction model run. The model predicted concentration estimates at three-year intervals starting in January 1992 for 15 years into the future. Figure 4-14 shows the predicted change in sodium concentrations over time after 1991. Please note that predicted concentrations do not include background average concentrations (i.e., the background average concentration for a particular chemical has not been added to the predicted concentration). Also note that predicted concentrations are dissolved (filtered) estimates and not total (unfiltered) estimates. Total concentration estimates may be obtained using the relationship established in regression analysis presented in appendix D.

Using the relationships established between the four inorganic modeling chemicals using regression analysis (appendix D), concentrations for the other three inorganic modeling chemicals were estimated from the sodium concentration model predictions (table 4-29 and figure 4-15). On this table and figure are predicted maximum concentrations over time and predicted concentrations at downgradient locations which roughly correspond to monitoring locations approximately 700 feet and 1,800 feet south of the companies' property.

### 4.6.2 *Prediction of Organic Modeling Chemicals*

Following ethylbenzene model calibration to 1991 conditions, provisions were made to predict ethylbenzene and other organic model chemical concentrations for future dates. Concentrations were predicted 15 years into the future. The trend these results show can be used to extrapolate to dates beyond 15 years. Scenario 2, Loading Rates (Section 4.3 (Model Conceptualization and Formulation) were used in the prediction model run. The model predicted concentration estimates at three-year intervals starting in January 1992 for 15 years into the future. Figure 4-16 shows the predicted change in ethylbenzene concentrations over time after 1991.

Using the relationships established between the five organic modeling chemicals using regression analysis (appendix D), concentrations for the other four organic modeling chemicals were estimated from the ethylbenzene concentration model predictions (table 4-30 and figure 4-17). On this table and figure are predicted maximum concentrations over time and predicted concentrations at downgradient locations which approximately correspond to monitoring locations at 700 feet and 1,800 feet south of the companies' property.

# *Section 5.0*

# *Summary of Modeling Effort*

# 5.0 SUMMARY OF MODELING EFFORT

An extensive ground water modeling effort has been completed for the PRRS to evaluate ground water flow and contaminant transport. One regional ground water flow model was successfully calibrated to 1986 and 1991 conditions and sensitivity tested to refine model parameters for more localized modeling. Subsequently, a localized (higher resolution) ground water flow model was developed and calibrated to 1986 and 1991 conditions. One of the local flow models was calibrated to 1991 water level data which was estimated to approximate average ground water flow conditions for the area. It was assumed that these average ground water flow conditions have existed throughout the time that contaminant transport from the PRRS has taken place. The 1991 ground water flow model was used for contaminant transport modeling.

Four inorganic chemicals and five organic chemicals were considered for contaminant transport modeling. One inorganic chemical and one organic chemical from each group were chosen for contaminant transport model development. A sodium model and an ethylbenzene model were developed and calibrated to average ground water concentration data collected during the RI for the PRRS. The ethylbenzene and sodium models were successfully calibrated and sensitivity tested. Consequently, two transport modeling tools are available for use in prediction of future concentrations and simulation of remedial alternatives for RA and FS purposes.

For this report, prediction of future chemical concentrations of the nine modeling chemicals was accomplished for RA purposes by running the ethylbenzene and sodium models 15 years into the future. Predicted concentrations from these models were used in conjunction with regression analysis of RI ground water concentration data to estimate concentrations for the other seven modeling chemicals. Additional modeling for FS purposes will be addressed in a future report.

*Section 6.0*

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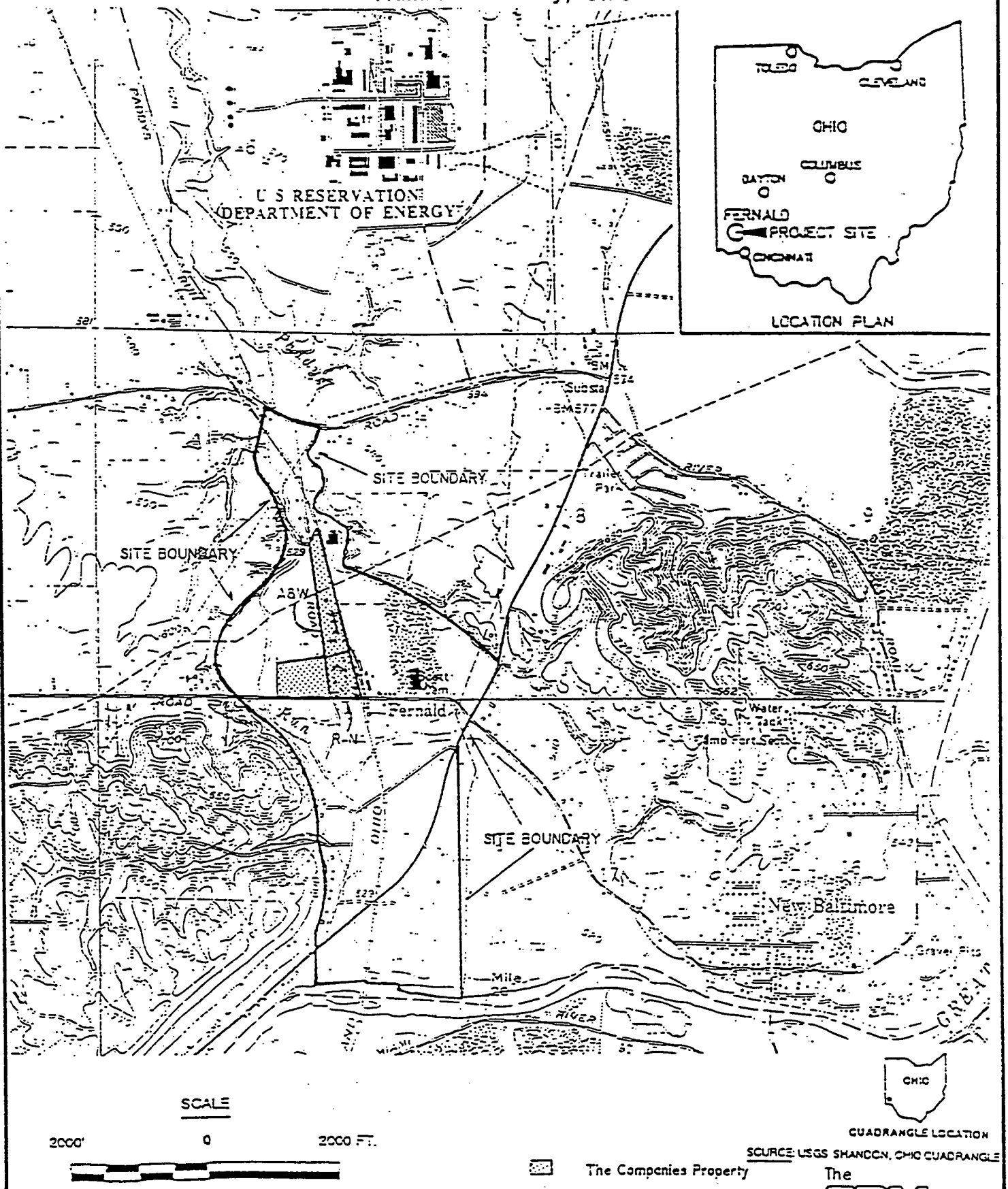
# *Appendix A*

## *Figures and Tables*

# Figure 1-1
## Site Location In Region
### Paddys Run Road Site
### Hamilton County, Ohio



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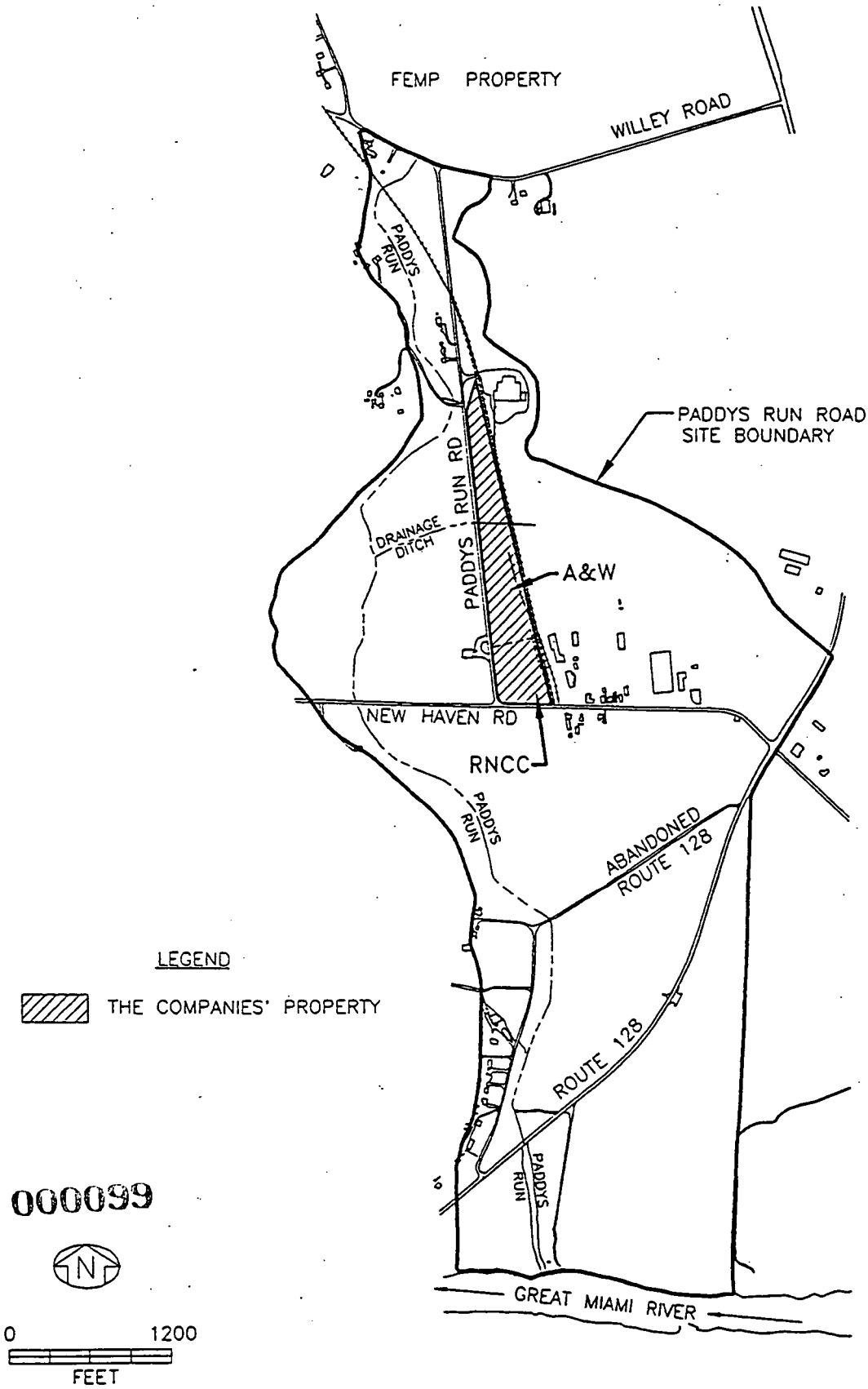
# Figure 1-2
## Site Location and Layout
### Paddys Run Road Site
### Hamilton County, Ohio

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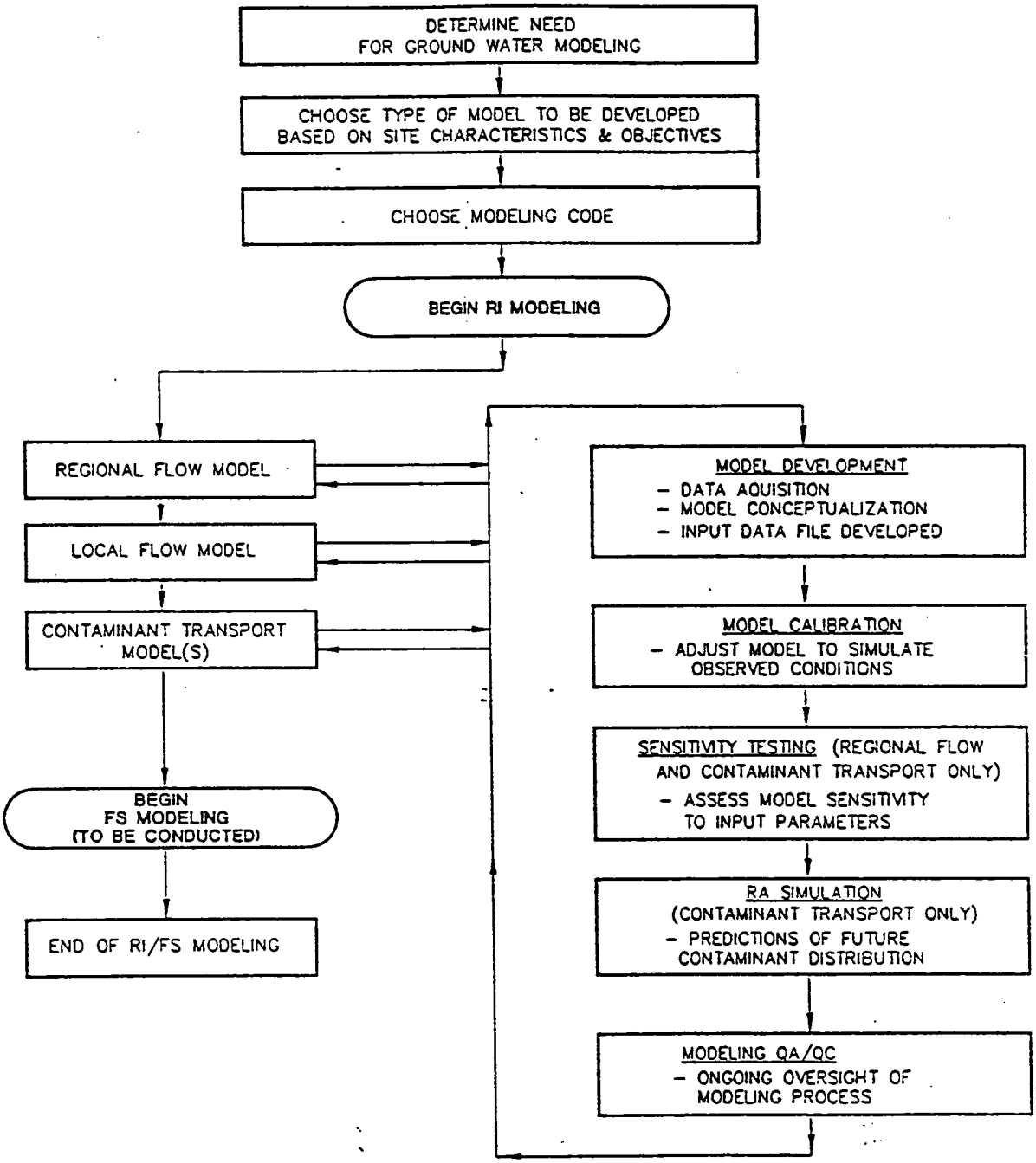
# Figure 1-3
## General Modeling Approach
### Paddys Run Road Site
### Hamilton County, Ohio





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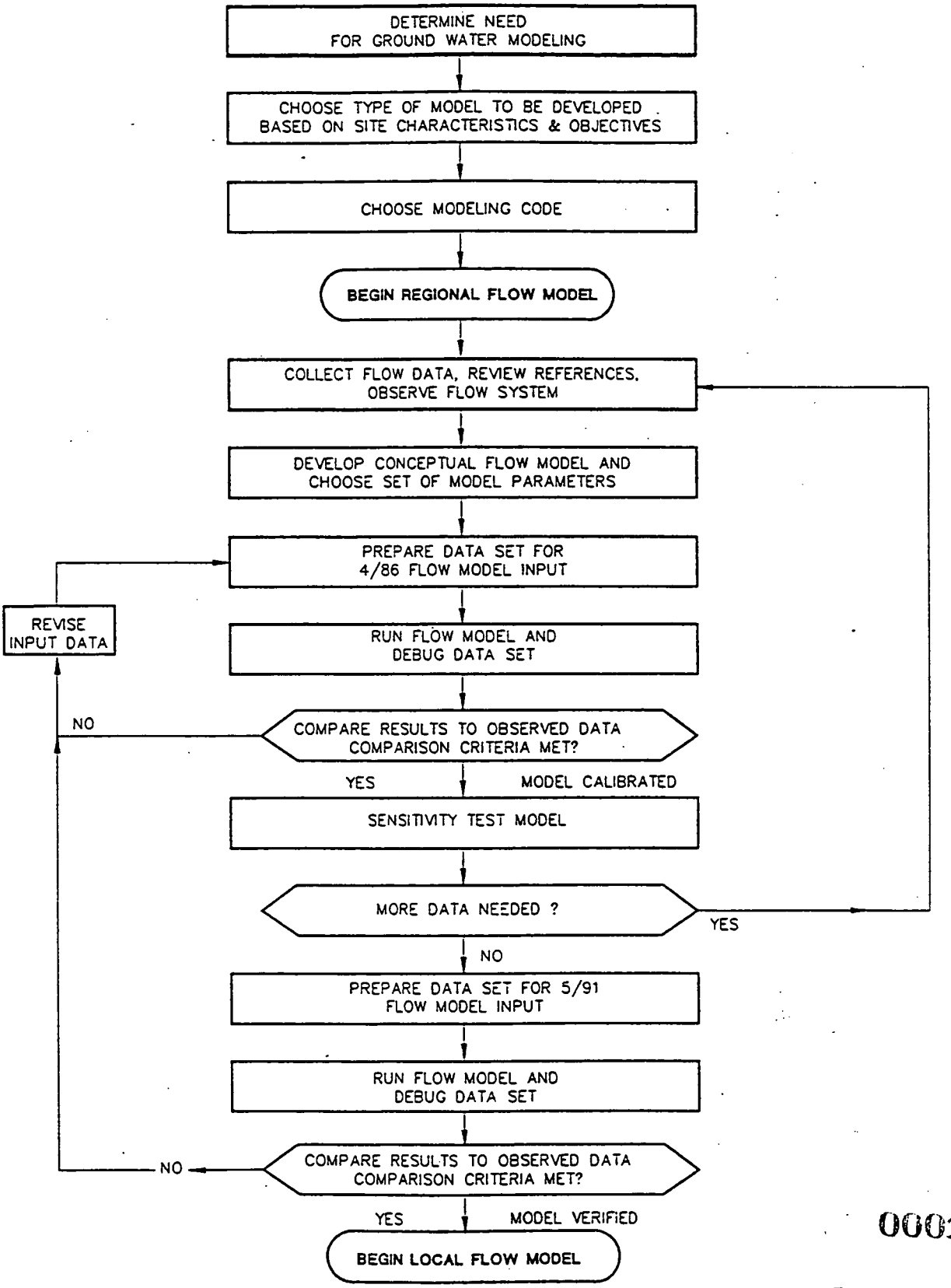
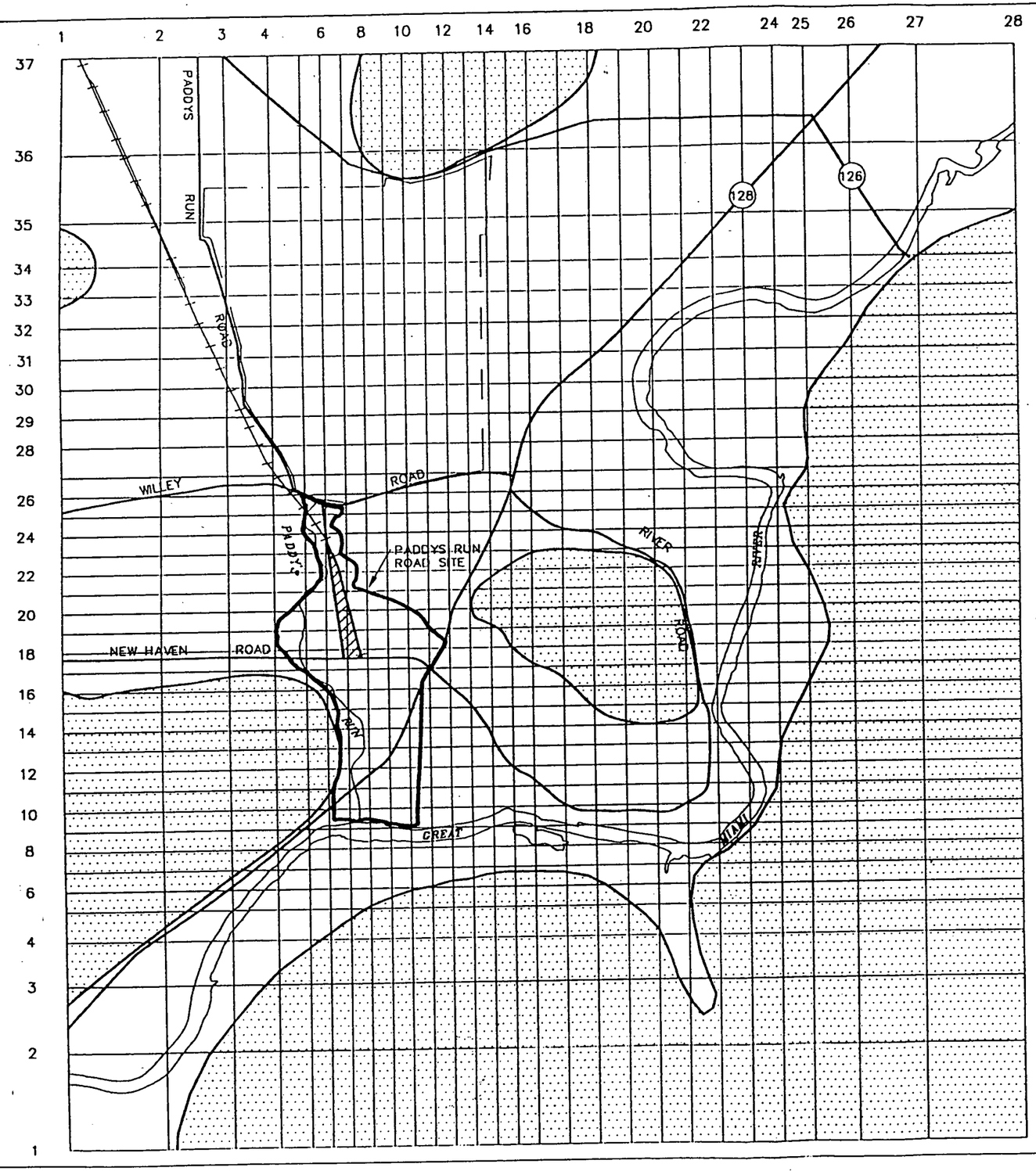
# Figure 2-1
## Approach for Regional Flow Modeling
### Paddys Run Road Site
### Hamilton County, Ohio





# Figure 2-2
## Regional Flow Model Descretization
### Paddys Run Road Site
### Hamilton County, Ohio




LEGEND

BEDROCK OUTCROP

PADDYS RUN ROAD SITE COMPANIES FACILITY PROPERTY BOUNDARY

N

0 3000
FEET

000102

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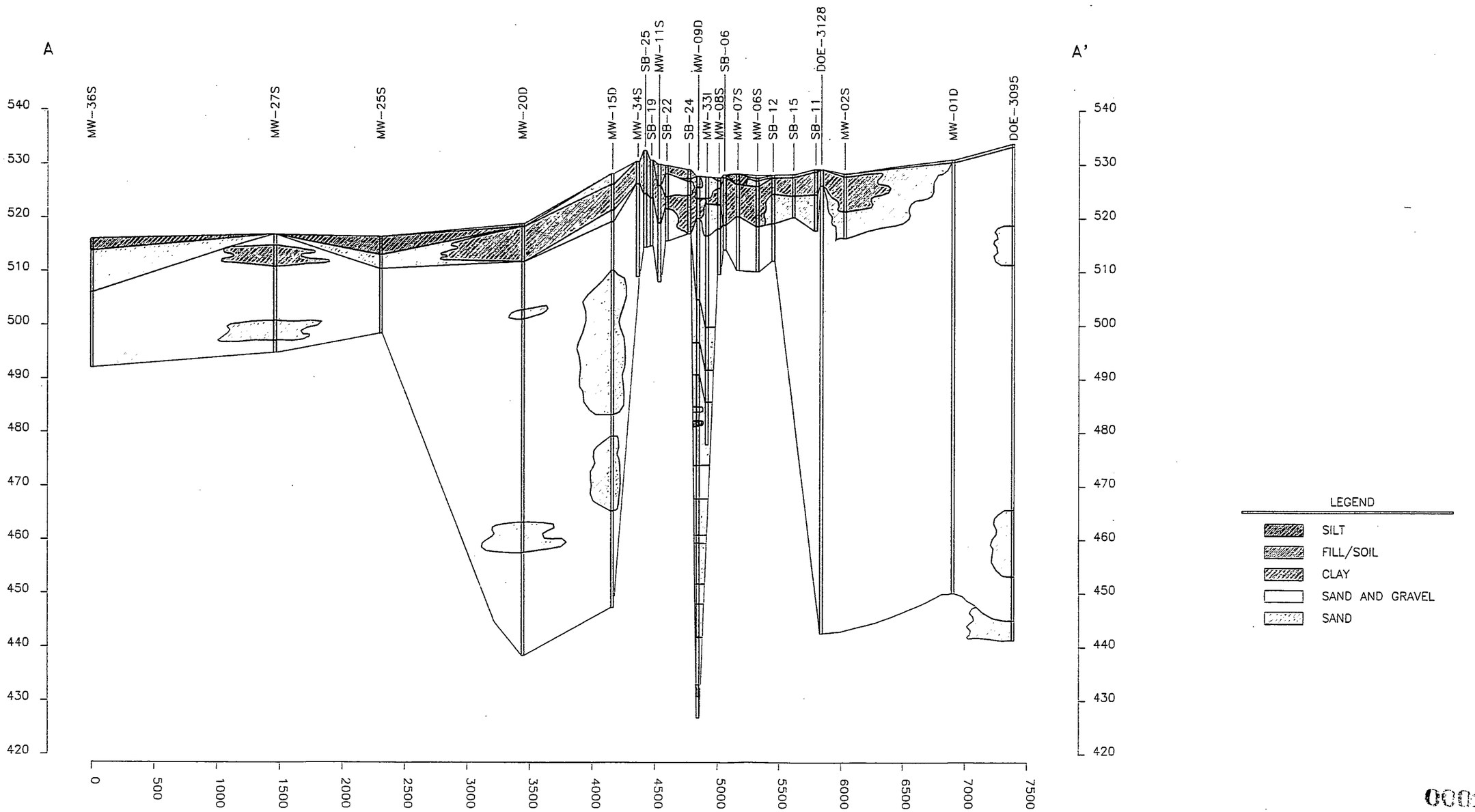
11102.07/11007RMD/062692-5

007360

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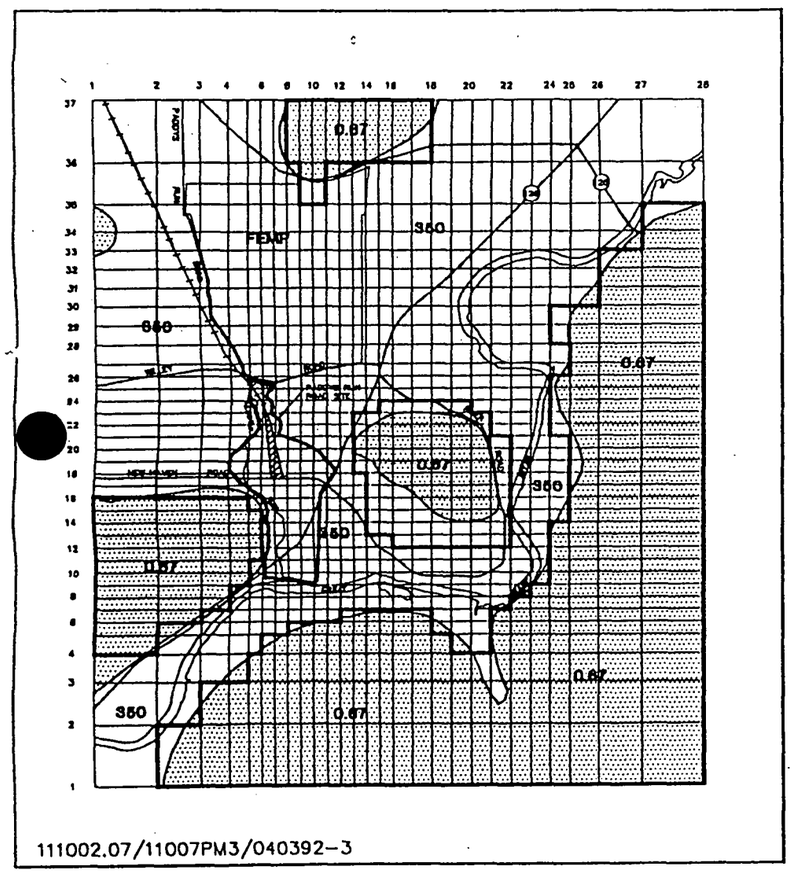
CROSS SECTION A – A'
PADDYS RUN ROAD SITE
HAMILTON COUNTY, OHIO

FIGURE 2-3

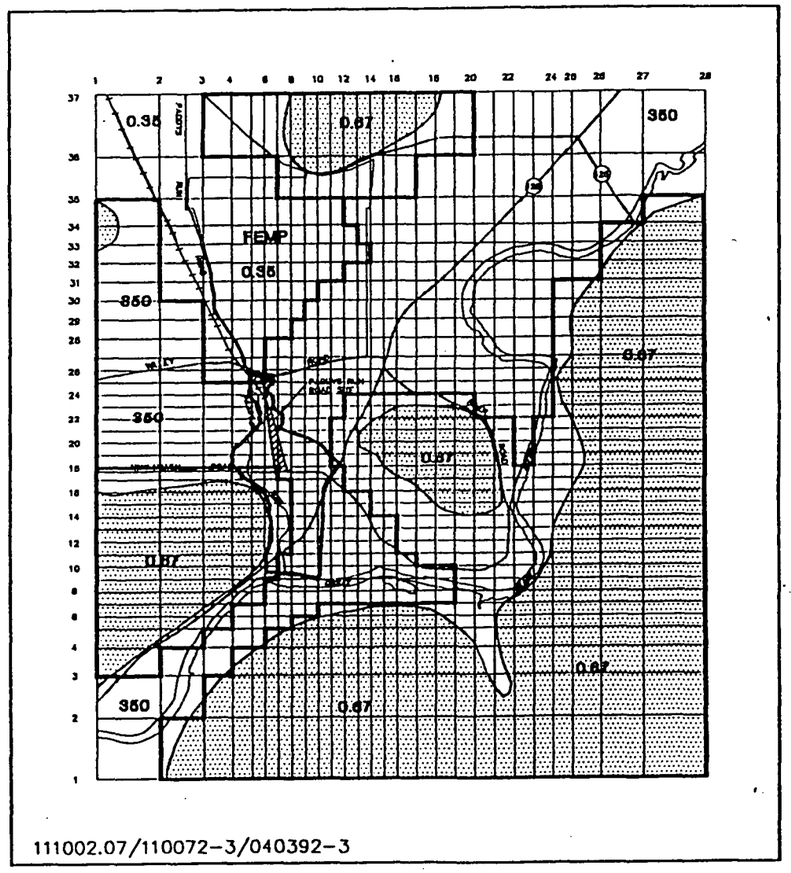
ERM ERM-Midwest, inc.
Environmental Resources Management

PROJECT\539-10-02\1002F317.DWG

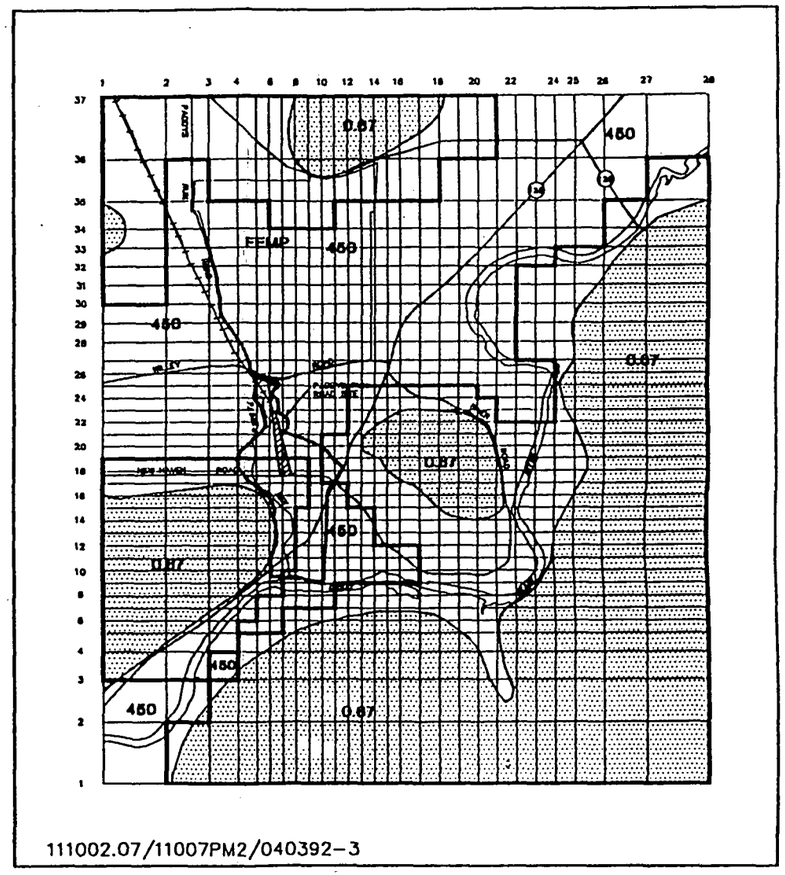
# Figure 2-4
## Regional Flow Model
## Hydraulic Conductivity Distribution
### Paddys Run Road Site
### Hamilton County, Ohio




Upper Porous Media Zone
Water Table to 455 FAMSL




Middle Porous Media Zone
455 to 445 FAMSL




Lower Porous Media Zone
445 to 380 FAMSL

LEGEND

- BEDROCK OUTCROP AT LAND SURFACE
- 350 — HORIZONTAL HYDRAULIC CONDUCTIVITY
- FAMSL = FEET ABOVE MEAN SEA LEVEL
- PADDYS RUN ROAD SITE COMPANIES FACILITY PROPERTY BOUNDARY



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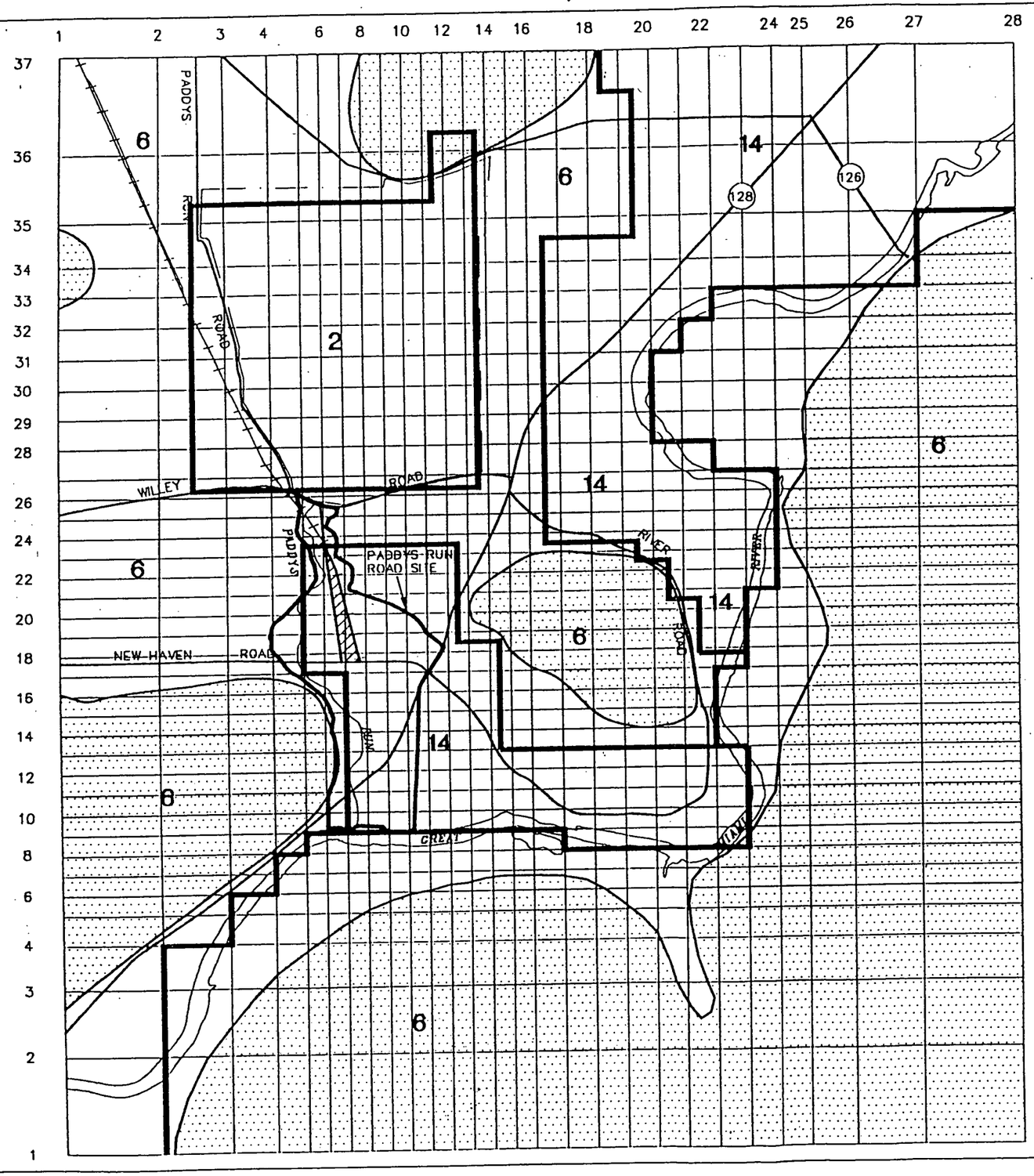
1102.07/11007FLH/062992-6




# Figure 2-5
## Regional Flow Model Net Precipitation Recharge Distribution
### Paddys Run Road Site
### Hamilton County, Ohio

LEGEND

- BEDROCK OUTCROP
- 6 — RECHARGE RATE (IN/YR)
- PADDYS RUN ROAD SITE COMPANIES FACILITY PROPERTY BOUNDARY

N

0 3000
FEET



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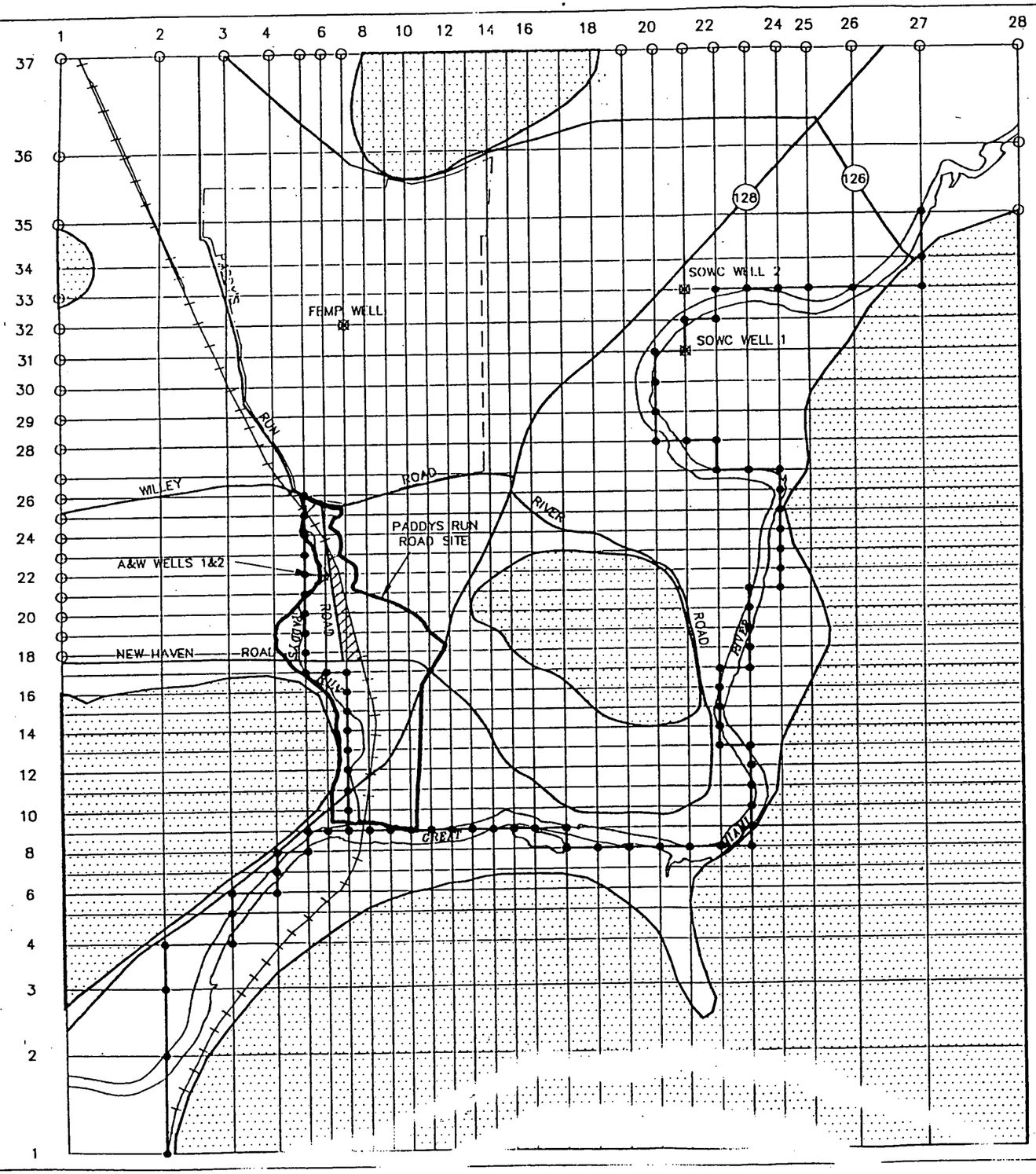
11102.07/110072-5/062692-5

# Figure 2-6
## Regional Flow Model Boundary Conditions, Stream Nodes, and Pumping Wells
### Paddys Run Road Site
### Hamilton County, Ohio




LEGEND

- BEDROCK OUTCROP
- PUMPING WELL
- STREAM NODE
- SPECIFIED PRESSURE NODE (TOP LAYER ONLY)
- PADDYS RUN ROAD SITE COMPANIES FACILITY PROPERTY BOUNDARY

NOTE: RNCC WELL NOT INCLUDED IN REGIONAL FLOW MODEL

N

0 3000
FEET



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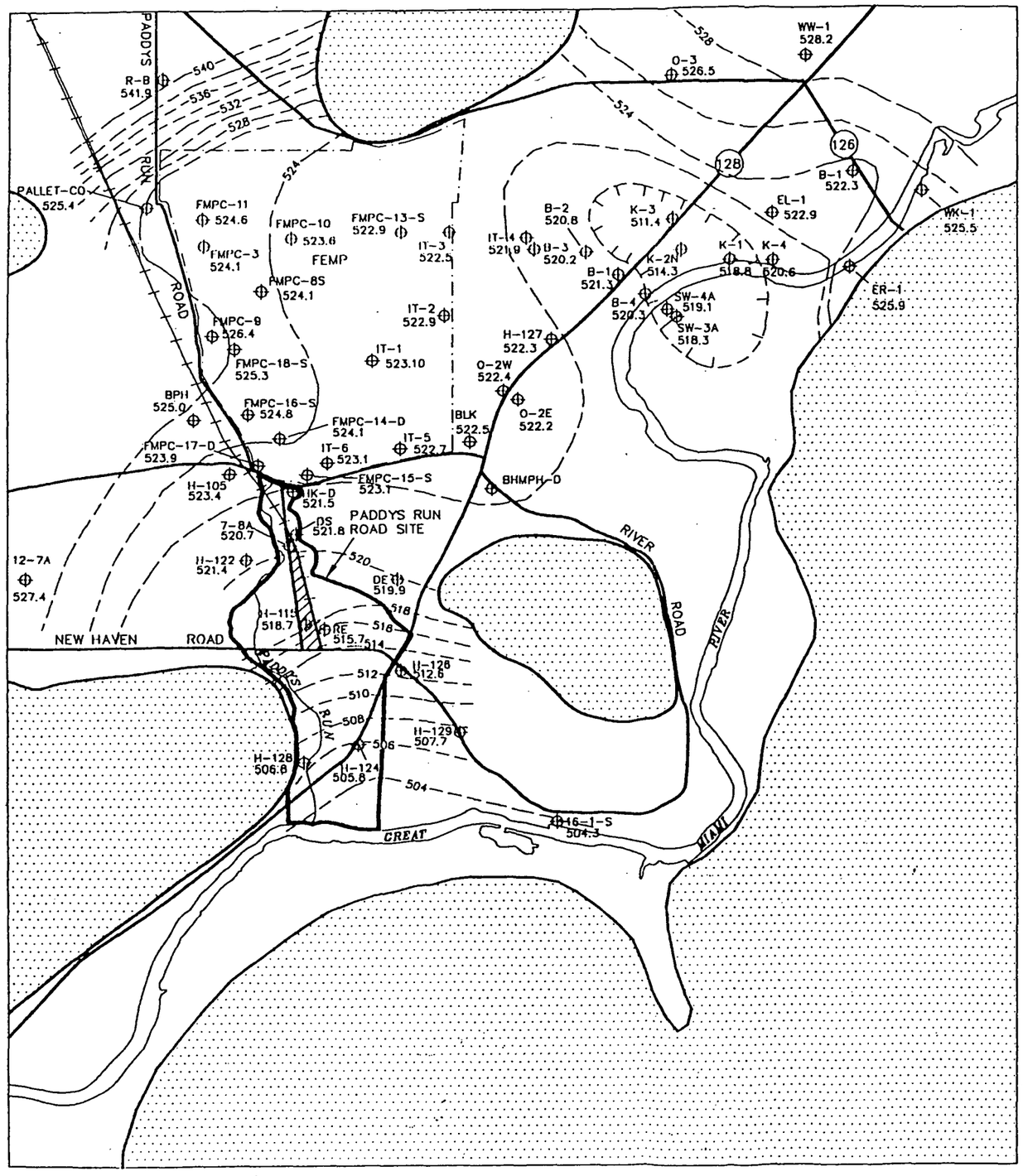
# Figure 2-7
## Observed 1986 Ground Water Level Elevations
### Paddys Run Road Site
### Hamilton County, Ohio




LEGEND

- BEDROCK OUTCROP
- MONITORING WELL
- 502 — GROUND WATER CONTOUR (FEET ABOVE MSL)
- PADDYS RUN ROAD SITE COMPANIES FACILITY PROPERTY BOUNDARY

SOURCE FOR WATER LEVEL DATA: IT (DEC. 1990)

MANUAL CONTOURING USED [SURFER (GOLDEN SOFTWARE, 1989) NOT APPLIED]

N

0 3000
FEET



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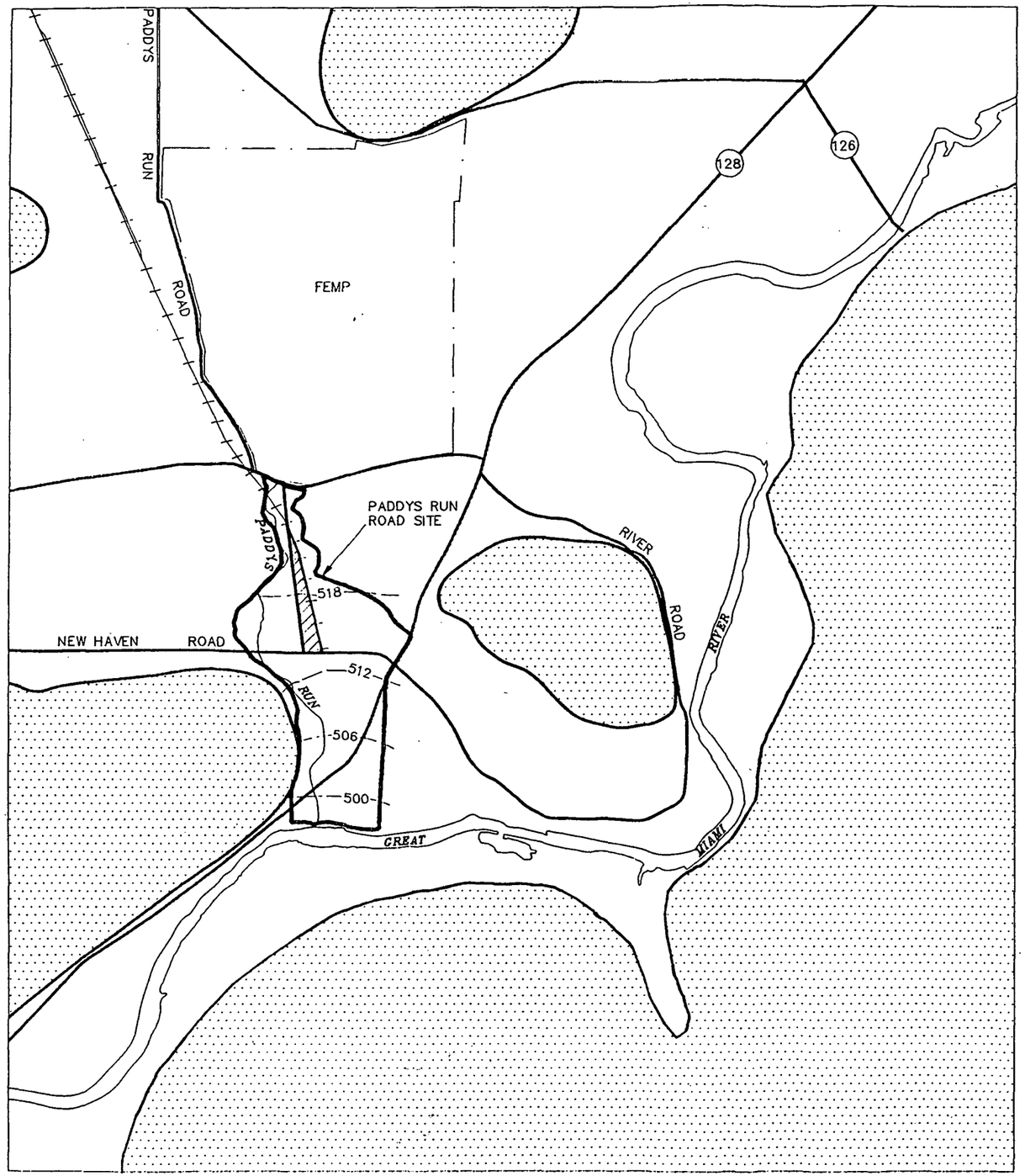
11102.07/1107GWE2/062692-7

# Figure 2-8
## Observed 1991 Ground Water Level Elevations
### Paddys Run Road Site
### Hamilton County, Ohio




LEGEND

BEDROCK OUTCROP

506 GROUND WATER CONTOUR (FEET ABOVE MSL)

PADDYS RUN ROAD SITE COMPANIES FACILITY PROPERTY BOUNDARY

NOTES: SOURCE FOR WATER LEVEL DATA: MAY 1991 MONITORING WELL DATA (ERM SEPT.,1992)

MANUAL CONTOURING USED [SURFER (GOLDEN SOFTWARE 1989) NOT APPLIED]

N

0 3000
FEET

000108

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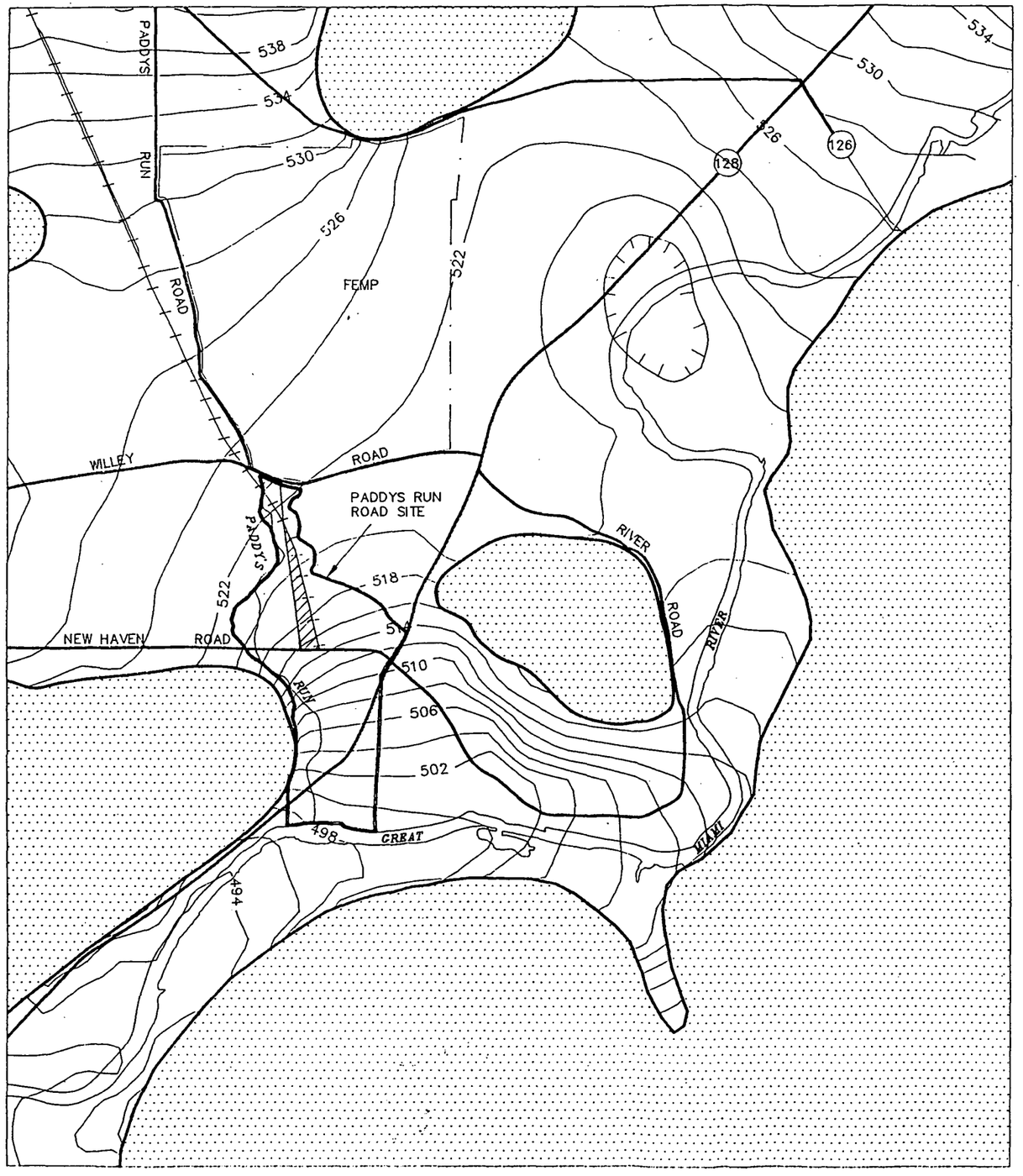
11102.07/1107GWE4/062692-7

007360

# Figure 2-9
## Modeled 1986 Hydraulic Head Distribution (Layer 4)
### Paddys Run Road Site
### Hamilton County, Ohio




LEGEND

BEDROCK OUTCROP

530 GROUND WATER CONTOUR (FEET, MSL)

PADDYS RUN ROAD SITE COMPANIES FACILITY PROPERTY BOUNDARY

NOTE: CONTOURING BASED ON SURFER (GOLDEN SOFTWARE, 1989) PLOT OF MODEL RESULTS USING INVERSE DISTANCE METHOD.

N

0 3000
FEET

000109

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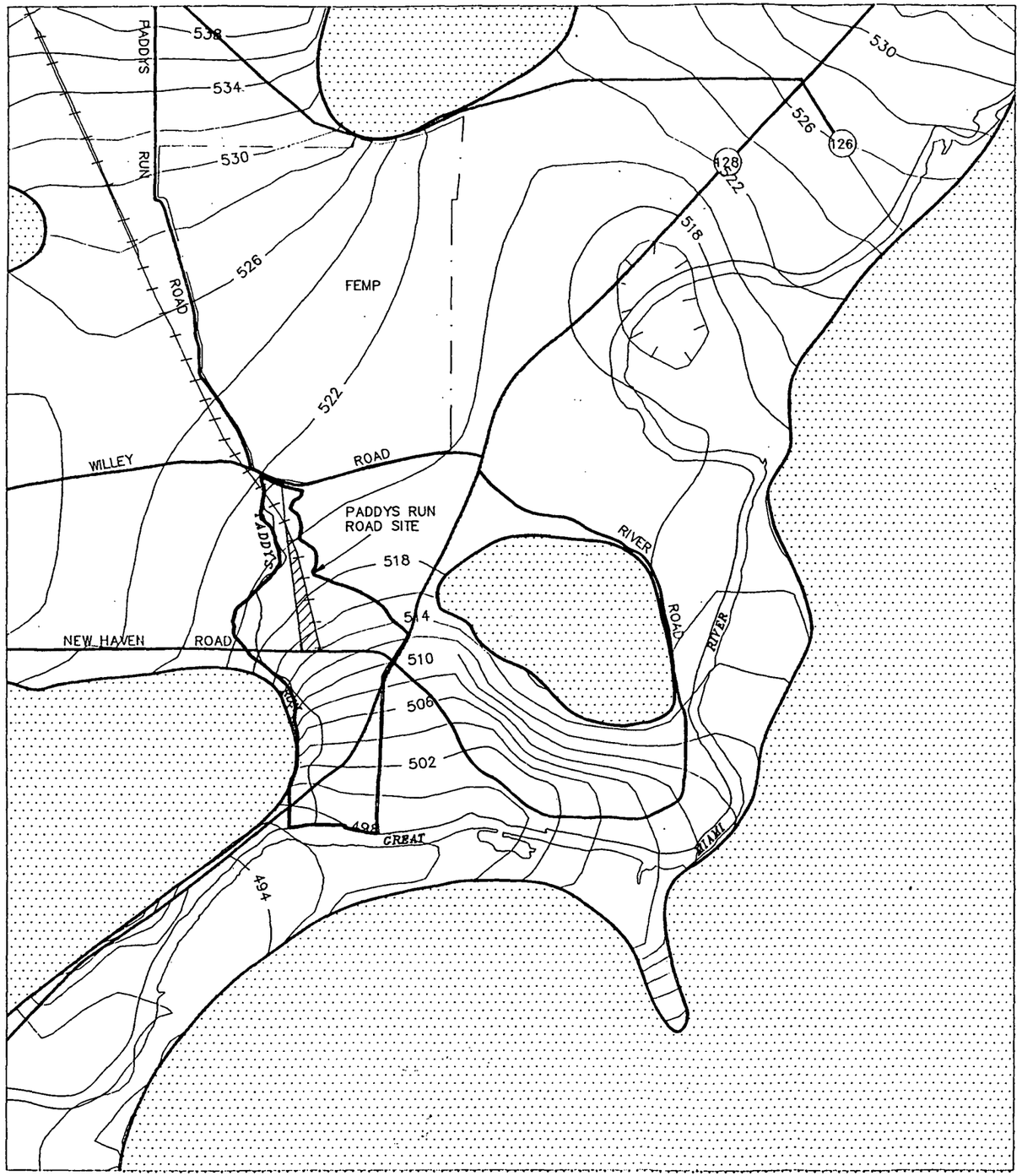
11102.07/1107-864/090492-8

007360

# Figure 2-10
## Modeled 1991 Hydraulic Head Distribution (Layer 4)
### Paddys Run Road Site
### Fernald, Ohio




LEGEND

BEDROCK OUTCROP

530 GROUND WATER CONTOUR (FEET, MSL)

PADDYS RUN ROAD SITE COMPANIES FACILITY PROPERTY BOUNDARY

NOTE: CONTOURING BASED ON SURFER (GOLDEN SOFTWARE, 1989) PLOT OF MODEL RESULTS USING INVERSE DISTANCE METHOD

N

0 3000
FEET

000110

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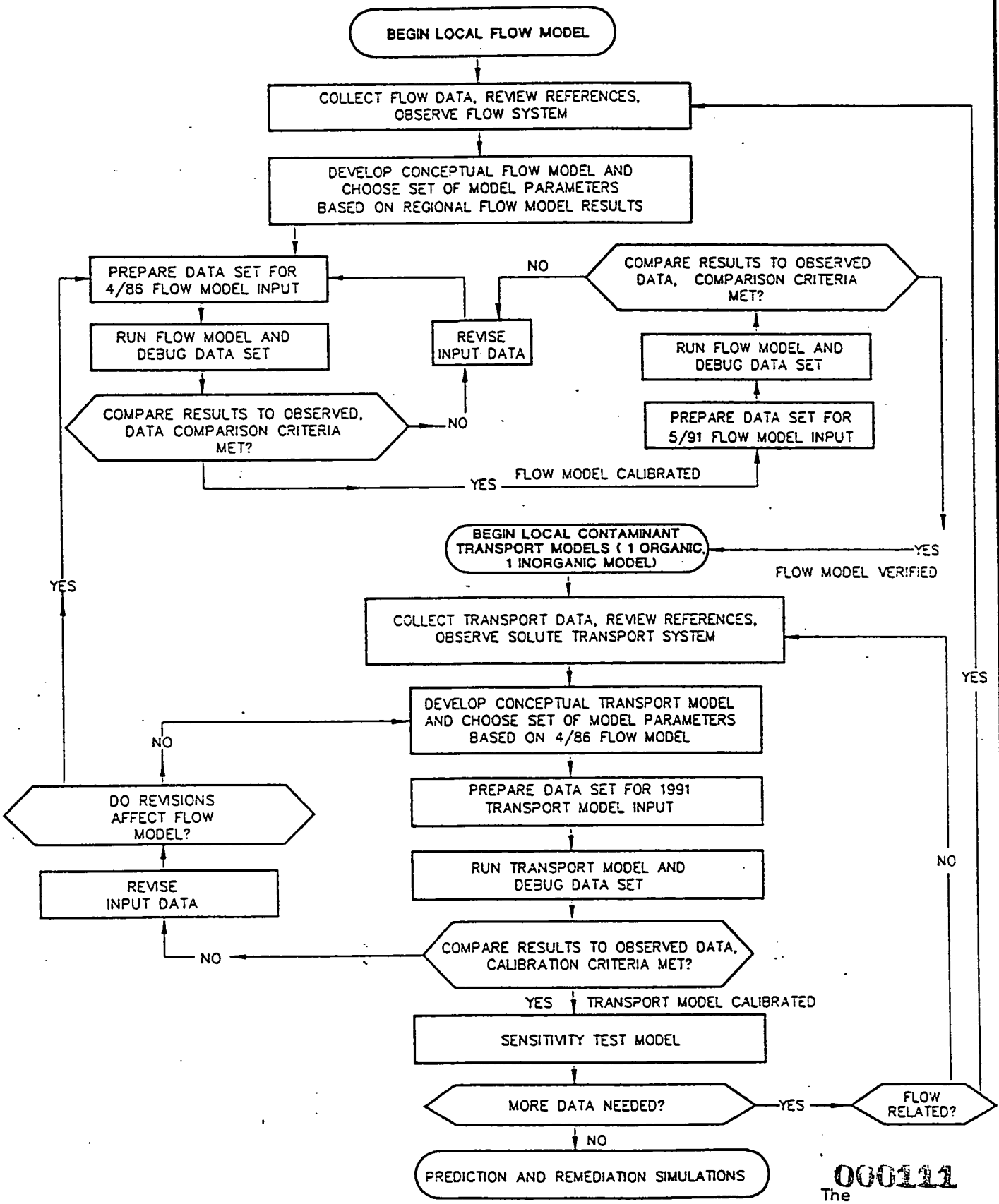
1102.07/1107-914/090492-5

# Figure 3-1
## Approach for Local Flow and Transport Modeling
### Paddys Run Road Site
### Hamilton County, Ohio

00 360




000111

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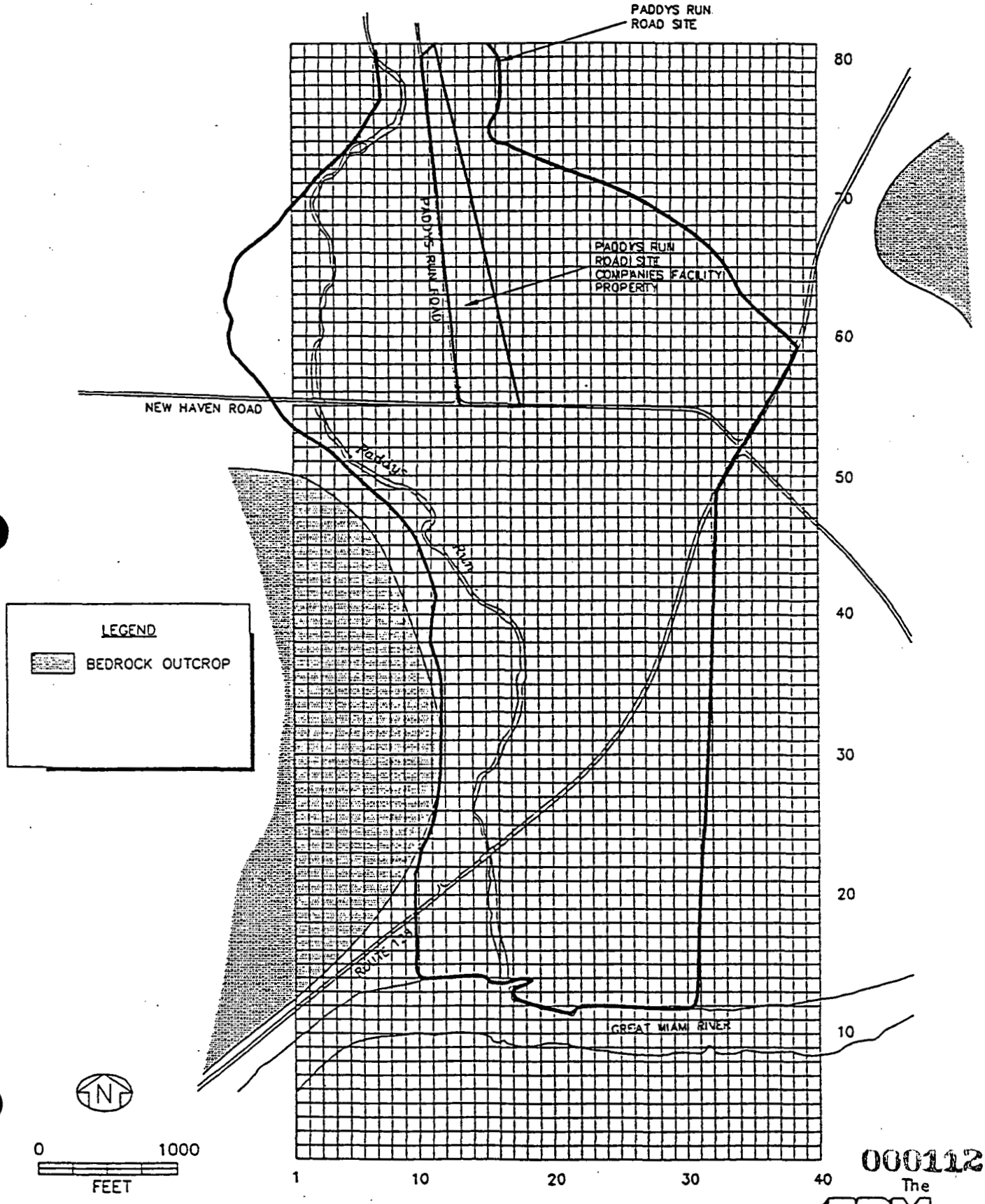
11102.07/11007FCG/062692-6

# Figure 3-2
## Local Model Descretization
### Paddys Run Road Site
### Hamilton County, Ohio




000112

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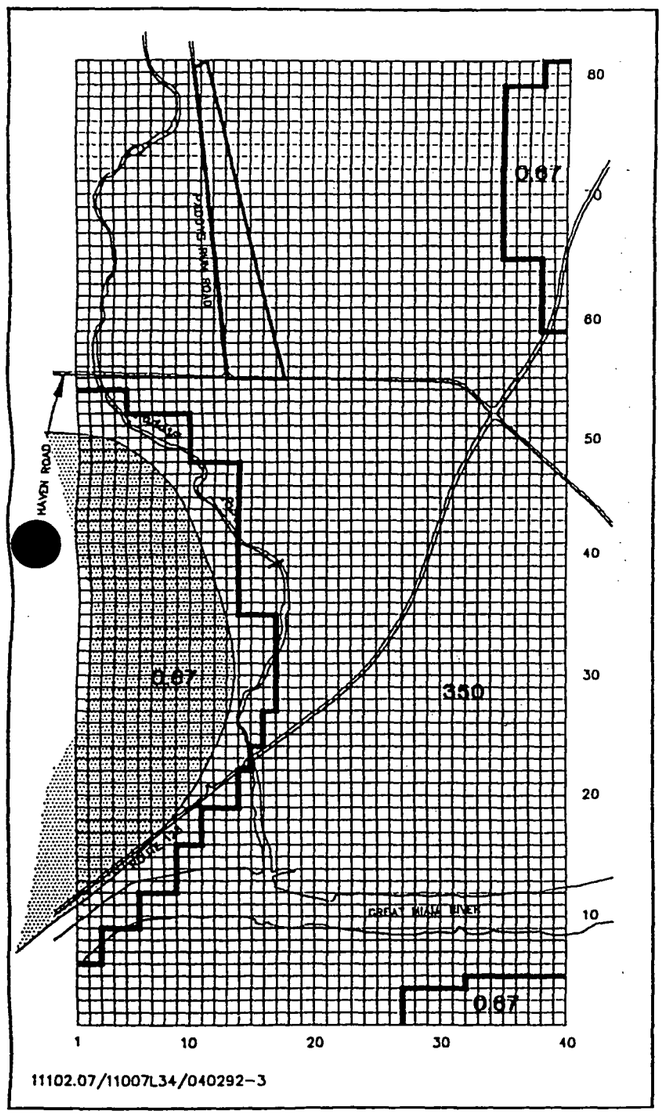
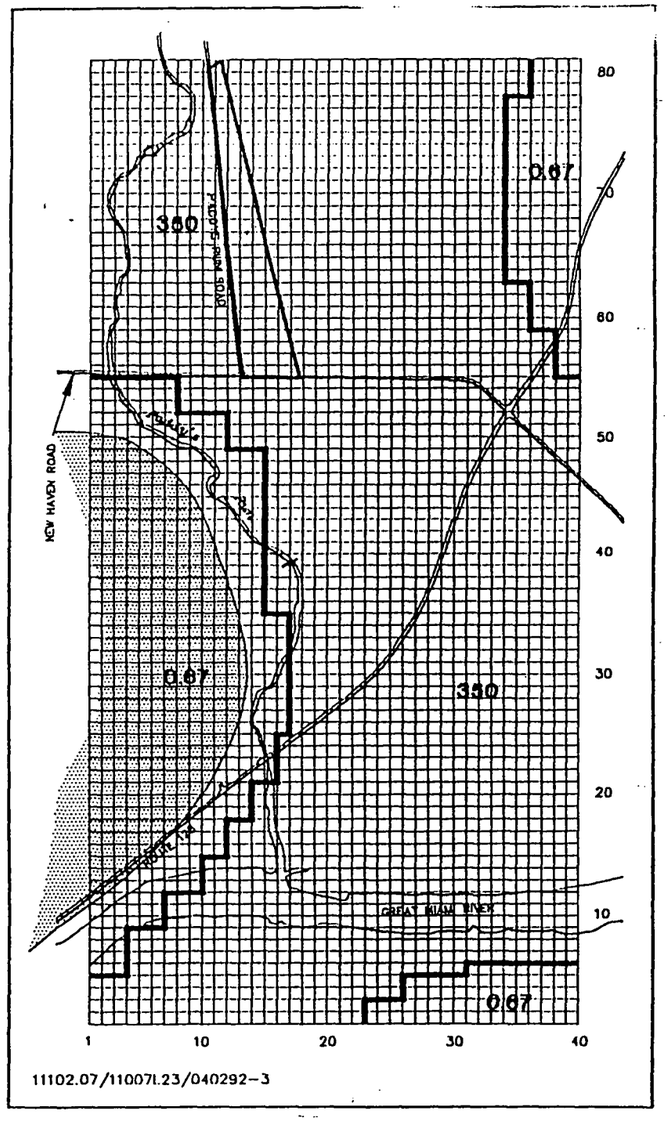
11102.07/11007LMD/062692-5

# Figure 3-3
## Local Model Hydraulic Conductivity Distribution
### Paddys Run Road Site
### Hamilton County, Ohio



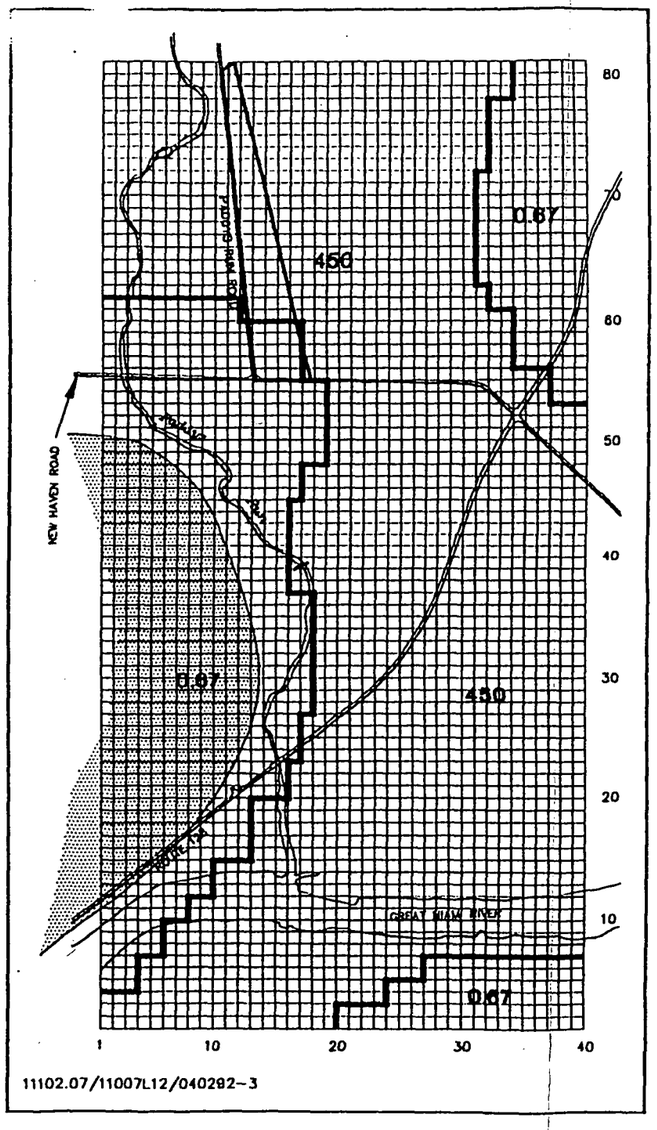

Upper Porous Media Zone

WATER TABLE TO 478 FAMSL




Middle Porous Media Zone

478 TO 450 FAMSL




Lower Porous Media Zone

450 TO 400 FAMSL

LEGEND

350 HORIZONTAL HYDRAULIC CONDUCTIVITY (FEET PER DAY)

BEDROCK OUTCROP AT LAND SURFACE

N

0 800
FEET

FAMSL = FEET ABOVE MEAN SEA LEVEL



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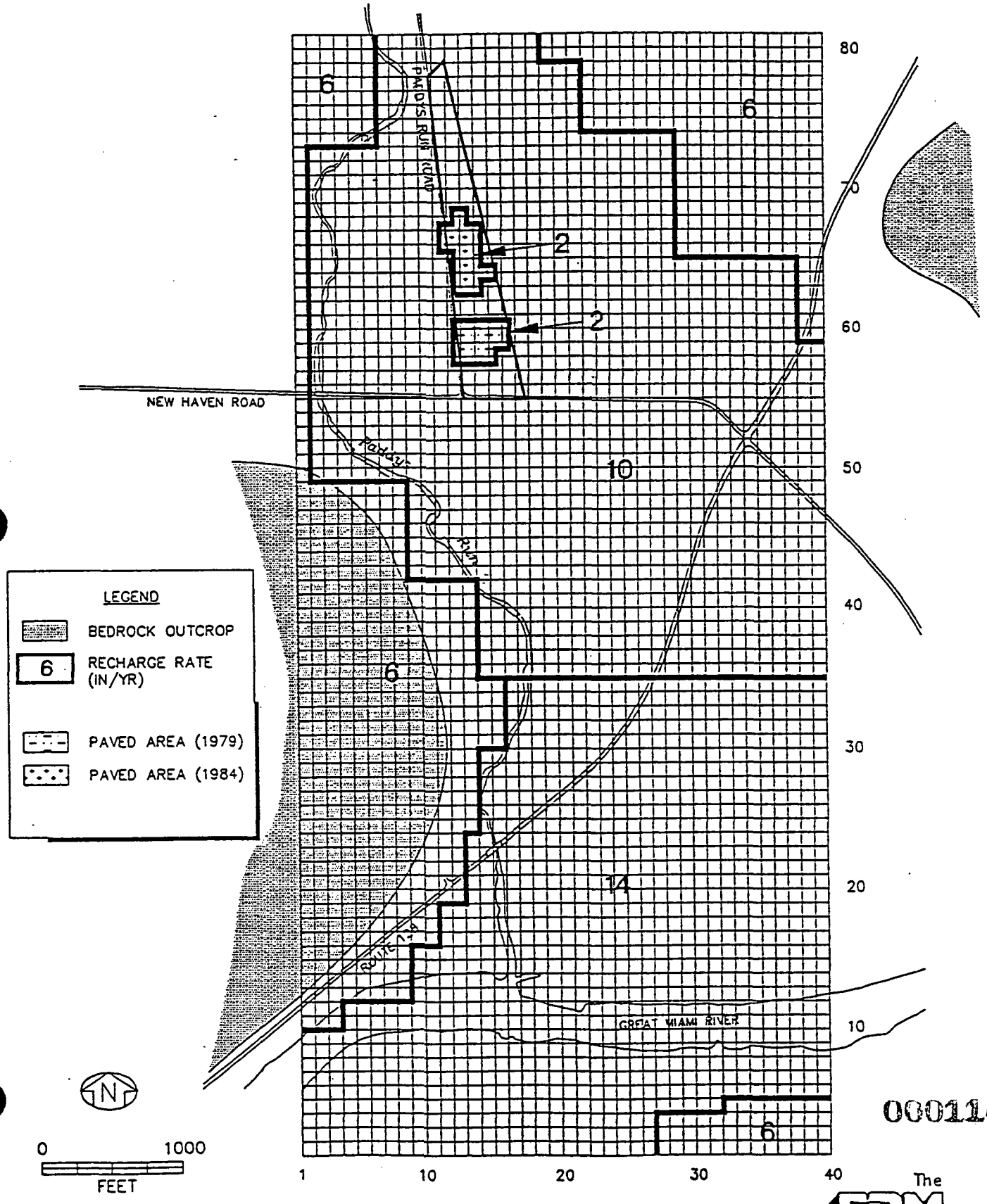
11102.07/11007PMZ/062692-5

# Figure 3-4
## Local Model Net Precipitation Recharge Distribution
### Paddys Run Road Site
### Hamilton County, Ohio

007360




060114

11102.07/11007L36/062692-7

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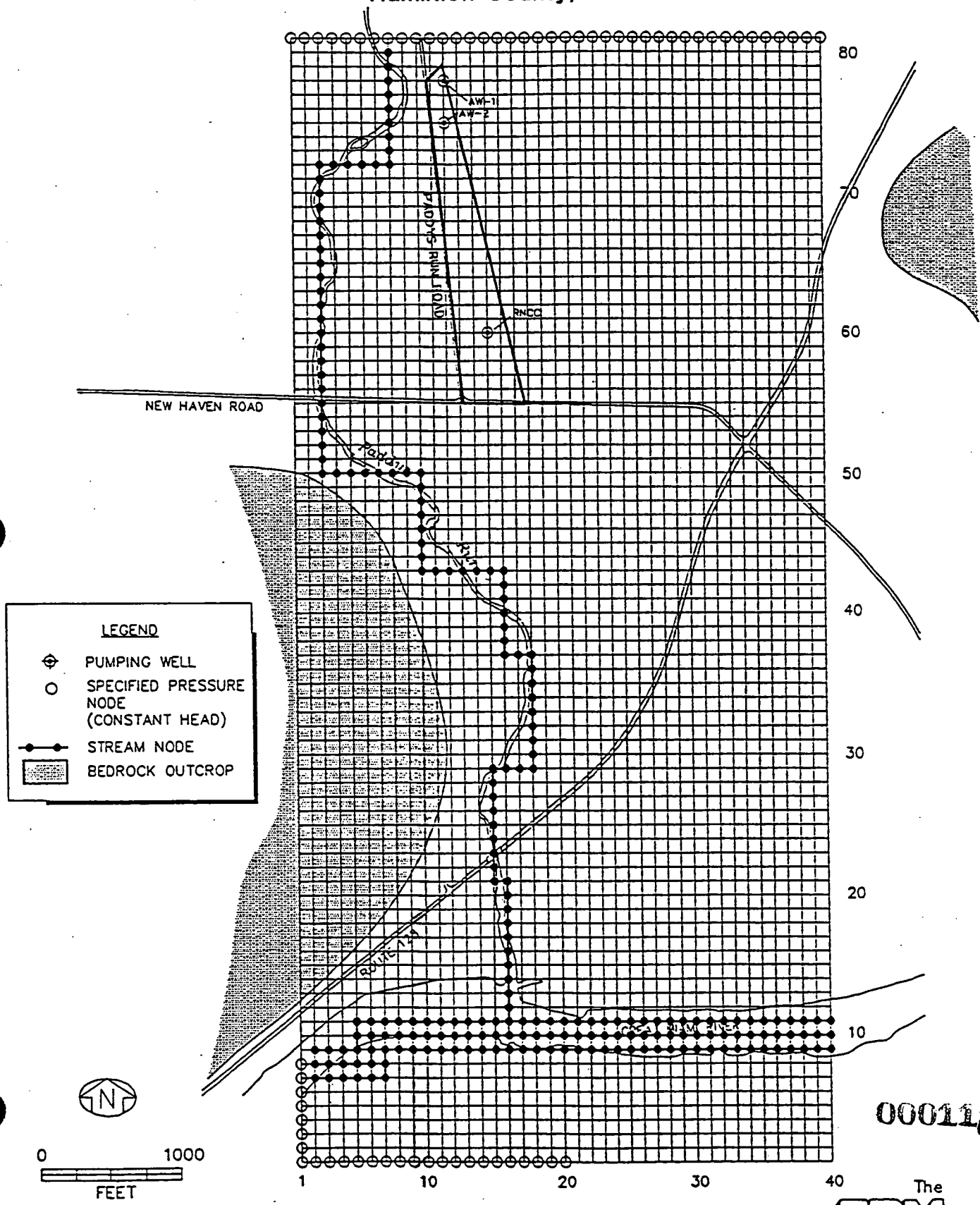
# Figure 3-5
# Local Model Boundary Conditions, Stream Nodes and Pumping Wells
## Paddys Run Road Site
## Hamilton County, Ohio





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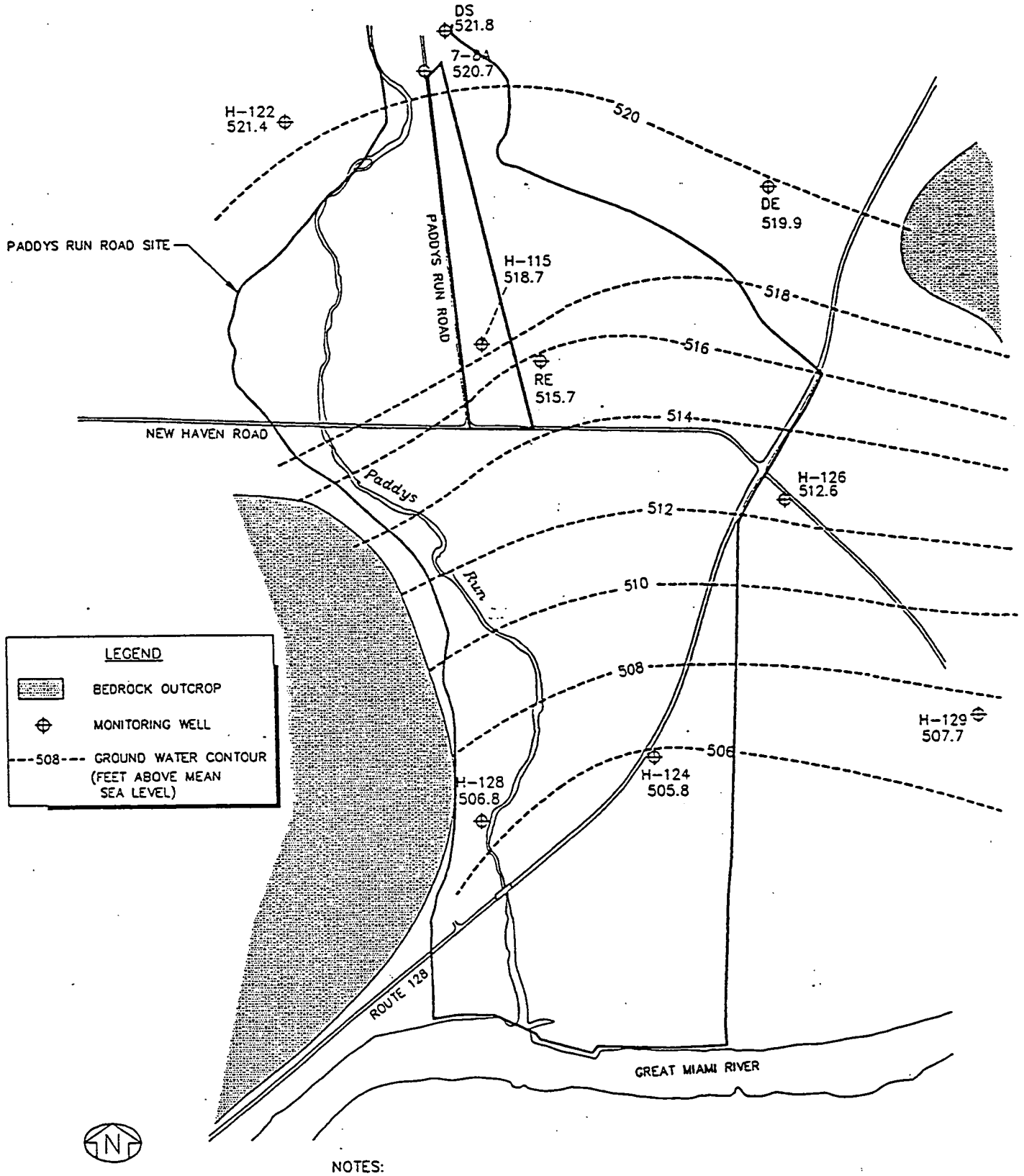
# Figure 3-6
## Observed 1986 Ground Water Level Elevations
### Paddys Run Road Site
### Hamilton County, Ohio




NOTES:

-SOURCE FOR WATER LEVEL DATA: IT (DEC, 1990)
-CONTOURED MANUALLY (NOT WITH CONTOURING SOFTWARE)

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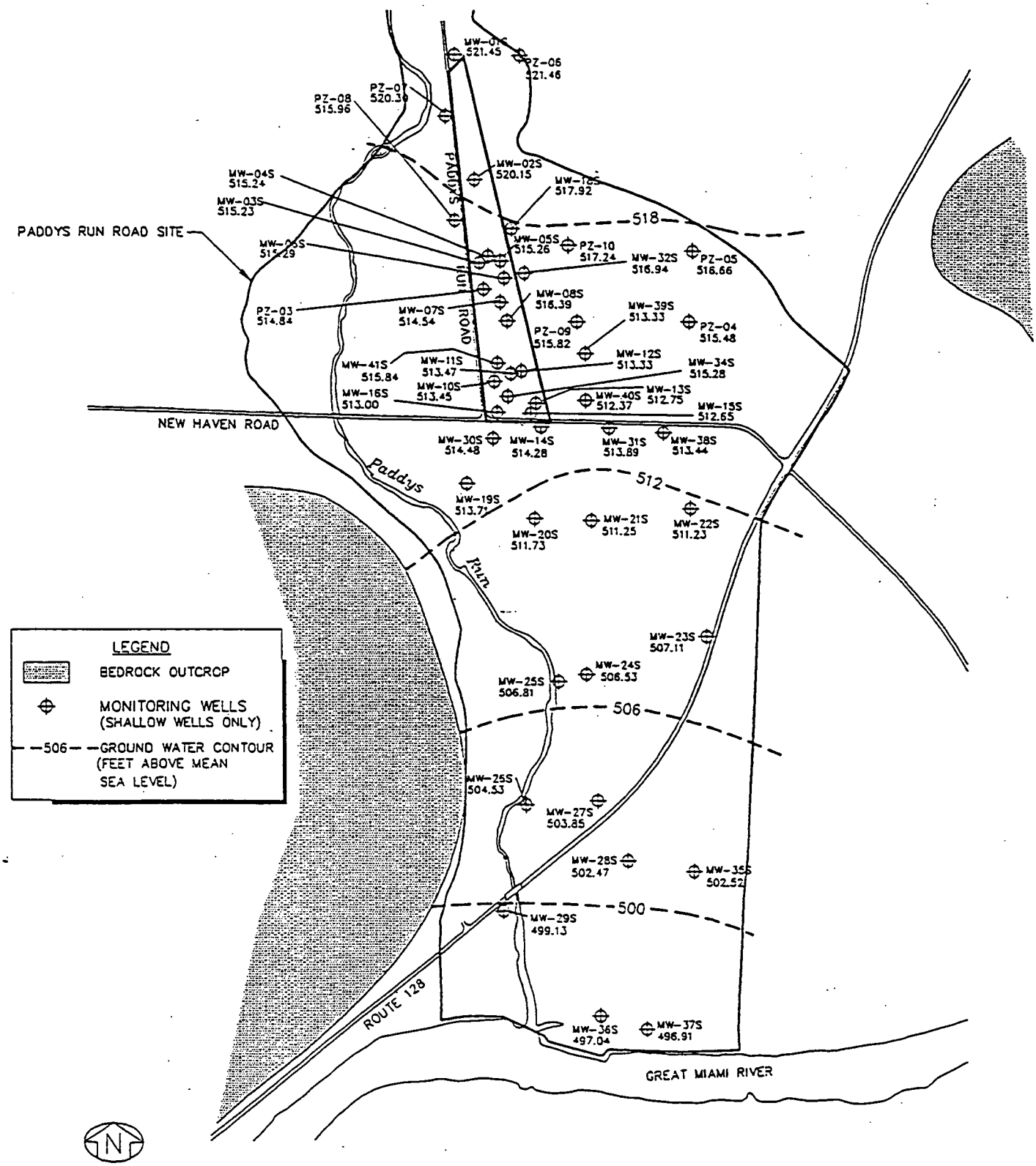
11102.07/1107GWE1/062992-6

# Figure 3-7
## Observed 1991 Ground Water Table Elevations
### Paddys Run Road Site
### Hamilton County, Ohio




NOTE: CONTOURED MANUALLY (NOT WITH CONTOURING SOFTWARE)

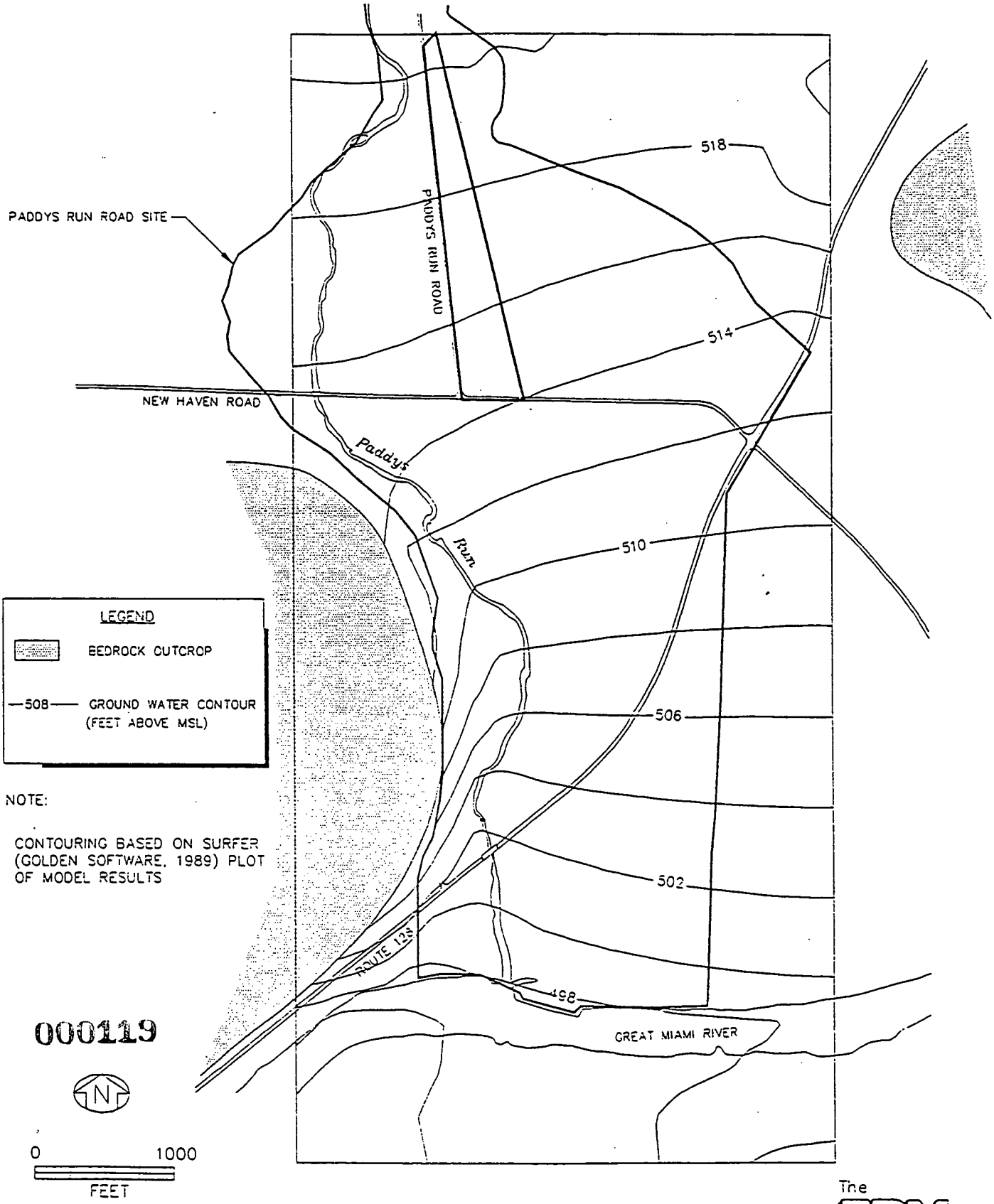
SOURCE FOR MAY 1991 WATER LEVEL DATA: ERM (SEPT, 1992)



The ERM

11102.07/1107GWE3/062992-7

# Figure 3-8
## Modeled 1986 Head Distribution (Layer 4)
### Paddys Run Road Site
### Hamilton County, Ohio




000119

11102.07/1107M864/063092-4

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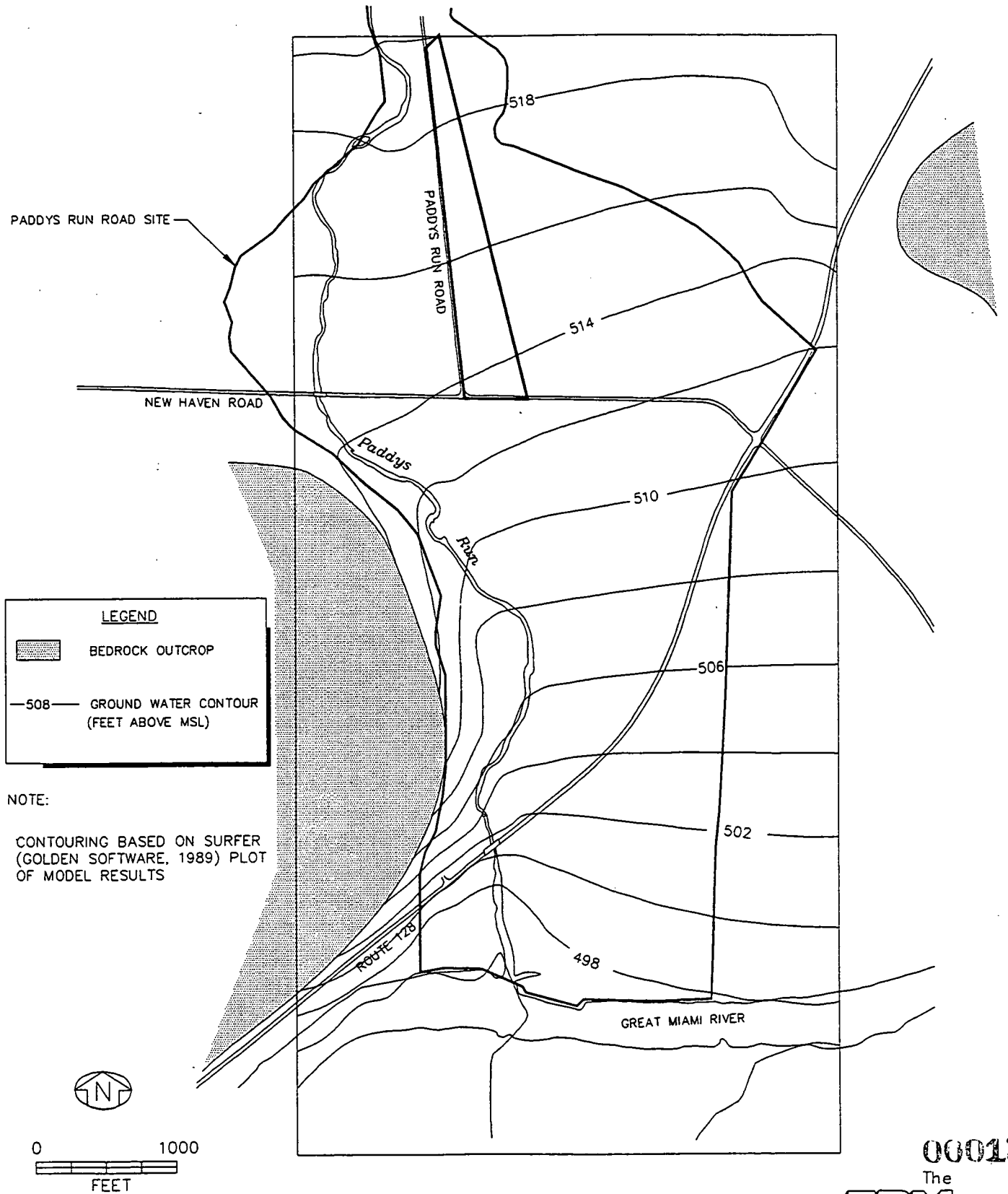
# Figure 3-9
## Modeled 1991 Head Distribution (Layer 4)
### Paddys Run Road Site
### Hamilton County, Ohio

007360




000120

11102.07/1107M914/063092-4

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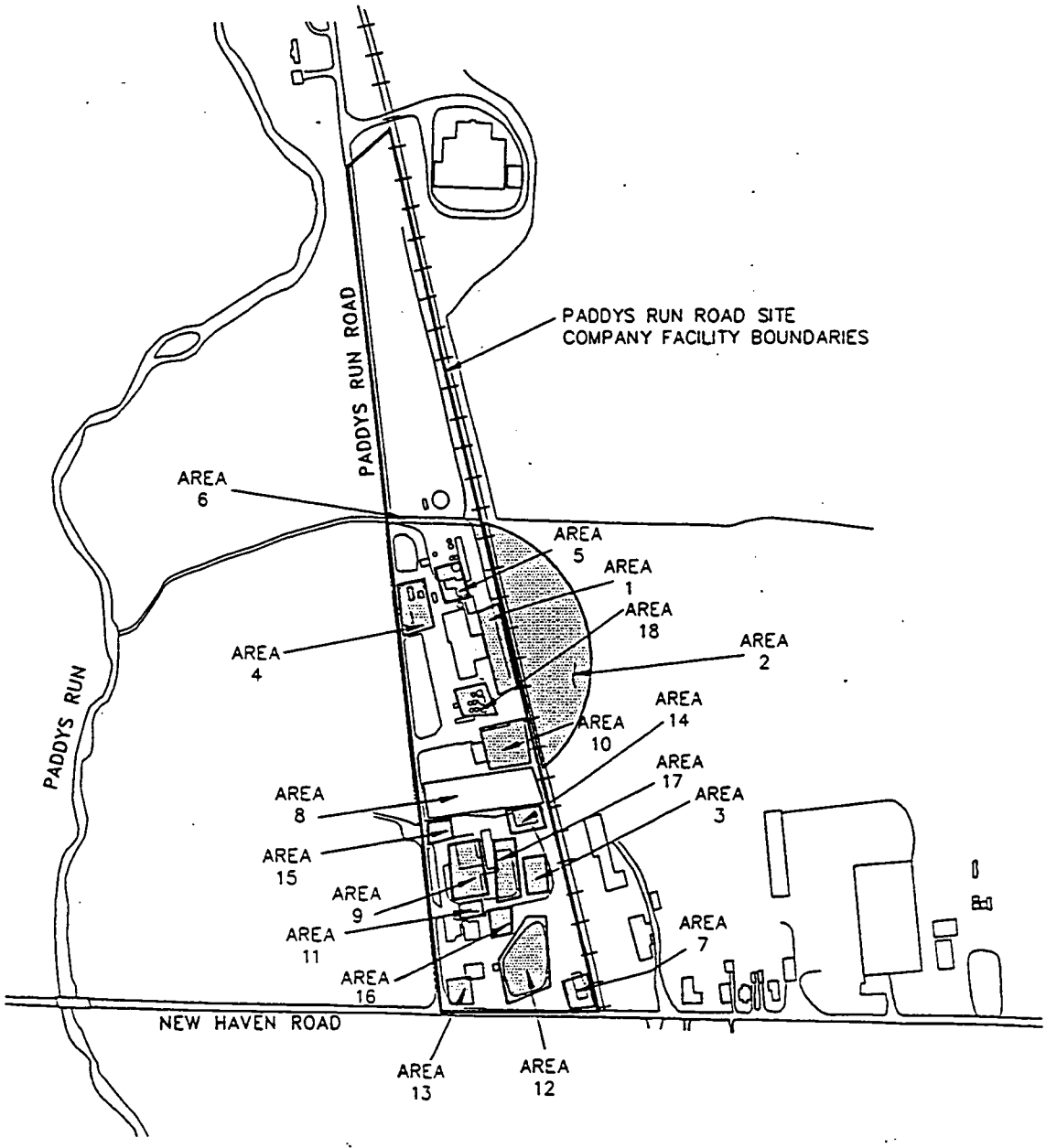
# Figure 4-1
## Potential Source Areas
### Paddys Run Road Site
### Hamilton County, Ohio




N

000121

0 500
FEET

NOTES: DIMENSIONS OF AREAS ARE APPROXIMATE.
REFER TO TABLE 4-4 FOR AREA DESCRIPTIONS
SOURCE AREAS BASED ON OPERATION HISTORY, REPORTED SPILLS, FACILITY PERSONNEL INTERVIEWS, AND AERIAL PHOTOGRAPH REVIEW (ERM, SEPT 1992)

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11102.07/11007DSA/082192-8

# Figure 4-2
## Methodology Used to Calculate Depth Averaged Chemical Concentrations for Soil Borings
### Paddys Run Road Site
### Hamilton County, Ohio

n = BORING (SAMPLE LOCATION) DESIGNATION
m = SAMPLE INTERVAL
Cnm = CONCENTRATION FOR SAMPLE
dn = LENGTH OF SAMPLE INTERVAL

Cavg = DEPTH AVERAGE SOIL CONCENTRATION FOR BORING

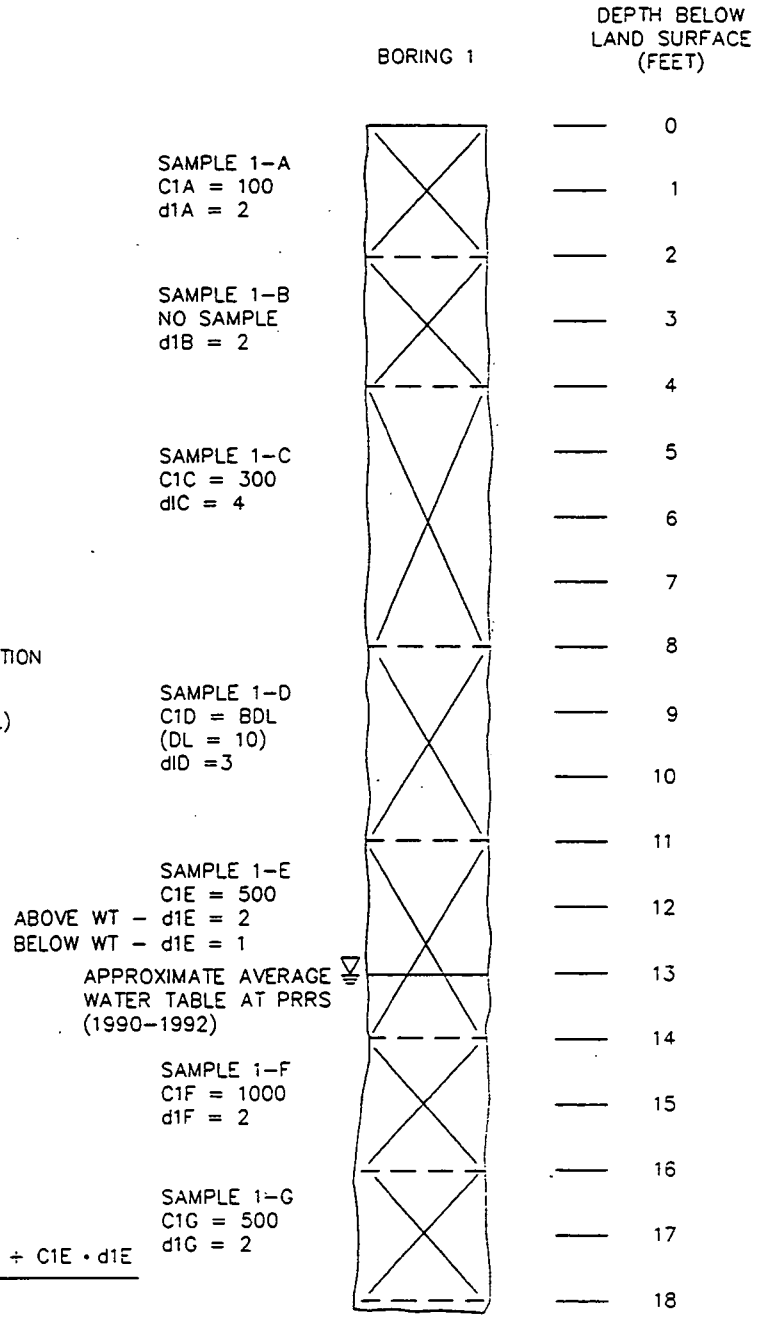
$$Cavg = \frac{CnA \cdot dnA + CnB \cdot dnB + \ldots}{dnA + dnB + \ldots}$$

NOTE:

IF NO SAMPLE WAS COLLECTED FOR AN INTERVAL THEN THE ASSOCIATED dn AND Cn•dn WERE ELIMINATED FROM THE EQUATION

IF THE SAMPLE WAS BELOW DETECTION LIMITS (BDL) THEN HALF THE DETECTION LIMIT (DL) WAS USED IN THE CALCULATION

IF ALL SAMPLE INTERVALS EXHIBITED BDL CONCENTRATIONS–CONTAMINANT WAS ASSUMED TO BE ABSENT




EXAMPLE ABOVE WATER TABLE:

$$Cavg = \frac{C1A \cdot d1A + C1B \cdot d1B + C1C \cdot d1C + C1D \cdot d1D + C1E \cdot d1E}{d1A + d1B + d1C + d1D + d1E}$$

$$Cavg = \frac{(100)(2) + 0 + (300)(4) + (10/2)(3) + (500)(2)}{2 + 0 + 4 + 3 + 2} = 220$$

EXAMPLE BELOW WATER TABLE:

$$Cavg = \frac{C1E \cdot d1E + C1F \cdot d1F + C1G \cdot d1G}{d1E + d1F + d1G}$$

$$Cavg = \frac{(500)(1) + (1000)(2) + (500)(2)}{1 + 2 + 2} = 700$$





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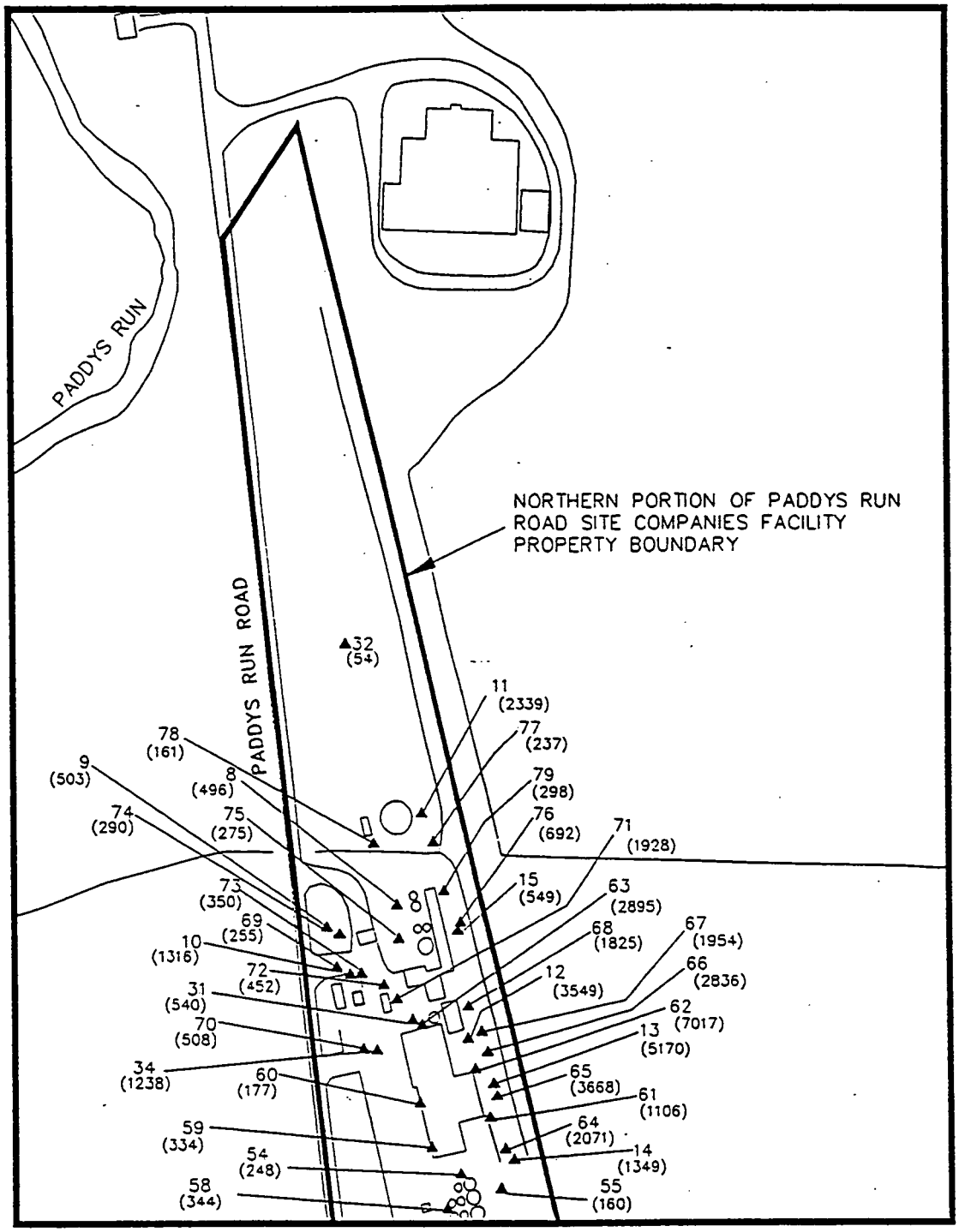
# Figure 4-3a
## Observed 1991 Depth Averaged Sodium Concentrations in Soil Above Water Table
### Paddys Run Road Site
### Hamilton County, Ohio




LEGEND

▲ 11 SOIL BORING NUMBER

(2338) CONCENTRATION IN mg/kg

NOTE: REPORTED CONCENTRATIONS ARE IN EXCESS OF AVERAGE SODIUM CONCENTRATIONS IN BACKGROUND SAMPLES

REFERENCE: ERM (SEPT, 1992)

N

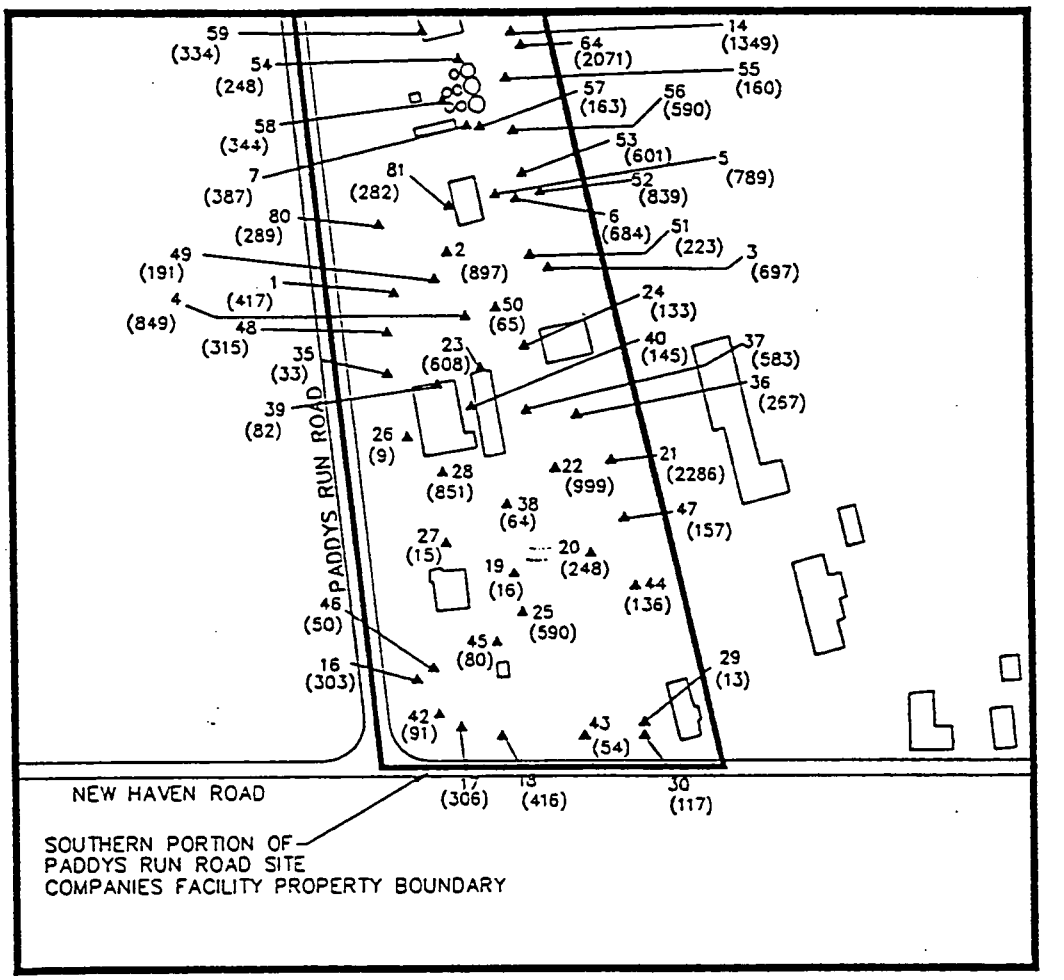
0 FEET

000123

The ERM Group

11102.07/11007SCA/082192-8

# Figure 4-3b
## Observed 1991 Depth Averaged Sodium Concentrations in Soil Above Water Table
### Paddys Run Road Site
### Hamilton County, Ohio




LEGEND

▲ 21 SOIL BORING NUMBER

(2286) CONCENTRATION IN mg/kg

NOTE: REPORTED CONCENTRATIONS ARE IN EXCESS OF AVERAGE SODIUM CONCENTRATIONS IN BACKGROUND SAMPLES

REFERENCE: ERM (SEPT. 1992)

N

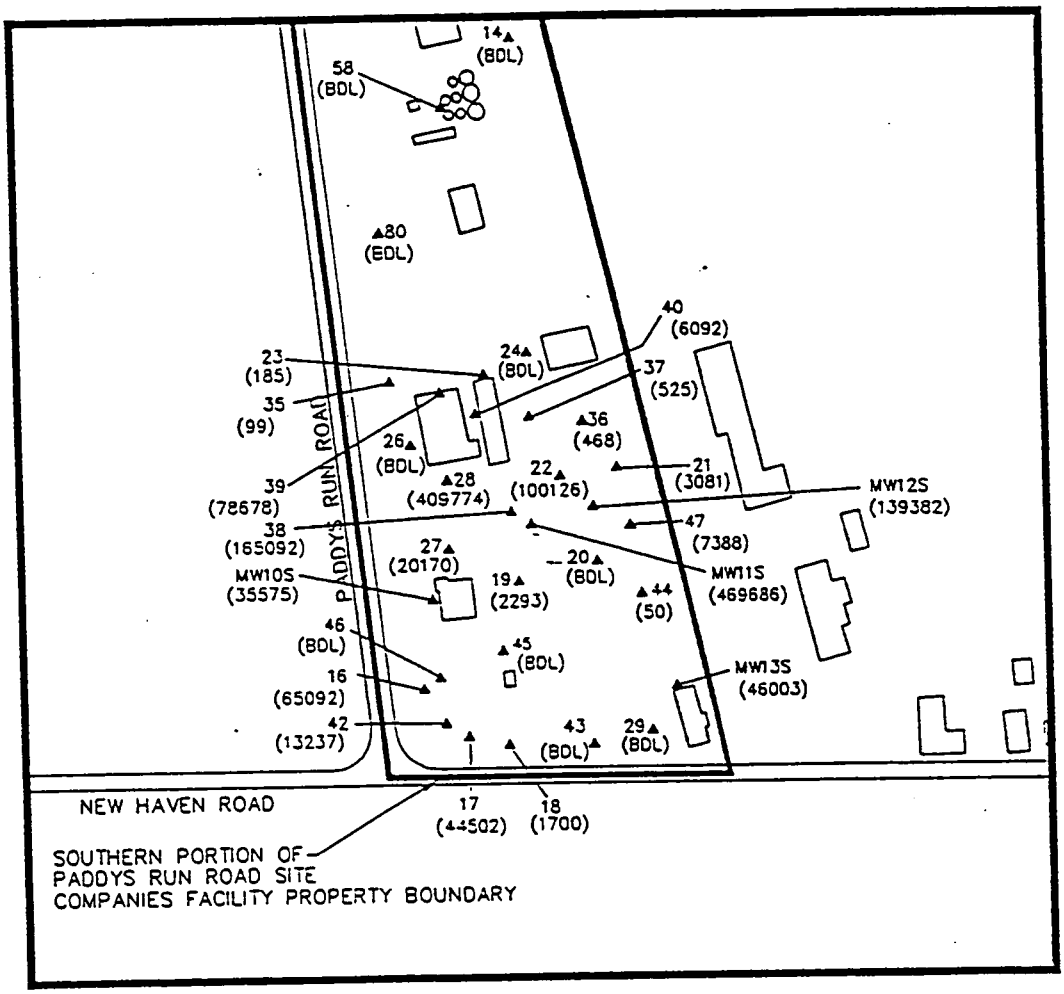
0 250

FEET



The ERM Group

# Figure 4-4
## Observed 1991 Depth Averaged Ethylbenzene Concentrations in Soil Above Water Table
### Paddys Run Road Site
### Hamilton County, Ohio




LEGEND

| | |
|---|---|
| ▲ 18 | SOIL BORING NUMBER |
| (1700) | CONCENTRATION IN ug/kg |
| BDL | BELOW DETECTION LIMIT |

REFERENCE: ERM (SEPT. 1992)

NOTE: ETHYLBENZENE SAMPLES IN NORTH HALF OF SITE WERE BELOW DETECTION LIMITS

000125

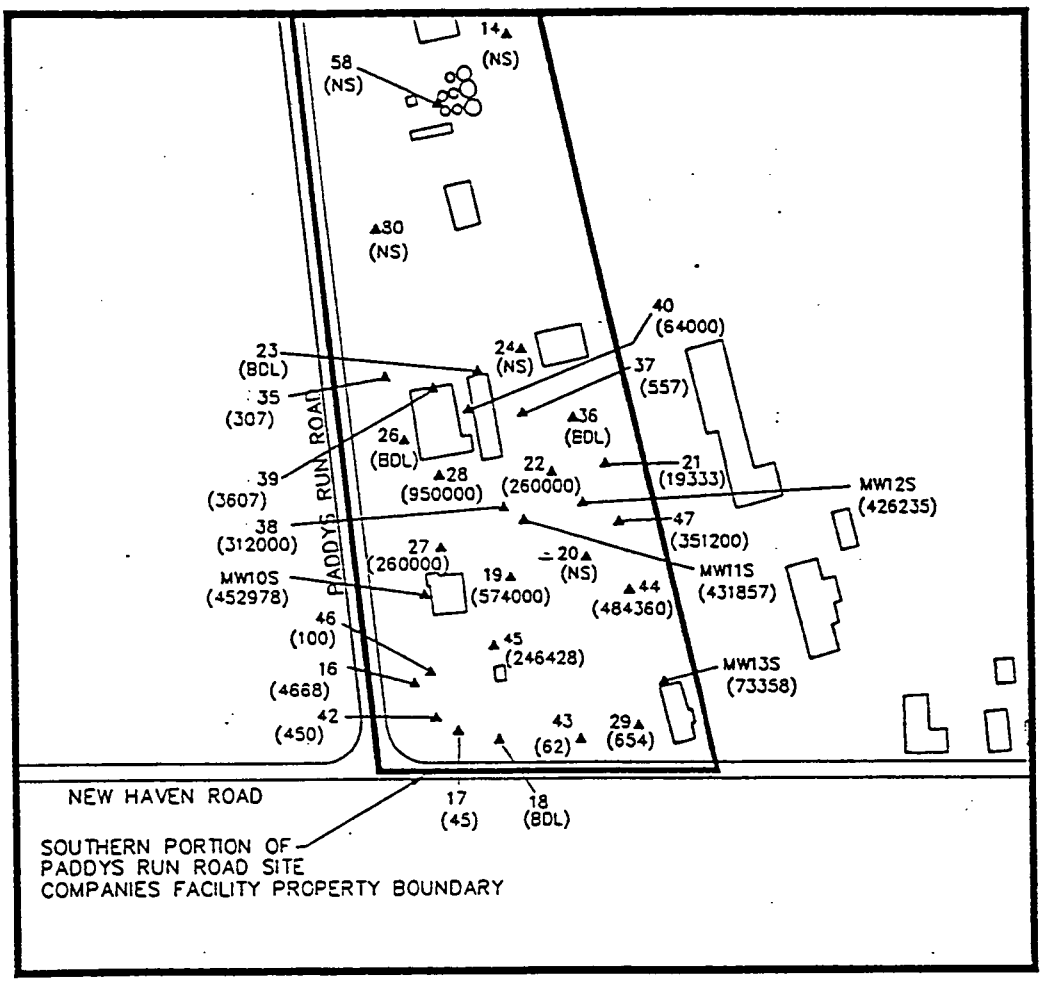
N

0 250
FEET

The ERM

11102.07/11007BU2/062692-7

# Figure 4-5
## Observed 1991 Depth Averaged Ethylbenzene Concentrations in Soil Below Water Table
### Paddys Run Road Site
### Hamilton County, Ohio




LEGEND

| | |
|---|---|
| ▲ 18 | SOIL BORING NUMBER |
| (1700) | CONCENTRATION IN ug/kg |
| BDL | BELOW DETECTION LIMIT |
| NS | NO SAMPLES BELOW WATER TABLE |

N

0 250
FEET

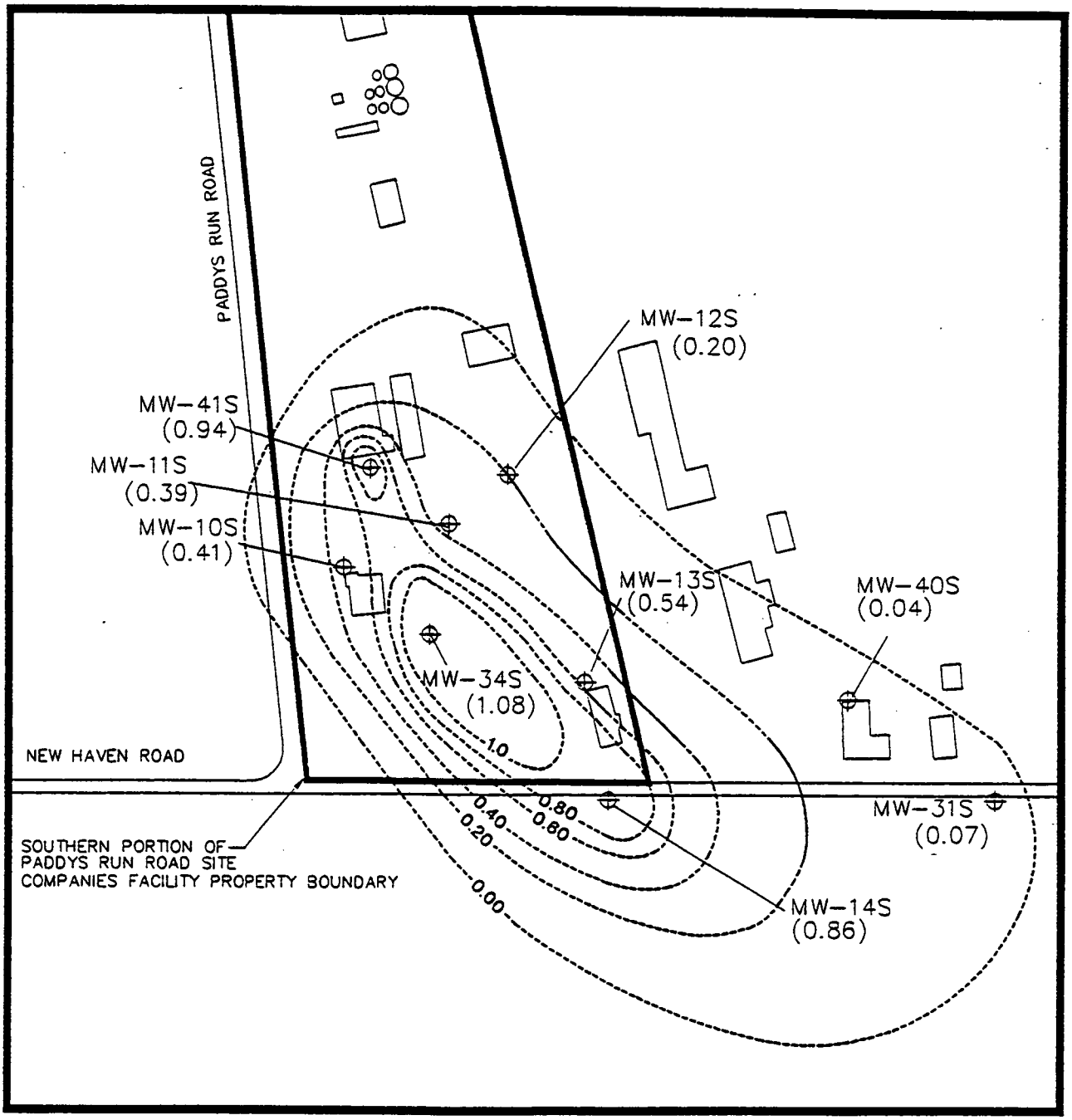
REFERENCE: ERM (SEPT, 1992)

NOTE: ETHYLBENZENE SAMPLES IN NORTH HALF OF SITE WERE BELOW DETECTION LIMITS



The ERM Group

# Figure 4-6
## Average 1991 Floating Hydrocarbon Extent and Thickness
### Paddys Run Road Site
### Hamilton County, Ohio




LEGEND

| | |
|---|---|
| ⊕ MW-40S (0.04) | MONITORING WELL WITH AVERAGE MEASURED PRODUCT THICKNESS (FT) |
| ------ (0.20) ------ | AVERAGE PRODUCT THICKNESS CONTOUR LINE (FT) |

000127

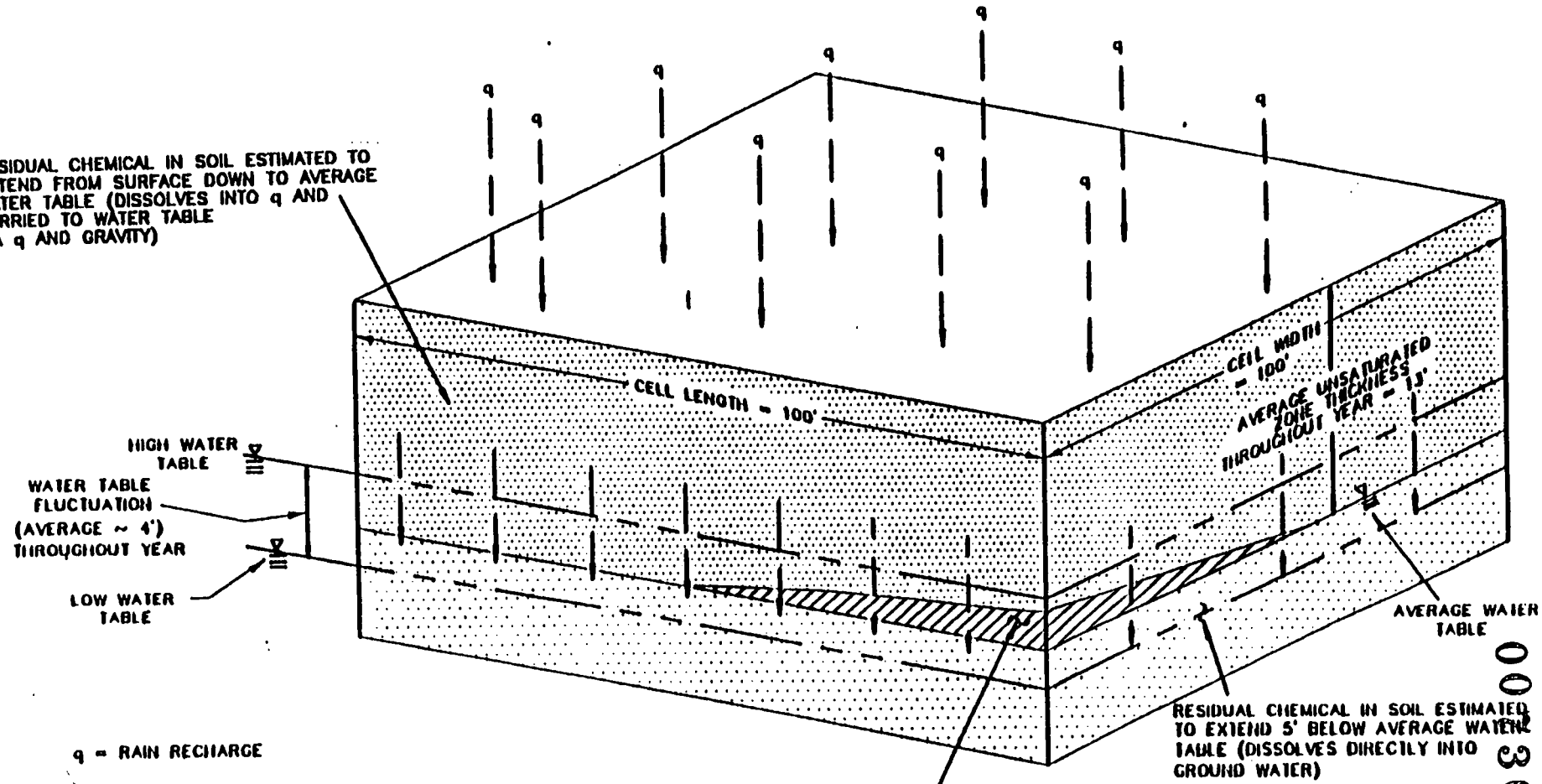
N

0 200
FEET

The ERM Group

11102.07/11007ALP/090492-8

# Figure 4-7
## Source Loading Conceptualization
### Paddys Run Road Site
### Hamilton County, Ohio




q = RAIN RECHARGE

NOTES:
AVERAGE WATER TABLE GRADIENT THROUGHOUT YEAR = 0.003 FT/FT
PARAMETER VALUES ESTIMATED FROM ERM (SEPT, 1992)

11102.07/11007SLC/062692-7

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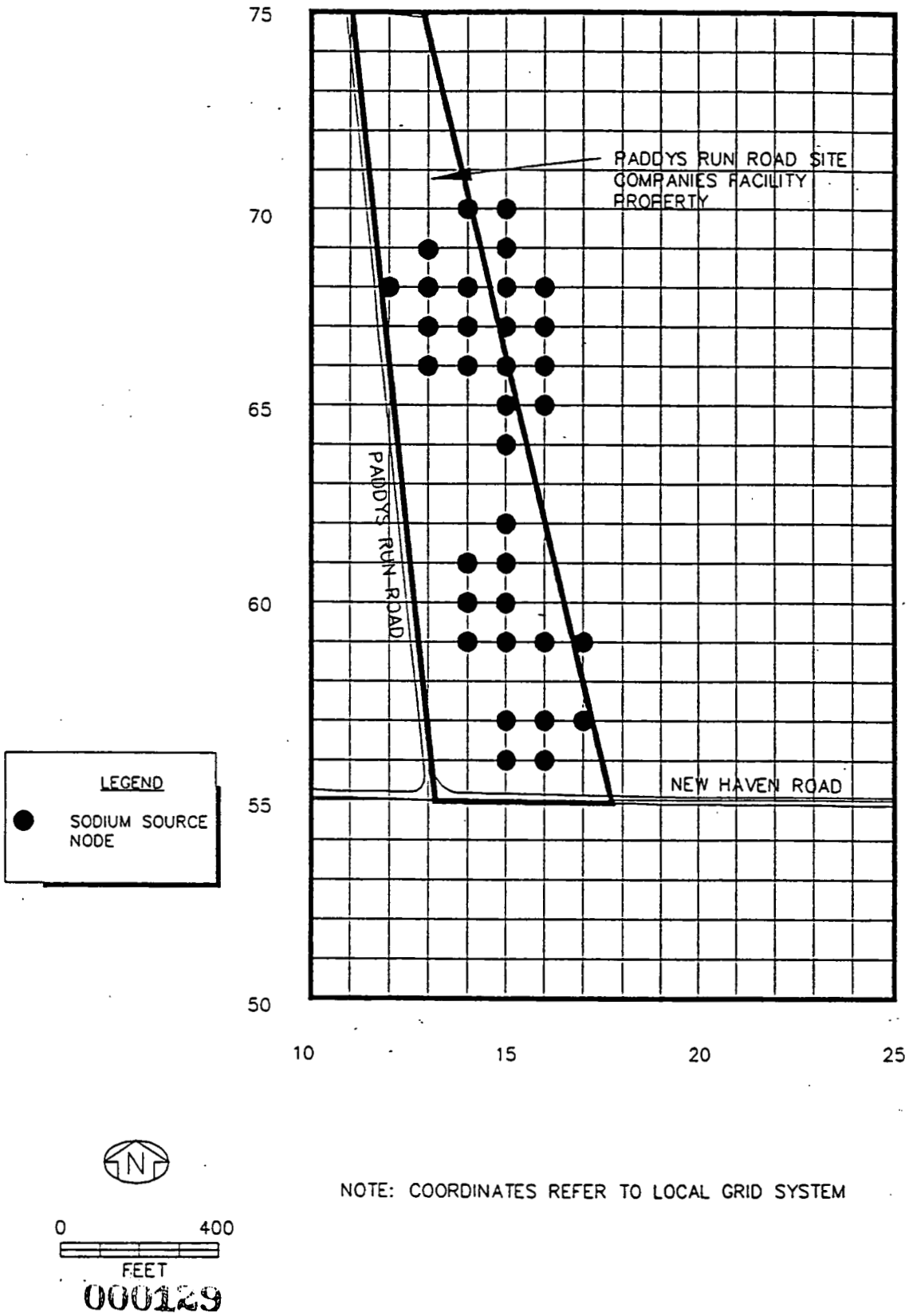
# Figure 4-8
## Sodium Model Source Nodes
### Paddys Run Road Site
### Hamilton County, Ohio




NOTE: COORDINATES REFER TO LOCAL GRID SYSTEM

000129



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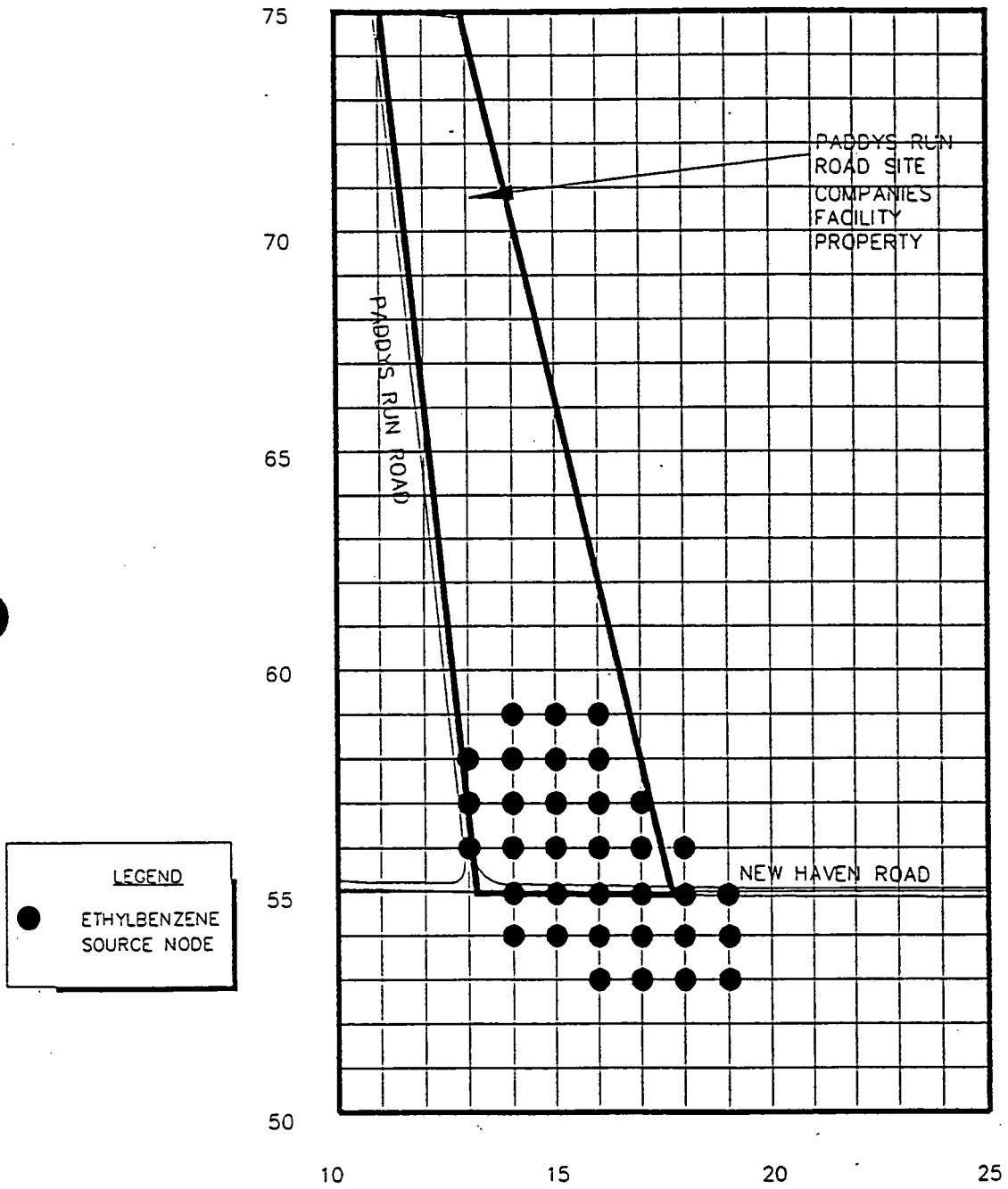
# Figure 4-9
## Ethylbenzene Model Source Nodes
### Paddys Run Road Site
### Hamilton County, Ohio




NOTE: COORDINATES REFER TO LOCAL GRID SYSTEM

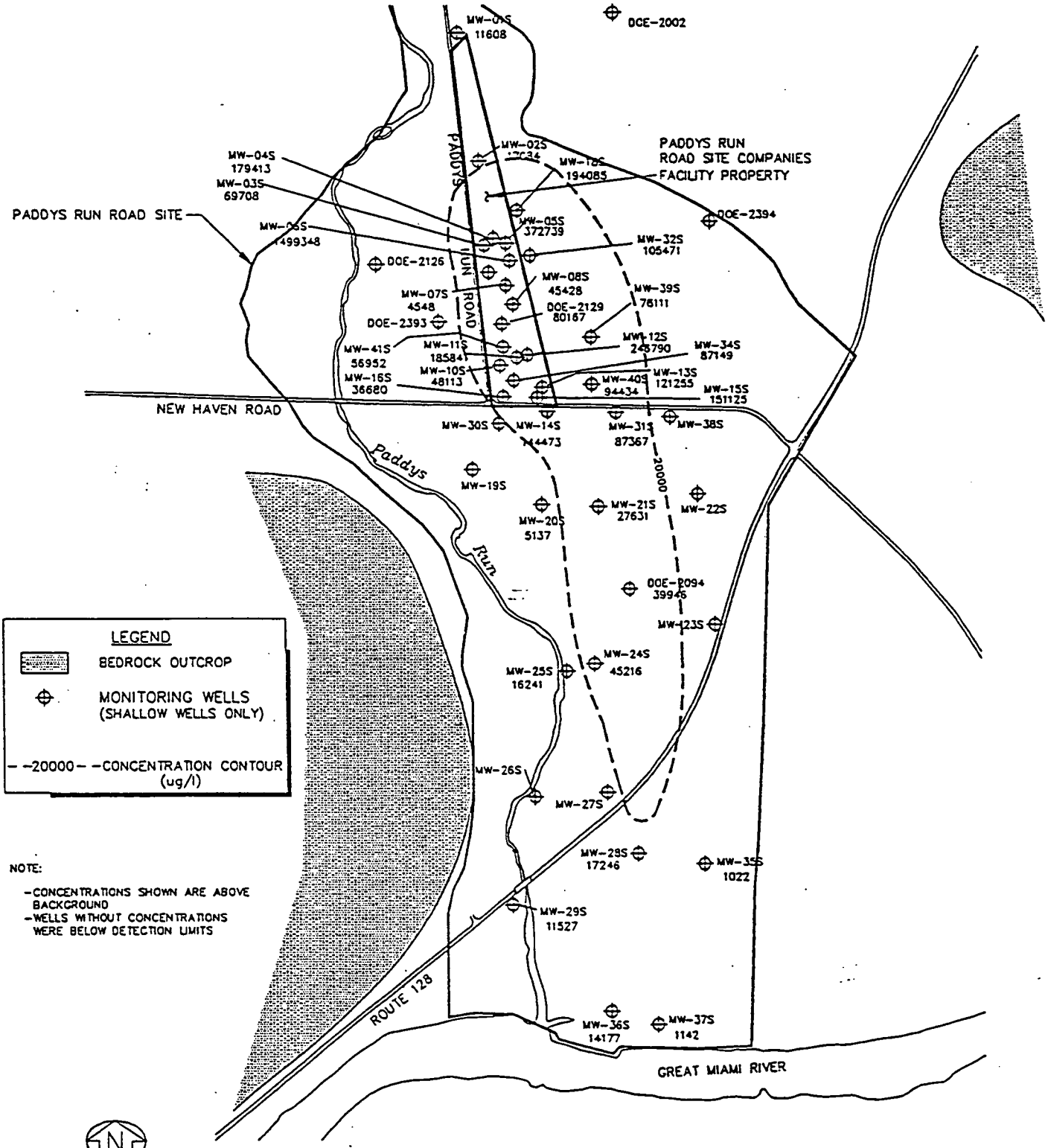
N

0 400
FEET



The ERM Group

# Figure 4-10
## 1991 Standardized Observed Average Sodium Concentrations in Groundwater
### Paddys Run Road Site
### Hamilton County, Ohio



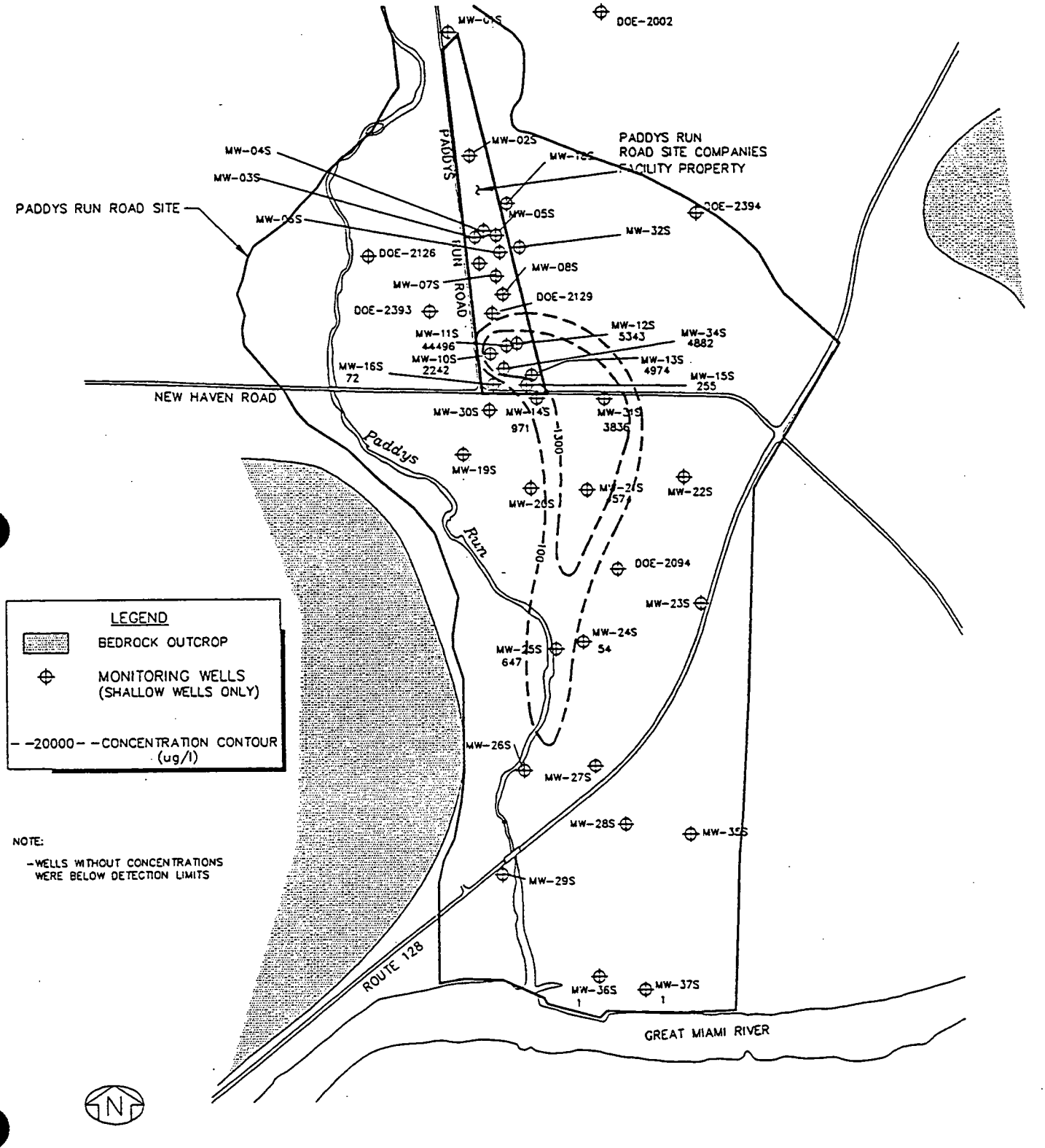

NOTE: CONTOURED MANUALLY (NOT WITH CONTOURING SOFTWARE)

SOURCE FOR DATA: TABLE 4-24

000131

The ERM

# Figure 4-11
## 1991 Standardized Observed Average Ethylbenzene Concentrations in Groundwater
### Paddys Run Road Site
### Hamilton County, Ohio




NOTE: CONTOURED MANUALLY (NOT WITH CONTOURING SOFTWARE)

SOURCE FOR DATA: TABLE 4-25



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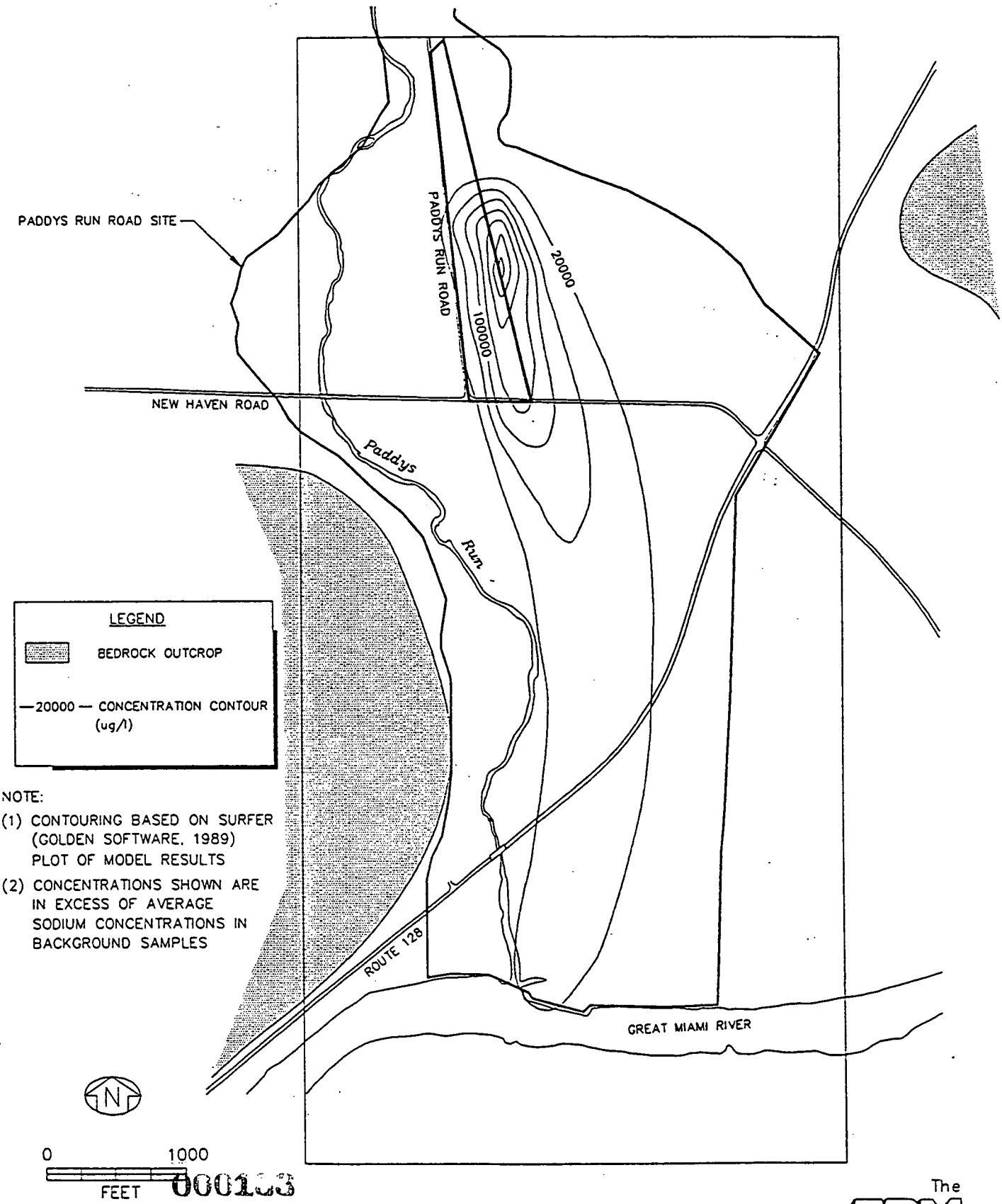
11102.07/1107GWE7/082192-4

# Figure 4-12
## 1991 Computed Sodium Concentrations (Layer 4)
### Paddys Run Road Site
### Hamilton County, Ohio




000133

11102.07/1107-NAO/082192-3

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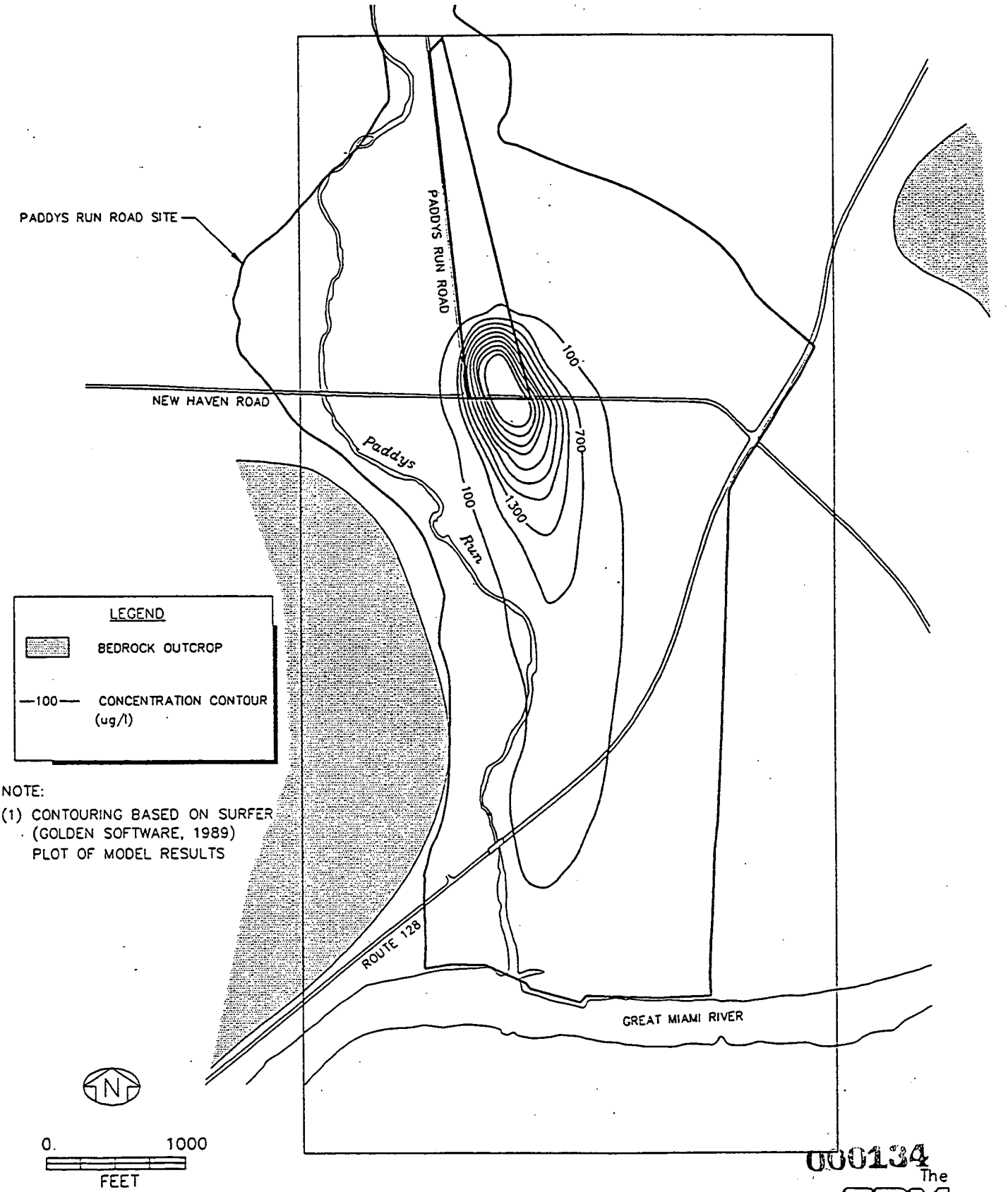
# Figure 4-13
## 1991 Computed Ethylbenzene Concentrations (Layer 4)
### Paddys Run Road Site
### Hamilton County, Ohio






11102.07/11007-E0/082192-3

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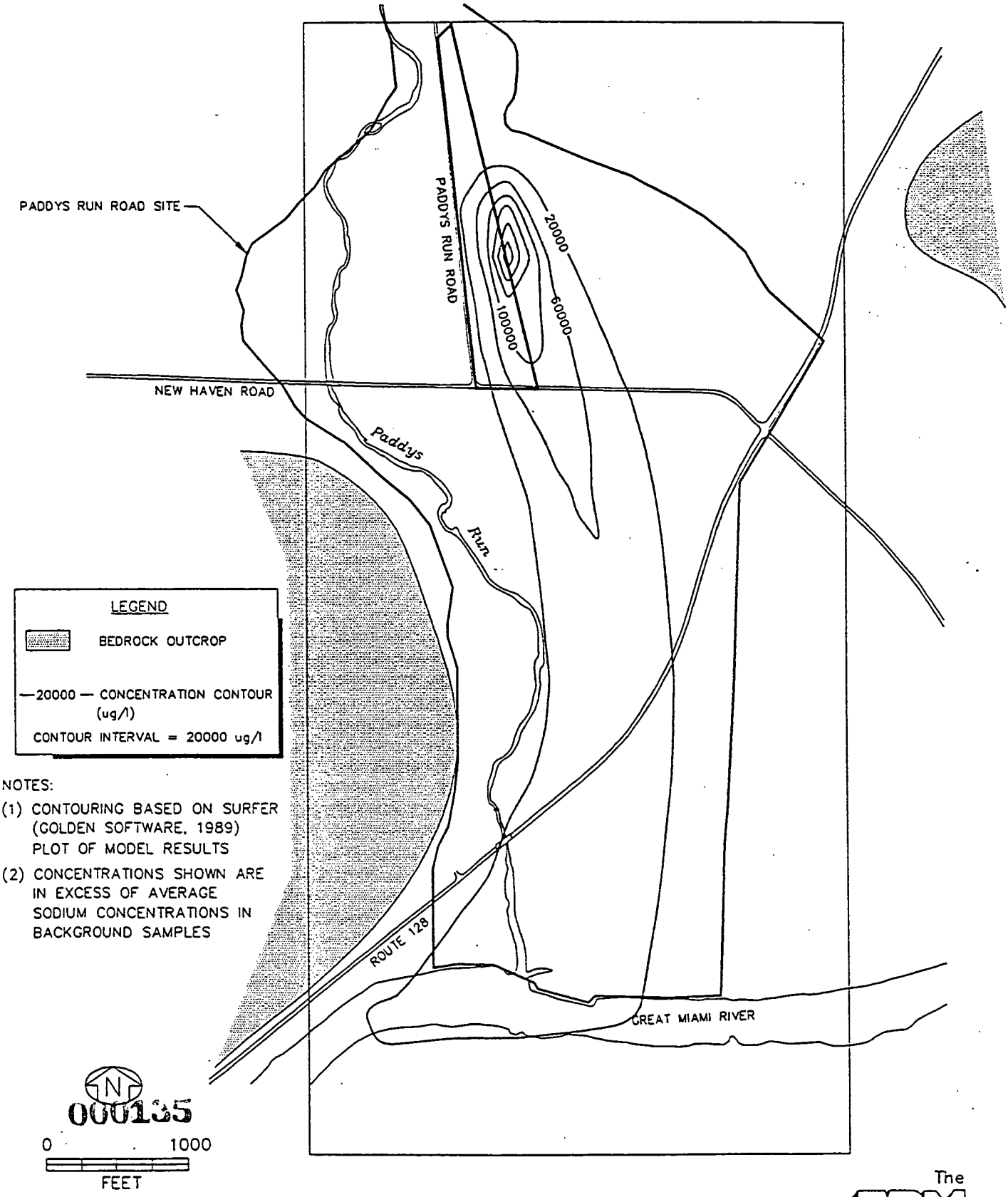
# Figure 4-14a
## Prediction of Future (1994) Sodium Concentration Distribution (Layer 4)
### Paddys Run Road Site
### Hamilton County, Ohio




000135

11102.07/1107-NA3/082192-4

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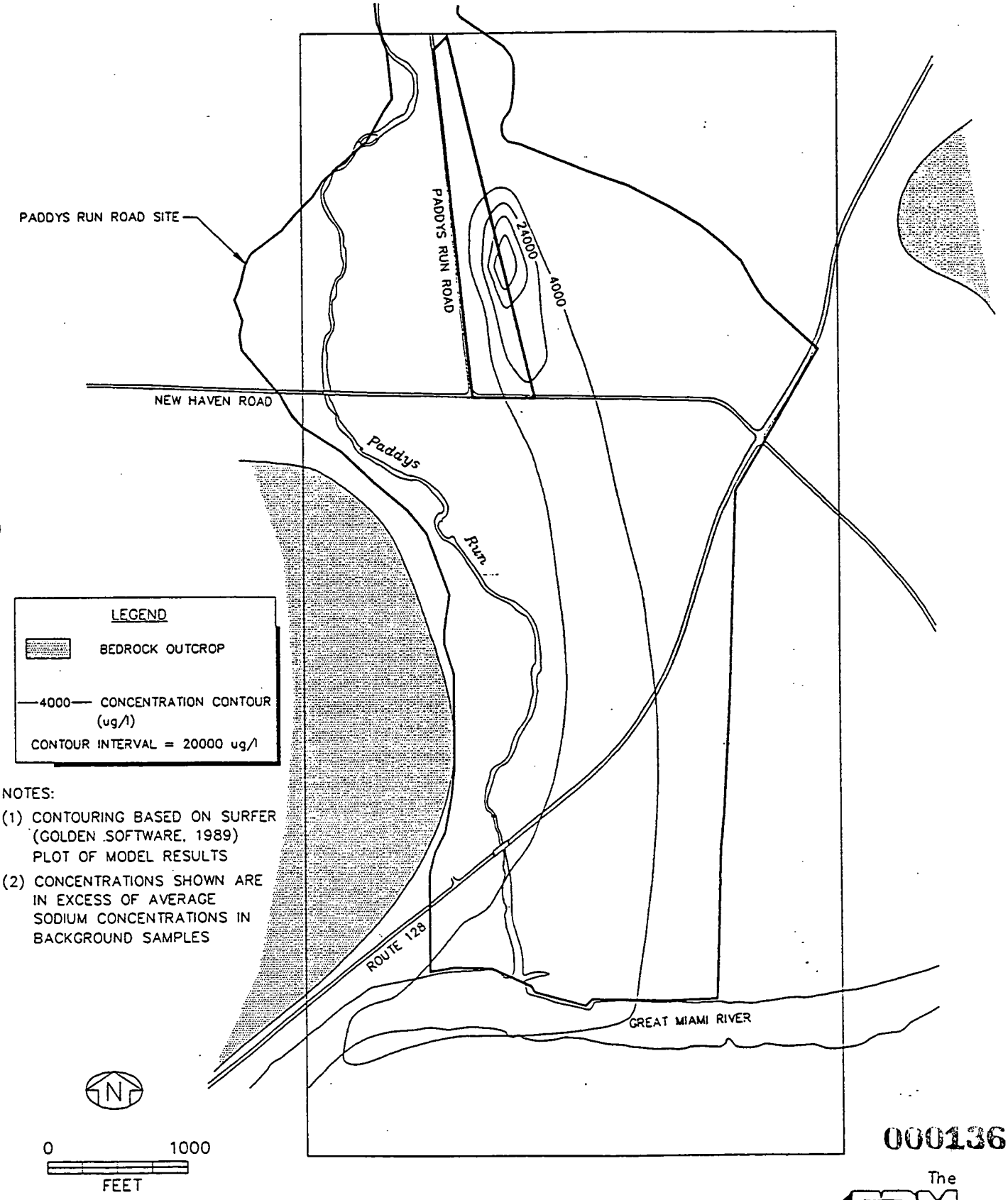
# Figure 4-14b
# Prediction of Future (1997) Sodium Concentration Distribution (Layer 4)
## Paddys Run Road Site
## Hamilton County, Ohio

007360




000136

11102.07/1107-NA6/082192-4

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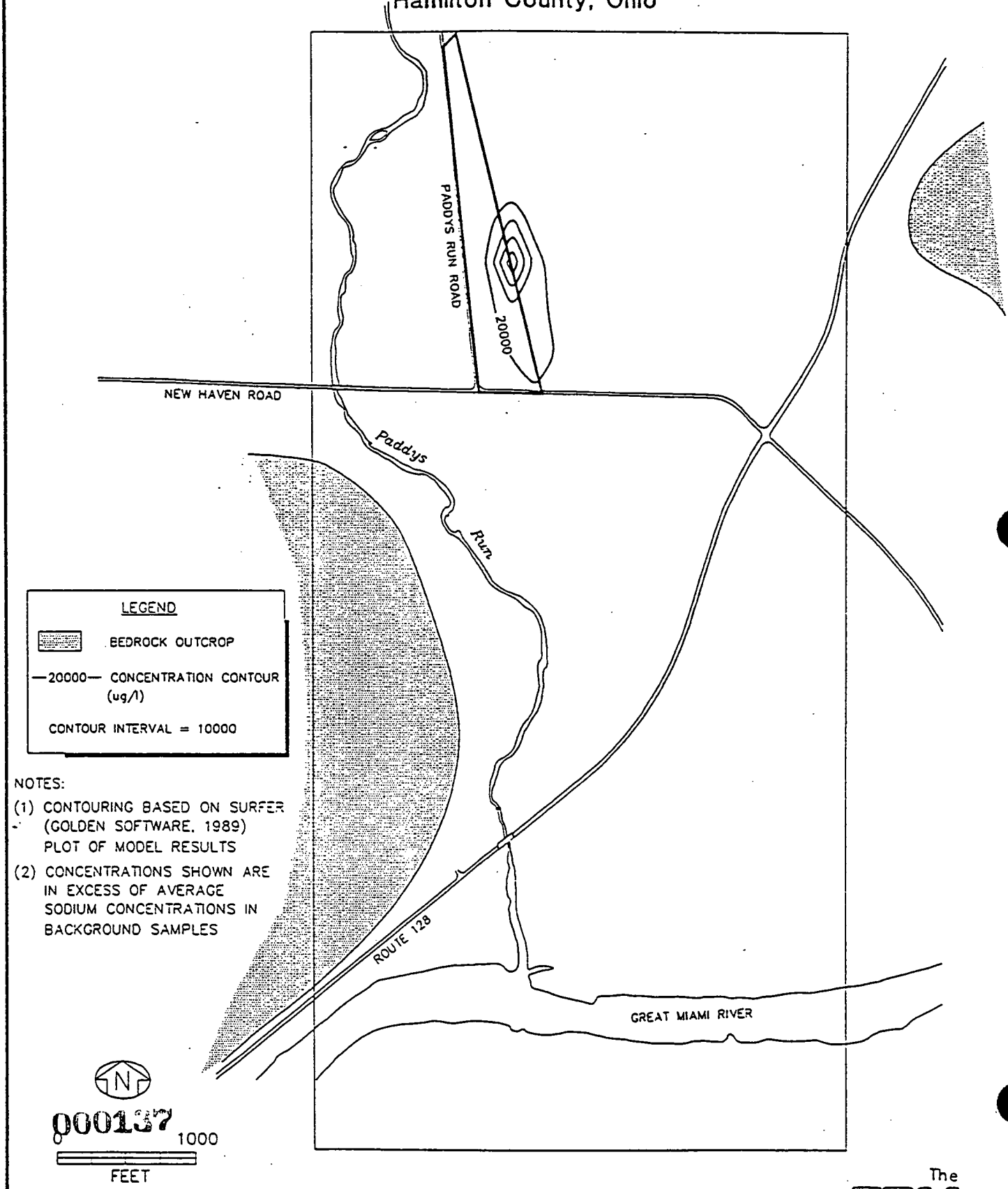
# Figure 4-14c
## Prediction of Future (2000) Sodium Concentration Distribution (Layer 4)
### Paddys Run Road Site
### Hamilton County, Ohio




000137

11102.07/1107-NA/082192-4

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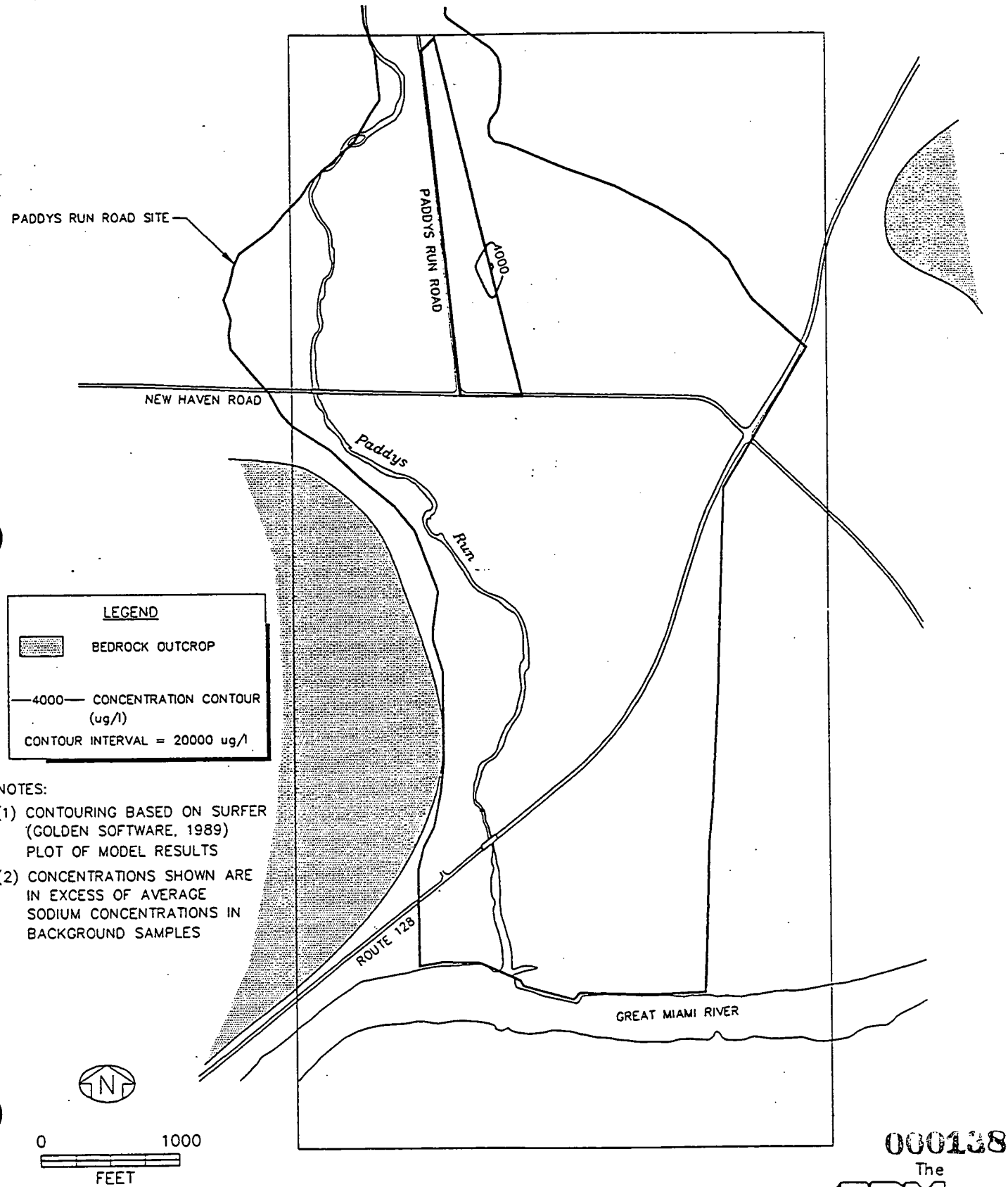
# Figure 4-14d
## Prediction of Future (2003) Sodium Concentration Distribution (Layer 4)
### Paddys Run Road Site
### Hamilton County, Ohio



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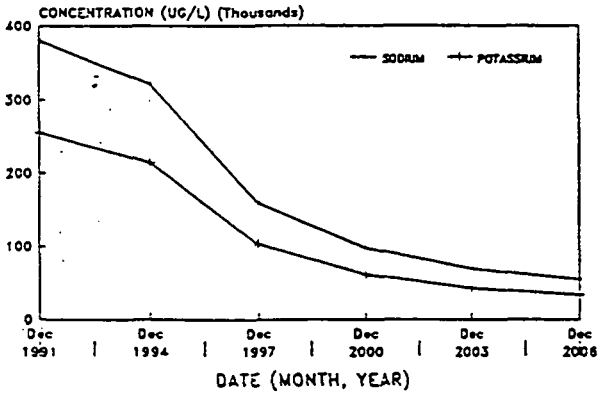
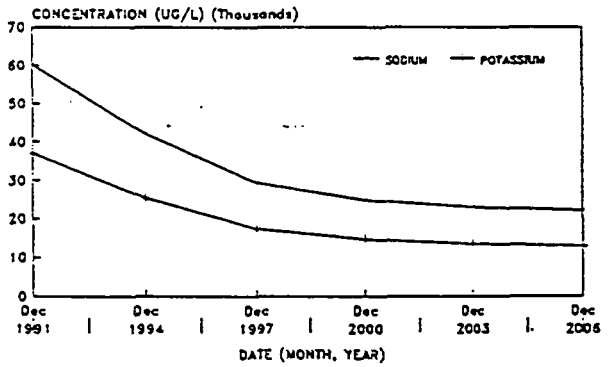
11102.07/1107NA15/082192-4

# Figure 4-15a
## Production of Future Inorganic Chemical Concentrations
### Paddys Run Road Site
### Hamilton County, Ohio

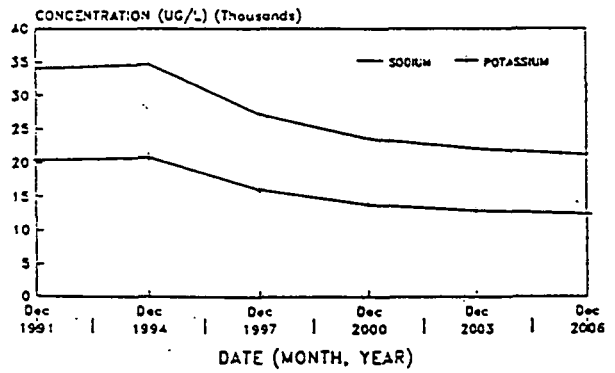
Predicted Maximum Concentrations




Predicted Concentrations Approximately
700 Feet South Of Company Property




Predicted Concentrations Approximately
1800 Feet South Of Company Property




000139



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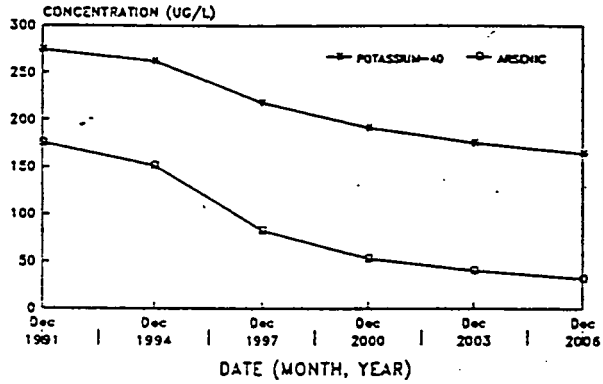
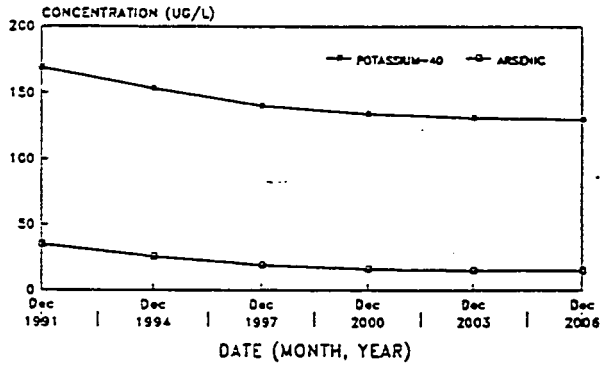
# Figure 4-15b
## Production of Future Inorganic Chemical Concentrations
### Paddys Run Road Site
### Hamilton County, Ohio

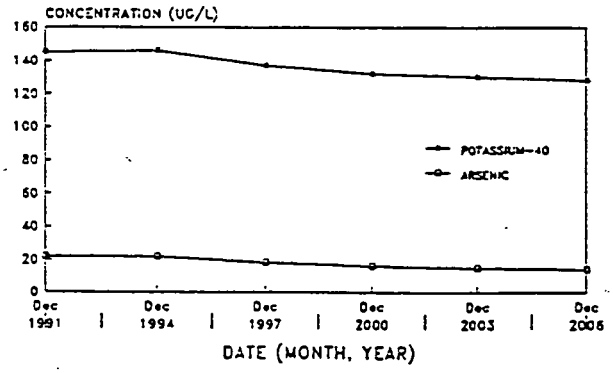
Predicted Maximum Concentrations




Predicted Concentrations Approximately
700 Feet South Of Company Property




Predicted Concentrations Approximately
1800 Feet South Of Company Property



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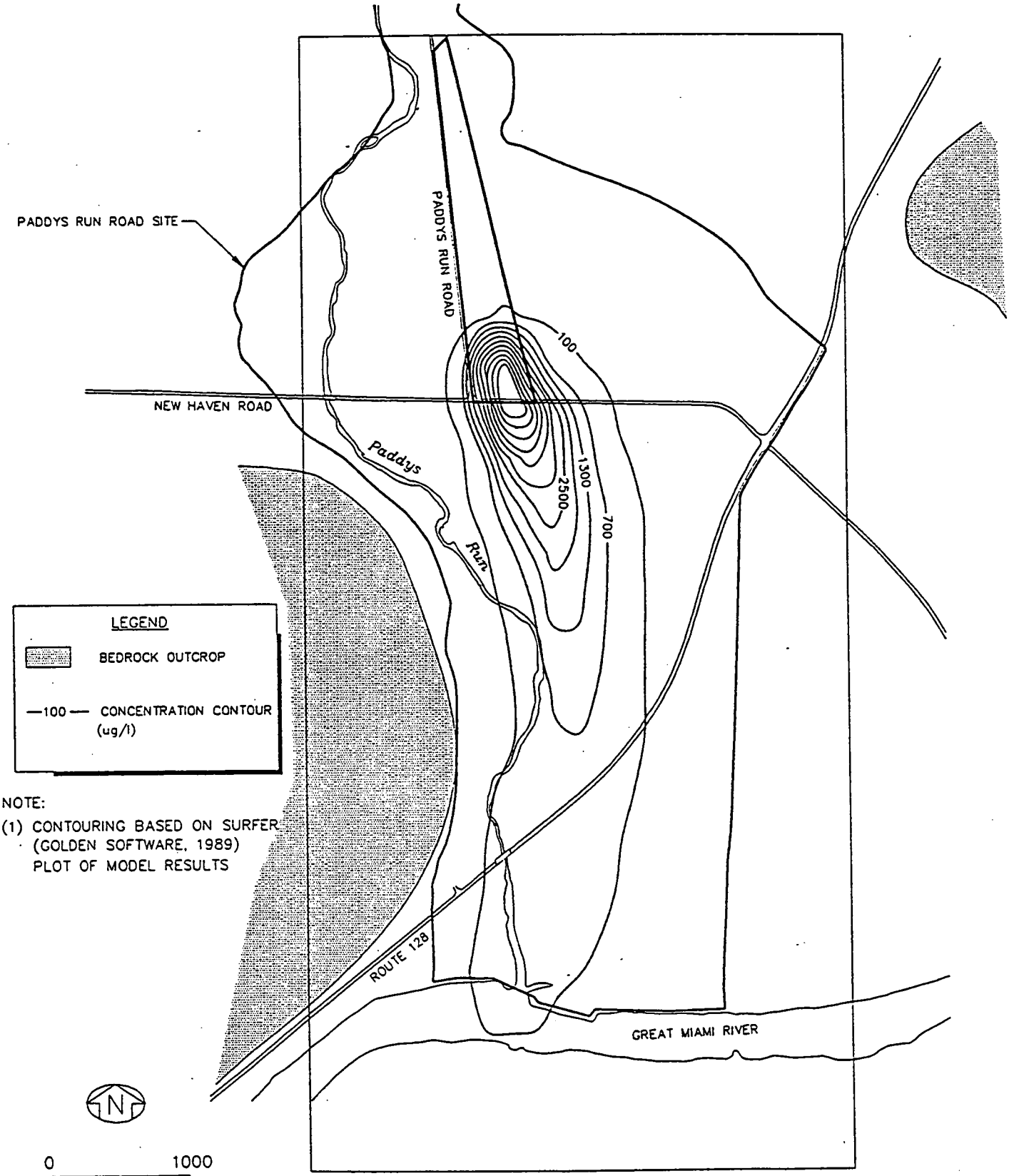
# Figure 4-16a
## Prediction of Future (1994) Ethylbenzene Concentration Distribution (Layer 4)
### Paddys Run Road Site
### Hamilton County, Ohio




000141

11102.07/11007-E3/082192-3

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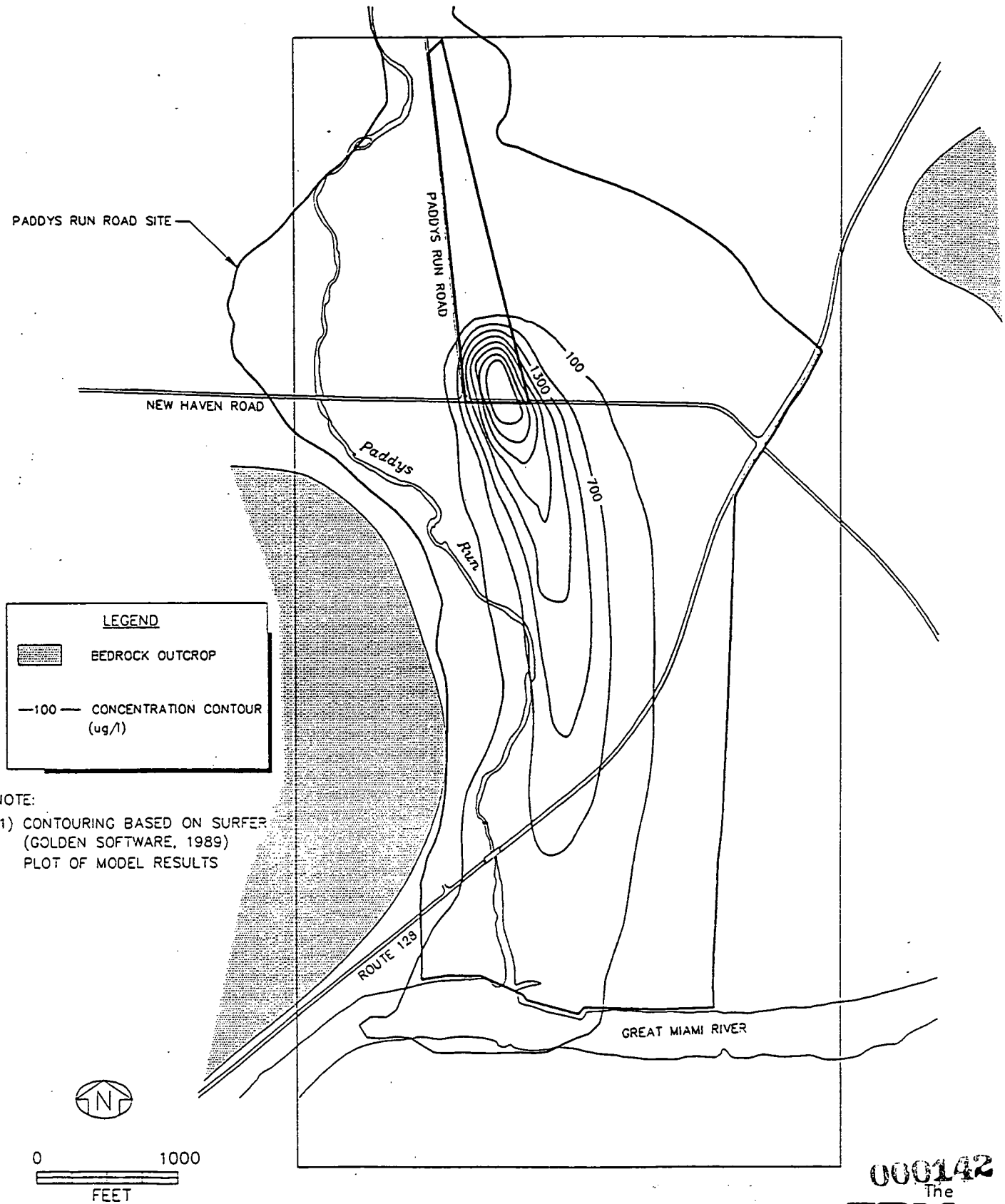
# Figure 4-16b
## Prediction of Future (1997) Ethylbenzene Concentration Distribution (Layer 4)
### Paddys Run Road Site
### Hamilton County, Ohio

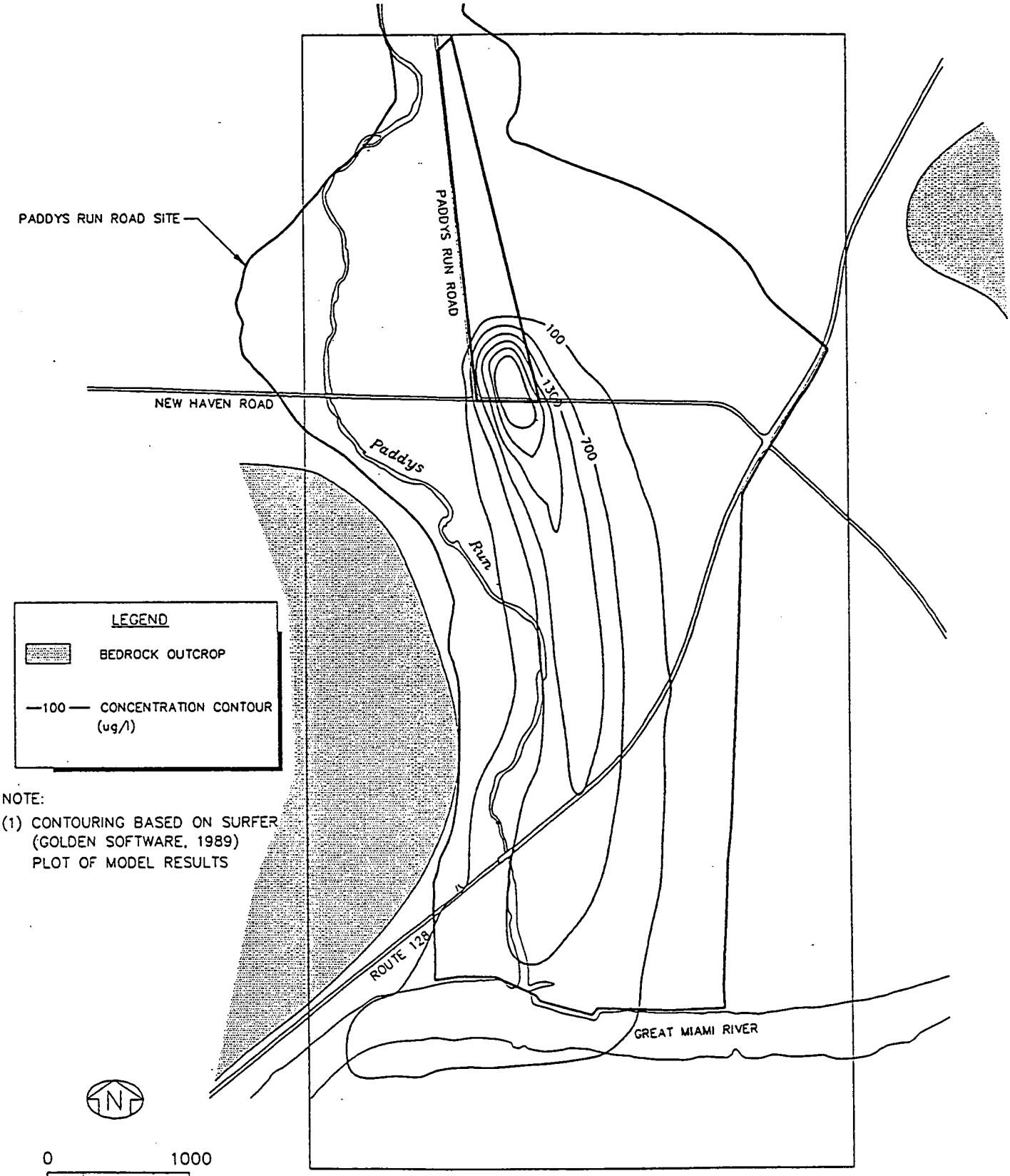





The ERM

11102.07/11007-E6/082192-3

# Figure 4-16c
## Prediction of Future (2000) Ethylbenzene Concentration Distribution (Layer 4)
### Paddys Run Road Site
### Hamilton County, Ohio




000143

11102.07/11007-E9/082192-3

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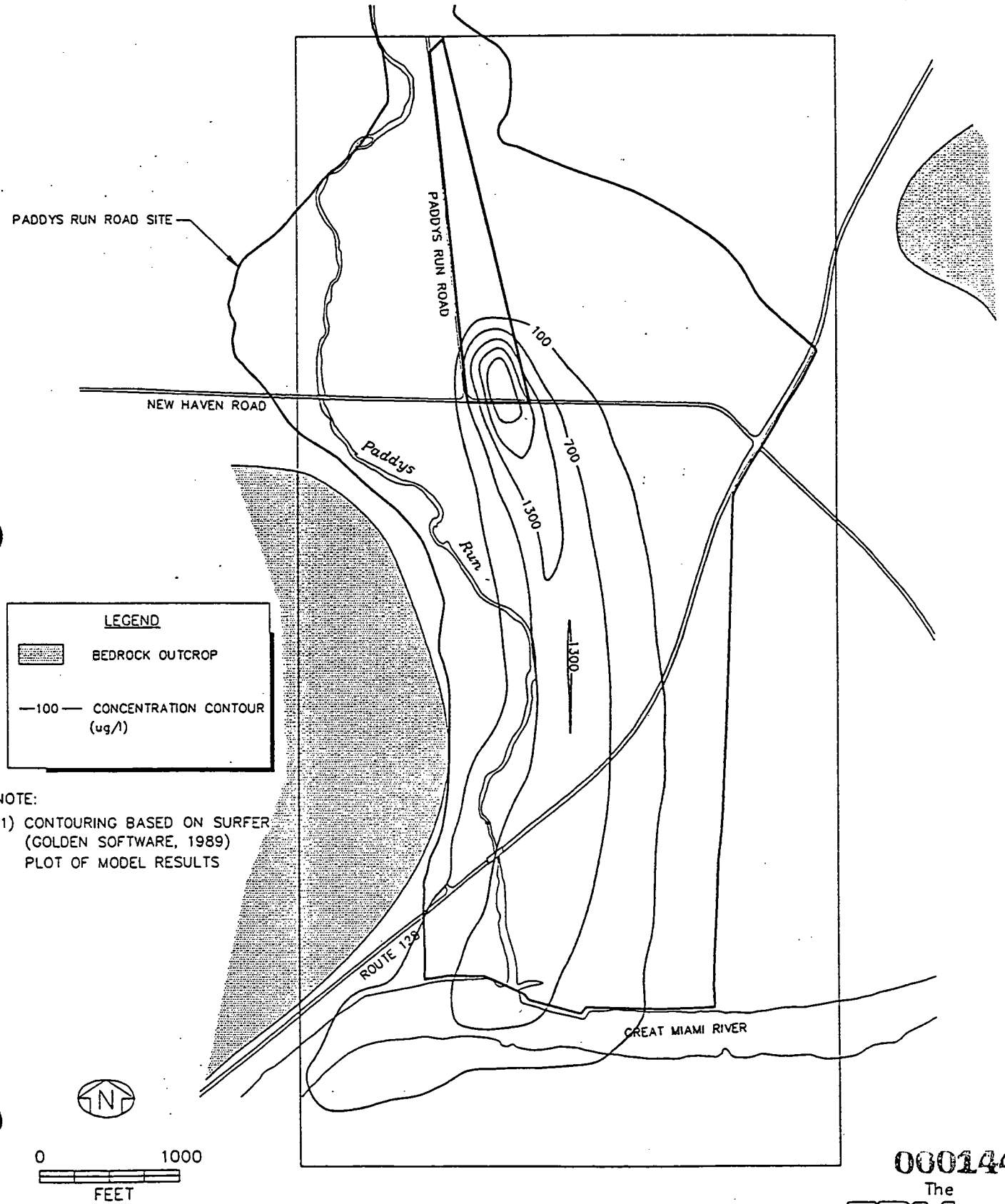
# Figure 4-16d
# Prediction of Future (2003) Ethylbenzene Concentration Distribution (Layer 4)
## Paddys Run Road Site
## Hamilton County, Ohio

007360




000144

11102.07/11007E12/082192-3

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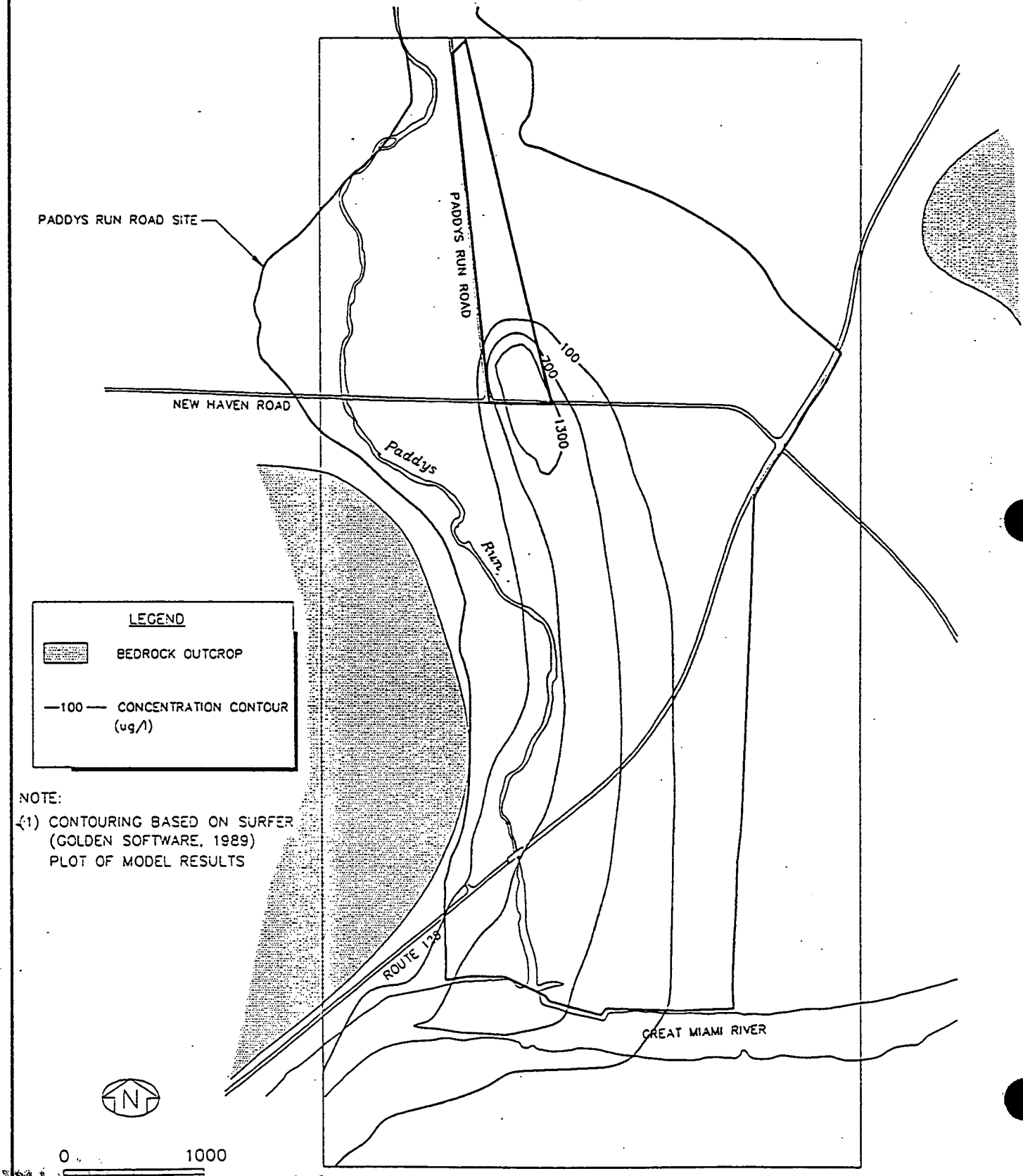
# Figure 4-16e
## Prediction of Future (2006) Ethylbenzene Concentration Distribution (Layer 4)
### Paddys Run Road Site
### Hamilton County, Ohio




000145

11102.07/11007E15/082192-3

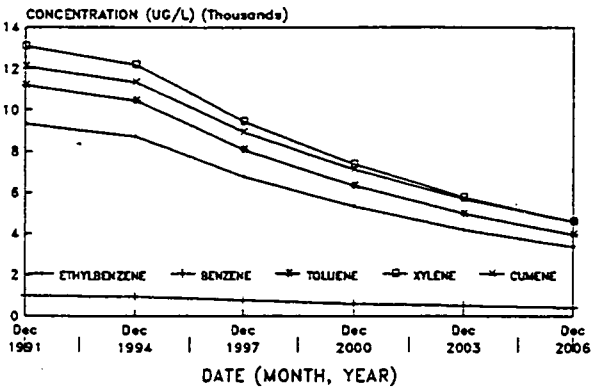
The ERM

# Figure 4-17
# Production of Future Organic Chemical Concentrations

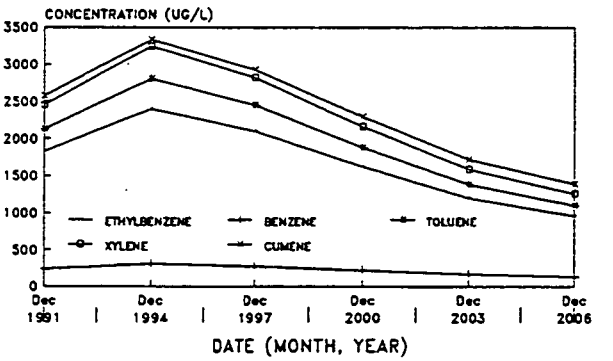
007360

Paddys Run Road Site
Hamilton County, Ohio

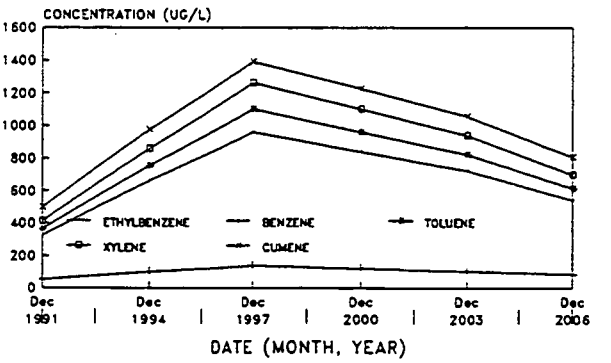
Predicted Maximum Concentrations




Predicted Concentrations Approximately
700 Feet South Of Company Property




Predicted Concentrations Approximately
1800 Feet South Of Company Property



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000142

# TABLE 2-1
## REPORTED GROUND WATER FLOW PARAMETER VALUES (INCLUDING RI FIELD DATA)
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Parameter | Test Method | Test Location | Reported Value/ Reported Units | Reported Value/ English Units | Value Based on These Constraints | Reference | Comments |
|---|---|---|---|---|---|---|---|
| Ground Water Temperature | Direct Measurement | SOWC, Venice Area | 53.7 - 58.9°F | --- | --- | Dove (1961) p. 69 | Average range measured during 6/56 to 6/59 |
| Average Ground Water Temperature | Direct Measurement | Hamilton-New Baltimore | 13.15 - 16.33°C | 55.7 - 61.4°F | 1974 Measurements | Plummer (1975) | --- |
| Average Ground Water Temperature | Direct Measurement | Hamilton-New Baltimore | 10.0 to 18.6°C | 50 - 66°F | 1971 - 1973 Measurements | Plummer (1974) | --- |
| Ground Water Temperature | Direct Measurement | Hamilton-New Baltimore | 12 - 16.5°C | 54 - 62°F | 1985 - 1986 Measurements | Weber (1987) | --- |
| Ground Water Temperature | Direct Measurement | PRRS | 6.25 - 27.0°C Avg. = 14.4°C | 43°F - 81°F Avg. ≈ 60°F | --- | ERM (Sept. 1992) | Range measured during 1991 |
| Fluid (Ground water) Compressibility | Literature Value | Not applicable | 4.4E-10 1/Pa | 3.033694E-06 1/psi | --- | Freeze and Cherry (1979) p. 52 | Text book reference |
| Fluid (Ground water) Compressibility | Literature Value | Not applicable | --- | 3.215E-06 1/psi | Pure Water @ 60°F | Daugherty, Franzini & Finnemore, (1985) p. 4 & 571 | Text book reference |

(See notes and abbreviations at end of table.)

**TABLE 2-1**
**REPORTED GROUND WATER FLOW PARAMETER VALUES (INCLUDING RI FIELD DATA)**
**PADDYS RUN ROAD SITE**
**HAMILTON COUNTY, OHIO**

| Parameter | Test Method | Test Location | Reported Value/ Reported Units | Reported Value/ English Units | Value Based on These Constraints | Reference | Comments |
|---|---|---|---|---|---|---|---|
| Ground Water Specific Gravity | Direct Measurement | PRRS | 1.000 | --- | Average Value | ERM (Sept. 1992) | --- |
| Fluid (Ground Water) Viscosity | Literature Value | Not applicable | 1.14 cP | --- | Pure $H_2O$ @ 60°F | Dove (1961) p. 70 | --- |
| Fluid (Ground Water) Viscosity | Literature Value | Not applicable | 1.125 cP | --- | Pure $H_2O$ @ 60°F | Fetter (1980) pg. 73 | --- |
| Fluid (Ground Water) Viscosity | Literature Value (interpolated) | Not applicable | 1,138 $\mu$Pa(s) | 1.138 cP | Pure $H_2O$ @ 60°F | Lide (1991) pg. 6-9 | --- |
| Fluid (Ground Water) Viscosity | Literature Value | Not applicable | 2.359E-05 lbs/ft$^2$ | 1.129 cP | Pure $H_2O$ @ 60°F | Daugherty, Franzini, & Finnemore (1985) p. 571 | --- |
| Viscosity (River Water) | Estimate based on surface water temperature | Near Venice | 0.836 cP - 1.7513 cP | --- | @ 82° - 34°F | Dove (1961) p. 75 | Change in viscosity due to seasonal temperature variations may lead to 52% variance between summer and winter infiltration |

(See notes and abbreviations at end of table.)



0073600

000149

# TABLE 2-1
## REPORTED GROUND WATER FLOW PARAMETER VALUES (INCLUDING RI FIELD DATA)
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Parameter | Test Method | Test Location | Reported Value/ Reported Units | Reported Value/ English Units | Value Based on These Constraints | Reference | Comments |
|---|---|---|---|---|---|---|---|
| $K_h$ (S&G aquifer) | --- | Spieker's (1968a) Type III Area | 250 ft/day | --- | --- | GeoTrans (1985) | Used in GeoTrans Model |
| $K_h$ (S&G aquifer) | --- | Spieker's (1968a) Type I-A-1 Area | 350 ft/day | --- | --- | GeoTrans (1985) | Used in GeoTrans Model |
| $K_h$ (S&G aquifer) | Pump Test | SOWC, Venice Area | 2,380 - 2,760 gpd/ft$^2$ | 319 - 369 ft/day | Aquifer thickness = 120 - 125 feet | GeoTrans (1985) | See GeoTrans (1985) Table 4.1 |
| $K_h$ (S&G aquifer) | Flow Net Analysis | SOWC, Venice Area | 2,440 - 2,780 gpd/ft$^2$ | 327 - 373 ft/day | Aquifer thickness = 120 feet | Schaefer & Walton (1956) | See GeoTrans (1985) Table 4.1 |
| $K_h$ (S&G aquifer) | Flow Net Analysis | SOWC, Venice Area | 2,466 gpd/ft$^2$ | 330 ft/day | Aquifer thickness = 150 | Dove (1961) | See GeoTrans (1985) Table 4.1 |
| $K_h$ (S&G aquifer) | Pump Test | SOWC, Venice Area | 2,800 to 3,000 gpd/ft$^2$ | 375 to 402 ft/day | --- | Dove (1961) | --- |
| $K_h$ (S&G aquifer) | Pump Test | Beneath clay unit at FEMP | 2,000 gpd/ft$^2$ | 268 ft/day | Aquifer thickness = 70 feet | Spieker & Norris (1962) | See GeoTrans (1985) Table 4.1 |

(See notes and abbreviations at end of table.)

**TABLE 2-1**
**REPORTED GROUND WATER FLOW PARAMETER VALUES (INCLUDING RI FIELD DATA)**
**PADDYS RUN ROAD SITE**
**HAMILTON COUNTY, OHIO**

| Parameter | Test Method | Test Location | Reported Value/ Reported Units | Reported Value/ English Units | Value Based on These Constraints | Reference | Comments |
|---|---|---|---|---|---|---|---|
| $K_h$ (S&G aquifer) | Pump Test | SOWC, Venice Area | 2,500 - 3,020 gpd/ft$^2$ | 335 - 405 ft/day | --- | Lewis (1968) | See GeoTrans (1985) Table 4.1 |
| $K_h$ (S&G aquifer) | --- | South Plume Study Area (South of FEMP) | 250 to 500 ft/day | --- | Sat. Aq. Thickness ≈ 130 ft. | IT Corp./ASI (Aug. 1988) | --- |
| $K_h$ (S&G aquifer) | Estimated | NW of Fernald | 1,000 to 2,000 gpd/ft$^2$ | 134 - 268 ft/day | --- | Univ. of Cinn. (1989) | Used in DRASTIC rating |
| $K_h$ (S&G aquifer) | Estimated | N, NE, & S of Fernald | 2,000 gpd/ft$^2$ and greater | 268 ft/day and greater | --- | Univ. of Cinn. (1989) | Used in DRASTIC rating |
| $K_h$ (S&G aquifer) | Estimated | New Baltimore Area | 60 ft/day | --- | --- | IT Corp./ASI (Dec, 1990) | Used in IT Model |
| $K_h$ (S&G aquifer) | Estimated | North of FEMP Area | 120 ft/day | --- | --- | IT Corp./ASI (Dec, 1990) | Used in IT Model |
| $K_h$ (S&G aquifer) | Estimated | Upper 3 layers of model throughout most of study area | 450 ft/day | --- | --- | IT Corp./ASI (Dec, 1990) | Used in IT Model |
| $K_h$ (S&G aquifer) | Estimated | Lower 2 layers of model throughout most of study area near Ross & FEMP | 600 ft/day | --- | --- | IT Corp./ASI (Dec, 1990) | Used in IT Model |
| $K_v$ (S&G aquifer) | --- | Spieker's (1968a) Type III Area | 2.5 ft/day | --- | --- | GeoTrans (1985) | Used in GeoTrans Model |

(See notes and abbreviations at end of table.)



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# TABLE 2-1
## REPORTED GROUND WATER FLOW PARAMETER VALUES (INCLUDING RI FIELD DATA)
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Parameter | Test Method | Test Location | Reported Value/ Reported Units | Reported Value/ English Units | Value Based on These Constraints | Reference | Comments |
|---|---|---|---|---|---|---|---|
| $K_v$ (S&G aquifer) | --- | Spieker's (1968a) Type I-A-1 Area | 35 ft/day | --- | --- | GeoTrans (1985) | Used in GeoTrans Model |
| $K_v$ (S&G aquifer) | Estimated | New Baltimore Area | 6 ft/day | --- | --- | IT Corp./ASI (Dec, 1990) | Used in IT Model Assumed $K_v$ = 0.1 $K_h$ |
| $K_v$ (S&G aquifer) | Estimated | North of FEMP Area | 12 ft/day | --- | --- | IT Corp./ASI (Dec, 1990) | Used in IT Model; Assumed $K_v$ = 0.1 $K_h$ |
| $K_v$ (S&G aquifer) | Estimated | Upper 3 layers of model throughout most of study area | 45 ft/day | --- | --- | IT Corp./ASI (Dec, 1990) | Used in IT Model; Assumed $K_v$ = 0.1 $K_h$ |
| $K_v$ (S&G aquifer) | Estimated | Lower 2 layers of model throughout most of study area near Ross & FEMP | 60 ft/day | --- | --- | IT (Dec, 1990) | Used in IT Model; Assumed $K_v$ = 0.1$K_h$ |
| $K_v$ (Clay unit) | --- | Aquitard below FEMP | 0.025 ft/day | --- | --- | GeoTrans (1985) | Used in GeoTrans Model |
| $K_v$ (Clay unit) | Pump Test | Aquitard below FEMP | 0.43 to 0.33 ft/day | --- | --- | Spieker & Norris (1962) | --- |
| $K_v$ (Clay unit) | Estimated | Aquitard below FEMP | 0.0003 ft/day | --- | --- | IT Corp./ASI (Dec, 1990) | Used in IT Model |
| $K_h$ (Bedrock) | Estimated | FEMP Area | 5 gpd/ft$^2$ | 0.67 ft/day | --- | IT Corp./ASI Nov. (1990) | --- |

(See notes and abbreviations at end of table.)

**TABLE 2-1**
**REPORTED GROUND WATER FLOW PARAMETER VALUES (INCLUDING RI FIELD DATA)**
**PADDYS RUN ROAD SITE**
**HAMILTON COUNTY, OHIO**

| Parameter | Test Method | Test Location | Reported Value/ Reported Units | Reported Value/ English Units | Value Based on These Constraints | Reference | Comments |
|---|---|---|---|---|---|---|---|
| $K_h$ (Bedrock) | Estimated | SOWC, Venice | 5 gpd/ft$^2$ | 0.67 ft/day | --- | Dove (1961) | Based on well flow rates in upland areas |
| K (Bedrock) | Estimated | E of Fernald | 1 to 100 gpd/ft$^2$ | 0.1 to 13 ft/day | --- | Univ. of Cinn. (1989) | Used in DRASTIC rating |
| Ground Water Flow Velocity (S&G aquifer) | Flow Meter | PRRS | 2.7 ft/day | --- | Avg. from 7 Shallow, 3 Intermed. & 1 Deep Well | Ground Water Flow Meter Study Ruetgers-Nease Chemical Co. Paddys Run Road Fernald, OH K-V Associates, Inc. Apr. (1991) | Direction = 154° from true north |
| Net Ground Water Recharge | Measurement/ Estimate | Venice area of Ohio | 12 in./year | --- | --- | Dove (1961) p. 61 | Equals 570,000 gpd/mi$^2$ Rainy season - Apr, May, June, Dry season - Sept, Oct |

(See notes and abbreviations at end of table.)



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# TABLE 2-1
## REPORTED GROUND WATER FLOW PARAMETER VALUES (INCLUDING RI FIELD DATA)
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Parameter | Test Method | Test Location | Reported Value/ Reported Units | Reported Value/ English Units | Value Based on These Constraints | Reference | Comments |
|---|---|---|---|---|---|---|---|
| Net Ground Water Recharge | Measurement/ Estimate | Fairfield-New Baltimore, Ohio | 6 - 21 in./year Avg 15 in./year | --- | 1931 - 1960 | Spieker (1968a) | Other estimates for avg. conditions: ET - 25 in./year; runoff = 8 in./year; rainfall 39 in./year; U.S. Weather Bureau Records |
| Net Ground Water Recharge | Calculated | Hamilton Co.; SOWC collector well area | 12 in./year | --- | --- | Lewis (1968) | --- |
| Net Ground Water Recharge | Measurement/ Estimate | NW of Fernald | 4 to 7 in./year | --- | --- | Univ. of Cinn (1989) | Used in DRASTIC rating |
| Net Ground Water Recharge | Measurement/ Estimate | N of Fernald | 7 to 10 in./year | --- | --- | Univ. of Cinn (1989) | Used in DRASTIC rating |
| Net Ground Water Recharge | Measurement/ Estimate | S of Fernald | 10 in./year or greater | --- | --- | Univ. of Cinn (1989) | Used in DRASTIC rating |
| Net Ground Water Recharge | Measurement/ Estimate | E of Fernald | 10 in./year or greater | --- | --- | Univ. of Cinn (1989) | Used in DRASTIC rating |
| Net Ground Water Recharge | Measurement/ Estimate | SW, S, & SE of Fernald | 2 to 4 in./year | --- | --- | Univ. of Cinn (1989) | Used in DRASTIC rating |

(See notes and abbreviations at end of table.)

**TABLE 2-1**
**REPORTED GROUND WATER FLOW PARAMETER VALUES (INCLUDING RI FIELD DATA)**
**PADDYS RUN ROAD SITE**
**HAMILTON COUNTY, OHIO**

| Parameter | Test Method | Test Location | Reported Value/ Reported Units | Reported Value/ English Units | Value Based on These Constraints | Reference | Comments |
|---|---|---|---|---|---|---|---|
| Net Ground Water Recharge | Estimate | Venice area where there was no till @ land surface | 15 in./year | --- | --- | GeoTrans (1985) | Used in GeoTrans Model |
| Net Ground Water Recharge | Estimate | Venice area where there was no till @ land surface | 6 in./year | --- | --- | GeoTrans (1985) | Used in GeoTrans Model |
| Net Ground Water Recharge | Estimate | FEMP site | 2 in./year | --- | --- | IT Corp./ASI (Dec. 1990) Walton & Schaefer (1956) | Used in IT Model |
| Net Ground Water Recharge | Estimate | Areas without till @ land surface (stream flood plains) | 14 in./year | --- | --- | IT Corp./ASI (Dec. 1990) | Used in IT Model |
| Net Ground Water Recharge | Estimate | Areas with till @ land surface (N,S,E, & W of FEMP); and New Baltimore Area | 6 in./year | --- | --- | IT Corp./ASI (Dec. 1990) | Used in IT Model |
| Net Ground Water Recharge | Calculated | Fairfield - New Baltimore Area | 6 - 21 in/yr | --- | Average annual rise of water table | Spieker (1968C) p. C5 | Considered recharge induced by pumping at boundaries and river |

(See notes and abbreviations at end of table.)



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# TABLE 2-1
## REPORTED GROUND WATER FLOW PARAMETER VALUES (INCLUDING RI FIELD DATA)
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Parameter | Test Method | Test Location | Reported Value/ Reported Units | Reported Value/ English Units | Value Based on These Constraints | Reference | Comments |
|---|---|---|---|---|---|---|---|
| Net Ground Water Recharge | Water Budget | Hamilton | 6 in/yr | --- | 38.81 in/yr precp; 25 in/yr ET; 8 in/yr run-off | Spieker (1968C) p. C9 | Referenced US Weather Bureau |
| Net Ground Water Recharge | Calculated | Fairfield - New Baltimore | 15.2 in/yr | --- | 76.2 in. rise in water level at well BU-7; s = 0.2 | Spieker (1968C) p. C10) | Used in model |
| Net Ground Water Recharge | Literature | Fairfield Area | 21 in/yr | --- | --- | GeoTrans (1985) p. 32 | --- |
| Net Ground Water Recharge | Literature | SOWC Wellfield Area | 8.5 in/yr | --- | --- | GeoTrans (1985) p. 34 | --- |
| Leakage from Valley Walls | Estimate | Fairborn Area to SOWC Area | 30 to 38 gpd/lf, respectively | 1.74 $ft^3$/day-lf | $K_h$ (Bedrock) = 1-5gpd/$ft^2$ | Spieker (1968c) | 13 gpd/lin. ft. was the rate used in the Spieker Model |
| Leakage from Valley Walls | | FEMP | --- | --- | --- | GeoTrans (1985) | Modeled as no-flow boundaries |
| Leakage from Valley Walls | Estimate | SOWC Area | 200,000 gpd/mi. | 5.1 $ft^3$/day-lf | $K_h$ (Bedrock) = 5 gpd/$ft^2$ | Dove (1961) | --- |
| Volumetric Flux (bedrock to aquifer) | Inferred | Near Venice | 200,000 gpd/mi. | 5.1 $ft^3/ft^2$ day | --- | Dove (1961) p. 62 | Based on permeability of 5 gpd/$ft^2$ for limestone and shale bedrock |

(See notes and abbreviations at end of table.)

**TABLE 2-1**
**REPORTED GROUND WATER FLOW PARAMETER VALUES (INCLUDING RI FIELD DATA)**
**PADDYS RUN ROAD SITE**
**HAMILTON COUNTY, OHIO**

| Parameter | Test Method | Test Location | Reported Value/ Reported Units | Reported Value/ English Units | Value Based on These Constraints | Reference | Comments |
|---|---|---|---|---|---|---|---|
| Great Miami River Leakage | Calculated | Near SOWC Collector Wells 1 and 2 | 113,000 - 140,000 gpd/ac-ft | 0.34 - 0.43 $day^{-1}$ | Headlosses from observation wells | Dove (1961) p. 64 | --- |
| Great Miami River Leakage | Flow net calculations | SOWC | 240,000 gpd/ac-ft | 0.74 $day^{-1}$ | Water table contours 512-513 | Dove (1961) p. 64 | --- |
| Great Miami River Leakage | Calculated from pump test | Near Fairfield | 490,000 gpd/ac | --- | --- | Spieker (1968) | Calculated average infiltration |
| Great Miami River Leakage | Calculated from observations | SOWC | 735,000 gpd/ac | --- | 115,000 gpd/ac-ft @ 6.37 ft headloss | Spieker (1968c) p. 10 | --- |
| Great Miami River Leakage | Estimated | Great Miami River | 240,000 - 500,000 gpd/ac | --- | Estimated range under low flow (summer) conditions or high flow (winter) with lower viscosities | Spieker (1968c) p. 11 | Used in Spieker Model |
| Great Miami River Leakage | Model fitted value/ estimate | IT Model domain | 0.5 $day^{-1}$ | --- | Initially set @ 0.35 $day^{-1}$ (3 orders of magnitude below K-value) | IT Corp/ASI (1990) p. 20-11, 14 | Calibrated model to 0.5 $day^{-1}$ |

(See notes and abbreviations at end of table.)



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# TABLE 2-1
## REPORTED GROUND WATER FLOW PARAMETER VALUES (INCLUDING RI FIELD DATA)
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Parameter | Test Method | Test Location | Reported Value/ Reported Units | Reported Value/ English Units | Value Based on These Constraints | Reference | Comments |
|---|---|---|---|---|---|---|---|
| Recharge due to Paddys Run | Assumed | FEMP | 14 in/yr | --- | Equivalent to infiltration rate of areas not covered with glacial overburden | IT Corp/ASI (1990) p. 13-4 | Used IT flow model |
| Recharge due to Paddys Run | Assumed | FEMP | 32 in/yr | --- | Increased to compensate for smaller cell dimensions | IT Corp/ASI (1990) p. 13-4 | Used in IT solute transport model |
| Average Width of Great Miami River | Assumed | Fairfield - New Baltimore | 250 ft | --- | --- | Spieker (1968C) p. C19 | Used in Spieker model |
| Average Width of Great Miami River | Estimated | Near SOWC wells | 200 ft | --- | --- | Dove (1961), p. 64 | Used to estimate rate of infiltration |
| Average Width of Great Miami River | --- | Near Baltimore - Ross | 302 - 346 ft | --- | --- | IT Corp. (1987) p. 2-8 | Based on USCOE HEC2. Modeled river as a constant head |
| Average Width of Great Miami River | --- | --- | Not reported | --- | --- | GeoTrans (1985) | Modeled as a constant head boundary |

(See notes and abbreviations at end of table.)

**TABLE 2-1**
**REPORTED GROUND WATER FLOW PARAMETER VALUES (INCLUDING RI FIELD DATA)**
**PADDYS RUN ROAD SITE**
**HAMILTON COUNTY, OHIO**

| Parameter | Test Method | Test Location | Reported Value/ Reported Units | Reported Value/ English Units | Value Based on These Constraints | Reference | Comments |
|---|---|---|---|---|---|---|---|
| Average Width of Paddys Run Creek | Measurement | @ SR 128 | 2.8 ft<br>4.0 ft<br>16.0 ft | --- | Measured in 10/76, 9/70, & 4/72, respectively | USGS Discharge Measurement Notes | Provided by MCD November 22, 1991 |
| Average Width of Paddys Run | Measurement | North of PRRS (near Delta Steel) | 24 - 28 ft | --- | --- | MCC (1984) p. 2 | --- |
| Average Flow Depth of Great Miami River | Measurement | Near FEMP | 5.4 - 5.7 feet | --- | --- | IT Corp./ASI (1990) p. 12-15<br>IT Corp. (1987) p. 2-8 | Based on USCOE HEC2 model |
| Average Flow Depth of Paddys Run | Measurement | Upstream of PRRS | 1.60 - 1.83 ft<br>0.45 - 0.59 ft | ---<br>--- | Measured on 05/11/83<br>Measured on 11/30/83 | MCC (1984) Tbl. 1<br>MCC (1984) Tbl. 1 | ---<br>--- |
| GMR Streambed Elevations | Survey | Hamilton County | 527 - 479 ft. (NGVD) | --- | --- | FEMA FIS (1981) | --- |
| Absolute Atmospheric Pressure | Book value | Book value | 1.01325E+05 Pa | --- | --- | Lide (1991) | --- |
| Acceleration of Gravity (g) | Book value | General | 32.15 $ft/s^2$ | 2.4E+11 $ft/day^2$ | @ 39° Latitude | Lide (1991) | --- |

(See notes and abbreviations at end of table.)



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# TABLE 2-1
## REPORTED GROUND WATER FLOW PARAMETER VALUES (INCLUDING RI FIELD DATA)
## PADDYS RUN ROAD SITE
## FERNALD, OHIO

| Parameter | Test Method | Test Location | Reported Value/ Reported Units | Reported Value/ English Units | Value Based on These Constraints | Reference | Comments |
|---|---|---|---|---|---|---|---|
| Well Pumping Rate | Direct Measurement | SOWC Collector Well 1, Venice Area | 6.51 to 11.86 mgd Avg = 9.19 mgd | 8.70E+05 $ft^3$/day-1.50E+06 $ft^3$/day Avg = 1.23E+06 $ft^3$/day | 1952 to 1958 | Dove (1961) | --- |
| Well Pumping Rate | Direct Measurement | SOWC Collector Well 2, Venice Area | 6.54 to 7.63 mgd Avg = 7.09 mgd | 8.74E+05 $ft^3$/day-1.02E+06 $ft^3$/day Avg = 9.47E+05 $ft^3$/day | 1955 to 1958 | Dove (1961) | --- |
| Well Pumping Rate | Estimate | FEMP Well P3 #4103 | 292 gpm | 5.6E+04 $ft^3$/day | Avg. 3/86 & 4/86 rate | IT Corp./ASI Dec. 1990 | Value used in IT Model |
| Well Screen Interval | --- | SOWC collector well 1, Venice | 117 - 140 ft. bls | --- | --- | Spieker (1968a) Tbl. 10 Dove (1961) Fig. 17 & 18 | Layer 4 of IT Model (≈EL 420) |
| Well Screen Interval | --- | SOWC collector well 2, Venice | 133 - 137 ft., bls | --- | --- | Spieker (1968) Tbl. 10 Dove (1961) Fig. 17 & 18 | Layer 4 of IT Model (≈EL 420) |
| Well Screen Interval | --- | FEMP well P3, #4103 | 390 - 369 msl | --- | Ground surface elevations = 579.34 msl | IT Corp. (1987) Tbl 2.1.1 | Not used in IT (1987) to construct ground water contour map |
| Well Screen Interval | --- | A&W well 1 | 62 - 82 ft, bls | --- | --- | ENSR (1988) | Total depth = 82 feet, bls |

(See notes and abbreviations at end of table.)

**TABLE 2-1**
**REPORTED GROUND WATER FLOW PARAMETER VALUES (INCLUDING RI FIELD DATA)**
**PADDYS RUN ROAD SITE**
**FERNALD, OHIO**

| Parameter | Test Method | Test Location | Reported Value/ Reported Units | Reported Value/ English Units | Value Based on These Constraints | Reference | Comments |
|---|---|---|---|---|---|---|---|
| Well Screen Interval | --- | A&W well 2 | 60 - 81 ft, bls | --- | --- | ENSR (1988) | Total depth = 81 feet, bls |
| Well Screen Interval | --- | Rutgers-Nease well | 78 - 94 ft, bls | --- | --- | Koehne (1959) | --- |
| Average Well Pumping Rate | Estimate | Rutgers-Nease pumping well | 2.5 gpm | 481 $ft^3$/day | --- | IT Corp./ASI (Dec, 1990) | Used in IT Model |
| Average Well Pumping Rate | Estimate | A&W wells 1&2 | 225 gpm | 43,316 $ft^3$/day | Combined pumping rate | IT Corp./ASI (Dec., 1990) p. 20-26 | Used in IT Model |
| Average Well Pumping Rate | Estimate | SOWC Collector well 1, Venice | 6,026 gpm | 1.16E+06 $ft^3$/day | --- | IT Corp./ASI (Dec., 1990) p. 20-26 | Used in IT Model |
| Average Well Pumping Rate | Estimate | SOWC Collector well 2, Venice | 6,026 gpm | 1.16E+06 $ft^3$/day | --- | IT Corp./ASI (Dec., 1990) p. 21-26 | Used in IT Model |
| Average Well Pumping Rate | Estimate | Rutgers-Nease pumping well | 2 - 3 gpm | 385 -578 $ft^3$/day | --- | ENSR (1988) | --- |
| Average Well Pumping Rate | Estimate | A&W well 1 | 100 gpm | 19,251 $ft^3$/day | --- | ENSR (1988) | Typical pumping rate |
| Average Well Pumping Rate | Estimate | A&W well 2 | 100 gpm | 19,251 $ft^3$/day | --- | ENSR (1988) | Typical pumping rate |

(See notes and abbreviations at end of table.)



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# TABLE 2-1
## REPORTED GROUND WATER FLOW PARAMETER VALUES (INCLUDING RI FIELD DATA)
## PADDYS RUN ROAD SITE
## FERNALD, OHIO

| Parameter | Test Method | Test Location | Reported Value/ Reported Units | Reported Value/ English Units | Value Based on These Constraints | Reference | Comments |
|---|---|---|---|---|---|---|---|
| Bedrock Elevation (aquifer dimensions) | Combined Watkins & Spieker (1964 & 1971) data with geologic drilling logs for area | Vicinity of subject site | Varies - see Plate 4.1 in Geotrans (1985) | --- | --- | GeoTrans (1985) | GeoTrans Model used aquifer dimensions shown on Plate 4.1 |
| Bedrock Elevation (aquifer dimensions) | Geologic drilling logs and geophysical data | Vicinity of subject site | Varies see Figure 4.1 in Watkins and Spieker (1964 and 1971) | --- | --- | Watkins & Spieker (1964 and 1971) | --- |
| Bedrock Elevation (aquifer dimensions) | Not reported | Vicinity of subject site | Varies | --- | --- | Vormelker (Sept, 1985) | Only the map was available for review |
| Bedrock Elevation (aquifer dimensions) | Literature review and well logs | Vicinity of subject site | Varies (see Figure 11-2) | ___ | ___ | IT Corp./ASI (Dec, 1990) | IT Model used aquifer dimensions shown in Figure ___ |
| Land Surface Elevation | Topographic Survey | Vicinity of subject site | Varies, see 7.5-minute Shandon Quadrangle topographic map) | --- | --- | USGS (1981) | --- |

(See notes and abbreviations at end of table.)

**TABLE 2-1**
**REPORTED GROUND WATER FLOW PARAMETER VALUES (INCLUDING RI FIELD DATA)**
**PADDYS RUN ROAD SITE**
**HAMILTON COUNTY, OHIO**

| Parameter | Test Method | Test Location | Reported Value/ Reported Units | Reported Value/ English Units | Value Based on These Constraints | Reference | Comments |
|---|---|---|---|---|---|---|---|
| Aquifer porosity | Estimated | --- | 0.25 | 0.25 | Literature and GeoTrans pump test (1965) | IT Corp./ASI (Dec, 1990) | Used in IT model |
| Aquifer porosity | Estimated | --- | 0.20 | 0.20 | --- | GeoTrans (1985) | Not field tested but representative of similar aquifer used in GeoTrans model |
| Storativity (S&G aquifer) | Estimated | Venice, OH & Louisville, KY | 0.2 | --- | --- | Dove (1961) p. 25 | --- |
| Storativity (S&G aquifer) | Pump Test | FEMP | 0.01 | --- | --- | Spieker & Norris (1962) | Confined conditions |
| Storativity (S&G aquifer) | Estimated | FEMP & PRRS Area | 0.1 | --- | --- | Spieker (1968c) | Used in Spieker Model |
| Storativity (S&G aquifer) | Estimated | East & South of FEMP & PRRS Area | 0.2 | --- | --- | Spieker (1968c) | Used in Spieker Model |
| Storativity (S&G aquifer) | Estimated | Great Miami Aquifer | 0.2 | --- | --- | IT Corp./ASI (Dec. 1990) | Used in IT Model |
| Storativity (S&G aquifer) | Pump Test | SOWC Collector Well, Venice Area | 0.23 | --- | --- | GeoTrans, (1985) | See GeoTrans Table 4.1 |

(See notes and abbreviations at end of table.)



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# TABLE 2-1
## REPORTED GROUND WATER FLOW PARAMETER VALUES (INCLUDING RI FIELD DATA)
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Parameter | Test Method | Test Location | Reported Value/ Reported Units | Reported Value/ English Units | Value Based on These Constraints | Reference | Comments |
|---|---|---|---|---|---|---|---|
| Storativity (S&G aquifer) | Estimated | FEMP | 0.2 | --- | --- | IT Corp./ASI (Oct, 1990) | Spieker's (1968a) Type I Environ |
| Storativity (S&G aquifer) | Estimated | Operable Unit 5 - FEMP | 0.2 | --- | --- | IT Corp./ASI (Nov, 1990) | Spieker's (1968a) Type I Environ |
| Storativity (S&G aquifer) | Estimated | Operable Unit 5 - FEMP | 0.001 | --- | --- | IT Corp./ASI (Nov, 1990) | Aquifer Below Clay; Clay 10 to 20 ft. thick |
| Storativity (S&G aquifer) | Estimated | IT's Modeled Area | 0.25 | --- | --- | IT Corp./ASI (Dec, 1990) | Value used in IT Model |

*NOTES:*

Refer to Section 6.0 for a listing of references.

*ABBREVIATIONS:*

USCOE = United States Corps of Engineers
S&G = Sand and gravel
$K_h$ = Horizontal hydraulic conductivity
$K_v$ = Vertical hydraulic conductivity
MCD = Miami Conservancy District
bls = Below land surface

(See notes and abbreviations at end of table.)

TABLE 2-2

# GROUND WATER FLOW PARAMETER VALUES USED IN CALIBRATED REGIONAL MODEL PADDYS RUN ROAD SITE HAMILTON COUNTY, OHIO

| Model Parameter | Reported Range | Modeled Value | Comments |
|---|---|---|---|
| Fluid Compressibility | 3.03E-06 to 3.22E-06 $psi^{-1}$ | 3.03E-06 $psi^{-1}$ | — |
| Reference Pressure | NA | 0.0 psi | Assume 0.0 psi at land surface |
| Reference Temperature - Ground Water, PPT and Surface Water | 34.2 - 82.8°F | 60°F | — |
| Fluid Density - Ground Water, PPT and Surface Water | 62.37 - 62.42 $lb/ft^3$ | 62.4 $lb/ft^3$ | — |
| Fluid Viscosity - Ground Water, PPT, and Surface Water | 0.836 to 1.7513 cP | 1.138 cP | — |
| Absolute Atmospheric Pressure | 1.01325E+05 Pa | 1.01325E+05 Pa | — |
| $K_h$ aquifer (Figures 2-7 and 3-6) | 134 - 600 ft/day | 350 - 450 ft/day | Converted to intrinsic permeability for model input[a] |
| $K_v$ aquifer | 2.5 - 60 ft/day | 35 - 45 ft/day | Converted to intrinsic permeability for model input[a] |
| $K_h$ clay (Figures 2-7 and 3-6) | NA | 0.35 ft/day | Converted to intrinsic permeability for model input[a][b] |
| $K_v$ clay | 0.00030 - 0.43 ft/day | 0.35 ft/day | Converted to intrinsic permeability for model input[a][b] |
| $K_h$ bedrock (Figures 2-7 and 3-6) | 0.1 - 13 ft/day | 0.67 ft/day | Converted to intrinsic permeability for model input[a] |
| $K_v$ bedrock | NA | 0.67 ft/day | Converted to intrinsic permeability for model input[a] |
| Porosity | 0.20 - 0.25 | 0.225 | — |
| Bulk Vertical Compressibility of Aquifer | NA | 0.0 | Assume Incompressibility |
| Elevation of top of clay confining unit @ FEMP | ≈ 455 - 469 ft (MSL) | 455 ft (MSL) | Range of Reported Clay Thickness ≈ 0 - 16 ft[b] |

TABLE 2-2

# GROUND WATER FLOW PARAMETER VALUES USED IN CALIBRATED REGIONAL MODEL PADDYS RUN ROAD SITE HAMILTON COUNTY, OHIO

| Model Parameter | Reported Range | Modeled Value | Comments |
|---|---|---|---|
| Elevation of bottom of clay confining unit | ≈ 425 - 450 ft (MSL) | 445 ft (MSL) | (b) |
| Range of elevation of water table | ≈ 504 - 542 ft (MSL) | 496 - 553 ft (MSL) | (c) |
| Range of elevation of top of bedrock | 334 - 600+ ft (MSL) | 380 - 553 ft (MSL) | --- |
| **Leakance**[d] (Figures 2-6 and 3-5) | | | |
| Leakance of GMR and PR | 0.34 - 0.74 $day^{-1}$ | 0.5 $day^{-1}$ | No Reported Value for PR |
| $K_v$ of GMR and PR streambeds | NA | 0.5 ft/day | --- |
| b of GMR and PR streambeds | NA | 1.0 ft | --- |
| Width of GMR | 200 - 346 ft | 300 ft | --- |
| Depth of flow in GMR | 5.4 - 5.7 ft | 6 ft/5 ft | 1986/1991 Model |
| Elevation of GMR streambed | 479 - 527 ft (MSL) | 495 - 524 ft (MSL) | (c) |
| Width of PR | 2.8 ft to 28 ft | 20 ft | --- |
| Depth of flow in PR | 0 - 1.83 ft | 1.0 ft/0.5 ft | 1986/1991 Model |
| Elevation of PR streambed | NA | 522 - 503 ft (MSL) | --- |
| Pump Rate SOWC Wells 1 & 2 | 8.74E+05 - 1.50E+06 $ft^3$/day | 1.16E+06 $ft^3$/day each | (b) |
| Pump Rate A & W Wells 1 & 2 | 19,251 - 21,656 $ft^3$/day | 21,500 $ft^3$/day each | --- |
| Pump Rate FEMP Well | 56,000 $ft^3$/day | 56,000 $ft^3$/day | (b) |
| Pump Rate RNCC Well | 481 $ft^3$/day | 481 $ft^3$/day | (e) |
| Net PPT Recharge (Figures 2-8 and 3-7) | 4 - 21 in/yr | 0.0014 - 0.0032 ft/day (2 - 14 in/yr) | (c) |
| g | 2.4E + 11 ft/$day^2$ | 2.4E + 11ft/$day^2$ | --- |

## TABLE 2-2

## GROUND WATER FLOW PARAMETER VALUES USED IN CALIBRATED REGIONAL MODEL PADDYS RUN ROAD SITE HAMILTON COUNTY, OHIO

*ABBREVIATIONS:*

| | | |
|---|---|---|
| PPT | = | Rainfall precipitation |
| NA | = | Not applicable or available |
| g | = | Acceleration of gravity |
| K | = | Hydraulic conductivity ($K_v$ = vertical K; $K_h$ = horizontal K) |
| GMR | = | Great Miami River |
| PR | = | Paddys Run |
| $k_i$ | = | Intrinsic permeability |
| v | = | Viscosity |
| D | = | Fluid density |
| L | = | Leakance through streambed |
| b | = | Bed thickness |
| ft (MSL) | = | Feet above mean sea level |

*FOOTNOTES:*

(a) $k_i = \frac{KV}{gD}$

(b) Applies to regional model only

(c) A subset of this range was used in the local model

(d) $L = \frac{K_v}{b}$

(e) Pumping from RNC's well was not included in the regional model because of the negligible effect that pumping at such a low rate would have on heads in the model.

*COMMENTS:*

Storativity is calculated internally by HST3D based on the relationship between the compressibilities of the fluid and porous media, the density of the water, gravity, and aquifer thickness (see Fetter, 1980 and Kipp, 1987).

References for reported ranges of parameters listed in this table are found in Table 2-1 and/or ERM (Sept., 1992).

# TABLE 2-3

## PRIMARY CALIBRATION EVALUATION CRITERIA FOR FLOW MODELING
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Designation | Description | Acceptable Range | Optimum Value |
|---|---|---|---|
| 1. Graphical comparison | Comparison of contour maps of observed and simulated values. | Not quantifiable. | Not quantifiable |
| 2. R1 OR mean of residuals | R1 is the ratio of the mean of the residuals (the difference between observed and computed values) to the mean of the observed values. | -5% < R1 < +5%<br>OR<br>-1 feet < mean of residuals < +1 feet | 0%<br><br>0 feet |
| 3. R2 OR mean of the absolute values of residuals | R2 is the ratio of the mean of absolute residuals to the mean of the observed values. | R2 < 5%<br>OR<br>mean of absolute values of residuals <2 feet | 0%<br><br>0 feet |
| 4. Percent of residuals within ± one standard deviation of observed values | Example: for 40 observations then 5% of observations (i.e., two residuals (40x0.05=2)) can fall outside of the one standard deviation of observed values. | 95% - 100% | 100% |
| *5. Residual standard deviation | — | 0 - 3 feet | 0 feet |
| *6. R3 | R3 is the ratio of variance in residuals to the variance in observed values. | 0 - 15% | 0% |
| *7. R4 | R4 is the regression coefficient between the observed and computed heads. | 0.90 - 1.0 | 1.0 |
| *8. R5 | R5 is the ratio of the coefficient of variation (the standard deviation divided by the mean) of the observed values to the computed values | 80 - 120% | 100% |
| 9. Model water balance error | This error is calculated by HST3D and termed the "fractional imbalance" by the code. | -15% < model water balance error < +15% | 0.0 |

***NOTES***:

*These criteria are expanded from those presented in the Phase II Work Plan (ERM, 1991).

## TABLE 2-4

## 1986 REGIONAL FLOW MODEL CALIBRATION PERFORMANCE
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Well I.D. | Model Coordinates | | | Observed Water Level Elev. (FAMSL) | Computed Water Level Elev. (FAMSL) | Residual Error | Residual Absolute Error |
|---|---|---|---|---|---|---|---|
| | I | J | K | | | | |
| R-B | 3 | 37 | 4 | 541.9 | 540.5 | 1.39 | 1.39 |
| WW-1 | 25 | 37 | 4 | 528.2 | 531.1 | -2.88 | 2.88 |
| O-3 | 21 | 36 | 4 | 526.5 | 523.8 | 2.66 | 2.66 |
| PALLET-CO | 3 | 35 | 4 | 525.4 | 530.8 | -5.42 | 5.42 |
| B-1 | 26 | 35 | 4 | 522.3 | 526.4 | -4.08 | 4.08 |
| WK-1 | 27 | 35 | 4 | 525.5 | 527.1 | -1.62 | 1.62 |
| FMPC-11 | 3 | 34 | 4 | 524.6 | 529.1 | -4.53 | 4.53 |
| FMPC-3 | 4 | 34 | 3 | 524.1 | 528.4 | -4.27 | 4.27 |
| FMPC-10 | 6 | 34 | 3 | 523.6 | 527.3 | -3.65 | 3.65 |
| FMPC-13-S | 11 | 34 | 4 | 522.9 | 523.7 | -0.80 | 0.80 |
| IT-3 | 14 | 34 | 4 | 522.5 | 522.2 | 0.28 | 0.28 |
| IT-4 | 17 | 34 | 4 | 521.9 | 520.8 | 1.12 | 1.12 |
| K-3 | 21 | 34 | 4 | 511.4 | 517.6 | -6.20 | 6.20 |
| EL-1 | 24 | 34 | 4 | 522.9 | 523.1 | -0.24 | 0.24 |
| B-3 | 16 | 33 | 4 | 520.2 | 521.2 | -0.99 | 0.99 |
| B-2 | 18 | 33 | 4 | 520.6 | 519.6 | 1.01 | 1.01 |
| B-1 | 19 | 32 | 4 | 521.3 | 518.2 | 3.09 | 3.09 |
| K-2N | 22 | 34 | 4 | 514.3 | 519.8 | -5.45 | 5.45 |
| K-1 | 22 | 33 | 4 | 518.8 | 518.7 | 0.08 | 0.08 |
| K-4 | 24 | 33 | 4 | 520.6 | 522.9 | -2.25 | 2.25 |
| ER-1 | 26 | 33 | 4 | 525.9 | 525.0 | 0.94 | 0.94 |
| FMPC-8-S | 5 | 32 | 4 | 524.1 | 526.0 | -1.91 | 1.91 |
| B-4 | 20 | 32 | 4 | 520.3 | 516.6 | 3.67 | 3.67 |
| FMPC-9 | 4 | 31 | 3 | 526.4 | 526.0 | 0.43 | 0.43 |
| IT-2 | 13 | 31 | 4 | 522.9 | 522.1 | 0.80 | 0.80 |
| H-127 | 18 | 31 | 3 | 522.3 | 519.5 | 2.82 | 2.82 |
| SW-4A | 20 | 30 | 4 | 519.1 | 518.8 | 0.30 | 0.30 |

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TABLE 2-4

# 1986 REGIONAL FLOW MODEL CALIBRATION PERFORMANCE
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Well I.D. | Model Coordinates | | | Observed Water Level Elev. (FAMSL) | Computed Water Level Elev. (FAMSL) | Residual Error | Residual Absolute Error |
|---|---|---|---|---|---|---|---|
| | I | J | K | | | | |
| SW-3A | 20 | 30 | 4 | 518.3 | 518.8 | -0.50 | 0.50 |
| FMPC-18-S | 4 | 30 | 4 | 525.3 | 525.4 | -0.10 | 0.10 |
| IT-1 | 10 | 30 | 4 | 523.2 | 522.9 | 0.28 | 0.28 |
| O-2W | 16 | 29 | 4 | 522.4 | 520.9 | 1.52 | 1.52 |
| O-2E | 17 | 29 | 4 | 522.2 | 520.5 | 1.73 | 1.73 |
| BPH | 3 | 28 | 3 | 525.0 | 525.3 | -0.26 | 0.26 |
| FMPC-16-S | 4 | 28 | 4 | 524.8 | 524.4 | 0.37 | 0.37 |
| FMPC-14-D | 6 | 27 | 3 | 524.1 | 522.9 | 1.16 | 1.16 |
| IT-6 | 8 | 27 | 4 | 523.1 | 522.3 | 0.83 | 0.83 |
| IT-5 | 11 | 27 | 4 | 522.7 | 521.5 | 1.16 | 1.16 |
| BLK | 14 | 27 | 4 | 522.5 | 521.1 | 1.42 | 1.42 |
| H-105 | 4 | 26 | 4 | 523.4 | 523.7 | -0.25 | 0.25 |
| FMPC-17-D | 5 | 26 | 3 | 523.9 | 523.0 | 0.94 | 0.94 |
| FMPC-15-S | 7 | 26 | 4 | 523.1 | 522.2 | 0.89 | 0.89 |
| HK-D | 7 | 25 | 1 | 521.5 | 521.8 | -0.27 | 0.27 |
| BHMPH-D | 16 | 25 | 3 | 522.4 | 520.7 | 1.70 | 1.70 |
| DS | 6 | 23 | 4 | 521.8 | 521.2 | 0.64 | 0.64 |
| 7-8A | 6 | 23 | 4 | 520.7 | 521.2 | -0.46 | 0.46 |
| H-122 | 5 | 23 | 4 | 521.4 | 521.7 | -0.29 | 0.29 |
| 12-7A | 1 | 21 | 4 | 527.4 | 527.9 | -0.45 | 0.45 |
| DE | 12 | 21 | 4 | 519.9 | 517.9 | 1.97 | 1.97 |
| H-115 | 6 | 18 | 2 | 518.7 | 517.7 | 0.96 | 0.96 |
| RE | 7 | 18 | 4 | 515.7 | 516.4 | -0.68 | 0.68 |
| H-126 | 11 | 17 | 4 | 512.6 | 510.3 | 2.29 | 2.29 |
| H-124 | 9 | 13 | 3 | 505.8 | 504.2 | 1.56 | 1.56 |
| H-129 | 14 | 14 | 4 | 507.7 | 504.6 | 3.11 | 3.11 |

## TABLE 2-4

## 1986 REGIONAL FLOW MODEL CALIBRATION PERFORMANCE
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Well I.D. | Model Coordinates | | | Observed Water Level Elev. (FAMSL) | Computed Water Level Elev. (FAMSL) | Residual Error | Residual Absolute Error |
|---|---|---|---|---|---|---|---|
| | I | J | K | | | | |
| H-128 | 6 | 12 | 4 | 506.8 | 505.6 | 1.22 | 1.22 |
| 16-1-S | 18 | 9 | 4 | 504.3 | 503.7 | 0.65 | 0.65 |

*SUMMARY:*

| | | |
|---|---|---|
| Observed Mean | = | 521.3 |
| Computed Mean | = | 521.4 |
| Error Mean | = | -0.1 |
| ABS ERR Mean | = | 1.6 |
| Observed Variance | = | 35.46 |
| Error Variance | = | 4.96 |
| Computed Variance | = | 42.03 |
| Obs STD | = | 5.95 |
| Comp STD | = | 6.48 |
| Err STD | = | 2.23 |
| Coeff. of Variation (OBS) | = | 0.011 |
| Coeff. of Variation (COMP) | = | 0.012 |
| R1 (ERR Mean/OBS Mean) | = | -0.02% |
| R2 (ABS ERR Mean/OBS Mean) | = | 0.32% |
| R3 (ERR VAR/OBS VAR) | = | 13.98% |
| R4 (CORR COEF) | = | 0.939 |
| R5 (Coeff. of Var. (OBS)/Coeff. of Var. (COMP) | = | 91.9% |
| Fractional Imbalance | = | -0.90% |

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TABLE 2-5

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# 1991 REGIONAL FLOW MODEL CALIBRATION PERFORMANCE
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Well I.D. | Model Coordinates | | | Observed Water Level Elev. (FAMSL) | Computed Water Level Elev. (FAMSL) | Residual Error | Residual Absolute Error |
|---|---|---|---|---|---|---|---|
| | I | J | K | | | | |
| PZ-03 | 7 | 20 | 4 | 514.80 | 517.84 | -3.00 | 3.00 |
| PZ-04 | 10 | 19 | 4 | 515.50 | 514.48 | 1.00 | 1.00 |
| PZ-05 | 10 | 20 | 4 | 516.70 | 516.07 | 0.59 | 0.59 |
| PZ-06 | 7 | 23 | 4 | 521.50 | 519.72 | 1.74 | 1.74 |
| PZ-07 | 6 | 22 | 4 | 520.30 | 519.48 | 0.82 | 0.82 |
| PZ-08 | 6 | 21 | 4 | 516.00 | 519.10 | -3.14 | 3.14 |
| PZ-09 | 8 | 19 | 4 | 515.80 | 516.10 | -0.28 | 0.28 |
| PZ-10 | 8 | 20 | 4 | 517.20 | 517.13 | 0.11 | 0.11 |
| MW-01S | 6 | 23 | 4 | 521.50 | 520.14 | 1.31 | 1.31 |
| MW-01D | 6 | 23 | 2 | 521.50 | 520.13 | 1.37 | 1.37 |
| MW-02S | 7 | 21 | 4 | 520.20 | 518.52 | 1.63 | 1.63 |
| MW-03S | 7 | 20 | 4 | 515.20 | 517.84 | -2.61 | 2.61 |
| MW-04S | 7 | 20 | 4 | 515.20 | 517.84 | -2.60 | 2.60 |
| MW-05S | 7 | 20 | 4 | 515.30 | 517.84 | -2.58 | 2.58 |
| MW-06S | 7 | 20 | 4 | 515.30 | 517.84 | -2.55 | 2.55 |
| MW-07S | 7 | 19 | 4 | 514.50 | 517.03 | -2.49 | 2.49 |
| MW-08S | 7 | 19 | 4 | 516.40 | 517.03 | -0.64 | 0.64 |
| MW-09D | 7 | 19 | 3 | 516.20 | 517.08 | -0.90 | 0.90 |
| MW-10S | 7 | 18 | 4 | 513.50 | 515.41 | -1.96 | 1.96 |
| MW-11S | 7 | 18 | 4 | 513.50 | 515.41 | -1.94 | 1.94 |
| MW-12S | 7 | 18 | 4 | 513.40 | 515.41 | -2.03 | 2.03 |
| MW-13S | 8 | 18 | 4 | 512.80 | 514.19 | -1.44 | 1.44 |
| MW-14S | 8 | 18 | 4 | 514.30 | 514.19 | 0.09 | 0.09 |
| MW-14I | 8 | 18 | 3 | 514.40 | 514.18 | 0.18 | 0.18 |
| MW-15S | 7 | 18 | 4 | 512.60 | 515.41 | -2.81 | 2.81 |
| MW-15D | 7 | 18 | 3 | 512.70 | 515.40 | -2.66 | 2.66 |
| MW-16S | 7 | 18 | 4 | 513.00 | 515.41 | -2.41 | 2.41 |
| MW-18S | 7 | 20 | 4 | 517.90 | 517.84 | 0.08 | 0.08 |
| MW-18D | 7 | 20 | 3 | 517.80 | 517.84 | -0.04 | 0.04 |

## TABLE 2-5

## 1991 REGIONAL FLOW MODEL CALIBRATION PERFORMANCE
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Well I.D. | Model Coordinates | | | Observed Water Level Elev. (FAMSL) | Computed Water Level Elev. (FAMSL) | Residual Error | Residual Absolute Error |
|---|---|---|---|---|---|---|---|
| | I | J | K | | | | |
| MW-19S | 7 | 17 | 4 | 513.70 | 513.45 | 0.26 | 0.26 |
| MW-20S | 8 | 17 | 4 | 511.70 | 512.10 | -0.37 | 0.37 |
| MW-20D | 8 | 17 | 2 | 511.90 | 512.09 | -0.17 | 0.17 |
| MW-21S | 8 | 17 | 4 | 511.30 | 512.10 | -0.85 | 0.85 |
| MW-21I | 8 | 17 | 3 | 511.40 | 512.09 | -0.74 | 0.74 |
| MW-21D | 8 | 17 | 2 | 511.40 | 512.09 | -0.74 | 0.74 |
| MW-22S | 10 | 17 | 4 | 511.20 | 510.10 | 1.13 | 1.13 |
| MW-23S | 10 | 15 | 4 | 507.10 | 506.41 | 0.70 | 0.70 |
| MW-24S | 8 | 14 | 4 | 506.50 | 505.07 | 1.46 | 1.46 |
| MW-24I | 8 | 14 | 3 | 506.60 | 505.05 | 1.54 | 1.54 |
| MW-25S | 8 | 14 | 4 | 506.80 | 505.07 | 1.74 | 1.74 |
| MW-26S | 7 | 13 | 4 | 504.50 | 503.25 | 1.28 | 1.28 |
| MW-27S | 8 | 13 | 4 | 503.90 | 503.30 | 0.55 | 0.55 |
| MW-28S | 9 | 12 | 4 | 504.50 | 501.64 | 2.83 | 2.83 |
| MW-29S | 7 | 11 | 4 | 499.10 | 498.68 | 0.45 | 0.45 |
| MW-30S | 7 | 18 | 4 | 514.50 | 515.41 | -0.93 | 0.93 |
| MW-30I | 7 | 18 | 3 | 514.50 | 515.40 | -0.89 | 0.89 |
| MW-31S | 9 | 18 | 4 | 513.90 | 513.04 | 0.85 | 0.85 |
| MW-31I | 9 | 18 | 3 | 513.90 | 512.99 | 0.88 | 0.88 |
| MW-32S | 7 | 20 | 4 | 516.90 | 517.84 | -0.90 | 0.90 |
| MW-33I | 7 | 19 | 3 | 516.10 | 517.08 | -0.96 | 0.96 |
| MW-34S | 7 | 18 | 4 | 515.30 | 515.41 | -0.13 | 0.13 |
| MW-35S | 10 | 12 | 4 | 502.50 | 501.68 | 0.84 | 0.84 |
| MW-36S | 8 | 10 | 4 | 497.00 | 498.01 | -0.97 | 0.97 |
| MW-37S | 9 | 10 | 4 | 496.90 | 498.51 | -1.60 | 1.60 |
| MW-38S | 9 | 18 | 4 | 513.40 | 513.04 | 0.40 | 0.40 |
| MW-39S | 8 | 19 | 4 | 515.30 | 516.10 | -0.76 | 0.76 |
| MW-40S | 8 | 18 | 4 | 512.40 | 514.19 | -1.82 | 1.82 |
| MW-41S | 7 | 19 | 4 | 515.80 | 517.03 | -1.27 | 1.27 |

TABLE 2-5

# 1991 REGIONAL FLOW MODEL CALIBRATION PERFORMANCE
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Well I.D. | Model Coordinates | | | Observed Water Level Elev. (FAMSL) | Computed Water Level Elev. (FAMSL) | Residual Error | Residual Absolute Error |
|---|---|---|---|---|---|---|---|
| | I | J | K | | | | |
| 2095 | 6 | 24 | 4 | 522.00 | 520.67 | 1.28 | 1.28 |
| 3095 | 6 | 24 | 3 | 522.00 | 520.67 | 1.32 | 1.32 |
| 2126 | 5 | 20 | 4 | 517.50 | 519.37 | -1.89 | 1.89 |
| 3126 | 5 | 20 | 3 | 517.80 | 519.40 | -1.59 | 1.59 |
| 2129 | 7 | 19 | 4 | 516.20 | 517.03 | -0.85 | 0.85 |
| 2393 | 6 | 19 | 4 | 517.10 | 517.99 | -0.93 | 0.93 |
| 2554 | 5 | 18 | 4 | 516.60 | 518.16 | -1.52 | 1.52 |

*SUMMARY*

| | | |
|---|---|---|
| Observed Mean | = | 513.4 |
| Computed Mean | = | 513.9 |
| Error Mean | = | -0.45 |
| ABS ERR Mean | = | 1.27 |
| Observed Variance | = | 30.38 |
| Error Variance | = | 2.08 |
| Computed Variance | = | 33.50 |
| Obs STD | = | 5.51 |
| Comp STD | = | 5.79 |
| Err STD | = | 1.44 |
| Coeff. of Variation (OBS) | = | 0.011 |
| Coeff. of Variation (COMP) | = | 0.011 |
| R1 (ERR Mean/OBS Mean) | = | -0.09% |
| R2 (ABS ERR Mean/OBS Mean) | = | 0.25% |
| R3 (ERR VAR/OBS VAR) | = | 6.85% |
| R4 (CORR COEF) | = | 0.968 |
| R5 (Coeff. of Var. (OBS)/Coeff. of Var. (COMP)) | = | 95.3% |
| Fractional Imbalance | = | -1.1% |

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# TABLE 2-6

## SENSITIVITY ANALYSIS RESULTS - 1986 REGIONAL FLOW MODEL
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Parameter | Reported Range | Calib. Value | Sens. Value | % Change from Calib. Value | Calibration Output | | | | Sensitivity Output | | | | % Change = 100 (Calib. - Sens.)/Calib. | | | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Max. Residual | Min. Residual | Computed Mean | Computed Std. Dev. | Max. Residual | Min. Residual | Computed Mean | Computed Std. Dev. | Max. Residual | Min. Residual | Computed Mean | Computed Std. Dev. | |
| 1. Recharge (inches/year) | 4-15 | 6 and 14 | 3 and 7 | 50% less | 3.67 | -6.2 | 521.4 | 6.48 | 3.54 | -6.35 | 521.4 | 6.51 | 3.54 | -2.42 | 0.00 | -0.46 | a |
| | | | 9 and 21 | 50% more | 3.67 | -6.2 | 521.4 | 6.48 | 2.74 | -6.51 | 521.7 | 6.36 | 25.34 | -5.00 | -0.06 | 1.85 | a |
| 2. River Leakance (1/day) | 0.5 | 0.5 | 0.25 | 50% less | 3.67 | -6.2 | 521.4 | 6.48 | 6.04 | -5.12 | 520.7 | 6.45 | -64.58 | 17.42 | 0.13 | 0.46 | a, b |
| | | | 1.0 | 50% more | 3.67 | -6.2 | 521.4 | 6.48 | 4.56 | -9.12 | 522.3 | 6.72 | -24.25 | -47.10 | -0.17 | -3.70 | a |
| 3. $K_h$ (aquifer) (feet/day) | 60-600 | 350 and 450 | 175 and 225 | 25% less | 3.67 | -6.2 | 521.4 | 6.48 | 10.31 | -4.77 | 519.6 | 6.95 | -180.93 | 23.06 | 0.35 | -7.25 | a, b |
| | | | 467 and 600 | 33% more | 3.67 | -6.2 | 521.4 | 6.48 | 4.44 | -5.47 | 521.5 | 6.30 | -20.98 | 11.77 | -0.02 | 2.78 | a, b |
| 4. $K_v/K_h$ (aquifer) (unitless) | 1/10 | 1/10 | 1/100 | 90% less | 3.67 | -6.2 | 521.4 | 6.48 | 3.72 | -5.88 | 521.2 | 6.28 | -1.36 | 5.16 | 0.04 | 3.09 | a, c |
| | | | 1/5 | 100% more | 3.67 | -6.2 | 521.4 | 6.48 | 3.64 | -6.22 | 521.4 | 6.50 | 0.82 | -0.32 | 0.00 | -0.31 | a, c |
| 5. River stage (depth of flow) (feet) | PR: 0-1.83<br>GMR: 0-5.7 | PR: 0.5<br>GMR: 5.0 | PR: 0.25<br>GMR: 2.5 | 50% less | 3.67 | -6.2 | 521.4 | 6.48 | 8.71 | -4.67 | 519.0 | 7.22 | -137.33 | 24.68 | 0.46 | -11.42 | a, d |
| | | | PR: 0.75<br>GMR: 7.5 | 50% more | 3.67 | -6.2 | 521.4 | 6.48 | 2.27 | -7.35 | 522.1 | 6.25 | 38.15 | -18.55 | -0.13 | 3.55 | a, d |

*NOTES:*

- Zonation used in calibrated model was preserved
- $K_v/K_h$ ratio was preserved for sensitivity test
- $K_h$ kept equal to calibrated values
- Dove (1961) reports maximum channel depth in GMR ≅ 8 feet

- Max. residual = maximum of the positive residuals
- Min. residual = minimum of negative residuals
- Residuals = observed minus computed
- All statistics are feet of hydraulic head

## TABLE 2-7

## SENSITIVITY ANALYSIS RESULTS - 1991 REGIONAL FLOW MODEL
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Parameter | Reported Range | Calib. Value | Sens. Value | % Change from Calib. Value | Calibration Output | | | | Sensitivity Output | | | | % Change = 100 (Calib. - Sens.)/Calib. | | | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Max. Residual | Min. Residual | Computed Mean | Computed Std. Dev. | Max. Residual | Min. Residual | Computed Mean | Computed Std. Dev. | Max. Residual | Min. Residual | Computed Mean | Computed Std. Dev. | |
| 1. Recharge (inches/year) | 4-15 | 6 and 14 | 3 and 7 | 50% less | 1.74 | -3.14 | 513.9 | 5.79 | 1.31 | -3.56 | 514.3 | 5.82 | 24.71 | -13.38 | -0.08 | -0.52 | a |
| | | | 9 and 21 | 50% more | 1.74 | -3.14 | 513.9 | 5.79 | 2.71 | -3.07 | 514.0 | 5.77 | -55.75 | 2.23 | -0.02 | 0.35 | a |
| 2. River Leakance (1/day) | 0.5 | 0.5 | 0.25 | 50% less | 1.74 | -3.14 | 513.9 | 5.79 | 1.76 | -2.94 | 514.1 | 5.49 | -1.15 | 6.37 | -0.04 | 5.18 | a, b |
| | | | 1.0 | 50% more | 1.74 | -3.14 | 513.9 | 5.79 | 4.22 | -2.95 | 513.3 | 6.17 | -142.53 | 6.05 | 0.12 | -6.56 | a |
| 3. $K_h$ (aquifer) (feet/day) | 60-600 | 350 and 450 | 175 and 225 | 25% less | 1.74 | -3.14 | 513.9 | 5.79 | 3.70 | -1.90 | 512.8 | 5.68 | -112.64 | 39.49 | 0.21 | 1.90 | a b |
| | | | 467 and 600 | 33% more | 1.74 | -3.14 | 513.9 | 5.79 | 2.32 | -3.50 | 514.3 | 5.74 | -33.33 | -11.46 | -0.08 | 0.86 | a b |
| 4. $K_v/K_h$ (aquifer) (unitless) | 1/10 | 1/10 | 1/100 | 90% less | 1.74 | -3.14 | 513.9 | 5.79 | 1.65 | -3.09 | 514.1 | 5.46 | 5.17 | 1.59 | -0.04 | 5.70 | a c |
| | | | 1/5 | 100% more | 1.74 | -3.14 | 513.9 | 5.79 | 2.93 | -3.11 | 513.9 | 5.81 | -68.39 | 0.96 | 0.00 | -0.35 | a c |
| 5. River stage (depth of flow) (feet) | PR: 0-1.83 GMR: 0-5.7 | PR: 0.5 GMR: 5.0 | PR: 0.25 GMR: 2.5 | 50% less | 1.74 | -3.14 | 513.9 | 5.79 | 4.87 | -2.03 | 512.5 | 6.08 | -179.89 | 35.35 | 0.27 | -5.01 | a d |
| | | | PR: 0.75 GMR: 7.5 | 50% more | 1.74 | -3.14 | 513.9 | 5.79 | 0.86 | -4.02 | 515.1 | 5.44 | 50.57 | -28.03 | -0.23 | 6.04 | a d |

*FOOTNOTES:*

- Zonation used in calibrated model was preserved
- $K_v/K_h$ ratio was preserved for sensitivity test
- $K_h$ kept equal to calibrated values
- Dove (1961) reports maximum channel depth in GMR = 8 feet

- Max. residual = maximum of the positive residuals
- Min. residual = minimum of negative residuals
- Residuals = observed minus computed
- All statistics are feet of hydraulic head



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# TABLE 3-1

## LOCAL MODEL CALIBRATION - APRIL 1986
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Well I.D. | Model Coordinates | | | Observed Water Level Elev. (FAMSL) | Computed Water Level Elev. (FAMSL) | Residual Error | Residual Absolute Error |
|---|---|---|---|---|---|---|---|
| | I | J | K | | | | |
| H-115 | 11 | 58 | 4 | 518.70 | 515.56 | 3.14 | 3.14 |
| H-122 | 1 | 76 | 4 | 521.40 | 519.62 | 1.78 | 1.78 |
| H-124 | 26 | 32 | 3 | 505.80 | 505.74 | 0.06 | 0.06 |
| H-126 | 36 | 50 | 4 | 512.60 | 511.10 | 1.50 | 1.50 |
| H-128 | 13 | 27 | 4 | 506.80 | 505.03 | 1.77 | 1.77 |
| DE | 35 | 71 | 4 | 519.90 | 517.41 | 2.49 | 2.49 |
| RE | 19 | 60 | 4 | 515.70 | 515.25 | 0.45 | 0.45 |
| 7-8A | 11 | 80 | 4 | 520.70 | 520.32 | 0.38 | 0.38 |

*SUMMARY*

| | | |
|---|---|---|
| Observed Mean | = | 515.2 |
| Computed Mean | = | 513.8 |
| Error Mean | = | 1.4 |
| ABS ERR Mean | = | 1.4 |
| Observed Variance | = | 33.62 |
| Error Variance | = | 1.03 |
| Computed Variance | = | 30.47 |
| Obs STD | = | 5.80 |
| Comp STD | = | 5.52 |
| Err STD | = | 1.01 |
| Coeff. of Variation (OBS) | = | 0.17 |
| Coeff. of Variation (COMP) | = | 0.18 |
| R1 (ERR Mean/OBS Mean) | = | 0.28% |
| R2 (ABS ERR Mean/OBS Mean) | = | 0.28% |
| R3 (ERR VAR/OBS VAR) | = | 3.06% |
| R4 (CORR COEF) | = | 0.985 |
| R5 (Coeff. of Var. (OBS)/Coeff. of Var. (COMP)) | = | 95.2% |
| Fractional Imbalance | = | 0.90% |

000176

TABLE 3-2

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# 1991 LOCAL FLOW MODEL CALIBRATION PERFORMANCE
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Well I.D. | Model Coordinates | | | Observed Water Level Elev. (FAMSL) | Computed Water Level Elev. (FAMSL) | Residual Error | Residual Absolute Error |
|---|---|---|---|---|---|---|---|
| | I | J | K | | | | |
| MW-18D | 15 | 68 | 2 | 517.80 | 517.20 | 0.60 | 0.60 |
| MW-20D | 17 | 48 | 2 | 511.70 | 511.29 | 0.41 | 0.41 |
| MW-21D | 21 | 48 | 2 | 511.30 | 511.19 | 0.11 | 0.11 |
| MW-09D | 14 | 61 | 2 | 516.20 | 515.94 | 0.26 | 0.26 |
| MW-15D | 16 | 55 | 2 | 512.70 | 514.07 | -1.37 | 1.37 |
| MW-01D | 11 | 80 | 2 | 521.50 | 519.92 | 1.58 | 1.58 |
| DOE-3126 | 5 | 65 | 3 | 517.80 | 517.28 | 0.52 | 0.52 |
| MW-14I | 17 | 55 | 3 | 514.40 | 513.93 | 0.47 | 0.47 |
| MW-21I | 21 | 48 | 3 | 511.40 | 511.30 | 0.10 | 0.10 |
| MW-24I | 20 | 38 | 3 | 506.60 | 508.21 | -1.61 | 1.61 |
| MW-30I | 14 | 54 | 3 | 514.50 | 514.05 | 0.45 | 0.45 |
| MW-31I | 22 | 55 | 3 | 513.90 | 513.37 | 0.53 | 0.53 |
| MW-33I | 15 | 61 | 3 | 516.10 | 515.75 | 0.35 | 0.35 |
| DOE-2126 | 5 | 65 | 4 | 517.50 | 517.21 | 0.29 | 0.29 |
| DOE-2129 | 14 | 61 | 4 | 516.20 | 515.81 | 0.39 | 0.39 |
| DOE-2393 | 9 | 61 | 4 | 517.10 | 516.23 | 0.87 | 0.87 |
| DOE-2554 | 5 | 56 | 4 | 516.60 | 515.50 | 1.10 | 1.10 |
| MW-01S | 11 | 80 | 4 | 521.50 | 519.99 | 1.51 | 1.51 |
| MW-02S | 12 | 71 | 4 | 520.20 | 518.03 | 2.17 | 2.17 |
| MW-03S | 13 | 66 | 4 | 515.20 | 516.96 | -1.76 | 1.76 |
| MW-04S | 13 | 66 | 4 | 515.20 | 516.96 | -1.76 | 1.76 |
| MW-05S | 14 | 66 | 4 | 515.30 | 516.89 | -1.59 | 1.59 |
| MW-06S | 15 | 65 | 4 | 515.30 | 516.60 | -1.30 | 1.30 |
| MW-07S | 14 | 63 | 4 | 514.50 | 516.25 | -1.75 | 1.75 |
| MW-08S | 15 | 62 | 4 | 516.40 | 515.94 | 0.46 | 0.46 |
| MW-10S | 14 | 58 | 4 | 513.50 | 515.09 | -1.59 | 1.59 |
| MW-11S | 15 | 58 | 4 | 513.50 | 514.98 | -1.48 | 1.48 |
| MW-12S | 16 | 58 | 4 | 513.40 | 514.87 | -1.47 | 1.47 |

000177

TABLE 3-2

# 1991 LOCAL FLOW MODEL CALIBRATION PERFORMANCE
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Well I.D. | Model Coordinates | | | Observed Water Level Elev. (FAMSL) | Computed Water Level Elev. (FAMSL) | Residual Error | Residual Absolute Error |
|---|---|---|---|---|---|---|---|
| | I | J | K | | | | |
| MW-13S | 17 | 56 | 4 | 512.80 | 514.23 | -1.43 | 1.43 |
| MW-14S | 17 | 55 | 4 | 514.30 | 513.96 | 0.34 | 0.34 |
| MW-15S | 16 | 55 | 4 | 512.70 | 514.08 | -1.38 | 1.38 |
| MW-16S | 14 | 56 | 4 | 513.00 | 514.59 | -1.59 | 1.59 |
| MW-18S | 15 | 68 | 4 | 517.90 | 517.23 | 0.67 | 0.67 |
| MW-19S | 12 | 51 | 4 | 513.70 | 513.51 | 0.19 | 0.19 |
| MW-20S | 17 | 48 | 4 | 511.70 | 511.83 | -0.13 | 0.13 |
| MW-21S | 21 | 48 | 4 | 511.30 | 511.42 | -0.12 | 0.12 |
| MW-22S | 28 | 49 | 4 | 511.20 | 511.24 | -0.04 | 0.04 |
| MW-23S | 29 | 40 | 4 | 507.10 | 508.59 | -1.49 | 1.49 |
| MW-24S | 20 | 38 | 4 | 506.50 | 508.25 | -1.75 | 1.75 |
| MW-25S | 18 | 37 | 4 | 506.80 | 507.97 | -1.17 | 1.17 |
| MW-26S | 16 | 29 | 4 | 504.50 | 504.22 | 0.28 | 0.28 |
| MW-27S | 21 | 29 | 4 | 503.90 | 504.87 | -0.97 | 0.97 |
| MW-28S | 23 | 25 | 4 | 502.50 | 503.58 | -1.08 | 1.08 |
| MW-29S | 14 | 22 | 4 | 499.10 | 501.51 | -2.41 | 2.41 |
| MW-30S | 14 | 54 | 4 | 514.50 | 514.06 | 0.44 | 0.44 |
| MW-31S | 22 | 55 | 4 | 513.90 | 513.42 | 0.48 | 0.48 |
| MW-32S | 16 | 65 | 4 | 516.90 | 516.52 | 0.38 | 0.38 |
| MW-34S | 15 | 57 | 4 | 515.30 | 514.73 | 0.57 | 0.57 |
| MW-35S | 28 | 24 | 4 | 502.50 | 503.51 | -1.01 | 1.01 |
| MW-36S | 21 | 14 | 4 | 497.00 | 499.57 | -2.57 | 2.57 |
| MW-37S | 24 | 14 | 4 | 496.90 | 499.83 | -2.93 | 2.93 |
| MW-38S | 26 | 54 | 4 | 513.40 | 512.79 | 0.61 | 0.61 |
| MW-39S | 20 | 59 | 4 | 515.30 | 514.72 | 0.58 | 0.58 |
| MW-40S | 20 | 56 | 4 | 512.40 | 513.90 | -1.50 | 1.50 |
| MW-41S | 14 | 59 | 4 | 515.80 | 515.34 | 0.46 | 0.46 |
| PZ-03 | 13 | 64 | 4 | 514.80 | 516.55 | -1.75 | 1.75 |

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TABLE 3-2

# 1991 LOCAL FLOW MODEL CALIBRATION PERFORMANCE
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Well I.D. | Model Coordinates | | | Observed Water Level Elev. (FAMSL) | Computed Water Level Elev. (FAMSL) | Residual Error | Residual Absolute Error |
|---|---|---|---|---|---|---|---|
| | I | J | K | | | | |
| PZ-04 | 27 | 62 | 4 | 515.50 | 514.89 | 0.61 | 0.61 |
| PZ-05 | 28 | 66 | 4 | 516.70 | 515.89 | 0.81 | 0.81 |
| PZ-06 | 15 | 80 | 4 | 521.50 | 519.71 | 1.79 | 1.79 |
| PZ-07 | 10 | 76 | 4 | 520.30 | 519.19 | 1.11 | 1.11 |
| PZ-08 | 11 | 69 | 4 | 516.00 | 517.69 | -1.69 | 1.69 |
| PZ-09 | 19 | 62 | 4 | 515.80 | 515.57 | 0.23 | 0.23 |
| PZ-10 | 19 | 67 | 4 | 517.20 | 516.73 | 0.47 | 0.40 |

*SUMMARY:*

| | | |
|---|---|---|
| Observed Mean | = | 513.1 |
| Computed Mean | = | 513.4 |
| Error Mean | = | -0.3 |
| ABS ERR Mean | = | 1.0 |
| Observed Variance | = | 29.57 |
| Computed Variance | = | 22.43 |
| Error Variance | = | 1.38 |
| Obs STD | = | 5.44 |
| Comp STD | = | 4.74 |
| Err STD | = | 1.17 |
| Coeff. of Variation (OBS) | = | 0.18 |
| Coeff. of Variation (COMP) | = | 0.21 |
| R1 (ERR Mean/OBS Mean) | = | -0.06% |
| R2 (ABS ERR Mean/OBS Mean) | = | 0.19% |
| R3 (ERR VAR/OBS VAR) | = | 4.65% |
| R4 (CORR COEF) | = | 0.983 |
| R5 (Coeff. of Var. (OBS)/Coeff. of Var. (COMP)) | = | 87.2% |
| Fractional Imbalance | = | 1.92% |

## TABLE 4-1

## SELECTION OF MODELING CHEMICALS
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| | Predictive Capability | Available Fate & Transport Info. | Relative Mobility | Relative Toxicity | Extent in Ground Water | Simple Source | Totals |
|---|---|---|---|---|---|---|---|
| **Organics** | | | | | | | |
| Benzene | 1 | 3 | 3 | 3 | 1 | 1 | 12 |
| Toluene | 2 | 3 | 2 | 1 | 2 | 2 | 12 |
| Ethylbenzene | 3 | 3 | 1 | 2 | 3 | 3 | 15 |
| Xylenes | 2 | 3 | 2 | 2 | 3 | 3 | 15 |
| Cumene | 2 | 1 | 1 | 2 | 3 | 2 | 11 |
| **Inorganics** | | | | | | | |
| Arsenic | 1 | 2 | 1 | 3 | 1 | 1 | 9 |
| Sodium | 3 | 1 | 3 | 1 | 3 | 2 | 13 |
| Potassium | 2 | 1 | 3 | 1 | 2 | 1 | 10 |
| Potassium-40 | 1 | 1 | 2 | 2 | 1 | 1 | 8 |

Qualitative Ranking: 1 = Low; 2 = Medium; 3 = High

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## TABLE 4-2

## ESTIMATED AND REPORTED TRANSPORT PARAMETER VALUES
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Parameter | Test Method | Test Location | Reported Value/ Reported Units | Reported Value/ English Units | Value Based on These Constraints | Reference | Comments |
|---|---|---|---|---|---|---|---|
| Fluid (water) density at minimum solute mass fraction | Literature value (interpolated) | Not applicable | 0.999 gm/cm$^3$ | 62.37 lb/ft$^3$ | Pure $H_2O$ @ 60°F | Fetter (1980) p. 73 | — |
| Fluid (water) density at minimum solute mass fraction | Literature value | Not applicable | 0.9999 gm/cm$^3$ | 62.42 lb/ft$^3$ | Pure $H_2O$ @ 60°F | Lide (1991) p. 6-9 | — |
| Density of ethylbenzene | Literature value | Not applicable | 0.867 gm/cm$^3$ | 54 lb/ft$^3$ | Pure ethylbenzene @ 20°C | Verschueren, 1983 | — |
| Dispersivity (longitudinal) ($D_L$) | Transport model calibration | FEMP area | 100 ft | — | — | IT Corp./ASI (Dec. 1990) | Used in IT Model; Dispersivity is scale dependent |
| Dispersivity (transverse) ($D_T$) | Transport model calibration | FEMP area | 10 ft | — | — | IT Corp./ASI (Dec. 1990) | Used in IT Model; Dispersivity is scale dependent |
| $D_L$ | Transport model calibration | Chem-Dyne site, Hamilton, Ohio | 50 ft | — | — | Ward, et al. (1987) | Used in Ward, et al.'s model; Dispersivity is scale dependent |
| $D_T$ | Transport model calibration | Chem-Dyne site, Hamilton, Ohio | 20 ft | — | — | Ward, et al. (1987) | Used in Ward, et al.'s model; Dispersivity is scale dependent |



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# TABLE 4-2

## ESTIMATED AND REPORTED TRANSPORT PARAMETER VALUES
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Parameter | Test Method | Test Location | Reported Value/ Reported Units | Reported Value/ English Units | Value Based on These Constraints | Reference | Comments |
|---|---|---|---|---|---|---|---|
| $D_L$ and $D_T$ | Model calibration | Various sandy aquifers | $D_L$ = 300 ft for coastal Georgia<br>$D_L$ = 63 ft, $D_T$ = 9 ft for Long Island, New York | --- | --- | Pinder (1973) | Dispersivity is scale dependent |
| $D_L$ and $D_T$ | Model calibration | Various sandy aquifers for Florida | $D_L$ = 60 - 150 ft<br>$D_T$ = 10 - 30 ft | --- | --- | Tucker et al. (1986) | Dispersivity is scale dependent |
| Total organic carbon content (TOC) (unsat. zone) | Based on sampling | FEMP area | 4% | --- | Till & sand & gravel (unsat. zone) | IT Corp./ASI (Dec. 1990) | Used in IT Unsaturated Zone Model |
| TOC (sat. zone) | Analysis of soil samples | FEMP area | 1.5 - 8.3 mg/g | 0.15 - 0.83% | Sand & gravel (sat. zone) | IT Corp./ASI (Dec. 1990) Geotechnical Program: Issues 3 & 5; p. P-12 | Implied-Majority of samples used to calculate an Apparent Distribution Coefficient ($K_d$); locations not given |

## TABLE 4-2

## ESTIMATED AND REPORTED TRANSPORT PARAMETER VALUES
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Parameter | Test Method | Test Location | Reported Value/ Reported Units | Reported Value/ English Units | Value Based on These Constraints | Reference | Comments |
|---|---|---|---|---|---|---|---|
| TOC (sat. zone) | Geochemical modeling | FEMP area | 15 - 16 mg/g | 1.5 - 1.6% | Clay (sat. zone) | IT Corp./ASI (Dec. 1990) Geotechnical Program: Issues 3 & 5; p. P-12 | Implied- Two samples associated with high iron; leaching used to calculate an Apparent Distribution Coefficient ($K_d$); locations not given |
| TOC (sat. zone) | Direct measurement of TOC | Vicinity of PRRS | 290 to 1,800 mg/kg Avg. = 1,093 mg/kg | 0.029 - 0.18% Avg. = 0.1093% | Sand & gravel aquifer | ERM (Sept. 1992) | --- |
| Total organic matter (TOM) | % loss on ignition | MW-20D<br>MW-18D<br>MW-18D<br>MW-9D<br>MW-9D<br>MW-21D<br>MW-21D at PRRS | 6%<br>5%<br>7%<br>6%<br>7%<br>6%<br>5%<br>Avg. 6% | 5 - 7% | --- | ERM (Sept. 1992) | --- |
| Total organic content (TOC) | % lost on ignition and relationship between TOM and TOC | Vicinity of PRRS | 3.5% | 3.5% | TOM = 6% | ERM (Sept. 1992) & Dragun (1989) | --- |



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# TABLE 4-2

## ESTIMATED AND REPORTED TRANSPORT PARAMETER VALUES
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Parameter | Test Method | Test Location | Reported Value/ Reported Units | Reported Value/ English Units | Value Based on These Constraints | Reference | Comments |
|---|---|---|---|---|---|---|---|
| Bulk Density (DB) (S&G aquifer) | — | FEMP | 1.60 mg/cm$^3$ | 99.88 lb/ft$^3$ | Measured in the unsaturated zone | IT Corp./ASI (Dec. 1990) | Used in IT Model |
| DB (S&G aquifer) | Soil test | SB-37, sample IB and IIB, SB-64, sample II at PRRS | 107.9 lb/ft$^3$<br>95.5 lb/ft$^3$<br>92.2 lb/ft$^3$<br>average 98.53 lb/ft$^3$<br>(98.53 lb/ft$^3$ = 1.58 gm/cm$^3$) | 98.53 lb/ft$^3$ | — | ERM (Sept. 1992) and Terzaghi and Peck (1968) | Reasonable for the "fine sand" type of soil as indicated by $d_{50}$ and Table 6.3 of Terzaghi and Peck (1968) |
| Median diameter of soil particles ($d_{50}$) | Grain-size distribution | SB-37, sample IB and IIB, SB-64, sample II at PRRS | 0.082<br>0.082<br>0.082<br>Avg. 0.082 mm | 0.082 mm | — | ERM (Sept. 1992) and Terzaghi and Peck (1968) | $d_{50}$ indicates "fine sand" type of soil |
| Distribution coefficient (Kd) for ethylbenzene | Calculated from KOC, DB, and TOC | Vicinity of PRRS | 0.33 - 1.98 mL/gm | — | — | Table 4-11 | Dependent on % TOC observed at Study Area |
| Distribution coefficient (Kd) for sodium | Estimated based on the relation of soil to water concentrations | Vicinity of PRRS | 0.001 mL/gm | — | — | Table 4-10 | — |
| Ethylbenzene decay constant | Lab tests for ground water | — | 0.116 to 0.003 day$^{-1}$ | — | Half-life ranged from 6 to 228 days | Howard, et al. (1991) | — |
| Benzene decay constant | Model calibration and lab tests | Florida | 3 x 10$^{-5}$ day$^{-1}$ to 3 x 10$^{-7}$ day$^{-1}$ | — | — | API (1986) | Provided for comparison to ethylbenzene |

TABLE 4-2

ESTIMATED AND REPORTED TRANSPORT PARAMETER VALUES
PADDYS RUN ROAD SITE
HAMILTON COUNTY, OHIO

| Parameter | Test Method | Test Location | Reported Value/ Reported Units | Reported Value/ English Units | Value Based on These Constraints | Reference | Comments |
|---|---|---|---|---|---|---|---|
| Ethylbenzene solubility (S) | Literature | --- | 0.152 gm/L | --- | --- | Vershueren (1983) | --- |
| Sodium solubility | Assumed to be equal to the detected concentration in well MW-6S | PRRS (well MW-6S) | 0.9 to 4.0 gm/L avg. = 2.1 gm/L | --- | --- | ERM (Sept. 1992) | Maximum sodium concentrations detected in ground water at site were in well MW-6S |
| Percent residual hydrocarbon | Literature | --- | 5% (coarse sand) to 25% (silty and clay) | --- | --- | API (1986) | See also CONCAWE (1979) |
| Ethylbenzene soil adsorption coefficient (KOC) | Literature | --- | 1,100 mL/gm | --- | --- | EPA (1989) | --- |

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# TABLE 4-3

## TRANSPORT PARAMETER VALUES USED IN MODELING
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Model Parameter | Reported Range | Modeled Value | Comments |
|---|---|---|---|
| Fluid density at minimum solute mass fraction | 62.37 - 62.42 lb/ft$^3$ | 62.42 lb/ft$^3$ | (1) |
| Fluid density at maximum solute mass fraction | Not reported | 62.42 lb/ft$^3$ | (1) (2) |
| $D_L$<br>$D_T$ | 50 - 300 feet<br>9 - 30 feet | 50 feet<br>5 feet | (1)<br>(1) |
| TOC - saturated zone | 0.029 to 4% | 0.11% | (1) |
| DB | 92.5 to 107.9 lb/ft$^3$ | 98.5 lb/ft$^3$ | (1) |
| Porosity | 0.20 - 0.25 | 0.225 | See Table 2-1 (1) |
| Kd - ethylbenzene | 1.20 mL/gm | 0.63 mL/gm | Dependent on TOC |
| Kd - sodium | 0.001 mL/gm | 0.06 mL/gm | |
| Solubility - ethylbenzene | 0.152 gm/L | 0.152 gm/L | |
| Solubility - sodium | 0.9 - 4.0 gm/L | 2.1 gm/L | |
| Loading rates | Not reported | See Tables 4-16 to 4-22 | |
| KOC - ethylbenzene | 1,100 mL/gm | 1,100 mL/gm | |
| Decay constant - ethylbenzene | 0.116 - 0.003 day$^{-1}$ | 5 x $10^{-10}$ day$^{-1}$ | See also the decay half-life for benzene in Table 4-2 |
| Density of ethylbenzene | 54 lb/ft$^3$ | 54 lb/ft$^3$ | |

***FOOTNOTES:***

(1) Same parameter used for sodium and ethylbenzene models.

(2) Chemical concentrations in ground water at PRRS are assumed to be dilute enough that they do not significantly affect the fluid (ground water) density.

**TABLE 4-4**
**CORRELATION OF POTENTIAL SOURCE AREAS AND ASSOCIATED MODELING CHEMICALS**
**PADDYS RUN ROAD SITE**
**HAMILTON COUNTY, OHIO**

| | Former Production Storage and Loadout Area | Discoloration of Veg.; Air Discharge up to 1980 | Na Chemical & Hydrotope Storage Area | p-Storage & Alkali Phosphate Production Area | p-Acid Production | Process Water Drainage | A&W Effluent Leak | Former Sludge Area (Up to 1982) | Process Building | Former Drums | Former Sludge Lagoon | Cooling Water Discharge Pond | Former Pond and Soil Piles | Truck Cleaning Area | Former Petroleum USTs | Former Pond | Raw Product Tank Farm Area | Caustic Potash Storage & Alkali Phosphate Products |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area 1 | Area 2 | Area 3 | Area 4 | Area 5 | Area 6 | Area 7 | Area 8 | Area 9 | Area 10 | Area 11 | Area 12 | Area 13 | Area 14 | Area 15 | Area 16 | Area 17 | Area 18 |
| RI (ERM, Sept. 1992) Designation | F | — | L | D | C | G | — | H | T | I | N | R | S | K | U | Q | M | — |
| K | ✓ | ✓ | | | | ✓ | | ✓ | | ✓ | | | | | | | | ✓ |
| K-40 | ✓ | | | ✓ | | ✓ | | | | | | | | | | | | |
| Ar | ✓ | | | | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | | | | | | |
| Na | ✓ | ✓ | ✓ | | | ✓ | | ✓ | | ✓ | | | | | | | | |
| CU | | | ✓ | | | | | | ✓ | | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| BE | | | ✓ | | | | | | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| EB | | | ✓ | | | | | | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| TO | | | ✓ | | | | | | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| XY | | | ✓ | | | | | | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |

*NOTES:*

See Figure 4-1 for source area delineation.
Information source: ERM (Sept. 1992) - Based on facility operation history, reported spills, facility personnel interviews, and review of aerial photographs.



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# TABLE 4-5

## AVERAGE CONCENTRATIONS IN BACKGROUND SOIL AND GROUND WATER PADDYS RUN ROAD SITE HAMILTON COUNTY, OHIO

| Chemical | Ground Water (Dissolved) | Soil |
|---|---|---|
| Benzene | BDL | BDL |
| Ethylbenzene | BDL | BDL |
| Toluene | BDL | BDL |
| Xylene | BDL | BDL |
| Cumene | BDL | BDL |
| Sodium | 20.65 mg/L | 150.64 mg/kg |
| Arsenic | BDL | 4.91 mg/kg |
| Potassium | 2.870 mg/L | 1,802.3 mg/kg |
| Potassium-40 | 58.15 pCi/L | 13.02 pCi/L |

*NOTES:*

BDL = Below analytical detection limits.

Concentration values are average background concentrations. These values are not representative of upper tolerance level background concentrations.

Reference: ERM (Sept. 1992).

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# TABLE 4-6

## 1991 DEPTH AVERAGED CONCENTRATIONS FOR SODIUM IN SOIL BORINGS PADDYS RUN ROAD SITE HAMILTON COUNTY, OHIO

| Boring No. | Sample Depth Interval (Ft.) | Sodium Concentration (µg/kg)[a] | Depth Avg. Conc. above Wt. (µg/kg)[b] | Comments |
|---|---|---|---|---|
| MW-06 | 0-2 | 2,340,000 | 1,869,400 | |
| MW-06 | 6-8 | 1,300,000 | | |
| MW-06 | 12-14 | 2,820,000 | | |
| MW-11S | 8-10 | 939,000 | 788,400 | |
| MW-12S | 6-8 | 797,000 | 646,400 | |
| SB-01 | 0-7 | 370,000 | 417,300 | |
| SB-01 | 7-12 | 845,000 | | |
| SB-02 | 0-7 | 929,000 | 697,150 | |
| SB-02 | 7-12 | 734,000 | | |
| SB-03 | 0-7 | 725,000 | 697,300 | |
| SB-03 | 7-12 | 1,020,000 | | |
| SB-04 | 0-7 | 949,000 | 848,800 | |
| SB-04 | 7-12 | 1,070,000 | | |
| SB-05 | 0-7 | 767,000 | 788,500 | |
| SB-06 | 0-7 | 1,010,000 | 684,000 | |
| SB-06 | 7-12 | 589,000 | | |
| SB-07 | 0-7 | 547,000 | 387,200 | |
| SB-07 | 7-12 | 525,000 | | |
| SB-08 | 0-7 | 665,000 | 496,100 | |
| SB-08 | 7-10 | 604,000 | | |
| SB-09 | 0-7 | 462,000 | 503,000 | |
| SB-09 | 7-11 | 989,000 | | |
| SB-10 | 0-7 | 1,590,000 | 1,315,800 | |
| SB-10 | 2-4 | 3,130,000 | | |
| SB-10 | 4-6 | 1,090,000 | | |
| SB-10 | 7-11 | 1,250,000 | | |
| SB-11 | 0-7 | 3,180,000 | 2,338,500 | |
| SB-11 | 7-11 | 1,280,000 | | |
| SB-12 | 0-7 | 3,700,000 | 3,549,400 | |
| SB-12 | 2-4 | 464,000 | | |
| SB-13 | 0-7 | 6,320,000 | 5,170,400 | |
| SB-13 | 7-10 | 2,990,000 | | |
| SB-14 | 0-7 | 1,400,000 | 1,349,400 | |
| SB-14 | 7-12 | 1,640,000 | | |
| SB-15 | 0-7 | 700,000 | 549,400 | |
| SB-16 | 0-7 | 442,000 | 302,900 | |
| SB-16 | 7-14 | 467,000 | | |
| SB-17 | 0-7 | 469,000 | 305,900 | |
| SB-17 | 7-16 | 442,000 | | |
| SB-17 | 9-10 | 463,000 | | |
| SB-17 | 10-12 | 625,000 | | |
| SB-18 | 0-7 | 549,000 | 416,400 | |
| SB-18 | 4-5 | 354,000 | | |
| SB-18 | 7-15 | 588,000 | | |
| SB-19 | 0-7 | 169,000 | 15,900 | c |
| SB-19 | 5-6 | 358,000 | | |
| SB-19 | 7-16 | 163,500 | | c |
| SB-19 | 9-10 | 698,000 | | |
| SB-20 | 0-7 | 360,000 | 247,800 | |
| SB-20 | 7-10 | 488,000 | | |
| SB-21 | 0-2 | 2,880,000 | 2,285,600 | |
| SB-21 | 0-7 | 2,390,000 | | |
| SB-21 | 7-13 | 2,490,000 | | |
| SB-21 | 13-14 | 1,120,000 | | |
| SB-22 | 0-7 | 1,150,000 | 999,400 | |
| SB-22 | 1-1 | 310,000 | | |
| SB-22 | 7-12 | 790,000 | | |
| SB-23 | 0-7 | 687,000 | 607,500 | |
| SB-23 | 3-4 | 360,000 | | |
| SB-23 | 4-5 | 490,000 | | |
| SB-23 | 7-11 | 802,000 | | |
| SB-23 | 11-12 | 1,080,000 | | |
| SB-24 | 0-7 | 168,000 | 132,800 | c |
| SB-24 | 7-12 | 445,000 | | |
| SB-24 | 8-9 | 183,000 | | c |
| SB-25 | 0-7 | 563,000 | 590,000 | |
| SB-25 | 7-8 | 799,000 | | |
| SB-25 | 8-17 | 938,000 | | |
| SB-25 | 15-16 | 1,070,000 | | |
| SB-25 | 17-18 | 802,000 | | |
| SB-26 | 0-7 | 161,500 | 9,300 | c |
| SB-26 | 101 | 449,000 | | |
| SB-26 | 7-15 | 158,000 | | c |
| SB-26 | 9-10 | 171,000 | | c |
| SB-26 | 15-16 | 330,000 | | |
| SB-27 | 0-7 | 171,000 | 14,600 | c |
| SB-27 | 5-6 | 176,500 | | c |
| SB-27 | 7-13 | 158,500 | | c |
| SB-27 | 10-11 | 169,000 | | c |
| SB-27 | 13-14 | 159,000 | | c |
| SB-28 | 0-7 | 1,220,000 | 851,100 | |
| SB-28 | 1-2 | 977,000 | | |
| SB-28 | 4-6 | 479,000 | | |
| SB-28 | 7-15 | 747,000 | | |
| SB-29 | 0-7 | 169,500 | 12,800 | c |
| SB-29 | 1-2 | 175,000 | | c |
| SB-29 | 7-14 | 158,000 | | c |
| SB-29 | 15-16 | 519,000 | | |

# TABLE 4-6

## 1991 DEPTH AVERAGED CONCENTRATIONS FOR SODIUM IN SOIL BORINGS PADDYS RUN ROAD SITE HAMILTON COUNTY, OHIO

| Boring No. | Sample Depth Interval (Ft.) | Sodium Concentration (µg/kg)[a] | Depth Avg. Conc. above Wt. (µg/kg)[b] | Comments |
|---|---|---|---|---|
| SB-30 | 0-7 | 174,500 | 117,300 | c |
| SB-30 | 7-14 | 377,000 | | |
| SB-31 | 0-6 | 712,000 | 540,400 | |
| SB-31 | 0-7 | 691,000 | | |
| SB-32 | 0-7 | 180,500 | 54,000 | c |
| SB-32 | 7-8 | 373,000 | | |
| SB-33 | 0-7 | 569,000 | 503,300 | |
| SB-33 | 7-10 | 852,000 | | |
| SB-34 | 0-7 | 1,320,000 | 1,238,300 | |
| SB-34 | 7-9 | 1,630,000 | | |
| SB-35 | 0-2 | 230,000 | 32,600 | |
| SB-35 | 2-6 | 223,000 | | |
| SB-35 | 6-8 | 211,500 | | c |
| SB-35 | 8-10 | 255,000 | | |
| SB-35 | 10-12 | 251,000 | | |
| SB-35 | 12-14 | 106,000 | | c |
| SB-35 | 14-16 | 122,500 | | c |
| SB-36 | 0-2 | 218,000 | 266,900 | c |
| SB-36 | 2-6 | 762,000 | | |
| SB-36 | 6-10 | 240,500 | | c |
| SB-36 | 10-13 | 327,000 | | |
| SB-37 | 0-2 | 1,440,000 | 582,700 | |
| SB-37 | 2-6 | 718,000 | | |
| SB-37 | 6-10 | 517,000 | | |
| SB-37 | 10-18 | 571,000 | | |
| SB-38 | 2-6 | 214,000 | 64,200 | |
| SB-38 | 6-10 | 208,000 | | |
| SB-38 | 10-18 | 225,000 | | |
| SB-39 | 0-2 | 290,000 | 82,100 | |
| SB-39 | 2-6 | 197,500 | | c |
| SB-39 | 6-10 | 692,000 | | |
| SB-39 | 10-18 | 374,000 | | |
| SB-40 | 0-2 | 429,000 | 145,200 | |
| SB-40 | 6-10 | 232,000 | | c |
| SB-40 | 10-18 | 435,000 | | |
| SB-42 | 2-6 | 252,000 | 91,000 | |
| SB-42 | 6-10 | 243,000 | | |
| SB-42 | 10-18 | 226,000 | | |
| SB-43 | 2-6 | 200,000 | 54,000 | |
| SB-43 | 6-10 | 158,000 | | |
| SB-43 | 10-21 | 273,000 | | |
| SB-44 | 2-6 | 344,000 | 136,300 | |
| SB-44 | 6-10 | 229,000 | | |
| SB-44 | 10-13 | 288,000 | | |
| SB-45 | 2-6 | 186,000 | 79,900 | |
| SB-45 | 6-10 | 252,000 | | |
| SB-45 | 10-18 | 261,000 | | |
| SB-46 | 0-2 | 255,000 | 50,200 | |
| SB-46 | 2-6 | 161,000 | | |
| SB-46 | 6-10 | 220,000 | | |
| SB-46 | 10-20 | 219,000 | | |
| SB-47 | 0-2 | 539,000 | 157,300 | |
| SB-47 | 2-6 | 319,000 | | |
| SB-47 | 6-10 | 245,000 | | |
| SB-47 | 10-18 | 223,000 | | |
| SB-48 | 2-4 | 164,000 | 314,800 | |
| SB-48 | 4-6 | 245,000 | | |
| SB-48 | 6-8 | 522,000 | | |
| SB-48 | 8-10 | 760,000 | | |
| SB-48 | 10-16 | 579,000 | | |
| SB-49 | 2-4 | 177,000 | 191,210 | |
| SB-49 | 4-6 | 564,000 | | |
| SB-49 | 6-8 | 462,000 | | |
| SB-49 | 8-10 | 287,000 | | |
| SB-49 | 10-16 | 260,000 | | |
| SB-50 | 2-4 | 268,000 | 65,300 | |
| SB-50 | 2-6 | 542,000 | | |
| SB-50 | 4-6 | 544,000 | | |
| SB-50 | 6-8 | 206,000 | | |
| SB-50 | 6-10 | 225,000 | | |
| SB-50 | 8-10 | 224,000 | | |
| SB-50 | 10-13 | 100,500 | | c |
| SB-51 | 2-4 | 348,000 | 224,900 | |
| SB-51 | 4-6 | 388,000 | | |
| SB-51 | 6-8 | 386,000 | | |
| SB-51 | 8-10 | 365,000 | | |
| SB-52 | 2-4 | 1,910,000 | 838,800 | |
| SB-52 | 4-6 | 1,880,000 | | |
| SB-52 | 6-8 | 747,000 | | |
| SB-52 | 8-10 | 420,000 | | |
| SB-52 | 10-13 | 323,000 | | |
| SB-53 | 2-4 | 1,770,000 | 600,900 | |
| SB-53 | 4-6 | 1,020,000 | | |
| SB-53 | 6-8 | 1,320,000 | | |
| SB-53 | 8-10 | 400,000 | | |
| SB-53 | 10-13 | 250,000 | | |
| SB-54 | 0-2 | 760,000 | 247,900 | |
| SB-54 | 2-4 | 418,000 | | |

# TABLE 4-6

## 1991 DEPTH AVERAGED CONCENTRATIONS FOR SODIUM IN SOIL BORINGS PADDYS RUN ROAD SITE HAMILTON COUNTY, OHIO

| Boring No. | Sample Depth Interval (Ft.) | Sodium Concentration (µg/kg)[a] | Depth Avg. Conc. above Wt. (µg/kg)[b] | Comments |
|---|---|---|---|---|
| SB-54 | 4-6 | 328,000 | | |
| SB-54 | 6-8 | 316,000 | | |
| SB-54 | 8-10 | 344,000 | | |
| SB-54 | 10-13 | 283,000 | | |
| SB-55 | 0-2 | 462,000 | 160,200 | |
| SB-55 | 2-4 | 537,000 | | |
| SB-55 | 4-6 | 579,000 | | |
| SB-55 | 6-8 | 579,000 | | |
| SB-55 | 8-10 | 112,500 | | c |
| SB-55 | 10-13 | 135,000 | | c |
| SB-56 | 0-2 | 1,360,000 | 589,700 | |
| SB-56 | 2-4 | 1,800,000 | | |
| SB-56 | 4-6 | 649,000 | | |
| SB-56 | 6-8 | 302,000 | | |
| SB-56 | 8-10 | 293,000 | | |
| SB-56 | 10-13 | 272,000 | | |
| SB-57 | 0-2 | 431,000 | 163,100 | |
| SB-57 | 2-4 | 352,000 | | |
| SB-57 | 4-6 | 277,000 | | |
| SB-57 | 6-8 | 265,000 | | |
| SB-57 | 8-10 | 306,000 | | |
| SB-57 | 10-13 | 272,000 | | |
| SB-58 | 0-2 | 242,000 | 343,700 | |
| SB-58 | 2-4 | 442,000 | | |
| SB-58 | 4-6 | 742,000 | | |
| SB-58 | 6-8 | 938,000 | | |
| SB-58 | 8-10 | 506,000 | | |
| SB-58 | 10-13 | 343,000 | | |
| SB-59 | 0-2 | 949,000 | 334,200 | |
| SB-59 | 2-4 | 530,000 | | |
| SB-59 | 4-6 | 552,000 | | |
| SB-59 | 6-8 | 207,000 | | |
| SB-59 | 8-10 | 492,000 | | |
| SB-59 | 10-13 | 281,000 | | |
| SB-60 | 0-2 | 622,000 | 176,900 | |
| SB-60 | 2-4 | 462,000 | | |
| SB-60 | 4-6 | 178,000 | | |
| SB-60 | 6-8 | 168,500 | | c |
| SB-60 | 8-10 | 230,000 | | |
| SB-60 | 10-13 | 312,000 | | |
| SB-61 | 0-2 | 667,000 | 1,105,500 | |
| SB-61 | 2-4 | 1,690,000 | | |
| SB-61 | 4-6 | 1,780,000 | | |
| SB-61 | 6-8 | 1,780,000 | | |
| SB-61 | 8-10 | 1,070,000 | | |
| SB-61 | 10-13 | 785,000 | | |
| SB-62 | 0-2 | 1,020,000 | 7,016,700 | |
| SB-62 | 2-4 | 11,900,000 | | |
| SB-62 | 6-8 | 8,950,000 | | |
| SB-62 | 8-10 | 12,000,000 | | |
| SB-62 | 10-13 | 3,700,000 | | |
| SB-63 | 0-2 | 5,490,000 | 2,895,100 | |
| SB-63 | 2-4 | 3,100,000 | | |
| SB-63 | 10-13 | 1,380,000 | | |
| SB-64 | 2-4 | 1,540,000 | 2,071,400 | |
| SB-64 | 4-6 | 3,890,000 | | |
| SB-64 | 6-8 | 3,590,000 | | |
| SB-64 | 8-10 | 2,670,000 | | |
| SB-64 | 10-13 | 354,000 | | |
| SB-65 | 0-2 | 4,240,000 | 3,667,900 | |
| SB-65 | 2-4 | 2,970,000 | | |
| SB-65 | 4-6 | 3,430,000 | | |
| SB-65 | 6-8 | 5,570,000 | | |
| SB-65 | 8-10 | 3,540,000 | | |
| SB-65 | 10-13 | 3,380,000 | | |
| SB-66 | 2-4 | 8,280,000 | 2,835,800 | |
| SB-66 | 4-6 | 1,060,000 | | |
| SB-66 | 6-8 | 1,080,000 | | |
| SB-66 | 8-10 | 1,280,000 | | |
| SB-66 | 10-13 | 3,150,000 | | |
| SB-67 | 0-2 | 6,110,000 | 1,953,900 | |
| SB-67 | 2-4 | 4,090,000 | | |
| SB-67 | 4-6 | 707,000 | | |
| SB-67 | 6-8 | 390,000 | | |
| SB-67 | 8-10 | 1,200,000 | | |
| SB-67 | 10-13 | 788,000 | | |
| SB-68 | 0-2 | 2,810,000 | 1,825,400 | |
| SB-68 | 2-4 | 1,770,000 | | |
| SB-68 | 4-6 | 1,070,000 | | |
| SB-68 | 6-8 | 5,560,000 | | |
| SB-68 | 8-10 | 887,000 | | |
| SB-68 | 10-13 | 498,000 | | |
| SB-69 | 0-2 | 554,000 | 255,400 | |
| SB-69 | 2-4 | 498,000 | | |
| SB-69 | 4-6 | 469,000 | | |
| SB-69 | 6-8 | 259,000 | | |
| SB-69 | 10-13 | 302,000 | | |
| SB-70 | 0-2 | 1,650,000 | 508,900 | |

# TABLE 4-6

## 1991 DEPTH AVERAGED CONCENTRATIONS FOR SODIUM IN SOIL BORINGS PADDYS RUN ROAD SITE HAMILTON COUNTY, OHIO

| Boring No. | Sample Depth Interval (Ft.) | Sodium Concentration (µg/kg)[a] | Depth Avg. Conc. above Wt. (µg/kg)[b] | Comments |
|---|---|---|---|---|
| SB-70 | 2-4 | 1,500,000 | | |
| SB-70 | 4-6 | 548,000 | | |
| SB-70 | 6-8 | 182,000 | | c |
| SB-70 | 8-10 | 344,000 | | |
| SB-70 | 10-13 | 313,000 | | |
| SB-71 | 0-2 | 2,210,000 | 1,928,400 | |
| SB-71 | 2-4 | 3,730,000 | | |
| SB-71 | 4-6 | 1,890,000 | | |
| SB-71 | 6-8 | 485,000 | | |
| SB-72 | 0-2 | 549,000 | 452,000 | |
| SB-72 | 2-4 | 1,660,000 | | |
| SB-72 | 4-6 | 333,000 | | |
| SB-72 | 6-8 | 366,000 | | |
| SB-72 | 8-10 | 403,000 | | |
| SB-72 | 10-13 | 404,000 | | |
| SB-73 | 0-2 | 804,000 | 350,100 | |
| SB-73 | 4-6 | 456,000 | | |
| SB-73 | 6-8 | 418,000 | | |
| SB-73 | 8-10 | 314,000 | | |
| SB-73 | 10-13 | 508,000 | | |
| SB-74 | 2-4 | 817,000 | 289,600 | |
| SB-74 | 4-6 | 381,000 | | |
| SB-74 | 6-8 | 360,000 | | |
| SB-74 | 8-10 | 371,000 | | |
| SB-74 | 10-13 | 328,000 | | |
| SB-75 | 2-4 | 359,000 | 274,700 | |
| SB-75 | 4-6 | 449,000 | | |
| SB-75 | 6-8 | 481,000 | | |
| SB-75 | 8-10 | 390,000 | | |
| SB-75 | 10-13 | 440,000 | | |
| SB-76 | 2-4 | 1,180,000 | 691,800 | |
| SB-76 | 4-6 | 789,000 | | |
| SB-76 | 6-8 | 1,180,000 | | |
| SB-76 | 8-10 | 719,000 | | |
| SB-76 | 10-13 | 510,000 | | |
| SB-77 | 0-2 | 1,240,000 | 236,900 | |
| SB-77 | 2-4 | 371,000 | | c |
| SB-77 | 4-6 | 186,500 | | c |
| SB-77 | 6-8 | 170,500 | | c |
| SB-77 | 8-10 | 303,000 | | |
| SB-77 | 10-13 | 165,000 | | c |
| SB-78 | 2-4 | 139,000 | 161,000 | c |
| SB-78 | 2-6 | 420,000 | | |
| SB-78 | 6-8 | 213,500 | | c |
| SB-78 | 6-10 | 326,000 | | |
| SB-78 | 8-10 | 263,000 | | |
| SB-78 | 12-14 | 354,000 | | |
| SB-78 | 10-13 | 265,000 | | |
| SB-79 | 2-4 | 783,000 | 297,800 | |
| SB-79 | 4-6 | 300,000 | | |
| SB-79 | 6-8 | 296,000 | | |
| SB-79 | 6-10 | 254,000 | | |
| SB-79 | 8-10 | 295,000 | z/re | |
| SB-79 | 10-13 | 528,000 | | |
| SB-80 | 2-4 | 631,000 | 288,700 | |
| SB-80 | 4-6 | 596,000 | | |
| SB-80 | 6-8 | 376,000 | | |
| SB-80 | 8-10 | 435,000 | | |
| SB-80 | 10-16 | 252,000 | | |
| SB-81 | 2-4 | 289,000 | 281,800 | |
| SB-81 | 4-6 | 818,000 | | |
| SB-81 | 6-8 | 497,000 | | |
| SB-81 | 8-10 | 390,000 | | |
| SB-81 | 10-16 | 256,000 | | |

*NOTES:*

[a] Observed value (ERM, Sept. 1992).

[b] Refer to Figure 4-2 for explanation of averaging method. The average concentration shown is minus the average sodium concentration (150,600 µg/L) observed in the background sampling locations.

[c] For borings with below detection limit values, one-half of the detection limit was assigned as the concentration.

NA = Not available

Average estimated DTW at PRRS property is 13 feet based on ERM (Sept. 1992)

# TABLE 4-7

## 1991 DEPTH AVERAGED CONCENTRATIONS FOR ETHYLBENZENE IN SOIL BORINGS PADDYS RUN ROAD SITE HAMILTON COUNTY, OHIO

| Boring No. | Sample Depth Interval (Ft.) | EB Conc. (µg/kg) | Depth Avg. Conc. Above Wt. (µg/kg)[a] | Depth Avg. Conc. Below Wt. (µg/kg)[b] | Comments |
|---|---|---|---|---|---|
| MW-06 | 2-4 | 3 | 3 | NA | c |
| MW-06 | 4-6 | 3 | | | c |
| MW-06 | 6-8 | 3 | | | c |
| MW-06 | 8-10 | 3 | | | c |
| MW-06 | 10-12 | 2.5 | | | c |
| MW-10S | 4-6 | 75 | 35,575 | 452,978 | |
| MW-10S | 6-8 | 3 | | | c |
| MW-10S | 8-10 | 6 | | | c |
| MW-10S | 10-12 | 5 | | | c |
| MW-10S | 12-14 | 320000 | | | |
| MW-10S | 14-16 | 870000 | | | |
| MW-10S | 16-17 | 2900000 | | | |
| MW-10S | 17-19 | 1400 | | | |
| MW-10S | 19-20.5 | 360 | | | |
| MW-11S | 4-6 | 3900 | 469,686 | 431,857 | |
| MW-11S | 8-10 | 480000 | | | |
| MW-11S | 10-12 | 930000 | | | |
| MW-11S | 12-14 | 460000 | | | |
| MW-11S | 14-16 | 670000 | | | |
| MW-11S | 16-17.5 | 570000 | | | |
| MW-11S | 19-20 | 38000 | | | |
| MW-11S | 17.5-19 | 220000 | | | |
| MW-12S | 2-4 | 4100 | 139,382 | 426,235 | |
| MW-12S | 4-6 | 270000 | | | |
| MW-12S | 6-8 | 27000 | | | |
| MW-12S | 8-10 | 110000 | | | |
| MW-12S | 10-12 | 69000 | | | |
| MW-12S | 12-14 | 33000 | | | |
| MW-12S | 14-16 | 560000 | | | |
| MW-12S | 16-18 | 880000 | | | |
| MW-12S | 18-20 | 22000 | | | |
| MW-12S | 20-21.5 | 180000 | | | |
| MW-13S | 8-10 | 3.5 | 46,003 | 73,358 | c |
| MW-13S | 10-12 | 3.5 | | | c |
| MW-13S | 12-14 | 230000 | | | |
| MW-13S | 14-16 | 1200000 | | | |
| MW-13S | 18-20 | 86000 | | | |
| MW-14S | 10-12 | 2.5 | | | c |
| MW-14S | 14-16 | 75 | | | |
| MW-14S | 16-18 | 110000 | | | |
| MW-18S | 8-10 | 2.5 | 3 | NA | c |
| MW-21D | 16-18 | 10.5 | | | |
| MW-21D | 20-21 | 105 | | | |
| MW-21D | 21-23 | 6.5 | | | c |
| MW-21S | 10-12 | 14500 | 12,000 | NA | |
| MW-21S | 12-14 | 7000 | | | |
| MW-21S | 14-16 | 160 | | | |
| SB-11 | 6-8 | 2.5 | 3 | NA | |
| SB-11 | 10-12 | 3 | | | c |
| SB-12 | 6-8 | 3 | 3 | NA | c |
| SB-12 | 8-10 | 3 | | | c |
| SB-13 | 0-2 | 3.5 | 3 | NA | c |
| SB-13 | 8-10 | 3 | | | c |
| SB-14 | 8-10 | 3 | 3 | NA | c |
| SB-14 | 10-12 | 2.5 | | | c |
| SB-15 | 0-2 | 3 | 3 | NA | c |
| SB-15 | 6-8 | 3 | | | c |
| SB-16 | 2-4 | 3 | 65,092 | 4,668 | c |
| SB-16 | 4-6 | 37000 | | | |
| SB-16 | 6-8 | 170000 | | | |
| SB-16 | 8-10 | 78000 | | | |
| SB-16 | 10-12 | 66000 | | | |
| SB-16 | 12-14 | 14000 | | | |
| SB-16 | 14-16 | 2.5 | | | c |
| SB-17 | 4-6 | 3 | 44,502 | 45 | c |
| SB-17 | 6-8 | 3 | | | c |
| SB-17 | 8-10 | 38000 | | | |
| SB-17 | 10-12 | 140000 | | | |
| SB-17 | 14-16 | 2.5 | | | c |
| SB-17 | 16-18 | 2.5 | | | c |
| SB-17 | 18-20 | 170 | | | |
| SB-17 | 20-22 | 3 | | | c |
| SB-18 | 4-6 | 1700 | 1,700 | 1 | |
| SB-18 | 14-16 | 2.5 | | | c |
| SB-19 | 4-6 | 5 | 229,334 | 574,000 | c |
| SB-19 | 6-8 | 77000 | | | |
| SB-19 | 8-10 | 240000 | | | |
| SB-19 | 10-12 | 530000 | | | |
| SB-19 | 12-14 | 370000 | | | |
| SB-19 | 14-16 | 440000 | | | |
| SB-19 | 16-18 | 810000 | | | |
| SB-20 | 4-6 | 0.5 | 2 | NA | c |
| SB-20 | 6-8 | 0.5 | | | c |
| SB-20 | 8-10 | 3 | | | c |
| SB-20 | 10-12 | 3 | | | c |
| SB-21 | 2-4 | 4100 | 3,081 | 19,333 | |
| SB-21 | 4-6 | 2.5 | | | c |
| SB-21 | 6-8 | 3 | | | c |

# TABLE 4-7

## 1991 DEPTH AVERAGED CONCENTRATIONS FOR ETHYLBENZENE IN SOIL BORINGS PADDYS RUN ROAD SITE HAMILTON COUNTY, OHIO

| Boring No. | Sample Depth Interval (Ft.) | EB Conc. (µg/kg) | Depth Avg. Conc. Above Wt. (µg/kg)[a] | Depth Avg. Conc. Below Wt. (µg/kg)[b] | Comments |
|---|---|---|---|---|---|
| SB-21 | 8-10 | 800 | | | |
| SB-21 | 10-12 | 42 | | | |
| SB-21 | 12-14 | 24000 | | | |
| SB-21 | 14-16 | 17000 | | | |
| SB-22 | 0-2 | 88000 | 100,126 | 260,000 | |
| SB-22 | 2-4 | 330000 | | | |
| SB-22 | 6-8 | 2000 | | | |
| SB-22 | 8-10 | 350 | | | |
| SB-22 | 21-22 | 340 | | | |
| SB-22 | 12-14 | 260000 | | | |
| SB-23 | 0-2 | 370 | 185 | 3 | |
| SB-23 | 0-2 | 0 | | | c |
| SB-23 | 2-4 | 3 | | | c |
| SB-23 | 8-10 | 8 | | | c |
| SB-23 | 10-12 | 450 | | | |
| SB-23 | 12-14 | 2 | | | c |
| SB-23 | 14-16 | 3 | | | c |
| SB-24 | 4-6 | 3 | 3 | NA | c |
| SB-24 | 8-10 | 3 | | | c |
| SB-24 | 10-12 | 3 | | | c |
| SB-26 | 0-2 | 3 | 2 | 2 | c |
| SB-26 | 2-4 | 2.5 | | | c |
| SB-26 | 4-6 | 2.5 | | | c |
| SB-26 | 9-10 | 2.5 | | | c |
| SB-26 | 10-12 | 2.5 | | | c |
| SB-26 | 12-14 | 0.5 | | | c |
| SB-26 | 15-16 | 3 | | | c |
| SB-26 | 10-13 | 54000 | | | |
| SB-27 | 0-2 | 3 | 20,170 | 260,000 | c |
| SB-27 | 2-4 | 220 | | | |
| SB-27 | 4-6 | 170 | | | |
| SB-27 | 6-8 | 6 | | | c |
| SB-27 | 8-10 | 47 | | | |
| SB-27 | 10-12 | 660 | | | |
| SB-27 | 12-14 | 260000 | | | |
| SB-28 | 0-2 | 4200 | 409,774 | 950,000 | |
| SB-28 | 2-4 | 13000 | | | |
| SB-28 | 4-6 | 19000 | | | |
| SB-28 | 6-8 | 170000 | | | |
| SB-28 | 9-95 | 470000 | | | |
| SB-28 | 10-11.5 | 310000 | | | |
| SB-28 | 11.5-13 | 2400000 | | | |
| SB-28 | 14-14.5 | 950000 | | | |
| SB-29 | 0-2 | 0.5 | 1 | 654 | c |
| SB-29 | 12-14 | 0.5 | | | c |
| SB-29 | 14-16 | 980 | | | |
| SB-30 | 14-16 | 0.5 | | | c |
| SB-30 | 16-18 | 7 | | | c |
| SB-31 | 2-4 | 3 | 3 | NA | c |
| SB-32 | 2-4 | 3 | 3 | NA | c |
| SB-33 | 8-10 | 2.5 | 3 | NA | c |
| SB-34 | 2-4 | 3 | 3 | NA | c |
| SB-35 | 0-2 | 2.5 | 99 | 307 | c |
| SB-35 | 2-4 | 2.5 | | | c |
| SB-35 | 4-6 | 22 | | | |
| SB-35 | 6-8 | 3 | | | c |
| SB-35 | 8-10 | 355 | | | |
| SB-35 | 10-12 | 90 | | | |
| SB-35 | 12-14 | 340 | | | |
| SB-35 | 14-16 | 290 | | | |
| SB-36 | 0-2 | 2700 | 468 | 3 | |
| SB-36 | 2-4 | 200 | | | |
| SB-36 | 4-6 | 26 | | | |
| SB-36 | 6-8 | 29 | | | |
| SB-36 | 8-10 | 74 | | | |
| SB-36 | 10-12 | 14 | | | |
| SB-36 | 12-14 | 2.5 | | | c |
| SB-36 | 14-16 | 2.5 | | | c |
| SB-37 | 0-2 | 1900 | 525 | 557 | |
| SB-37 | 2-4 | 19 | | | |
| SB-37 | 4-6 | 180 | | | |
| SB-37 | 6-8 | 530 | | | |
| SB-37 | 8-10 | 17 | | | |
| SB-37 | 10-12 | 330 | | | |
| SB-37 | 12-14 | 870 | | | |
| SB-37 | 14-16 | 400 | | | |
| SB-38 | 2-4 | 2.5 | 165,092 | 312,000 | c |
| SB-38 | 4-6 | 3 | | | c |
| SB-38 | 6-8 | 8000 | | | |
| SB-38 | 8-10 | 440000 | | | |
| SB-38 | 10-12 | 220000 | | | |
| SB-38 | 12-14 | 480000 | | | |
| SB-38 | 14-16 | 100000 | | | |
| SB-38 | 16-18 | 440000 | | | |
| SB-39 | 0-2 | 370000 | 78,678 | 3,607 | |
| SB-39 | 2-4 | 140000 | | | |
| SB-39 | 4-6 | 820 | | | |
| SB-39 | 6-8 | 230 | | | |

000194

# TABLE 4-7

007360

## 1991 DEPTH AVERAGED CONCENTRATIONS FOR ETHYLBENZENE IN SOIL BORINGS PADDYS RUN ROAD SITE HAMILTON COUNTY, OHIO

| Boring No. | Sample Depth Interval (Ft.) | EB Conc. (µg/kg) | Depth Avg. Conc. Above Wt. (µg/kg)[a] | Depth Avg. Conc. Below Wt. (µg/kg)[b] | Comments |
|---|---|---|---|---|---|
| SB-39 | 8-10 | 345 | | | |
| SB-39 | 10-12 | 4 | | | c |
| SB-39 | 12-14 | 17 | | | |
| SB-39 | 14-16 | 8200 | | | |
| SB-39 | 16-18 | 810 | | | |
| SB-40 | 0-2 | 2 | 6,092 | 64,000 | c |
| SB-40 | 2-4 | 140 | | | |
| SB-40 | 4-6 | 330 | | | |
| SB-40 | 6-8 | 24 | | | |
| SB-40 | 8-10 | 1700 | | | |
| SB-40 | 10-12 | 3400 | | | |
| SB-40 | 12-14 | 68000 | | | |
| SB-40 | 14-16 | 100000 | | | |
| SB-40 | 16-18 | 26000 | | | |
| SB-42 | 2-4 | 3 | 13,237 | 450 | c |
| SB-42 | 4-6 | 3 | | | c |
| SB-42 | 6-8 | 5 | | | c |
| SB-42 | 8-10 | 72000 | | | |
| SB-42 | 10-12 | 340 | | | |
| SB-42 | 12-14 | 900 | | | |
| SB-42 | 14-16 | 335 | | | |
| SB-42 | 16-18 | 340 | | | |
| SB-43 | 0-2 | 0 | 3 | 62 | c |
| SB-43 | 2-4 | 3 | | | c |
| SB-43 | 4-6 | 2.5 | | | c |
| SB-43 | 6-8 | 3 | | | c |
| SB-43 | 8-10 | 3 | | | c |
| SB-43 | 10-12 | 3 | | | c |
| SB-43 | 12-14 | 3 | | | c |
| SB-43 | 14-16 | 2.5 | | | c |
| SB-43 | 16-18 | 2.5 | | | c |
| SB-43 | 18-20 | 2.5 | | | c |
| SB-43 | 20-22 | 270 | | | |
| SB-44 | 2-4 | 2.5 | 50 | 484,360 | c |
| SB-44 | 4-6 | 3 | | | c |
| SB-44 | 6-8 | 2.5 | | | c |
| SB-44 | 8-10 | 2.5 | | | c |
| SB-44 | 10-12 | 2.5 | | | c |
| SB-44 | 12-14 | 520 | | | |
| SB-44 | 14-16 | 115000 | | | |
| SB-44 | 16-18 | 1300000 | | | |
| SB-44 | 18-20 | 280000 | | | |
| SB-45 | 2-4 | 3 | 3 | 246,428 | c |
| SB-45 | 4-6 | 3 | | | c |
| SB-45 | 6-8 | 2.5 | | | c |
| SB-45 | 8-10 | 2.5 | | | c |
| SB-45 | 10-12 | 2.5 | | | c |
| SB-45 | 12-14 | 2.5 | | | c |
| SB-45 | 14-16 | 2900 | | | |
| SB-45 | 16-18 | 9600 | | | |
| SB-45 | 18-20 | 850000 | | | |
| SB-46 | 0-2 | 2.5 | 3 | 100 | c |
| SB-46 | 2-4 | 3 | | | c |
| SB-46 | 4-6 | 3 | | | c |
| SB-46 | 6-8 | 3 | | | c |
| SB-46 | 8-10 | 3 | | | c |
| SB-46 | 10-12 | 2.5 | | | c |
| SB-46 | 12-14 | 2.5 | | | c |
| SB-46 | 14-16 | 2.5 | | | c |
| SB-46 | 16-18 | 2.5 | | | c |
| SB-46 | 18-20 | 345 | | | |
| SB-47 | 0-2 | 4 | 7,388 | 351,200 | c |
| SB-47 | 2-4 | 3 | | | c |
| SB-47 | 4-6 | 3 | | | c |
| SB-47 | 6-8 | 4 | | | c |
| SB-47 | 8-10 | 4 | | | c |
| SB-47 | 10-12 | 6 | | | c |
| SB-47 | 12-14 | 96000 | | | |
| SB-47 | 14-16 | 270000 | | | |
| SB-47 | 16-18 | 560000 | | | |
| SB-58 | 12-14 | 3 | 3 | NA | c |
| SB-60 | 0-2 | 3 | 3 | NA | c |
| SB-60 | 2-6 | 3 | | | c |
| SB-60 | 6-10 | 3 | | | c |
| SB-60 | 10-13 | 3 | | | c |
| SB-61 | 0-2 | 2.5 | 3 | NA | c |
| SB-61 | 2-6 | 3 | | | c |
| SB-61 | 10-12 | 3 | | | c |
| SB-61 | 12-14 | 2.5 | | | c |
| SB-61 | 14-16 | 2.5 | | | c |
| SB-62 | 6-8 | 3 | 3 | NA | c |
| SB-62 | 8-10 | 3 | | | c |
| SB-62 | 10-12 | 2.5 | | | c |
| SB-62 | 12-15 | 2.5 | | | c |
| SB-79 | 2-6 | 2.5 | 3 | NA | c |
| SB-79 | 6-10 | 2.5 | | | c |
| SB-79 | 10-13 | 2.5 | | | c |
| SB-80 | 2-6 | 3 | 3 | NA | c |
| SB-80 | 6-10 | 2.5 | | | c |
| SB-80 | 10-16 | 2.5 | | | c |

## TABLE 4-7

## 1991 DEPTH AVERAGED CONCENTRATIONS FOR ETHYLBENZENE IN SOIL BORINGS PADDYS RUN ROAD SITE HAMILTON COUNTY, OHIO

*NOTES:*

[a] Observed value (ERM, Sept. 1992).

[b] For borings with below detection limit values, one half of the detection limit was assigned as the concentration.

[c] Refer to Figure 4-2 for explanation of averaging method.

NA = Not Available

Average estimated DTW at PRRS property is 13 feet based on ERM (Sept. 1992)

000196

## TABLE 4-8

## MEASURED FLOATING HYDROCARBON THICKNESS
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Date Measured | Well Designation | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | MW-10S | MW-11S | MW-12S | MW-13S | MW-14S | MW-31S | MW-34S | MW-40S | MW-41S |
| 02/06/91 | 0.00 | 0.47 | 0.10 | NM | NM | NM | NM | NM | NM |
| 03/28/91 | 0.00 | 0.28 | 0.05 | 0.00 | NM | NM | NM | NM | NM |
| 04/29/91 | 0.00 | 0.00 | 0.00 | 0.00 | NM | NM | NM | NM | 1.58 |
| 05/21/91 | 0.00 | 0.64 | 0.07 | 0.00 | NM | NM | NM | NM | 0.00 |
| 06/26/91 | 0.00 | 0.00 | 0.00 | 0.62 | NM | NM | NM | NM | 0.00 |
| 07/24/91 | 0.00 | 0.27 | 0.23 | 0.39 | NM | NM | NM | NM | 0.81 |
| 08/27/91 | 0.82 | 0.34 | 0.25 | 0.35 | NM | NM | NM | NM | 0.83 |
| 09/30/91 | 1.22 | 0.51 | 0.13 | 0.62 | NM | NM | NM | NM | 1.83 |
| 10/30/91 | 0.02 | 0.89 | 0.01 | 0.03 | NM | NM | NM | NM | 1.11 |
| 11/20/91 | 0.02 | 0.49 | 0.00 | 0.00 | NM | NM | NM | NM | 0.68 |
| 12/18/91 | 0.10 | 0.38 | 0.10 | 0.92 | NM | NM | 1.15 | NM | 0.13 |
| 01/30/92 | 0.30 | 0.09 | 0.31 | 0.53 | NM | NM | 1.00 | NM | NM |
| 02/13/92 | 0.46 | 0.12 | 0.60 | 0.81 | 1.08 | 0.07 | 1.16 | 0.05 | 0.82 |
| 02/24/92 | 0.39 | 0.30 | 0.40 | 0.61 | 0.64 | NM | 1.02 | 0.04 | 0.72 |
| Average Thickness | 0.41 | 0.39 | 0.20 | 0.54 | 0.86 | 0.07 | 1.08 | 0.04 | 0.94 |
| No. of Measurements | 14 | 14 | 14 | 13 | 2 | 1 | 4 | 2 | 11 |

***NOTES***:

NM = No measurement

Only "Apparent" (measured) floating hydrocarbon thicknesses in wells are provided in this table.

Thickness measurements are in feet units.

000360

000792

TABLE 4-9

# ESTIMATED TIME FOR CONTAMINANTS TO REACH WATER TABLE
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

***METHOD 1***

Methodology reference: EPA (1988a)

Soil type: clayey loam (based on lithologies for the site reported in ERM, Sept. 1992)

*Governing Equations*:

$$\theta_u = \theta_s \, (q/K_s)^{\frac{1}{2b+3}}$$

$$v_p = q/\theta_u$$

$$t = z/v_p$$

| | | |
|---|---|---|
| $\theta_u$ | = | Unsaturated moisture content, unitless |
| $\theta_s$ | = | Saturated moisture content, unitless |
| $q$ | = | Infiltration rate (ft/yr) |
| $K_s$ | = | Saturated hydraulic conductivity (ft/yr) |
| $v_p$ | = | pore velocity |
| $b$ | = | a constant |
| $t$ | = | travel time |
| $z$ | = | travel distance (depth to water table) |

From Tables 3-8 and 3-11 of EPA (1988a):

$$\frac{1}{2b+3} = 0.050$$

| | | |
|---|---|---|
| $\theta_s$ | = | 0.476 |
| $K_s$ | = | $6.4 \times 10^{-5}$ cm/sec = 66.2 ft/yr |

000198

## ESTIMATED TIME FOR CONTAMINANTS TO REACH WATER TABLE
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

For an infiltration rate (q) of 10 inches/year (the assumed net recharge rate for the PRRS prior to paving), or 0.83 foot/year:

$$\theta_u = 0.382$$

Pore velocity, $v_p = q/\theta_u = 2.17\ ft/yr$

Time ($t$) to travel a distance ($z$) of 13 ft (average depth to water table based on ERM, June 1992) in the soil zone without adsorption:

$$t = z/v_p = 5.99\ years \approx 6\ years$$

*METHOD 2*

Methodology reference: Hern and Melancon (1987)

*Governing Equations*:

$$d_{vz} = \frac{d_w\ D_w}{\Delta\theta_u\ DB}$$

$$t = z/d_{vz}$$

| | | |
|---|---|---|
| $d_{vz}$ | = | Rate of transport in unsaturated zone when wetted (ft/yr) |
| $d_w$ | = | Rate of infiltration (ft/yr) |
| $\Delta\theta_u$ | = | Difference in water content in saturated and oven dried condition (dimensionless) = $\theta_s - \theta_{wp}$ |
| $\theta_s$ | = | Saturation water content |
| $\theta_{wp}$ | = | Wilting point water content |
| $DB$ | = | Bulk density (lb/ft$^3$) |
| $D_w$ | = | Density of water |

000199

TABLE 4-9

ESTIMATED TIME FOR CONTAMINANTS TO REACH WATER TABLE
PADDYS RUN ROAD SITE
HAMILTON COUNTY, OHIO

From Method 1:

| | | |
|---|---|---|
| $\theta_s$ | = | 0.476 |
| $\theta_{wp}$ | = | 0.218 (assumed based on the field capacity from Table 3-10 of EPA (1988a)) |
| $d_w$ | = | 0.83 ft/yr |
| $\theta_u$ | = | 0.476 - 0.218 = 0.258 |
| $z$ | = | 13.0 ft |

From Table 4-2:

| | | |
|---|---|---|
| $DB$ | = | 98.5 lb/ft$^3$ |
| $D_w$ | = | 62.4 lb/ft$^3$ |

Using the above values:

$$d_{vz} = 2.04\ ft/yr$$

$$t = z/d_{vz} = 6.38\ years$$

Thus, to wet 13 feet of vadose zone, it takes 6.38 years, which is close to the value of 5.99 years obtained with Method 1.

000200

# TABLE 4-10

## RETARDATION FACTORS FOR SODIUM
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Constituent | Kd | RF |
|---|---|---|
| Sodium | 0.001 | 1.007 |

***EQUATIONS:***

(1) Kd = CS/CG
(2) RF = 1 + (DB x Kd/NE)

***REFERENCES:***

Freeze and Cherry (1979)
Freeze and Cherry (1979)

***PARAMETER ASSIGNMENTS:***

| | | |
|---|---|---|
| Kd | = mL/gm (variable) | Appendix D |
| Cs | = $\mu$g/kg (variable) | ERM (Sept. 1992) |
| CG | = $\mu$g/L (variable) | ERM (Sept. 1992) |
| RF | = unitless (variable) | ——— |
| Ne | = 0.225 (%/100) | Table 4-3 |
| DB | = 1.58 gm/cm$^3$ = 98.0 lb/ft$^3$ | Table 4-3 |

***REFERENCES:***

***PARAMETERS DEFINED***

Kd = distribution coefficient (mL/gm) obtained as slope of CS and CG plots
CS = concentration in soil ($\mu$g/kg)
CG = concentration in ground water ($\mu$g/L)
RF = Retardation Factor (unitless)
DB = soil bulk density (gm/cm$^3$)
NE = Effective porosity for ground water flow (unitless)

# TABLE 4-11

## RETARDATION FACTORS FOR ETHYLBENZENE
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Solute | KOC | % TOC | KD | RF | RELATIVE % TOC |
|---|---|---|---|---|---|
| Ethylbenzene | 1,100 | 0.03 | 0.33 | 3.32 | Low Observed |
| Ethylbenzene | 1,100 | 0.11 | 1.20 | 9.44 | Average Observed |
| Ethylbenzene | 1,100 | 0.18 | 1.98 | 14.90 | High Observed |

***EQUATIONS:***

(1) KD = KOC * (%oc/100)
(2) RF = VG/VC = 1 + (DB/NE) * KD

***REFERENCES:***

EPA (1989)
Freeze and Cherry (1979)

***PARAMETER ASSIGNMENTS:***

TOC = 290 mg/kg (low observed value)
TOC = 1,093 mg/kg (average observed value)
TOC = 1,800 mg/kg (high observed value)
NE = 0.225
DB = 1.58 gm/cm$^3$

***PARAMETERS DEFINED:***

KOC = Soil adsorption coefficient ((μg/gm)/(μg/ml))
%OC = Percent of organic carbon contained in soil (unitless)
KD = Adsorption coefficient or distribution coefficient (mL/gm)
RF = Retardation factor (unitless)
VG = Average linear ground water flow velocity (feet/second)
VC = Average linear dissolved solute plume velocity (feet/second)
DB = Bulk density of soil (gm/cm$^3$)
NE = Effective porosity for ground water flow (unitless)

000202

TABLE 4-12

# GRID AVERAGED SODIUM CONCENTRATIONS FOR 1991
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

| Model Cell (I,J) | Borings in Cell | Depth Avg'd Conc. for Borings (µg/kg) | Avg. Conc. for Cell (µg/kg) | Comments |
|---|---|---|---|---|
| 15,56 | SB18 | 416,400 | 416,400 | |
| 16,56 | SB43 | 54,000 | 61,000 | |
| | SB29 | 13,000 | | |
| | SB30 | 117,000 | | |
| 15,57 | SB25 | 590,000 | 590,000 | |
| 16,57 | SB44 | 136,000 | 136,000 | |
| 17,57 | NA | NA | 136,000 | a |
| 14,59 | SB28 | 851,000 | 851,000 | |
| 15,59 | SB22 | 999,000 | 999,000 | |
| 16,59 | SB21 | 2,285,000 | 2,285,000 | |
| 17,59 | NA | NA | 2,000,000 | b |
| 14,60 | SB39 | 82,000 | 278,000 | |
| | SB23 | 608,000 | | |
| | SB40 | 145,000 | | |
| 15,60 | SB24 | 133,000 | 358,000 | |
| | SB37 | 583,000 | | |
| 14,61 | SB2 | 697,000 | 579,000 | |
| | SB49 | 191,000 | | |
| | SB4 | 849,000 | | |
| 15,61 | SB50 | 65,300 | 381,300 | |
| | SB3 | 697,300 | | |
| 15,62 | SB5 | 788,500 | 728,000 | |
| | SB6 | 684,000 | | |
| | SB52 | 838,800 | | |
| | SB53 | 600,900 | | |
| 15,64 | SB14 | 1,349,400 | 1,193,000 | |
| | SB55 | 160,200 | | |

TABLE 4-12

GRID AVERAGED SODIUM CONCENTRATIONS FOR 1991
PADDYS RUN ROAD SITE
HAMILTON COUNTY, OHIO

| Model Cell (I,J) | Borings in Cell | Depth Avg'd Conc. for Borings (µg/kg) | Avg. Conc. for Cell (µg/kg) | Comments |
|---|---|---|---|---|
| | SB64 | 2,071,400 | | |
| 15,65 | MW06 | 1,869,400 | 2,953,000 | |
| | SB61 | 1,105,000 | | |
| | SB13 | 5,170,400 | | |
| | SB65 | 3,667,900 | | |
| 16,65 | NA | NA | 2,000,000 | b |
| 13,66 | SB70 | 508,900 | 1,296,000 | |
| | SB34 | 1,238,300 | | |
| | SB31 | 540,400 | | |
| | SB63 | 2,895,100 | | |
| 14,66 | SB67 | 1,953,900 | 4,173,000 | |
| | SB12 | 3,549,400 | | |
| | SB62 | 7,016,700 | | |
| 15,66 | SB66 | 2,835,800 | 2,836,000 | |
| 16,66 | NA | NA | 2,000,000 | b |
| 13,67 | SB10 | 1,315,500 | 864,000 | |
| | SB73 | 350,100 | | |
| | SB72 | 452,000 | | |
| | SB71 | 1,928,400 | | |
| | SB75 | 274,700 | | |
| 14,67 | SB68 | 1,825,400 | 1,187,400 | |
| | SB15 | 549,400 | | |
| 15,67 | NA | NA | 2,000,000 | b |
| 16,67 | NA | NA | 2,000,000 | b |
| 12,68 | SB9 | 503,000 | 503,000 | |
| 13,68 | SB8 | 496,100 | 496,100 | |
| 14,68 | SB79 | 297,800 | 495,000 | |
| | SB76 | 691,800 | | |

TABLE 4-12

# GRID AVERAGED SODIUM CONCENTRATIONS FOR 1991
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

| Model Cell (I,J) | Borings in Cell | Depth Avg'd Conc. for Borings (µg/kg) | Avg. Conc. for Cell (µg/kg) | Comments |
|---|---|---|---|---|
| 15,68 | NA | NA | 2,000,000 | b |
| 16,68 | NA | NA | 2,000,000 | b |
| 13,69 | SB78 | 161,000 | 1,250,000 | |
| | SB11 | 2,338,500 | | |
| 15,69 | NA | NA | 2,000,000 | b |
| 14,70 | NA | NA | 2,000,000 | b |
| 15,70 | NA | NA | 2,000,000 | b |

*NOTES*:

a Assumed same average concentration as in grid 16,57.

b Cells with no data were assigned a concentration of 2,000,000 µg/kg.

- NA = Not Available
- Average estimated DTW at PRRS property is 13 feet based on ERM (Sept. 1992).
- Refer to Table 4-6 for depth averaged calculations.

## TABLE 4-13

## ESTIMATED MASS OF SODIUM IN SOURCE AREA FOR 1991 PADDYS RUN ROAD SITE HAMILTON COUNTY, OHIO

| Model Cell (I,J) | Above Water Table Source Area | | Below Water Table Source Area | | Total Mass in Source Area (lbs) |
|---|---|---|---|---|---|
| | Csb (µg/kg) | Mass (lbs) | Csb (µg/kg) | Mass (lbs) | |
| 14,59 | 851,100 | 10,898 | 851,100 | 4,192 | 15,090 |
| 14,60 | 278,300 | 3,564 | 278,300 | 1,371 | 4,934 |
| 15,56 | 416,400 | 5,332 | 416,400 | 2,051 | 7,383 |
| 15,57 | 590,000 | 7,555 | 590,000 | 2,906 | 10,461 |
| 15,59 | 999,400 | 12,797 | 999,400 | 4,922 | 17,719 |
| 15,60 | 357,750 | 4,581 | 357,750 | 1,762 | 6,343 |
| 15,61 | 331,300 | 4,242 | 331,300 | 1,632 | 5,874 |
| 16,56 | 61,300 | 785 | 61,300 | 302 | 1,087 |
| 16,57 | 138,300 | 1,771 | 138,300 | 681 | 2,452 |
| 16,59 | 2,285,600 | 29,267 | 2,285,600 | 11,257 | 40,524 |
| 17,57 | 138,300 | 1,771 | 138,300 | 681 | 2,452 |
| 17,59 | 2,000,000 | 25,610 | 2,000,000 | 9,850 | 35,460 |
| 12,68 | 503,000 | 6,441 | 503,000 | 2,477 | 8,918 |
| 13,66 | 1,295,000 | 16,582 | 1,295,000 | 6,378 | 22,960 |
| 13,67 | 864,000 | 11,064 | 864,000 | 4,255 | 15,319 |
| 13,68 | 496,100 | 6,353 | 496,100 | 2,443 | 8,796 |
| 13,69 | 1,249,750 | 16,003 | 1,249,750 | 6,155 | 22,158 |
| 14,61 | 579,000 | 7,414 | 579,000 | 2,852 | 10,266 |
| 14,66 | 4,176,000 | 53,474 | 4,176,000 | 20,567 | 74,040 |
| 14,67 | 1,137,000 | 14,559 | 1,137,000 | 5,600 | 20,159 |
| 14,68 | 513,000 | 6,569 | 513,000 | 2,527 | 9,095 |
| 14,70 | 2,338,500 | 29,944 | 2,338,500 | 11,517 | 41,462 |
| 15,62 | 728,000 | 9,322 | 728,000 | 3,585 | 12,907 |
| 15,64 | 1,193,600 | 15,284 | 1,193,600 | 5,878 | 21,163 |
| 15,65 | 2,953,000 | 37,813 | 2,953,000 | 14,544 | 52,357 |
| 15,66 | 2,835,800 | 36,312 | 2,835,800 | 13,966 | 50,279 |
| 15,67 | 2,000,000 | 25,610 | 2,000,000 | 9,850 | 35,460 |

000206

# TABLE 4-13

## ESTIMATED MASS OF SODIUM IN SOURCE AREA FOR 1991 PADDYS RUN ROAD SITE HAMILTON COUNTY, OHIO

| Model Cell (I,J) | Above Water Table Source Area | | Below Water Table Source Area | | Total Mass in Source Area (lbs) |
|---|---|---|---|---|---|
| | Csb (µg/kg) | Mass (lbs) | Csb (µg/kg) | Mass (lbs) | |
| 15,68 | 2,000,000 | 25,610 | 2,000,000 | 9,850 | 35,460 |
| 15,69 | 2,000,000 | 25,610 | 2,000,000 | 9,850 | 35,460 |
| 15,70 | 2,000,000 | 25,610 | 2,000,000 | 9,850 | 35,460 |
| 16,65 | 2,000,000 | 25,610 | 2,000,000 | 9,850 | 35,460 |
| 16,66 | 2,000,000 | 25,610 | 2,000,000 | 9,850 | 35,460 |
| 16,67 | 2,000,000 | 25,610 | 2,000,000 | 9,850 | 35,460 |
| 16,68 | 2,000,000 | 25,610 | 2,000,000 | 9,850 | 35,460 |
| TOTAL MASS OF SODIUM IN SOURCE AREA | | | | | 803,337 |

*NOTES*:

Refer to Table 4-12 for Csb calculation details.

| *Governing Equations:* | Reference |
|---|---|
| Mass in cell (above water table source) = Csb x cell x cell x Dtw x DB | — |
| Mass in cell (below water table source) = Csb x cell x cell x BWTT x DB | — |

*Parameter Assignments:*

| | | |
|---|---|---|
| Csb | = µg/kg (variable)--converted to lb/ft$^3$ in calculation | Table 4-12 |
| cell | = 100 feet | — |
| Dtw | = 13 feet | Figure 4-7 |
| DB | = 98.5 lb/ft$^3$ | Table 2-2 |
| BWTT | = 5 feet | Figure 4-7 |

*Parameter Definitions:*

Csb = Average estimated concentration in soil above water table (µg/kg)
Dtw = Estimated average depth to water at PRRS property (ft)
DB = Soil bulk density (lb/ft$^3$)
cell = Model cell width or length (ft)
BWTT = Thickness of below water table source

# TABLE 4-14

## GRID AVERAGED ETHYLBENZENE CONCENTRATIONS FOR 1991
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Above Water Table | | | | Below Water Table | | | |
|---|---|---|---|---|---|---|---|
| Model Cell (I,J) | Borings in Cell | Depth Avg'd Conc. for Borings (µg/kg) | Avg. Conc. for Cell (µg/kg) | Model Cell (I,J) | Borings in Cell | Depth Avg'd Conc. for Borings (µg/kg) | Avg. Conc. for Cell (µg/kg) |
| 14,56 | SB17 | 44,501 | 30,708 | 14,57 | MW10S | 452,978 | 452,978 |
| | SB46 | 3 | | 14,58 | SB27 | 260,000 | 260,000 |
| | SB16 | 650,962 | | 14,59 | SB26 | 2 | 475,001 |
| | SB42 | 13,237 | | | SB28 | 950,000 | |
| 14,58 | SB27 | 20,170 | 20,170 | 15,57 | SB19 | 574,000 | 410,214 |
| 14,59 | SB26 | 2 | 204,888 | | SB45 | 246,428 | |
| | SB28 | 409,774 | | 15,58 | SB38 | 312,000 | 439,286 |
| 15,56 | SB18 | 1,700 | 1,700 | | MW11S | 431,857 | |
| 15,58 | SB38 | 165,092 | 288,037 | | SB19 | 574,000 | |
| | MW11S | 469,686 | | 15,59 | SB22 | 160,000 | 260,000 |
| | SB19 | 229,334 | | 16,57 | SB44 | 484,360 | 484,360 |
| 15,59 | SB22 | 100,126 | 100,126 | 16,58 | SB20 | NA | 388,718 |
| 16,58 | SB20 | 2 | 48,924 | | MW12S | 426,235 | |
| | MW12S | 139,382 | | | SB47 | 351,200 | |
| | SB47 | 7,388 | | 17,56 | MW13S | 73,358 | 37,006 |
| 16,59 | SB21 | 3,081 | 1,775 | | SB29 | 654 | |
| | SB36 | 468 | | | | | |
| 17,56 | MW13S | 46,003 | 23,002 | | | | |
| | SB29 | 1 | | | | | |

*NOTES*:

- NA = Not Available
- Average estimated DTW at PRRS property is 13 feet based on ERM (Sept. 1992).
- Refer to Table 4-6 for depth averaged calculations.

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## TABLE 4-15

## ESTIMATED MASS OF ETHYLBENZENE IN SOURCE AREA FOR 1991
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Model Cell (I,J) | Above Water Table Source Area | | Floating Hydrocarbon Source Area | | | Below Water Table Source Area | | Total Mass in Source Area (lbs) |
|---|---|---|---|---|---|---|---|---|
| | Csb (µg/kg) | Mass (lbs) | Apparent Thickness (ft) | Actual Thickness (ft) | Mass (lbs) | Csb (µg/kg) | Mass (lbs) | |
| 13,56 | | | 0.18 | 0.03 | 330 | | | 330 |
| 13,56 | | | 0.20 | 0.03 | 330 | | | 330 |
| 13,58 | | | 0.15 | 0.02 | 220 | | | 220 |
| 14,54 | | | 0.15 | 0.02 | 220 | | | 220 |
| 14,55 | | | 0.40 | 0.06 | 660 | | | 660 |
| 14,56 | 30,708 | 393 | 0.70 | 0.11 | 1,210 | | | 1,603 |
| 14,57 | | | 0.70 | 0.11 | 1;210 | 452,978 | 2,231 | 3,440 |
| 14,58 | 20,170 | 258 | 0.60 | 0.09 | 990 | 260,000 | 1,281 | 2,528 |
| 14,59 | 204,888 | 2,624 | 0.70 | 0.11 | 1,210 | 950,000 | 4,679 | 8,513 |
| 15,54 | | | 0.40 | 0.06 | 660 | | | 660 |
| 15,55 | | | 0.80 | 0.12 | 1,319 | | | 1,319 |
| 15,56 | 1,700 | 22 | 1.00 | 0.16 | 1,759 | | | 1,781 |
| 15,57 | | | 1.00 | 0.16 | 1,759 | 574,000 | 2,827 | 4,586 |
| 15,58 | 288,037 | 3,688 | 0.60 | 0.09 | 990 | 371,929 | 1,832 | 6,510 |
| 15,59 | 100,126 | 1,282 | 0.30 | 0.05 | 550 | 260,000 | 1,281 | 3,112 |
| 16,53 | | | 0.12 | 0.02 | 220 | | | 220 |
| 16,54 | | | 0.70 | 0.11 | 1,210 | | | 1,210 |
| 16,55 | | | 1.00 | 0.16 | 1,759 | | | 1,759 |

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# TABLE 4-15

## ESTIMATED MASS OF ETHYLBENZENE IN SOURCE AREA FOR 1991
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Model Cell (I,J) | Above Water Table Source Area | | Floating Hydrocarbon Source Area | | | Below Water Table Source Area | | Total Mass in Source Area (lbs) |
|---|---|---|---|---|---|---|---|---|
| | Csb (μg/kg) | Mass (lbs) | Apparent Thickness (ft) | Actual Thickness (ft) | Mass (lbs) | Csb (μg/kg) | Mass (lbs) | |
| 16,56 | | | 0.80 | 0.12 | 1,319 | | | 1,319 |
| 16,57 | | | 0.60 | 0.09 | 990 | 484,360 | 2,385 | 3,375 |
| 16,58 | 48,924 | 626 | 0.50 | 0.08 | 880 | 388,718 | 1,914 | 3,421 |
| 16,59 | 1,775 | 23 | 0.15 | 0.02 | 220 | | | 243 |
| 17,53 | | | 0.20 | 0.03 | 330 | | | 330 |
| 17,54 | | | 0.50 | 0.08 | 880 | | | 880 |
| 17,55 | | | 0.80 | 0.12 | 1,319 | | | 1,319 |
| 17,56 | 23,002 | 295 | 0.40 | 0.06 | 660 | 37,006 | 182 | 1,137 |
| 17,57 | | | 0.15 | 0.02 | 220 | | | 220 |
| 18,53 | | | 0.20 | 0.03 | 330 | | | 330 |
| 18,54 | | | 0.40 | 0.06 | 660 | | | 660 |
| 18,55 | | | 0.50 | 0.08 | 880 | | | 880 |
| 18,56 | | | 0.25 | 0.04 | 440 | | | 440 |
| 19,53 | | | 0.15 | 0.02 | 220 | | | 220 |
| 19,54 | | | 0.25 | 0.04 | 440 | | | 440 |
| 19,55 | | | 0.25 | 0.04 | 440 | | | 440 |
| Total Mass of Ethylbenzene in Source Area: | | | | | | | | 54,655 |

## TABLE 4-15

## ESTIMATED MASS OF ETHYLBENZENE IN SOURCE AREA FOR 1991
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

*NOTES*:

Refer to Table 4-14 for Csb calculation details.

Apparent Floating hydrocarbon thicknesses for cells
were estimated by overlaying the model grid onto Figure 4-6.

| *Governing Equations*: | Reference |
|---|---|
| mass in cell (above water table source) = Csb x cell x cell x Dtw x D | --- |
| mass in cell (floating hydrocarbon source) = Csp x cell x cell x Ne x h x DB | --- |
| mass in cell (below water table source) = Csb x cell x cell x BWTT x DB | --- |
| h = H x (DBw - DBh)/DBh | (AAPG, 1989 & CONCAWE, 1979) |

*Parameter Assignments*:

| | | | |
|---|---|---|---|
| Csb | = | µg/kg (variable) -- converted to lb/cf in calculation | Table 4-14 |
| cell | = | 100 feet | --- |
| Dtw | = | 13 feet | Figure 4-7 |
| DB | = | 98.5 lb/cf | Table 2-2 |
| BWTT | = | 5 feet | Figure 4-7 |
| Ne | = | 0.225 (%/100) | Table 4-3 |
| h | = | feet (variable) | --- |
| H | = | feet (variable) | Table 4-8 and Figure 4-6 |
| DBh | = | 54 lb/cf | Table 4-3 |
| Csp | = | 90500 mg/l = 0.0905 lb/lb | ERM (Sept. 1992) |
| DBW | = | 62.4 lb/cf | Table 4-3 |

*Parameter Definitions*:

| | | |
|---|---|---|
| Csb | = | Average estimated concentration in soil above water table (µg/kg) |
| Dtw | = | Estimated average depth to water at PRRS property (ft) |
| Ne | = | Effective porosity (%/100) |
| DB | = | Soil bulk density (lb/cf) |
| Cell | = | Model cell width and length (ft) |
| BWTT | = | Thickness of below water table source (ft) |
| DBw | = | Density of water (lb/cf) |

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# TABLE 4-15

## ESTIMATED MASS OF ETHYLBENZENE IN SOURCE AREA FOR 1991
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

*NOTES*: (Continued)

| | | |
|---|---|---|
| DBh | = | Density of ethylbenzene (lb/cf) |
| h | = | Actual product thickness (ft) |
| H | = | Apparent product thickness (ft) |
| Cell | = | Model cell width or length (ft) |
| Csp | = | Average concentration of ethylbenzene in liquid phase hydrocarbon at site (mg/l) |
| Ne | = | Effective porosity (%/100) |

## TABLE 4-16

## SODIUM LOADING RATES PRIOR TO 1992
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Model Coordinate | | | | Calibrated Loading Rates (lb/day) | | | | |
|---|---|---|---|---|---|---|---|---|
| I | J | Site | Paved or Unpaved | Period 01/62 to 12/79 | Period 01/80 to 12/84 | Period 01/85 to 12/88 | Period 01/89 to 12/90 | Period 01/91 to 12/91 |
| 14 | 70 | A&W | U | --- | --- | --- | --- | 23.08 |
| 15 | 70 | A&W | U | --- | --- | --- | --- | 23.08 |
| 13 | 69 | A&W | U | --- | --- | 23.08 | 23.08 | 23.08 |
| 15 | 69 | A&W | U | --- | --- | 23.08 | 23.08 | 23.08 |
| 12 | 68 | A&W | U | --- | --- | --- | 23.08 | 23.08 |
| 13 | 68 | A&W | P | --- | --- | 4.62 | 4.62 | 4.62 |
| 14 | 68 | A&W | U | --- | 23.08 | 23.08 | 23.08 | 23.08 |
| 15 | 68 | A&W | U | --- | --- | 23.08 | 23.08 | 23.08 |
| 16 | 68 | A&W | U | --- | --- | --- | 23.08 | 23.08 |
| 13 | 67 | A&W | P | --- | --- | 4.62 | 4.62 | 4.62 |
| 14 | 67 | A&W | P | 23.08 | 23.08 | 4.62 | 4.62 | 4.62 |
| 15 | 67 | A&W | U | --- | 23.08 | 23.08 | 23.08 | 23.08 |
| 16 | 66 | A&W | U | --- | --- | --- | 23.08 | 23.08 |
| 13 | 66 | A&W | P | --- | --- | --- | 4.62 | 4.62 |
| 14 | 66 | A&W | P | --- | 23.08 | 4.62 | 4.62 | 4.62 |
| 15 | 66 | A&W | U | --- | 23.08 | 23.08 | 23.08 | 23.08 |
| 16 | 67 | A&W | U | --- | --- | --- | 23.08 | 23.08 |
| 15 | 65 | A&W | U | --- | --- | --- | --- | 23.08 |
| 16 | 65 | A&W | U | --- | --- | --- | 23.08 | 23.08 |

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000224

# TABLE 4-16

## SODIUM LOADING RATES PRIOR TO 1992
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Model Coordinate | | Site | Paved or Unpaved | Calibrated Loading Rates (lb/day) | | | | |
|---|---|---|---|---|---|---|---|---|
| I | J | | | Period 01/62 to 12/79 | Period 01/80 to 12/84 | Period 01/85 to 12/88 | Period 01/89 to 12/90 | Period 01/91 to 12/91 |
| 15 | 64 | A&W | P | --- | --- | --- | --- | 4.62 |
| 15 | 62 | A&W | U | --- | --- | --- | --- | 23.08 |
| 14 | 61 | A&W | U | --- | --- | --- | --- | 23.08 |
| 15 | 61 | RNC | U | --- | --- | --- | --- | 23.08 |
| 14 | 60 | RNC | P | --- | --- | --- | 4.62 | 4.62 |
| 15 | 60 | RNC | P | --- | 4.62 | 4.62 | 4.62 | 4.62 |
| 14 | 59 | RNC | P | --- | 4.62 | 4.62 | 4.62 | 4.62 |
| 15 | 59 | RNC | P | 23.08 | 4.62 | 4.62 | 4.62 | 4.62 |
| 16 | 59 | RNC | P | --- | --- | 4.62 | 4.62 | 4.62 |
| 17 | 59 | RNC | U | --- | --- | 23.08 | 23.08 | 23.08 |
| 17 | 57 | RNC | U | --- | --- | --- | --- | 23.08 |
| 16 | 57 | RNC | U | --- | --- | --- | 23.08 | 23.08 |
| 15 | 57 | RNC | U | --- | --- | --- | 23.08 | 23.08 |
| 16 | 56 | RNC | U | --- | --- | --- | --- | 23.08 |
| 15 | 56 | RNC | U | --- | --- | --- | --- | 23.08 |

***NOTES***:

The source cell activation scheme set up in this table is based on the assumption that the source area expands logarthmically with time according to the information presented in Appendix F.

U = Unpaved
P = Paved (portions of the A&W site were paved after 1984 and portions of the RNC site were paved after 1979)
RNC = Ruetgers-Nease Company
A&W = Albright & Wilson Company

TABLE 4-17

ETHYLBENZENE LOADING RATES PRIOR TO 1992
PADDYS RUN ROAD SITE
HAMILTON COUNTY, OHIO

| Model Coordinate | | | Calibrated Loading Rates (lb/day) | | | | |
|---|---|---|---|---|---|---|---|
| I | J | Paved or Unpaved | Period 01/70 to 12/74 | Period 01/74 to 12/79 | Period 01/80 to 12/88 | Period 01/88 to 12/90 | Period 01/91 to 12/91 |
| 16 | 59 | P | --- | --- | --- | 0.0433 | 0.0433 |
| 13 | 58 | P | --- | --- | --- | 0.0433 | 0.0433 |
| 13 | 57 | U | --- | --- | --- | 0.2165 | 0.2165 |
| 17 | 57 | U | --- | --- | --- | --- | 0.2165 |
| 13 | 56 | U | --- | --- | --- | 0.2165 | 0.2165 |
| 14 | 56 | U | --- | --- | --- | 0.2165 | 0.2165 |
| 15 | 56 | U | --- | --- | 0.2165 | 0.2165 | 0.2165 |
| 16 | 56 | U | --- | --- | 0.2165 | 0.2165 | 0.2165 |
| 18 | 56 | U | --- | --- | --- | --- | 0.2165 |
| 14 | 54 | U | --- | --- | --- | --- | 0.2165 |
| 15 | 54 | U | --- | --- | --- | --- | 0.2165 |
| 16 | 54 | U | --- | --- | --- | 0.2165 | 0.2165 |
| 17 | 54 | U | --- | --- | --- | 0.2165 | 0.2165 |
| 18 | 54 | U | --- | --- | --- | 0.2165 | 0.2165 |
| 19 | 54 | U | --- | --- | --- | --- | 0.2165 |
| 14 | 55 | U | --- | --- | --- | 0.2165 | 0.2165 |
| 15 | 55 | U | --- | --- | --- | 0.2165 | 0.2165 |
| 16 | 55 | U | --- | --- | --- | 0.2165 | 0.2165 |
| 17 | 55 | U | --- | --- | 0.2165 | 0.2165 | 0.2165 |

002360

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000416

# TABLE 4-17

## ETHYLBENZENE LOADING RATES PRIOR TO 1992
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Model Coordinate | | Paved or Unpaved | Calibrated Loading Rates (lb/day) | | | | |
|---|---|---|---|---|---|---|---|
| I | J | | Period 01/70 to 12/74 | Period 01/74 to 12/79 | Period 01/80 to 12/88 | Period 01/88 to 12/90 | Period 01/91 to 12/91 |
| 18 | 55 | U | — | — | — | — | 0.2165 |
| 19 | 55 | U | — | — | — | — | 0.2165 |
| 16 | 53 | U | — | — | — | — | 0.2165 |
| 17 | 53 | U | — | — | — | — | 0.2165 |
| 18 | 53 | U | — | — | — | — | 0.2165 |
| 19 | 53 | U | — | — | — | — | 0.2165 |
| 14 | 59 | P | — | — | — | 0.846 | 0.784 |
| 15 | 59 | P | 2.85E-03 | 0.0433 | 0.907 | 0.846 | 0.784 |
| 14 | 58 | P | — | 0.0433 | 0.907 | 0.846 | 0.784 |
| 15 | 58 | P | 0.286 | 1.08 | 0.907 | 0.846 | 0.784 |
| 16 | 58 | U | — | — | 0.217 | 1.02 | 0.958 |
| 14 | 57 | U | — | — | 0.217 | 0.217 | 0.958 |
| 15 | 57 | U | — | — | 0.217 | 1.02 | 0.958 |
| 16 | 57 | U | — | — | 0.217 | 0.217 | 0.958 |
| 17 | 56 | U | — | — | — | 0.217 | 0.958 |

***NOTES***:

The source cell activation scheme set up in this table is based on the assumption that the source area expands logarthmically with time according to the information presented in Appendix F.

U = Unpaved
P = Paved (portions of the A&W site were paved after 1984 and portions of the RNC site were paved after 1979)
RNC = Ruetgers-Nease Company
A&W = Albright & Wilson Company

# TABLE 4-18
# SODIUM LOADING RATES AFTER 1991
# (BELOW WATER TABLE SOURCE)
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

| Cell (I,J) | Site Location | k ($yr^{-1}$) | Csb Average Concentration (µg/kg) | M(0) Mass Remaining (lbs) | M(3) Mass Remaining (lbs) | M(6) Mass Remaining (lbs) | M(9) Mass Remaining (lbs) | M(12) Mass Remaining (lbs) | M(15) Mass Remaining (lbs) |
|---|---|---|---|---|---|---|---|---|---|
| 14,59 | RNC | 0.602 | 851,100 | 4,192 | 689 | 113 | 19 | 3 | 1 |
| 14,60 | RNC | 1.841 | 278,300 | 1,371 | 5 | 0 | 0 | 0 | 0 |
| 15,56 | RNC | 1.230 | 416,400 | 2,051 | 51 | 1 | 0 | 0 | 0 |
| 15,57 | RNC | 0.868 | 590,000 | 2,906 | 215 | 16 | 1 | 0 | 0 |
| 15,59 | RNC | 0.513 | 999,400 | 4,922 | 1,058 | 227 | 49 | 10 | 2 |
| 15,60 | RNC | 1.432 | 357,750 | 1,762 | 24 | 0 | 0 | 0 | 0 |
| 15,61 | RNC | 1.546 | 331,300 | 1,632 | 16 | 0 | 0 | 0 | 0 |
| 16,56 | RNC | 8.357 | 61,300 | 302 | 0 | 0 | 0 | 0 | 0 |
| 16,57 | RNC | 3.704 | 138,300 | 681 | 0 | 0 | 0 | 0 | 0 |
| 16,59 | RNC | 0.224 | 2,285,600 | 11,257 | 5,746 | 2933 | 1,497 | 764 | 390 |
| 17,57 | RNC | 3.704 | 138,300 | 681 | 0 | 0 | 0 | 0 | 0 |
| 17,59 | RNC | 0.256 | 2,000,000 | 9,850 | 4,568 | 2118 | 982 | 456 | 211 |
| 12,68 | A&W | 1.018 | 503,000 | 2,477 | 117 | 5 | 0 | 0 | 0 |
| 13,66 | A&W | 0.396 | 1,295,000 | 6,378 | 1,947 | 594 | 181 | 55 | 17 |
| 13,67 | A&W | 0.593 | 864,000 | 4,255 | 718 | 121 | 20 | 3 | 1 |
| 13,68 | A&W | 1.033 | 496,100 | 2,443 | 110 | 5 | 0 | 0 | 0 |
| 13,69 | A&W | 0.410 | 1,249,750 | 6,155 | 1,800 | 526 | 154 | 45 | 13 |

812000

# TABLE 4-18
# SODIUM LOADING RATES AFTER 1991
# (BELOW WATER TABLE SOURCE)
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

| Cell (I,J) | Site Location | k ($yr^{-1}$) | Csb Average Concentration (µg/kg) | M(0) Mass Remaining (lbs) | M(3) Mass Remaining (lbs) | M(6) Mass Remaining (lbs) | M(9) Mass Remaining (lbs) | M(12) Mass Remaining (lbs) | M(15) Mass Remaining (lbs) |
|---|---|---|---|---|---|---|---|---|---|
| 14,61 | A&W | 0.885 | 579,000 | 2,852 | 201 | 14 | 1 | 0 | 0 |
| 14,66 | A&W | 0.123 | 4,176,000 | 20,567 | 14,234 | 9852 | 6,818 | 4,719 | 3,266 |
| 14,67 | A&W | 0.451 | 1,137,000 | 5,600 | 1,449 | 375 | 97 | 25 | 7 |
| 14,68 | A&W | 0.999 | 513,000 | 2,527 | 126 | 6 | 0 | 0 | 0 |
| 14,70 | A&W | 0.219 | 2,338,500 | 11,517 | 5,969 | 3094 | 1,604 | 831 | 431 |
| 15,62 | A&W | 0.704 | 728,000 | 3,585 | 434 | 53 | 6 | 1 | 0 |
| 15,64 | A&W | 0.429 | 1,193,600 | 5,878 | 1,622 | 448 | 124 | 34 | 9 |
| 15,65 | A&W | 0.173 | 2,953,000 | 14,544 | 8,643 | 5136 | 3,052 | 1,814 | 1,078 |
| 15,66 | A&W | 0.181 | 2,835,800 | 13,966 | 8,123 | 4724 | 2,748 | 1,598 | 930 |
| 15,67 | A&W | 0.256 | 2,000,000 | 9,850 | 4,568 | 2118 | 982 | 456 | 211 |
| 15,68 | A&W | 0.256 | 2,000,000 | 9,850 | 4,568 | 2118 | 982 | 456 | 211 |
| 15,69 | A&W | 0.256 | 2,000,000 | 9,850 | 4,568 | 2118 | 982 | 456 | 211 |
| 15,70 | A&W | 0.256 | 2,000,000 | 9,850 | 4,568 | 2118 | 982 | 456 | 211 |
| 16,65 | A&W | 0.256 | 2,000,000 | 9,850 | 4,568 | 2118 | 982 | 456 | 211 |
| 16,66 | A&W | 0.256 | 2,000,000 | 9,850 | 4,568 | 2118 | 982 | 456 | 211 |
| 16,67 | A&W | 0.256 | 2,000,000 | 9,850 | 4,568 | 2118 | 982 | 456 | 211 |
| 16,68 | A&W | 0.256 | 2,000,000 | 9,850 | 4,568 | 2118 | 982 | 456 | 211 |

# TABLE 4-18
# SODIUM LOADING RATES AFTER 1991
# (BELOW WATER TABLE SOURCE)
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

| Cell (I,J) | Site Location | k ($yr^{-1}$) | Csb Average Concentration ($\mu g/kg$) | M(0) Mass Remaining (lbs) | M(3) Mass Remaining (lbs) | M(6) Mass Remaining (lbs) | M(9) Mass Remaining (lbs) | M(12) Mass Remaining (lbs) | M(15) Mass Remaining (lbs) |
|---|---|---|---|---|---|---|---|---|---|
| Total mass in unsaturated zone: | | | | 223,149 | 94,408 | 47310 | 25,213 | 14,004 | 8,045 |

Total average load rate for period 0 to 3 years = 118 lb/day
Total average load rate for period 3 to 6 years = 43 lb/day
Total average load rate for period 6 to 9 years = 20 lb/day
Total average load rate for period 9 to 12 years = 10 lb/day
Total average load rate for period 12 to 15 years = 5 lb/day

***NOTES:***

RNC = Ruetgers-Nease Company
A&W = Albright & Wilson

***Governing Equations:***

| | | | ***References*** |
|---|---|---|---|
| Q | = | K x i x A | Freeze and Cherry (1979) |
| M(0) | = | Csb x V x DB | --- |
| M(t) | = | M(0) x $e^{(-kt)}$ | Section 4.4.5 |
| V | = | Cell x Cell x Dbwt | --- |
| k | = | RM/M(0) | Section 4.4.5 |
| A | = | Cell x Dbwt | --- |
| RM | = | Q x Csol | --- |



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# TABLE 4-18
# SODIUM LOADING RATES AFTER 1991
# (BELOW WATER TABLE SOURCE)
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

***NOTES: (Continued)***

***Parameter Assignments***:

| | | | ***References*** |
|---|---|---|---|
| Q | = | 19,163 $ft^3$/yr (varaible) | --- |
| K | = | 35 ft/day | Section 4.4.5 |
| i | = | 0.003 ft/ft | ERM (Sept. 1992) |
| A | = | 500 ft | Figure 4-7 |
| R | = | 10 in/yr (unpaved) or 2 in/yr (paved area) | Figure 3-4 |
| Csb | = | $\mu$g/kg (variable) | Table 4-13 |
| V | = | 50,000 $ft^3$ | --- |
| Dbwt | = | 5 ft | Section 4.4.5 |
| DB | = | 98.5 lb/$ft^3$ | Table 4-3 |
| Cell | = | 100 ft | Figure 3-2 |
| M(t) | = | lbs (variable) | --- |
| t | = | years (variable) | --- |
| k | = | $day^{-1}$ (variable) | --- |
| Csol | = | 2.1 gm/L = 0.1313 lb/$ft^3$ | Table 4-3 |

***Parameters Defined***:

| | | |
|---|---|---|
| Q | = | Ground water flow through the affected zone ($ft^3$/yr) |
| K | = | Hydraulic conductivity of matrix in the affected zone (ft/day) |
| i | = | Average hyraulic gradient through the PRRS property (ft/ft) |
| A | = | Cross-sectional flow area of the affected zone ($ft^2$) |
| Csb | = | Average estimated concentration in soil below water table ($\mu$g/kg) |
| V | = | Cell volume of source area below water table ($ft^3$) |
| Dbwt | = | Depth of sodium source area below the water table (ft) |
| DB | = | Soil bulk density (lb/$ft^3$) |
| Cell | = | model cell width and length (ft) |
| M(t) | = | mass remaining at time t (lbs) |
| t | = | time past 1/1/92 (years) |
| k | = | decay constant ($day^{-1}$) |
| Csol | = | sodium solubility (gm/L to lb/$ft^3$) |

# TABLE 4-19
# SODIUM LOADING RATES AFTER 1991
# (ABOVE WATER TABLE SOURCE)
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

| Cell (I,J) | Site Location | Paved or Unpaved | Q ($ft^3/yr$) | k ($yr^{-1}$) | Csb Average Concentration ($\mu g/kg$) | M(0) Mass Remaining (lbs) | M(3) Mass Remaining (lbs) | M(6) Mass Remaining (lbs) | M(9) Mass Remaining (lbs) | M(12) Mass Remaining (lbs) | M(15) Mass Remaining (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 14,59 | RNC | P | 1,667 | 0.057 | 851,100 | 10,898 | 9,186 | 7,743 | 6,526 | 5,501 | 4,636 |
| 14,60 | RNC | P | 1,667 | 0.057 | 278,300 | 3,564 | 3,004 | 2,532 | 2,134 | 1,799 | 1,516 |
| 15,56 | RNC | U | 8,333 | 0.285 | 416,400 | 5,332 | 2,268 | 965 | 411 | 175 | 74 |
| 15,57 | RNC | U | 8,333 | 0.285 | 590,000 | 7,555 | 3,214 | 1,367 | 582 | 247 | 105 |
| 15,59 | RNC | P | 1,667 | 0.057 | 999,400 | 12,797 | 10,787 | 9,092 | 7,663 | 6,459 | 5,444 |
| 15,60 | RNC | P | 1,667 | 0.057 | 357,750 | 4,581 | 3,861 | 3,254 | 2,743 | 2,312 | 1,949 |
| 15,61 | RNC | U | 8,333 | 0.285 | 331,300 | 4,242 | 1,805 | 768 | 327 | 139 | 59 |
| 16,56 | RNC | U | 8,333 | 0.285 | 61,300 | 785 | 334 | 142 | 60 | 26 | 11 |
| 16,57 | RNC | U | 8,333 | 0.285 | 138,300 | 1,771 | 753 | 320 | 136 | 58 | 25 |
| 16,59 | RNC | P | 1,667 | 0.057 | 2,285,600 | 29,267 | 24,668 | 20,792 | 17,525 | 14,772 | 12,451 |
| 17,57 | RNC | U | 8,333 | 0.285 | 138,300 | 1,771 | 753 | 320 | 136 | 58 | 25 |
| 17,59 | RNC | U | 8,333 | 0.285 | 2,000,000 | 25,610 | 10,895 | 4,635 | 1,972 | 839 | 357 |
| 12,68 | A&W | U | 8,333 | 0.285 | 503,000 | 6,441 | 2,740 | 1,166 | 496 | 211 | 90 |
| 13,66 | A&W | P | 1,667 | 0.057 | 1,295,000 | 16,582 | 13,977 | 11,781 | 9,930 | 8,369 | 7,054 |
| 13,67 | A&W | P | 1,667 | 0.057 | 864,000 | 11,064 | 9,325 | 7,860 | 6,625 | 5,584 | 4,707 |
| 13,68 | A&W | P | 1,667 | 0.057 | 496,100 | 6,353 | 5,354 | 4,513 | 3,804 | 3,206 | 2,702 |
| 13,69 | A&W | U | 8,333 | 0.285 | 1,249,750 | 16,003 | 6,808 | 2,896 | 1,232 | 524 | 223 |
| 14,61 | A&W | U | 8,333 | 0.285 | 579,000 | 7,414 | 3,154 | 1,342 | 571 | 243 | 103 |
| 14,66 | A&W | P | 1,667 | 0.057 | 4,176,000 | 53,474 | 45,071 | 37,989 | 32,020 | 26,989 | 22,748 |
| 14,67 | A&W | P | 1,667 | 0.057 | 1,137,000 | 14,559 | 12,272 | 10,343 | 8,718 | 7,348 | 6,194 |
| 14,68 | A&W | U | 8,333 | 0.285 | 513,000 | 6,569 | 2,795 | 1,189 | 506 | 215 | 92 |
| 14,70 | A&W | U | 8,333 | 0.285 | 2,338,500 | 29,944 | 12,739 | 5,419 | 2,305 | 981 | 417 |



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# TABLE 4-19
# SODIUM LOADING RATES AFTER 1991
# (ABOVE WATER TABLE SOURCE)
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

| Cell (I,J) | Site Location | Paved or Unpaved | Q ($ft^3/yr$) | k ($yr^{-1}$) | Csb Average Concentration (µg/kg) | M(0) Mass Remaining (lbs) | M(3) Mass Remaining (lbs) | M(6) Mass Remaining (lbs) | M(9) Mass Remaining (lbs) | M(12) Mass Remaining (lbs) | M(15) Mass Remaining (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15,62 | A&W | U | 8,333 | 0.285 | 728,000 | 9,322 | 3,966 | 1,687 | 718 | 305 | 130 |
| 15,64 | A&W | P | 1,667 | 0.057 | 1,193,600 | 15,284 | 12,882 | 10,858 | 9,152 | 7,714 | 6,502 |
| 15,65 | A&W | U | 8,333 | 0.285 | 2,953,000 | 37,813 | 16,086 | 6,843 | 2,911 | 1,238 | 527 |
| 15,66 | A&W | U | 8,333 | 0.285 | 2,835,800 | 36,312 | 15,448 | 6,572 | 2,796 | 1,189 | 506 |
| 15,67 | A&W | U | 8,333 | 0.285 | 2,000,000 | 25,610 | 10,895 | 4,635 | 1,972 | 839 | 357 |
| 15,68 | A&W | U | 8,333 | 0.285 | 2,000,000 | 25,610 | 10,895 | 4,635 | 1,972 | 839 | 357 |
| 15,69 | A&W | U | 8,333 | 0.285 | 2,000,000 | 25,610 | 10,895 | 4,635 | 1,972 | 839 | 357 |
| 15,70 | A&W | U | 8,333 | 0.285 | 2,000,000 | 25,610 | 10,895 | 4,635 | 1,972 | 839 | 357 |
| 16,65 | A&W | U | 8,333 | 0.285 | 2,000,000 | 25,610 | 10,895 | 4,635 | 1,972 | 839 | 357 |
| 16,66 | A&W | U | 8,333 | 0.285 | 2,000,000 | 25,610 | 10,895 | 4,635 | 1,972 | 839 | 357 |
| 16,67 | A&W | U | 8,333 | 0.285 | 2,000,000 | 25,610 | 10,895 | 4,635 | 1,972 | 839 | 357 |
| 16,68 | A&W | U | 8,333 | 0.285 | 2,000,000 | 25,610 | 10,895 | 4,635 | 1,972 | 839 | 357 |
| Total Mass in Unsaturated zone: | | | | | | 580,188 | 309,762 | 184,829 | 123,345 | 90,163 | 70,125 |
| Total average load rate for period 0 to 3 years = 247 lb/day | | | | | | | | | | | |
| Total average load rate for period 3 to 6 years = 114 lb/day | | | | | | | | | | | |
| Total average load rate for period 6 to 9 years = 56 lb/day | | | | | | | | | | | |
| Total average load rate for period 9 to 12 years = 30 lb/day | | | | | | | | | | | |
| Total average load rate for period 12 to 15 years = 18 lb/day | | | | | | | | | | | |

# TABLE 4-19
# SODIUM LOADING RATES AFTER 1991
# (ABOVE WATER TABLE SOURCE)
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

***NOTES:***

RNC = Ruetgers-Nease Company
A&W = Albright & Wilson

| *Governing Equations*: | | | Reference |
|---|---|---|---|
| Q | = | R x Cell x Cell | --- |
| M(0) | = | Csb x V x DB | --- |
| M(t) | = | $M(0) \times e^{(-kt)}$ | EPA (1988a) |
| k | = | Q/(V x Ne) | EPA (1988a) |
| V | = | Cell x Cell x Dtw | --- |

| *Parameter Assignments*: | | | |
|---|---|---|---|
| Q | = | $ft^3/yr$ (variable) | --- |
| R | = | 10 in/yr (unpaved) or 2 in/yr (paved) | Figure 3-4 |
| Csb | = | $\mu g/kg$ (variable) | Table 4-13 |
| Dtw | = | 13 ft | Figure 4-7 |
| Ne | = | 0.225 (%/100) | Table 2-2 |
| V | = | 130,000 $ft^3$ | Figure 4-7 |
| DB | = | 98.5 $lb/ft^3$ | Table 4-3 |
| Cell | = | 100 ft | Figure 3-2 |
| M(t) | = | mass (lbs) remaining at time t (variable) | --- |
| t | = | years (variable) | --- |
| k | = | $day^{-1}$ (variable) | --- |

***Parameter Defined***:

| | | |
|---|---|---|
| Q | = | Volumetric rainfall recharge ($ft^3/yr$) |
| R | = | Infiltration rate at unpaved or paved area (in/yr) |
| Csb | = | Average estimated concentration in soil above water table ($\mu g/kg$) |
| Dtw | = | Estimated average depth to water at PRRS property (ft) |
| Ne | = | Effective porosity (%/100) |
| V | = | Cell volume above water table ($ft^3$) |
| DB | = | Soil bulk density ($lb/ft^3$) |
| Cell | = | model cell width and length (ft) |
| M(t) | = | mass remaining at time t (lbs) |
| t | = | time past 1/1/92 (years) |
| k | = | decay constant ($day^{-1}$) |



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# TABLE 4-20
# ETHYLBENZENE LOADING RATES AFTER 1991 IN SOIL
# (BELOW WATER TABLE)
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

| Model Cell (I,J) | k $yr^{-1}$ | Csb Average Concentration (µg/kg) | M(0) Mass (lbs) | M(3) Mass Remaining (lbs) | M(6) Mass Remaining (lbs) | M(9) Mass Remaining (lbs) | M(12) Mass Remaining (lbs) | M(15) Mass Remaining (lbs) |
|---|---|---|---|---|---|---|---|---|
| 14,57 | 0.08 | 452,978 | 2,231 | 1,746 | 1,367 | 1,070 | 838 | 656 |
| 14,58 | 0.14 | 260,000 | 1,281 | 836 | 546 | 356 | 233 | 152 |
| 14,59 | 0.08 | 475,001 | 2,339 | 1,852 | 1,467 | 1,161 | 920 | 728 |
| 15,57 | 0.09 | 410,214 | 2,020 | 1,542 | 1,177 | 898 | 685 | 523 |
| 15,58 | 0.08 | 439,286 | 2,163 | 1,681 | 1,306 | 1,015 | 788 | 612 |
| 15,59 | 0.14 | 260,000 | 1,281 | 836 | 546 | 356 | 233 | 152 |
| 16,57 | 0.08 | 484,360 | 2,385 | 1,897 | 1,509 | 1,200 | 955 | 759 |
| 16,58 | 0.10 | 388,718 | 1,914 | 1,439 | 1,082 | 814 | 612 | 460 |
| 17,56 | 1.00 | 37,006 | 182 | 9 | 0 | 0 | 0 | 0 |
| Total mass below water table: | | | 15,797 | 11,839 | 8,999 | 6,870 | 5,262 | 4,042 |
| Total average loading rate for period 0 to 3 years = 3.61 lb/day | | | | | | | | |
| Total average loading rate for period 3 to 6 years = 2.59 lb/day | | | | | | | | |
| Total average loading rate for period 6 to 9 years = 1.94 lb/day | | | | | | | | |
| Total average loading rate for period 9 to 12 years = 1.47 lb/day | | | | | | | | |
| Total average loading rate for period 12 to 15 years = 1.11 lb/day | | | | | | | | |

# TABLE 4-20
# ETHYLBENZENE LOADING RATES AFTER 1991 IN SOIL
# (BELOW WATER TABLE)
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

*NOTES*:

RNC = Ruetgers-Nease Company
A&W = Albright & Wilson Company

| **Governing Equations:** | | | References |
|---|---|---|---|
| M(0) | = | Csb x V x DB | --- |
| RM | = | Csol x Q | --- |
| Q | = | K x i x A | Freeze and Cherry (1979) |
| A | = | Cell x Dbwt | --- |
| V | = | Cell x Cell x Dbwt | --- |
| M(t) | = | $M(0) \times e^{(-kt)}$ | Section 4.4.5 |
| k | = | RM/M(0) | Section 4.4.5 |

| **Parameter Assignments:** | | | |
|---|---|---|---|
| K | = | 35 ft/day | Section 4.4.5 |
| i | = | 0.003 ft/ft | ERM (Sept. 1992) |
| Cell | = | 100 feet | Figure 3-2 |
| Dbwt | = | 5 ft | Figure 4-7 |
| Csb | = | $\mu$g/kg (variable) | Table 4-15 |
| V | = | 50,000 $ft^3$ | --- |
| DB | = | 98.5 $lb/ft^3$ | Table 4-3 |
| RM | = | 182 lb/yr | --- |
| Csol | = | 0.152 gm/L = 0.0095 $lb/ft^3$ | Table 4-3 |
| Q | = | 19,163 $ft^3$/yr | --- |
| t | = | years (variable) | --- |
| M(t) | = | lb (varaible) | --- |
| k | = | $day^{-1}$ (variable) | --- |
| A | = | 500 $ft^2$ | --- |

| **Parameter Assignment:** | | |
|---|---|---|
| K | = | estimated hydraulic conductivity at water table (ft/day) |
| i | = | average estimated water table gradient accross PRRS property (ft/ft) |
| Cell | = | model cell width and length (ft) |
| Dbwt | = | average estimated depth below water table of impacted soil |
| Csb | = | average estimated concentration in soil below water table for a model cell ($\mu$g/kg) |
| V | = | cell volume of source area below water table ($ft^3$) |
| DB | = | Bulk density of soil ($lb/ft^3$) |
| RM | = | ethylbenzene mass removal rate (lb/yr) |



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# TABLE 4-20
# ETHYLBENZENE LOADING RATES AFTER 1991 IN SOIL
# (BELOW WATER TABLE)
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

***NOTES: (Continued)***

| | | |
|---|---|---|
| Csol | = | solubility of ethylbenzene (gm/L to $lb/ft^3$) |
| Q | = | ground water flow rate through impacted zone ($ft^3/y$) |
| t | = | time past 1/1/92 (years) |
| M(t) | = | mass remaining at time equals t (lb) |
| k | = | decay constant ($day^{-1}$) |
| A | = | cross sectional area of flow through impacted soil zone in model cell ($ft^2$) |

# TABLE 4-21
# ETHYLBENZENE LOADING RATES AFTER 1991
# (ABOVE WATER TABLE SOURCE)
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

| Cell (I,J) | Paved or Unpaved | Q ($ft^3/y$) | k ($day^{-1}$) | Csb Average Concentration ($\mu g/kg$) | M(0) Mass Remaining (lbs) | M(3) Mass Remaining (lbs) | M(6) Mass Remaining (lbs) | M(9) Mass Remaining (lbs) | M(12) Mass Remaining (lbs) |
|---|---|---|---|---|---|---|---|---|---|
| 14,56 | U | 8,333 | 0.285 | 30,708 | 393 | 167 | 71 | 30 | 13 |
| 14,58 | P | 1,667 | 0.057 | 20,170 | 258 | 218 | 183 | 155 | 130 |
| 14,59 | P | 1,667 | 0.057 | 204,888 | 2,624 | 2,211 | 1,864 | 1,571 | 1,324 |
| 15,56 | U | 8,333 | 0.285 | 1,700 | 22 | 9 | 4 | 2 | 1 |
| 15,58 | P | 1,667 | 0.057 | 288,037 | 3,688 | 3,109 | 2,620 | 2,209 | 1,862 |
| 15,59 | P | 1,667 | 0.057 | 100,126 | 1,282 | 1,081 | 911 | 768 | 647 |
| 16,58 | P | 1,667 | 0.057 | 48,924 | 626 | 528 | 445 | 375 | 316 |
| 16,59 | P | 1,667 | 0.057 | 1,775 | 23 | 19 | 16 | 14 | 11 |
| 17,56 | U | 8,333 | 0.285 | 23,002 | 295 | 125 | 53 | 23 | 10 |
| Total mass in unsaturated zone: | | | | | 9,211 | 7,468 | 6,168 | 5,145 | 4,314 |
| Total average loading rate for period 0 to 3 years = 1.592 lb/day | | | | | | | | | |
| Total average loading rate for period 3 to 6 years = 1.187 lb/day | | | | | | | | | |
| Total average loading rate for period 6 to 9 years = 0.934 lb/day | | | | | | | | | |
| Total average loading rate for period 9 to 12 years = 0.759 lb/day | | | | | | | | | |
| Total average loading rate for period 12 to 15 years = 0.628 lb/day | | | | | | | | | |



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# TABLE 4-21
# ETHYLBENZENE LOADING RATES AFTER 1991
# (ABOVE WATER TABLE SOURCE)
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

***NOTES:***

RNC = Ruetgers-Nease Company
A&W = Albright & Wilson Company

| ***Governing Equations***: | | Reference |
|---|---|---|
| Q | = R x Cell x Cell | --- |
| M(0) | = Csb x V x DB | --- |
| M(t) | = $M(0) \times e^{(-kt)}$ | EPA (1988a) |
| k | = Q/(V x Ne) | EPA (1988a) |
| V | = Cell x Cell x Dtw | --- |

| ***Parameter Assignments***: | | |
|---|---|---|
| Q | = $ft^3$/yr (variable) | --- |
| R | = 10 in/yr (unpaved) or 2 in/yr (paved) | Figure 3-4 |
| Csb | = $\mu$g/kg (variable) | Table 4-15 |
| Dtw | = 13 ft | Figure 4-7 |
| Ne | = 0.225 (%/100) | Table 2-2 |
| V | = 130,000 $ft^3$ | Figure 4-7 |
| DB | = 98.5 $lb/ft^3$ | Table 4-3 |
| Cell | = 100 ft | Figure 3-2 |
| M(t) | = mass (lbs) remaining at time t (variable) | --- |
| t | = years (variable) | --- |
| k | = $day^{-1}$ (variable) | --- |

# TABLE 4-21
# ETHYLBENZENE LOADING RATES AFTER 1991
# (ABOVE WATER TABLE SOURCE)
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

***NOTES: (Continued)***

***Parameter Defined***:

Q = Volumetric rainfall recharge rate ($ft^3/yr$)
R = Infiltration rate at unpaved or paved area (in/yr)
Csb = Average estimated concentration in soil above water table ($\mu g/kg$)
Dtw = Estimated average depth to water at PRRS property (ft)
Ne = Effective porosity (%/100)
V = Cell volume above water table ($ft^3$)
DB = Soil bulk density ($lb/ft^3$)
Cell = model cell width and length (ft)
M(t) = mass remaining at time t (lbs)
t = time past 01/01/92 (years)
k = decay constant ($day^{-1}$)

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# TABLE 4-22
# ETHYLBENZENE LOADING RATES AFTER 1991
# (FLOATING HYDROCARBON SOURCE)
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

| Cell (I,J) | Paved (P) or Unpaved (U) | H (ft) | h (ft) | Q ($ft^3$/yr) | Vp ($ft^2$) | M(0) Mass Remaining (lbs) | RM1 (lbs/yr) | RM2 (lb/yr) | RM Total Mass Released (lbs/yr) | M(3) Mass Remaining (lbs) | M(6) Mass Remaining (lbs) | M(9) Mass Remaining (lbs) | M(12) Mass Remaining (lbs) | M(15) Mass Remaining (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13,56 | U | 0.18 | 0.03 | 8,333 | 67.50 | 329.87 | 79.17 | 11.13 | 90.30 | 145.11 | 63.83 | 28.08 | 12.35 | 5.43 |
| 13,57 | U | 0.20 | 0.03 | 8,333 | 67.50 | 329.87 | 79.17 | 11.13 | 90.30 | 145.11 | 63.83 | 28.08 | 12.35 | 5.43 |
| 13,58 | P | 0.15 | 0.02 | 1,667 | 45.00 | 219.92 | 15.83 | 7.42 | 23.26 | 160.13 | 116.60 | 84.90 | 61.82 | 45.02 |
| 14,54 | U | 0.15 | 0.02 | 8,333 | 45.00 | 219.92 | 79.17 | 7.42 | 86.59 | 67.49 | 20.71 | 6.36 | 1.95 | 0.60 |
| 14,55 | U | 0.40 | 0.06 | 8,333 | 135.00 | 659.75 | 79.17 | 22.27 | 101.43 | 415.97 | 262.27 | 165.36 | 104.26 | 65.74 |
| 14,56 | U | 0.70 | 0.11 | 8,333 | 247.50 | 1,209.53 | 79.17 | 40.82 | 119.99 | 898.19 | 666.99 | 495.30 | 367.81 | 273.13 |
| 14,57 | U | 0.70 | 0.11 | 8,333 | 247.50 | 1,209.53 | 79.17 | 40.82 | 119.99 | 898.19 | 666.99 | 495.30 | 367.81 | 273.13 |
| 14,58 | P | 0.60 | 0.09 | 1,667 | 202.50 | 989.62 | 15.83 | 33.40 | 49.23 | 852.41 | 734.23 | 632.43 | 544.75 | 469.22 |
| 14,59 | P | 0.70 | 0.11 | 1,667 | 247.50 | 1,209.53 | 15.83 | 40.82 | 56.66 | 1,050.97 | 913.19 | 793.48 | 689.46 | 599.07 |
| 15,54 | U | 0.40 | 0.06 | 8,333 | 135.00 | 659.75 | 79.17 | 22.27 | 101.43 | 415.97 | 262.27 | 165.36 | 104.26 | 65.74 |
| 15,55 | U | 0.80 | 0.12 | 8,333 | 270.00 | 1,319.49 | 79.17 | 44.53 | 123.70 | 996.01 | 751.83 | 567.52 | 428.39 | 323.36 |

# TABLE 4-22
# ETHYLBENZENE LOADING RATES AFTER 1991
# (FLOATING HYDROCARBON SOURCE)
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

| Cell (I,J) | Paved (P) or Unpaved (U) | H (ft) | h (ft) | Q ($ft^3/yr$) | Vp ($ft^3$) | M(0) Mass Remaining (lbs) | RM1 (lbs/yr) | RM2 (lb/yr) | RM Total Mass Released (lbs/yr) | M(3) Mass Remaining (lbs) | M(6) Mass Remaining (lbs) | M(9) Mass Remaining (lbs) | M(12) Mass Remaining (lbs) | M(15) Mass Remaining (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15,56 | U | 1.00 | 0.16 | 8,333 | 360.00 | 1,759.32 | 79.17 | 59.38 | 138.54 | 1,389.14 | 1,096.84 | 866.05 | 683.82 | 539.94 |
| 15,57 | U | 1.00 | 0.16 | 8,333 | 360.00 | 1,759.32 | 79.17 | 59.38 | 138.54 | 1,389.14 | 1,096.84 | 866.05 | 683.82 | 539.94 |
| 15,58 | P | 0.60 | 0.09 | 1,667 | 202.50 | 989.62 | 15.83 | 33.40 | 49.23 | 852.41 | 734.23 | 632.43 | 544.75 | 469.22 |
| 15,59 | P | 0.30 | 0.05 | 1,667 | 112.50 | 549.79 | 15.83 | 18.56 | 34.39 | 455.72 | 377.75 | 313.12 | 259.55 | 215.14 |
| 16,53 | U | 0.12 | 0.02 | 8,333 | 45.00 | 219.92 | 79.17 | 7.42 | 86.59 | 67.49 | 20.71 | 6.36 | 1.95 | 0.60 |
| 16,54 | U | 0.70 | 0.11 | 8,333 | 247.50 | 1,209.53 | 79.17 | 40.82 | 119.99 | 898.19 | 666.99 | 495.30 | 367.81 | 273.13 |
| 16,55 | U | 1.00 | 0.16 | 8,333 | 360.00 | 1,759.32 | 79.17 | 59.38 | 138.54 | 1,389.14 | 1,096.84 | 866.05 | 683.82 | 539.94 |
| 16,56 | U | 0.80 | 0.12 | 8,333 | 270.00 | 1,319.49 | 79.17 | 44.53 | 123.70 | 996.01 | 751.83 | 567.52 | 428.39 | 323.36 |
| 16,57 | U | 0.60 | 0.09 | 8,333 | 202.50 | 989.62 | 79.17 | 33.40 | 112.57 | 703.51 | 500.11 | 355.52 | 252.74 | 179.67 |
| 16,58 | U | 0.50 | 0.08 | 8,333 | 180.00 | 879.66 | 79.17 | 29.69 | 108.86 | 606.86 | 418.66 | 288.82 | 199.25 | 137.46 |
| 16,59 | P | 0.15 | 0.02 | 1,667 | 45.00 | 219.92 | 15.83 | 7.42 | 23.26 | 160.13 | 116.60 | 84.90 | 61.82 | 45.02 |

# TABLE 4-22
# ETHYLBENZENE LOADING RATES AFTER 1991
# (FLOATING HYDROCARBON SOURCE)
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

| Cell (I,J) | Paved (P) or Unpaved (U) | H (ft) | h (ft) | Q ($ft^3$/yr) | Vp ($ft^3$) | M(0) Mass Remaining (lbs) | RM1 (lbs/yr) | RM2 (lb/yr) | RM Total Mass Released (lbs/yr) | M(3) Mass Remaining (lbs) | M(6) Mass Remaining (lbs) | M(9) Mass Remaining (lbs) | M(12) Mass Remaining (lbs) | M(15) Mass Remaining (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17,53 | U | 0.20 | 0.03 | 8,333 | 67.50 | 329.87 | 79.17 | 11.13 | 90.30 | 145.11 | 63.83 | 28.08 | 12.35 | 5.43 |
| 17,54 | U | 0.50 | 0.08 | 8,333 | 180.00 | 879.66 | 79.17 | 29.69 | 108.86 | 606.86 | 418.66 | 288.82 | 199.25 | 137.46 |
| 17,55 | U | 0.80 | 0.12 | 8,333 | 270.00 | 1,319.49 | 79.17 | 44.53 | 123.70 | 996.01 | 751.83 | 567.52 | 428.39 | 323.36 |
| 17,56 | U | 0.40 | 0.06 | 8,333 | 135.00 | 659.75 | 79.17 | 22.27 | 101.43 | 415.97 | 262.27 | 165.36 | 104.26 | 65.74 |
| 17,57 | U | 0.15 | 0.02 | 8,333 | 45.00 | 219.92 | 79.17 | 7.42 | 86.59 | 67.49 | 20.71 | 6.36 | 1.95 | 0.60 |
| 18,53 | U | 0.20 | 0.03 | 8,333 | 67.50 | 329.87 | 79.17 | 11.13 | 90.30 | 145.11 | 63.83 | 28.08 | 12.35 | 5.43 |
| 18,54 | U | 0.40 | 0.06 | 8,333 | 135.00 | 659.75 | 79.17 | 22.27 | 101.43 | 415.97 | 262.27 | 165.36 | 104.26 | 65.74 |
| 18,55 | U | 0.50 | 0.08 | 8,333 | 180.00 | 879.66 | 79.17 | 29.69 | 108.86 | 606.86 | 418.66 | 288.82 | 199.25 | 137.46 |
| 18,56 | U | 0.25 | 0.04 | 8,333 | 90.00 | 439.83 | 79.17 | 14.84 | 94.01 | 231.63 | 121.99 | 64.24 | 33.83 | 17.82 |
| 19,53 | U | 0.15 | 0.02 | 8,333 | 45.00 | 219.92 | 79.17 | 7.42 | 86.59 | 67.49 | 20.71 | 6.36 | 1.95 | 0.60 |
| 19,54 | U | 0.25 | 0.04 | 8,333 | 90.00 | 439.83 | 79.17 | 14.84 | 94.01 | 231.63 | 121.99 | 64.24 | 33.83 | 17.82 |

# TABLE 4-22
# ETHYLBENZENE LOADING RATES AFTER 1991
# (FLOATING HYDROCARBON SOURCE)
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

| Cell (I,J) | Paved (P) or Unpaved (U) | H (ft) | h (ft) | Q ($ft^3$/yr) | Vp ($ft^3$) | M(0) Mass Remaining (lbs) | RMI (lbs/yr) | RM2 (lb/yr) | RM Total Mass Released (lbs/yr) | M(3) Mass Remaining (lbs) | M(6) Mass Remaining (lbs) | M(9) Mass Remaining (lbs) | M(12) Mass Remaining (lbs) | M(15) Mass Remaining (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19,55 | U | 0.25 | 0.04 | 8,333 | 90.00 | 439.83 | 79.17 | 14.84 | 94.01 | 231.63 | 121.99 | 64.24 | 33.83 | 17.82 |
| Total mass in unsaturated zone: | | | | | | 26,830 | | | | 19,115 | 14,050 | 10,544 | 8,032 | 6,189 |
| Total average loading rate for period 0 to 3 years = 7.045 lb/day | | | | | | | | | | | | | | |
| Total average loading rate for period 3 to 6 years = 4.262 lb/day | | | | | | | | | | | | | | |
| Total average loading rate for period 6 to 9 years = 3.202 lb/day | | | | | | | | | | | | | | |
| Total average loading rate for period 9 to 12 years = 2.294 lb/day | | | | | | | | | | | | | | |
| Total average loading rate for period 12 to 15 years = 1.683 lb/day | | | | | | | | | | | | | | |

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# TABLE 4-22
# ETHYLBENZENE LOADING RATES AFTER 1991
# (FLOATING HYDROCARBON SOURCE)
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

***NOTES***:

***Governing Equations***:

| | | | Reference |
|---|---|---|---|
| Q | = | R x Cell x Cell | --- |
| RM1 | = | Cs x Q | --- |
| RM2 | = | Rh x Ne x M(0)/ 1 year | --- |
| h | = | H x (DBw - DBh)/DBh | (AAPG, 1989 & CONCAWE, 1979) |
| M(t) | = | M(0) x $e^{(-kt)}$ | Section 4.4.5 |
| k | = | RM/M(0) | Section 4.4.5 |
| RM | = | RM1 + RM2 | --- |
| Vp | = | Cell x Cell x Ne x h | --- |
| M(0) | = | Csp x Vp x DBh | --- |

***Parameter Assignments***:

| | | | |
|---|---|---|---|
| Q | = | $ft^3$/yr (varable) | --- |
| RM1 | = | lb/day (variable) | --- |
| RM2 | = | lb/day (varaible) | --- |
| RM | = | 1b/day (variable) | --- |
| DBw | = | 62.4 lb/$ft^3$ | Table 4-3 |
| DBh | = | 54 lb/$ft^3$ | Table 4-3 |
| h | = | ft (variable) | --- |
| H | = | ft (variable) | Table 4-8 |
| R | = | $ft^3$/day (10 in/yr (unpaved) or 2 in/yr (paved)) | Figure 3-4 |
| Cell | = | 100 feet | Figure 3-2 |
| Csp | = | 90,500 mg/L = 0.0905 | ERM (Sept., 1992) |
| Cs | = | 0.152 gm/L = 0.0095 | Table 4-3 |
| Ne | = | 0.225 (%/100) | Table 2-2 |
| Rh | = | 0.15 (%/100) | Table 4-3 |
| Vp | = | $ft^3$ (variable) | --- |
| M(t) | = | lb (variable) | --- |
| t | = | year (varaible) | --- |
| k | = | $day^{-1}$ (varaible) | --- |

***Parameter Definitions***:

| | | |
|---|---|---|
| Q | = | recharge flow rate ($ft^3$/yr) |
| RM1 | = | ethylbenzene mass removal rate due to rainfall infiltration (lb/day) |
| RM2 | = | ethylbenzene mass removal rate due to water table fluctuation and subsequent dissolution (lb/day) |
| RM | = | total mass removal rate |
| DBw | = | density of water (lb/$ft^3$) |
| DBh | = | density of ethylbenzene (lb/$ft^3$) |
| h | = | actual product thickness (ft) |
| H | = | apparent product thickness (ft) |
| R | = | infiltration rate at unpaved or paved cell ($ft^3$/day) |

# TABLE 4-22
# ETHYLBENZENE LOADING RATES AFTER 1991
# (FLOATING HYDROCARBON SOURCE)
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

***NOTES:*** ***(Continued)***

| | | |
|---|---|---|
| Cell | = | model cell width or length (ft) |
| Csp | = | average concentration of ethylbenzene detected in liquid phase hydrocarbon at site |
| Cs | = | ethylbenzene solubility in water ($lb/ft^3$) |
| Ne | = | effective porsity (%/100) |
| $R_h$ | = | percentage of Ne which retains liquid phase hydrocarbon after mobile hydrocarbon removed (%/100) |
| $V_p$ | = | volume of product in cell ($ft^3$) |
| M(t) | = | Mass remaining at time (t) |
| t | = | time past 01/01/92 (years) |
| k | = | decay constant ($day^{-1}$) |

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## TABLE 4-23

## PRIMARY CALIBRATION EVALUATION CRITERIA FOR TRANSPORT MODELING
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Designation | Description | Acceptable Range | Optimum Value |
|---|---|---|---|
| 1. Graphical comparison | Comparison of observed and simulated values via contour mapping and x-y arithmetic graphs. | Not quantifiable. | Not quantifiable |
| 2. R1 | R1 is the ratio of the mean of the residuals (the difference between observed and computed values) to the mean of the observed values. | -30% < R1 < +30% | 0% |
| 3. Percent of residuals within ± one standard deviation of observed values | Example: for 40 observations then 5% of observations (i.e., two residuals (40x0.05=2)) can fall outside of the one standard deviation of observed values. | 90% - 100% | 100% |
| 4. R4 | R4 is the regression coefficient between the observed and computed heads. | 0.50 - 1.0 | 1.0 |
| 5. R5 | R5 is the ratio of the coefficient of variation (the standard deviation divided by the mean) of the observed values to the computed values | 0.80 - 1.2 | 1.0 |
| 6. Model mass balance error | This error is calculated by HST3D and termed the "fractional imbalance" by the code. | -15% < model mass balance error < +15% | 0.0 |

## TABLE 4-24

## OBSERVED SODIUM CONCENTRATIONS IN GROUND WATER (1990-1992)
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Well Designation | Model Coordinates i | j | k | Elev. Top of Sat Scrn (FAMSL) | Elev. Base of Scrn (FAMSL) | Sat Well Scrn Length (ft) | Elev. Sat Scrn Midpoint (FAMSL) | Elev. Top of Sat Cell (FAMSL) | Elev. Base of Cell (FAMSL) | Depth of Sat Cell (ft) | Elev. Midpt of Sat Cell (FAMSL) | n Distance Between Midpoints (ft) | Cxn Stand Obs Avg Conc[a] (μg/L) | Cx Obs Avg Conc[a] (μg/L) | Cxn Stand Obs Max Conc[a] (μg/L) | Cx Obs Max Conc[a] (μg/L) | Cxn Stand Obs Min Conc[a] (μg/L) | Cx Obs Min Conc[a] (μg/L) | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AW-1 | 12 | 78 | 2 | 468.30 | 448.30 | 20.00 | 458.30 | 460.00 | 425.00 | 35.00 | 442.50 | 15.80 | 0 | 0 | 0 | 0 | 0 | 0 | |
| AW-2 | 12 | 75 | 2 | 469.30 | 449.30 | 20.00 | 459.30 | 460.00 | 425.00 | 35.00 | 442.50 | 16.80 | 0 | 0 | 2,015 | 3,650 | 0 | 0 | |
| DOE-2002 | 21 | 81 | 4 | 522.39 | 507.40 | 14.99 | 514.90 | 522.39 | 487.00 | 35.39 | 504.70 | 10.20 | 0 | 0 | 0 | 0 | 0 | 0 | |
| DOE-2094 | 23 | 43 | 4 | 509.00 | 494.00 | 15.00 | 501.50 | 509.00 | 487.00 | 22.00 | 498.00 | 3.50 | 39,946 | 44,300 | 50,496 | 57,150 | 29,467 | 33,350 | |
| DOE-2126 | 5 | 65 | 4 | 517.50 | 502.90 | 14.60 | 510.20 | 517.50 | 487.00 | 30.50 | 502.25 | 7.95 | 0 | 0 | 0 | 0 | 0 | 0 | |
| DOE-2129 | 14 | 61 | 4 | 515.90 | 505.90 | 10.00 | 510.90 | 515.90 | 487.00 | 28.90 | 501.45 | 9.45 | 80,167 | 106,000 | 98,328 | 137,350 | 51,509 | 71,950 | |
| DOE-2393 | 9 | 61 | 4 | 512.50 | 497.10 | 15.40 | 504.80 | 512.50 | 487.00 | 25.50 | 499.75 | 5.05 | 0 | 0 | 0 | 0 | 0 | 0 | |
| DOE-2394 | 28 | 68 | 4 | 509.79 | 494.80 | 14.99 | 502.30 | 509.79 | 487.00 | 22.79 | 498.40 | 3.90 | 0 | 0 | 0 | 0 | 0 | 0 | |
| DOE-3094 | 23 | 43 | 3 | 459.24 | 449.20 | 10.04 | 454.22 | 460.00 | 425.00 | 35.00 | 442.50 | 11.72 | 8,769 | 12,400 | 10,670 | 16,150 | 5,186 | 7,850 | |
| DOE-3126 | 5 | 65 | 3 | 460.80 | 450.40 | 10.40 | 455.60 | 460.00 | 425.00 | 35.00 | 442.50 | 13.10 | 0 | 0 | 0 | 0 | 0 | 0 | |
| EVERS | 18 | 60 | 4 | 515.30 | 505.30 | 10.00 | 510.30 | 515.30 | 487.00 | 28.30 | 501.15 | 9.15 | 8,794 | 11,525 | 18,559 | 25,650 | 0 | 0 | b, c |
| HPF | 28 | 58 | 2 | 454.00 | 444.00 | 10.00 | 449.00 | 460.00 | 425.00 | 35.00 | 442.50 | 6.50 | 0 | 0 | 0 | 0 | 0 | 0 | b |
| MW-01D | 11 | 80 | 2 | 460.20 | 450.20 | 10.00 | 455.20 | 460.00 | 425.00 | 35.00 | 442.50 | 12.70 | 0 | 0 | 0 | 0 | 0 | 0 | |
| MW-01S | 11 | 80 | 4 | 521.50 | 514.00 | 7.50 | 517.75 | 521.50 | 487.00 | 34.50 | 504.25 | 13.50 | 11,608 | 17,300 | 20,007 | 32,250 | 3,133 | 5,050 | |
| MW-02S | 12 | 70 | 4 | 520.20 | 513.70 | 6.50 | 516.95 | 520.20 | 487.00 | 33.20 | 503.60 | 13.35 | 17,084 | 25,350 | 20,550 | 32,950 | 13,876 | 22,250 | |
| MW-03S | 13 | 66 | 4 | 515.20 | 508.90 | 6.30 | 512.05 | 515.20 | 487.00 | 28.20 | 501.10 | 10.95 | 69,708 | 96,350 | 71,523 | 105,350 | 59,981 | 88,350 | |
| MW-04S | 13 | 66 | 4 | 515.20 | 509.00 | 6.20 | 512.10 | 515.20 | 487.00 | 28.20 | 501.10 | 11.00 | 179,413 | 248,350 | 194,739 | 287,350 | 141,878 | 209,350 | |

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# TABLE 4-24

## OBSERVED SODIUM CONCENTRATIONS IN GROUND WATER (1990-1992)
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Well Designation | Model Coordinates i | j | k | Elev. Top of Sat Scrn (FAMSL) | Elev. Base of Scrn (FAMSL) | Sat Well Scrn Length (ft) | Elev. Sat Scrn Midpoint (FAMSL) | Elev. Top of Sat Cell (FAMSL) | Elev. Base of Cell (FAMSL) | Depth of Sat Cell (ft) | Elev. Midpt of Sat Cell (FAMSL) | n Distance Between Midpoints (ft) | Cxn Stand Obs Avg Conc* (µg/L) | Cx Obs Avg Conc* (µg/L) | Cxn Stand Obs Max Conc* (µg/L) | Cx Obs Max Conc* (µg/L) | Cxn Stand Obs Min Conc* (µg/L) | Cx Obs Min Conc* (µg/L) | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-05S | 14 | 66 | 4 | 515.30 | 512.00 | 3.30 | 513.65 | 515.30 | 487.00 | 28.30 | 501.15 | 12.50 | 372,739 | 539,350 | 497,026 | 773,350 | 256,016 | 398,350 | |
| MW-06S | 15 | 65 | 4 | 515.30 | 510.00 | 5.30 | 512.65 | 515.30 | 487.00 | 28.30 | 501.15 | 11.50 | 1,499,348 | 2,106,350 | 2,682,859 | 4,029,350 | 610,798 | 917,350 | |
| MW-07S | 14 | 63 | 4 | 514.50 | 510.70 | 3.80 | 512.60 | 514.50 | 487.00 | 27.50 | 500.75 | 11.85 | 4,548 | 6,455 | 32,454 | 49,350 | 0 | 0 | |
| MW-08S | 15 | 62 | 4 | 516.40 | 509.50 | 6.90 | 512.95 | 516.40 | 487.00 | 29.40 | 501.70 | 11.25 | 45,428 | 63,350 | 69,425 | 103,350 | 5,475 | 8,150 | |
| MW-09D | 14 | 61 | 2 | 457.00 | 447.00 | 10.00 | 452.00 | 460.00 | 425.00 | 35.00 | 442.50 | 9.50 | 0 | 0 | 0 | 0 | 0 | 0 | |
| MW-10S | 14 | 58 | 4 | 513.50 | 507.90 | 5.60 | 510.70 | 513.50 | 487.00 | 26.50 | 500.25 | 10.45 | 48,113 | 65,525 | 58,288 | 84,350 | 26,846 | 38,850 | |
| MW-11S | 15 | 58 | 4 | 513.50 | 508.30 | 5.20 | 510.90 | 513.50 | 487.00 | 26.50 | 500.25 | 10.65 | 185,841 | 254,600 | 212,260 | 309,350 | 104,535 | 152,350 | |
| MW-12S | 16 | 58 | 4 | 513.40 | 508.20 | 5.20 | 510.80 | 513.40 | 487.00 | 26.40 | 500.20 | 10.60 | 246,790 | 337,600 | 345,297 | 502,350 | 108,844 | 158,350 | |
| MW-13S | 17 | 56 | 4 | 512.80 | 508.80 | 4.00 | 510.80 | 512.80 | 487.00 | 25.80 | 499.90 | 10.90 | 121,255 | 167,350 | 124,698 | 183,350 | 102,935 | 151,350 | |
| MW-14I | 14 | 59 | 3 | 490.20 | 480.20 | 10.00 | 485.20 | 487.00 | 460.00 | 27.00 | 473.50 | 11.70 | 0 | 0 | 2,016 | 3,050 | 0 | 0 | |
| MW-14S | 17 | 55 | 4 | 514.30 | 507.50 | 6.80 | 510.90 | 514.30 | 487.00 | 27.30 | 500.65 | 10.25 | 144,473 | 195,600 | 139,429 | 200,350 | 131,773 | 189,350 | |
| MW-15D | 16 | 55 | 2 | 458.20 | 448.20 | 10.00 | 453.20 | 460.00 | 425.00 | 35.00 | 442.50 | 10.70 | 0 | 0 | 0 | 0 | 0 | 0 | |
| MW-15S | 16 | 56 | 4 | 512.70 | 507.00 | 5.70 | 509.85 | 512.70 | 487.00 | 25.70 | 499.85 | 10.00 | 151,125 | 203,100 | 177,878 | 253,350 | 95,030 | 135,350 | |
| MW-16S | 14 | 56 | 4 | 513.00 | 508.60 | 4.40 | 510.80 | 513.00 | 487.00 | 26.00 | 500.00 | 10.80 | 36,680 | 50,475 | 50,541 | 74,050 | 18,462 | 27,050 | |
| MW-18D | 15 | 68 | 2 | 460.00 | 450.00 | 10.00 | 455.00 | 460.00 | 425.00 | 35.00 | 442.50 | 12.50 | 0 | 0 | 0 | 0 | 0 | 0 | |
| MW-18S | 15 | 68 | 4 | 517.90 | 512.90 | 5.00 | 515.40 | 517.90 | 487.00 | 30.90 | 502.45 | 12.95 | 194,085 | 284,600 | 298,782 | 472,350 | 66,006 | 104,350 | |
| MW-19S | 12 | 51 | 4 | 513.70 | 504.00 | 9.70 | 508.85 | 513.70 | 487.00 | 26.70 | 500.35 | 8.50 | 0 | 0 | 0 | 0 | 0 | 0 | |
| MW-20D | 17 | 48 | 2 | 446.70 | 436.70 | 10.00 | 441.70 | 460.00 | 425.00 | 35.00 | 442.50 | -0.80 | 0 | 0 | 0 | 0 | 0 | 0 | |

## TABLE 4-24

## OBSERVED SODIUM CONCENTRATIONS IN GROUND WATER (1990-1992)
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Well Designation | Model Coordinates i | j | k | Elev. Top of Sat Scrn (FAMSL) | Elev. Base of Scrn (FAMSL) | Sat Well Scrn Length (ft) | Elev. Sat Scrn Midpoint (FAMSL) | Elev. Top of Sat Cell (FAMSL) | Elev. Base of Cell (FAMSL) | Depth of Sat Cell (ft) | Elev. Midpt of Sat Cell (FAMSL) | n Distance Between Midpoints (ft) | Cxn Stand Obs Avg Conc* (µg/L) | Cx Obs Avg Conc* (µg/L) | Cxn Stand Obs Max Conc* (µg/L) | Cx Obs Max Conc* (µg/L) | Cxn Stand Obs Min Conc* (µg/L) | Cx Obs Min Conc* (µg/L) | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-20S | 17 | 48 | 4 | 511.70 | 503.70 | 8.00 | 507.70 | 511.70 | 487.00 | 24.70 | 499.35 | 8.35 | 5,137 | 6,575 | 8,076 | 10,850 | 1,600 | 2,150 | |
| MW-21D | 21 | 48 | 2 | 447.10 | 437.10 | 10.00 | 442.10 | 460.00 | 425.00 | 35.00 | 442.50 | -0.40 | 34,404 | 34,000 | 43,055 | 42,450 | 28,551 | 28,150 | |
| MW-21I | 21 | 48 | 3 | 478.60 | 468.30 | 10.30 | 473.45 | 487.00 | 460.00 | 27.00 | 473.50 | -0.05 | 52,327 | 52,250 | 55,648 | 55,550 | 49,037 | 48,950 | |
| MW-21S | 21 | 48 | 4 | 511.30 | 502.90 | 8.40 | 507.10 | 511.30 | 487.00 | 24.30 | 499.15 | 7.95 | 27,631 | 34,950 | 34,914 | 46,250 | 12,796 | 16,950 | |
| MW-22S | 28 | 49 | 4 | 511.20 | 502.50 | 8.70 | 506.85 | 511.20 | 487.00 | 24.20 | 499.10 | 7.75 | 0 | 0 | 0 | 0 | 0 | 0 | |
| MW-23S | 29 | 40 | 4 | 507.10 | 500.80 | 6.30 | 503.95 | 507.10 | 487.00 | 20.10 | 497.05 | 6.90 | 0 | 0 | 0 | 0 | 0 | 0 | |
| MW-24D | 20 | 38 | 2 | 451.60 | 441.60 | 10.00 | 446.60 | 460.00 | 425.00 | 35.00 | 442.50 | 4.10 | 0 | 0 | 0 | 0 | 0 | 0 | |
| MW-24I | 20 | 38 | 3 | 478.60 | 470.90 | 7.70 | 474.75 | 487.00 | 460.00 | 27.00 | 473.50 | 1.25 | 0 | 0 | 0 | 0 | 0 | 0 | |
| MW-24S | 20 | 38 | 4 | 506.50 | 499.20 | 7.30 | 502.85 | 506.50 | 487.00 | 19.50 | 496.75 | 6.10 | 45,216 | 54,150 | 51,540 | 63,950 | 34,535 | 42,850 | |
| MW-25S | 18 | 37 | 4 | 506.80 | 498.50 | 8.30 | 502.65 | 506.80 | 487.00 | 19.80 | 496.90 | 5.75 | 16,241 | 19,250 | 25,336 | 31,050 | 6,079 | 7,450 | |
| MW-26S | 16 | 29 | 4 | 504.50 | 497.10 | 7.40 | 500.80 | 504.50 | 487.00 | 17.50 | 495.75 | 5.05 | 0 | 0 | 0 | 0 | 0 | 0 | |
| MW-27S | 21 | 29 | 4 | 503.90 | 497.00 | 6.90 | 500.45 | 503.90 | 487.00 | 16.90 | 495.45 | 5.00 | 0 | 0 | 0 | 0 | 0 | 0 | |
| MW-28S | 23 | 25 | 4 | 502.50 | 498.20 | 4.30 | 500.35 | 502.50 | 487.00 | 15.50 | 494.75 | 5.60 | 17,246 | 20,350 | 26,291 | 32,050 | 7,096 | 8,650 | |
| MW-29S | 14 | 22 | 4 | 499.10 | 494.00 | 5.10 | 496.55 | 499.10 | 487.00 | 12.10 | 493.05 | 3.50 | 11,527 | 12,783 | 17,627 | 19,950 | 6,494 | 7,350 | |
| MW-30I | 14 | 54 | 3 | 491.60 | 481.60 | 10.00 | 486.60 | 487.00 | 460.00 | 27.00 | 473.50 | 13.10 | 0 | 0 | 0 | 0 | 0 | 0 | |
| MW-30S | 14 | 54 | 4 | 514.50 | 507.10 | 7.40 | 510.80 | 514.50 | 487.00 | 27.50 | 500.75 | 10.05 | 0 | 0 | 0 | 0 | 0 | 0 | |
| MW-31I | 22 | 55 | 3 | 486.2 | 476.2 | 10.00 | 481.20 | 487.00 | 460.00 | 27.00 | 473.50 | 7.70 | 42,331 | 53,150 | 40,479 | 53,150 | 40,479 | 53,150 | |
| MW-31S | 22 | 55 | 4 | 513.90 | 505.80 | 8.10 | 509.85 | 513.90 | 487.00 | 26.90 | 500.45 | 9.40 | 87,367 | 115,350 | 89,179 | 124,350 | 76,270 | 106,350 | |

# TABLE 4-24

## OBSERVED SODIUM CONCENTRATIONS IN GROUND WATER (1990-1992)
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Well Designation | Model Coordinates i | j | k | Elev. Top of Sat Scrn (FAMSL) | Elev. Base of Scrn (FAMSL) | Sat Well Scrn Length (ft) | Elev. Sat Scrn Midpoint (FAMSL) | Elev. Top of Sat Cell (FAMSL) | Elev. Base of Cell (FAMSL) | Depth of Sat Cell (ft) | Elev. Midpt of Sat Cell (FAMSL) | n Distance Between Midpoints (ft) | Cxn Stand Obs Avg Conc[a] (μg/L) | Cx Obs Avg Conc[a] (μg/L) | Cxn Stand Obs Max Conc[a] (μg/L) | Cx Obs Max Conc[a] (μg/L) | Cxn Stand Obs Min Conc[a] (μg/L) | Cx Obs Min Conc[a] (μg/L) | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-32S | 16 | 65 | 4 | 516.90 | 508.70 | 8.20 | 512.80 | 516.90 | 487.00 | 29.90 | 501.95 | 10.85 | 105,471 | 145,350 | 109,930 | 161,350 | 88,128 | 129,350 | |
| MW-33I | 15 | 61 | 3 | 488.00 | 477.70 | 10.30 | 482.85 | 487.00 | 460.00 | 27.00 | 473.50 | 9.35 | 93,944 | 123,850 | 100,114 | 139,350 | 77,842 | 108,350 | |
| MW-34S | 15 | 57 | 4 | 515.30 | 509.40 | 5.90 | 512.35 | 515.30 | 487.00 | 28.30 | 501.15 | 11.20 | 87,149 | 121,350 | 101,175 | 150,350 | 62,145 | 92,350 | |
| MW-35S | 28 | 24 | 4 | 502.50 | 496.90 | 5.60 | 499.70 | 502.50 | 487.00 | 15.50 | 494.75 | 4.95 | 1,022 | 1,183 | 4,910 | 5,850 | 0 | 0 | |
| MW-36I | 21 | 14 | 3 | 495.30 | 480.30 | 15.00 | 487.80 | 487.00 | 460.00 | 27.00 | 473.50 | 14.30 | 24,933 | 38,050 | 22,946 | 38,050 | 22,946 | 38,050 | |
| MW-36S | 21 | 14 | 4 | 497.00 | 492.60 | 4.40 | 494.80 | 497.00 | 487.00 | 10.00 | 492.00 | 2.80 | 14,177 | 15,400 | 17,616 | 19,450 | 10,280 | 11,350 | |
| MW-37I | 24 | 14 | 3 | 496.40 | 481.40 | 15.00 | 488.90 | 487.00 | 460.00 | 27.00 | 473.50 | 15.40 | 8,785 | 13,850 | 8,034 | 13,850 | 8,034 | 13,850 | |
| MW-37S | 24 | 14 | 4 | 496.90 | 493.10 | 3.80 | 495.00 | 496.90 | 487.00 | 9.90 | 491.95 | 3.05 | 1,142 | 1,250 | 1,930 | 2,150 | 314 | 350 | |
| MW-38S | 26 | 54 | 4 | 513.4 | 506.3 | 7.10 | 509.85 | 513.40 | 487.00 | 26.40 | 500.20 | 9.65 | 0 | 0 | 0 | 0 | 0 | 0 | |
| MW-39S | 20 | 59 | 4 | 515.3 | 507.7 | 7.60 | 511.50 | 515.30 | 487.00 | 28.30 | 501.15 | 10.35 | 76,111 | 103,350 | 71,670 | 103,350 | 71,670 | 103,350 | |
| MW-40S | 20 | 56 | 4 | 512.4 | 506.7 | 5.70 | 509.55 | 512.40 | 487.00 | 25.40 | 499.70 | 9.85 | 94,434 | 126,350 | 89,183 | 126,350 | 89,183 | 126,350 | |
| MW-41S | 14 | 59 | 4 | 515.8 | 505.4 | 10.40 | 510.60 | 515.80 | 487.00 | 28.80 | 501.40 | 9.20 | 56,952 | 74,750 | 53,989 | 74,750 | 53,989 | 74,750 | |
| RNCC | 15 | 60 | 2 | 451.8 | 434.8 | 17.00 | 443.30 | 460.00 | 425.00 | 35.00 | 442.50 | 0.80 | 51,615 | 52,850 | 5,104 | 5,250 | 0 | 0 | |
| ROLFES | 14 | 32 | 4 | 504.5 | 494.5 | 10.00 | 499.50 | 504.50 | 487.00 | 17.50 | 495.75 | 3.75 | 0 | 0 | 0 | 0 | 0 | 0 | b, c, d, e |
| WEBER1 | 26 | 56 | 3 | 465 | 463 | 2.00 | 464.00 | 487.00 | 460.00 | 27.00 | 473.50 | -9.50 | 0 | 0 | 0 | 0 | 0 | 0 | b |
| WEBER2 | 24 | 60 | 2 | 458 | 443 | 15.00 | 450.50 | 460.00 | 425.00 | 35.00 | 442.50 | 8.00 | 0 | 0 | 0 | 0 | 0 | 0 | b |
| WEBER3 | 25 | 57 | 2 | 458 | 443 | 15.00 | 450.50 | 460.00 | 425.00 | 35.00 | 442.50 | 8.00 | 0 | 0 | 641 | 850 | 0 | 0 | b |

# TABLE 4-24

## OBSERVED SODIUM CONCENTRATIONS IN GROUND WATER (1990-1992)
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

***NOTES:***

a Concentrations shown are in excess of the average sodium concentration detected in background wells (2,065 mg/l).
b If well construction information was unknown, then the screened length of the well was assumed to be 10 feet.
c If well depth was unknown, then the base of the well was placed 10 feet below the water table.
d Top of well elevation (used to calculate screen elevation) was estimated to be equal to the ground elevation based on the USGS 7.5 minute quadrangle map for the area.
e The water table elevation for the well was estimated to be equal to the water table elevation measured in a nearby monitoring well.

- If maximum, minimum, and average concentrations are the same, only one sample was collected from well during RI (excluding Round 4).
- A zero concentration means the concentration was below the average sodium concentration detected in background wells.
- Source of observed concentration and water level data and monitoring well construction information is ERM (Sept. 1992).
- Source of private well construction data is ENSR (1990a).

***Governing Equation:***

$$C_{x\text{-}n} = C_x * K_n$$

***Parameter Assignments:***

$C_x$ = µg/L (variable)
n = ft (variable)
K = 1.036 (-)
$C_{x\text{-}n}$ = µg/L (variable)

***Parameter Definitions:***

$C_x$ = Average observed concentration in well during investigation (µg/L)
n = Distance between midpoint of well and midpoint of model cell (ft)
K = Average slope of semi-log plots of well screen midpoint elevations versus average observed concentrations (-)
$C_{x\text{-}n}$ = "Standardized" well concentration which is the observed concentration projected from the well to the midpoint of the model cell (µg/L)

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# TABLE 4-25

## OBSERVED ETHYLBENZENE CONCENTRATIONS IN GROUND WATER (1990-1992)
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Well Designation | Model Coordinate i | Model Coordinate j | Model Coordinate k | Elev. of Top of Sat. Scrn. (FAMSL) | Elev. of Base of Scrn. (FAMSL) | Sat. Well Scrn. Length (Feet) | Elev. of Sat. Scrn. Midpoint (FAMSL) | Elev. of Top of Sat. Cell (FAMSL) | Elev. of Base of Cell (FAMSL) | Depth of Sat. Cell (Feet) | Elev. of Midpoint of Sat. Cell (FAMSL) | n Distance Between Midpoints (Feet) | Cxn Stand. OBS Avg. Conc. (μg/L) | Cx OBS Avg. Conc.[a] (μg/L) | Cxn Stand. OBS Max Conc. (μg/L) | Cx OBS Max. Conc.[a] (μg/L) | Cxn Stand. OBS Min. Conc. (μg/L) | Cx OBS Min. Conc.[a] (μg/L) | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AW-1 | 12 | 78 | 2 | 468.30 | 448.30 | 20.00 | 458.30 | 460.00 | 425.00 | 35.00 | 442.50 | 15.80 | 0 | 0 | 0 | 0 | 0 | 0 | |
| AW-2 | 12 | 75 | 2 | 469.30 | 449.30 | 20.00 | 459.30 | 460.00 | 425.00 | 35.00 | 442.50 | 16.80 | 0 | 0 | 0 | 0 | 0 | 0 | |
| DOE-2002 | 21 | 81 | 4 | 522.39 | 507.40 | 14.99 | 514.90 | 522.39 | 487.00 | 35.39 | 504.70 | 10.20 | 0 | 0 | 0 | 0 | 0 | 0 | |
| DOE-2094 | 23 | 43 | 4 | 509.00 | 494.00 | 15.00 | 501.50 | 509.00 | 487.00 | 22.00 | 498.00 | 3.50 | 0 | 0 | 0 | 0 | 0 | 0 | |
| DOE-2126 | 5 | 65 | 4 | 517.50 | 502.90 | 14.60 | 510.20 | 517.50 | 487.00 | 30.50 | 502.25 | 7.95 | 0 | 0 | 0 | 0 | 0 | 0 | |
| DOE-2129 | 14 | 61 | 4 | 515.90 | 505.90 | 10.00 | 510.90 | 515.90 | 487.00 | 28.90 | 501.45 | 9.45 | 0 | 0 | 0 | 0 | 0 | 0 | |
| DOE-2393 | 9 | 61 | 4 | 512.50 | 497.10 | 15.40 | 504.80 | 512.50 | 487.00 | 25.50 | 499.75 | 5.05 | 0 | 0 | 0 | 0 | 0 | 0 | |
| DOE-2394 | 28 | 68 | 4 | 509.79 | 494.80 | 14.99 | 502.30 | 509.79 | 487.00 | 22.79 | 498.40 | 3.90 | 0 | 0 | 0 | 0 | 0 | 0 | |
| DOE-3094 | 23 | 43 | 3 | 459.24 | 449.20 | 10.04 | 454.22 | 460.00 | 425.00 | 35.00 | 442.50 | 11.72 | 0 | 0 | 0 | 0 | 0 | 0 | |
| DOE-3126 | 5 | 65 | 3 | 460.80 | 450.40 | 10.40 | 455.60 | 460.00 | 425.00 | 35.00 | 442.50 | 13.10 | 0 | 0 | 0 | 0 | 0 | 0 | |
| EVERS | 18 | 60 | 4 | 515.30 | 505.30 | 10.00 | 510.30 | 515.30 | 487.00 | 28.30 | 501.15 | 9.15 | 0 | 0 | 0 | 0 | 1 | 1 | b, c |
| HPF | 28 | 58 | 2 | 454.00 | 444.00 | 10.00 | 449.00 | 460.00 | 425.00 | 35.00 | 442.50 | 6.50 | 0 | 0 | 0 | 0 | 1 | 1 | b |
| MW-01D | 11 | 80 | 2 | 460.20 | 450.20 | 10.00 | 455.20 | 460.00 | 425.00 | 35.00 | 442.50 | 12.70 | 0 | 1 | 1 | 1 | 0 | 0 | |
| MW-01S | 11 | 80 | 4 | 521.50 | 514.00 | 7.50 | 517.75 | 521.50 | 487.00 | 34.50 | 504.25 | 13.50 | 0 | 1 | 1 | 1 | 0 | 0 | |
| MW-02S | 12 | 70 | 4 | 520.20 | 513.70 | 6.50 | 516.95 | 520.20 | 487.00 | 33.20 | 503.60 | 13.35 | 0 | 0 | 0 | 0 | 0 | 0 | |
| MW-03S | 13 | 66 | 4 | 515.20 | 508.90 | 6.30 | 512.05 | 515.20 | 487.00 | 28.20 | 501.10 | 10.95 | 0 | 0 | 0 | 0 | 1 | 1 | |
| MW-04S | 13 | 66 | 4 | 515.20 | 509.00 | 6.20 | 512.10 | 515.20 | 487.00 | 28.20 | 501.10 | 11.00 | 0 | 0 | 0 | 0 | 0 | 1 | |
| MW-05S | 14 | 66 | 4 | 515.30 | 512.00 | 3.30 | 513.65 | 515.30 | 487.00 | 28.30 | 501.15 | 12.50 | 0 | 1 | 1 | 1 | 0 | 1 | |
| MW-06S | 15 | 65 | 4 | 515.30 | 510.00 | 5.30 | 512.65 | 515.30 | 487.00 | 28.30 | 501.15 | 11.50 | 0 | 19 | 1 | 1 | 0 | 0 | |

# TABLE 4-25

## OBSERVED ETHYLBENZENE CONCENTRATIONS IN GROUND WATER (1990-1992)
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Well Designation | Model Coordinate | | | Elev. of Top of Sat. Scrn. (FAMSL) | Elev. of Base of Scrn. (FAMSL) | Sat. Well Scrn. Length (Feet) | Elev. of Sat. Scrn. Midpoint (FAMSL) | Elev. of Top of Sat. Cell (FAMSL) | Elev. of Base of Cell (FAMSL) | Depth of Sat. Cell (Feet) | Elev. of Midpoint of Sat. Cell (FAMSL) | n Distance Between Midpoints (Feet) | Cxn Stand. OBS Avg. Conc. (μg/L) | Cx OBS Avg. Conc.[a] (μg/L) | Cxn Stand. OBS Max Conc. (μg/L) | Cx OBS Max. Conc.[a] (μg/L) | Cxn Stand. OBS Min. Conc. (μg/L) | Cx OBS Min. Conc.[a] (μg/L) | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | i | j | k | | | | | | | | | | | | | | | | |
| MW-07S | 14 | 63 | 4 | 514.50 | 510.70 | 3.80 | 512.60 | 514.50 | 487.00 | 27.50 | 500.75 | 11.85 | 0 | 1 | 1 | 1 | 1 | 1 | |
| MW-08S | 15 | 62 | 4 | 516.40 | 509.50 | 6.90 | 512.95 | 516.40 | 487.00 | 29.40 | 501.70 | 11.25 | 0 | 0 | 0 | 0 | 0 | 0 | |
| MW-09D | 14 | 61 | 2 | 457.00 | 447.00 | 10.00 | 452.00 | 460.00 | 425.00 | 35.00 | 442.50 | 9.50 | 0 | 1 | 1 | 1 | 0 | 1 | |
| MW-10S | 14 | 58 | 4 | 513.50 | 507.90 | 5.60 | 510.70 | 513.50 | 487.00 | 26.50 | 500.25 | 10.45 | 2,242 | 7,967 | 10,365 | 15,000 | 1,866 | 2,700 | |
| MW-11S | 15 | 58 | 4 | 513.50 | 508.30 | 5.20 | 510.90 | 513.50 | 487.00 | 26.50 | 500.25 | 10.65 | 44,496 | 162,000 | 164,676 | 240,000 | 9,522 | 14,000 | |
| MW-12S | 16 | 58 | 4 | 513.40 | 508.20 | 5.20 | 510.80 | 513.40 | 487.00 | 26.40 | 500.20 | 10.60 | 5,343 | 19,333 | 18,559 | 27,000 | 1 | 1 | |
| MW-13S | 17 | 56 | 4 | 512.80 | 508.80 | 4.00 | 510.80 | 512.80 | 487.00 | 25.80 | 499.90 | 10.90 | 4,974 | 18,667 | 18,363 | 27,000 | 1,670 | 2,400 | |
| MW-14I | 14 | 59 | 3 | 490.20 | 480.20 | 10.00 | 485.20 | 487.00 | 460.00 | 27.00 | 473.50 | 11.70 | 0 | 1 | 1 | 1 | 0 | 0 | |
| MW-14S | 17 | 55 | 4 | 514.30 | 507.50 | 6.80 | 510.90 | 514.30 | 487.00 | 27.30 | 500.65 | 10.25 | 971 | 3,367 | 2,714 | 3,900 | 190 | 270 | |
| MW-15D | 16 | 55 | 2 | 458.20 | 448.20 | 10.00 | 453.20 | 460.00 | 425.00 | 35.00 | 442.50 | 10.70 | 0 | 0 | 0 | 0 | 102 | 150 | |
| MW-15S | 16 | 56 | 4 | 512.70 | 507.00 | 5.70 | 509.85 | 512.70 | 487.00 | 25.70 | 499.85 | 10.00 | 255 | 857 | 843 | 1,200 | 0 | 0 | |
| MW-16S | 14 | 56 | 4 | 513.00 | 508.60 | 4.40 | 510.80 | 513.00 | 487.00 | 26.00 | 500.00 | 10.80 | 72 | 267 | 239 | 350 | 0 | 0 | |
| MW-18D | 15 | 68 | 2 | 460.00 | 450.00 | 10.00 | 455.00 | 460.00 | 425.00 | 35.00 | 442.50 | 12.50 | 0 | 0 | 0 | 0 | 1 | 1 | |
| MW-18S | 15 | 68 | 4 | 517.90 | 512.90 | 5.00 | 515.40 | 517.90 | 487.00 | 30.90 | 502.45 | 12.95 | 0 | 0 | 0 | 0 | 1 | 1 | |
| MW-19S | 12 | 51 | 4 | 513.70 | 504.00 | 9.70 | 508.85 | 513.70 | 487.00 | 26.70 | 500.35 | 8.50 | 0 | 1 | 1 | 1 | 1 | 1 | |
| MW-20D | 17 | 48 | 2 | 446.70 | 436.70 | 10.00 | 441.70 | 460.00 | 425.00 | 35.00 | 442.50 | -0.80 | 42 | 38 | 1 | 1 | 1 | 1 | |
| MW-20S | 17 | 48 | 4 | 511.70 | 503.70 | 8.00 | 507.70 | 511.70 | 487.00 | 24.70 | 499.35 | 8.35 | 0 | 1 | 1 | 1 | 471 | 470 | |
| MW-21D | 21 | 48 | 2 | 447.10 | 437.10 | 10.00 | 442.10 | 460.00 | 425.00 | 35.00 | 442.50 | -0.40 | 1 | 1 | 7 | 6.5 | 7,549 | 10,000 | |
| MW-21I | 21 | 48 | 3 | 478.60 | 468.30 | 10.30 | 473.45 | 487.00 | 460.00 | 27.00 | 473.50 | -0.05 | 473 | 470 | 471 | 470 | 0 | 1 | |
| MW-21S | 21 | 48 | 4 | 511.30 | 502.90 | 8.40 | 507.10 | 511.30 | 487.00 | 24.30 | 499.15 | 7.95 | 4,574 | 12,000 | 10,569 | 14,000 | 0 | 0 | |

# TABLE 4-25

## OBSERVED ETHYLBENZENE CONCENTRATIONS IN GROUND WATER (1990-1992)
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Well Designation | Model Coordinate i | Model Coordinate j | Model Coordinate k | Elev. of Top of Sat. Scrn. (FAMSL) | Elev. of Base of Scrn. (FAMSL) | Sat. Well Scrn. Length (Feet) | Elev. of Sat. Scrn. Midpoint (FAMSL) | Elev. of Top of Sat. Cell (FAMSL) | Elev. of Base of Cell (FAMSL) | Depth of Sat. Cell (Feet) | Elev. of Midpoint of Sat. Cell (FAMSL) | n Distance Between Midpoints (Feet) | Cxn Stand. OBS Avg. Conc. (μg/L) | Cx OBS Avg. Conc.[a] (μg/L) | Cxn Stand. OBS Max Conc. (μg/L) | Cx OBS Max. Conc.[a] (μg/L) | Cxn Stand. OBS Min. Conc. (μg/L) | Cx OBS Min. Conc.[a] (μg/L) | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-22S | 28 | 49 | 4 | 511.20 | 502.50 | 8.70 | 506.85 | 511.20 | 487.00 | 24.20 | 499.10 | 7.75 | 1,022 | 2,618 | 1 | 1 | 0 | 1 | |
| MW-23S | 29 | 40 | 4 | 507.10 | 500.80 | 6.30 | 503.95 | 507.10 | 487.00 | 20.10 | 497.05 | 6.90 | 0 | 0 | 0 | 0 | 1 | 1 | |
| MW-24D | 20 | 38 | 2 | 451.60 | 441.60 | 10.00 | 446.60 | 460.00 | 425.00 | 35.00 | 442.50 | 4.10 | 0 | 1 | 0 | 1 | 77 | 95 | |
| MW-24I | 20 | 38 | 3 | 478.60 | 470.90 | 7.70 | 474.75 | 487.00 | 460.00 | 27.00 | 473.50 | 1.25 | 1 | 1 | 1 | 1 | 1,061 | 1,300 | |
| MW-24S | 20 | 38 | 4 | 506.50 | 499.20 | 7.30 | 502.85 | 506.50 | 487.00 | 19.50 | 496.75 | 6.10 | 54 | 113 | 105 | 130 | 0 | 1 | |
| MW-25S | 18 | 37 | 4 | 506.80 | 498.50 | 8.30 | 502.65 | 506.80 | 487.00 | 19.80 | 496.90 | 5.75 | 647 | 1,300 | 1,061 | 1,300 | 0 | 0 | |
| MW-26S | 16 | 29 | 4 | 504.50 | 497.10 | 7.40 | 500.80 | 504.50 | 487.00 | 17.50 | 495.75 | 5.05 | 0 | 1 | 1 | 1 | 0 | 1 | |
| MW-27S | 21 | 29 | 4 | 503.90 | 497.00 | 6.90 | 500.45 | 503.90 | 487.00 | 16.90 | 495.45 | 5.00 | 0 | 0 | 0 | 0 | 0 | 0 | |
| MW-28S | 23 | 25 | 4 | 502.50 | 498.20 | 4.30 | 500.35 | 502.50 | 487.00 | 15.50 | 494.75 | 5.60 | 0 | 1 | 1 | 1 | 0 | 0 | |
| MW-29S | 14 | 22 | 4 | 499.10 | 494.00 | 5.10 | 496.55 | 499.10 | 487.00 | 12.10 | 493.05 | 3.50 | 0 | 0 | 0 | 0 | 0 | 0 | |
| MW-30I | 14 | 54 | 3 | 491.60 | 481.60 | 10.00 | 486.60 | 487.00 | 460.00 | 27.00 | 473.50 | 13.10 | 0 | 0 | 0 | 0 | 8,606 | 12,000 | |
| MW-30S | 14 | 54 | 4 | 514.50 | 507.10 | 7.40 | 510.80 | 514.50 | 487.00 | 27.50 | 500.75 | 10.05 | 0 | 0 | 0 | 0 | 0 | 0 | |
| MW-31S | 22 | 55 | 4 | 513.90 | 505.80 | 8.10 | 509.85 | 513.90 | 487.00 | 26.90 | 500.45 | 9.40 | 3,836 | 12,000 | 8,606 | 12,000 | 1 | 1 | |
| MW-32S | 16 | 65 | 4 | 516.90 | 508.70 | 8.20 | 512.80 | 516.90 | 487.00 | 29.90 | 501.95 | 10.85 | 0 | 0 | 0 | 0 | 12,786 | 19,000 | |
| MW-33I | 15 | 61 | 3 | 488.00 | 477.70 | 10.30 | 482.85 | 487.00 | 460.00 | 27.00 | 473.50 | 9.35 | 0 | 1 | 1 | 1 | 0 | 1 | |
| MW-34S | 15 | 57 | 4 | 515.30 | 509.40 | 5.90 | 512.35 | 515.30 | 487.00 | 28.30 | 501.15 | 11.20 | 4,882 | 19,000 | 12,786 | 19,000 | 0 | 1 | |
| MW-35S | 28 | 24 | 4 | 502.50 | 496.90 | 5.60 | 499.70 | 502.50 | 487.00 | 15.50 | 494.75 | 4.95 | 0 | 1 | 1 | 1 | 1 | 1 | |
| MW-36I | 21 | 14 | 3 | 495.30 | 480.30 | 15.00 | 487.80 | 487.00 | 460.00 | 27.00 | 473.50 | 14.30 | 0 | 1 | 0 | 1 | 0 | 1 | |
| MW-36S | 21 | 14 | 4 | 497.00 | 492.60 | 4.40 | 494.80 | 497.00 | 487.00 | 10.00 | 492.00 | 2.80 | 1 | 1 | 1 | 1 | 1 | 1 | |
| MW-37I | 24 | 14 | 3 | 496.40 | 481.40 | 15.00 | 488.90 | 487.00 | 460.00 | 27.00 | 473.50 | 15.40 | 0 | 1 | 0 | 1 | 0 | 0 | |

TABLE 4-25

# OBSERVED ETHYLBENZENE CONCENTRATIONS IN GROUND WATER (1990-1992)
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

| Well Designation | Model Coordinate | | | Elev. of Top of Sat. Scrn. (FAMSL) | Elev. of Base of Scrn. (FAMSL) | Sat. Well Scrn. Length (Feet) | Elev. of Sat. Scrn. Midpoint (FAMSL) | Elev. of Top of Sat. Cell (FAMSL) | Elev. of Base of Cell (FAMSL) | Depth of Sat. Cell (Feet) | Elev. of Midpoint of Sat. Cell (FAMSL) | n Distance Between Midpoints (Feet) | Cxn Stand. OBS Avg. Conc. (μg/L) | Cx OBS Avg. Conc.* (μg/L) | Cxn Stand. OBS Max Conc. (μg/L) | Cx OBS Max. Conc.* (μg/L) | Cxn Stand. OBS Min. Conc. (μg/L) | Cx OBS Min. Conc.* (μg/L) | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | i | j | k | | | | | | | | | | | | | | | | |
| MW-37S | 24 | 14 | 4 | 496.90 | 493.10 | 3.80 | 495.00 | 496.90 | 487.00 | 9.90 | 491.95 | 3.05 | 1 | 1 | 1 | 1 | 0 | 0 | |
| RNCC | 15 | 60 | 2 | 451.80 | 434.80 | 17.00 | 443.30 | 460.00 | 425.00 | 35.00 | 442.50 | 0.80 | 0 | 0 | 0 | 0 | 0 | 0 | |
| ROLFES | 14 | 32 | 4 | 504.50 | 494.50 | 10.00 | 499.50 | 504.50 | 487.00 | 17.50 | 495.75 | 3.75 | 0 | 0 | 0 | 0 | 0 | 0 | b, c, d, e |
| WEBER 1 | 26 | 56 | 3 | 465.00 | 463.00 | 2.00 | 464.00 | 487.00 | 460.00 | 27.00 | 473.50 | -9.50 | 0 | 0 | 0 | 0 | 0 | 0 | b |

*NOTES*:

a Round 4 water quality data excluded.
b If well construction information was unknown, then the screened length of the well was assumed to be 10 feet.
d If well depth was unknown, then the base of the well was placed 10 feet below the water table.
e Top of well elevation (used to calculate screen elevation) was estimated to be equal to the ground elevation based on the USGS 7.5 minute quadrangle map for the area.
f The water table elevation for the well was estimated to be equal to the water table elevation measured in a nearby monitoring well.

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# TABLE 4-25

## OBSERVED ETHYLBENZENE CONCENTRATIONS IN GROUND WATER (1990-1992)
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

***NOTES: (Continued)***

- If maximum, minimum, and average concentrations are the same, only one sample was collected from well during RI (excluding Round 4).
- A zero concentration means the concentration was below the average sodium concentration detected in background wells.
- Source of observed concentration and water level data and monitoring well construction information is ERM (Sept. 1992).
- Source of private well construction data is ENSR (1990a).

***Governing Equation:***

$$C_{xn} = C_x * K^{-n}$$

***Parameter Assignments:***

$C_x$ = µg/L (variable)
n = ft (variable)
K = 1.130 (unitless)
$C_{xn}$ = µg/L (variable)

***Parameter Definitions:***

$C_x$ = Average observed concentration in well during investigation (µg/L)
n = Distance between midpoint of well and midpoint of model cell (ft)
K = Average slope of semi-log plots of well screen midpoint elevations versus average observed concentrations (-)
$C_{x-n}$ = "Standardized" well concentration which is the observed concentration projected from the well to the midpoint of the model cell (µg/L)

# TABLE 4-26

## SODIUM MODEL CALIBRATION PERFORMANCE
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Well Designation | Model Coordinate | | | Computed Conc. (µg/L) | Stand. OBS Avg. Conc. (µg/L) | Stand. OBS Max. Conc. (µg/L) | Stand. OBS Min. Conc. (µg/L) | Residuals |
|---|---|---|---|---|---|---|---|---|
| | i | j | k | | | | | |
| AW-1 | 12 | 78 | 2 | 0 | 0 | 0 | 0 | 0 |
| AW-2 | 12 | 75 | 2 | 0 | 0 | 2,221 | | 0 |
| DOE-2002 | 21 | 81 | 4 | 0 | 0 | 0 | 0 | 0 |
| DOE-2094 | 23 | 43 | 4 | 48,300 | 39,946 | 51,533 | 30,072 | -8,354 |
| DOE-2126 | 5 | 65 | 4 | 0 | 0 | 0 | 0 | 0 |
| DOE-2129 | 14 | 61 | 4 | 105,000 | 80,167 | 103,876 | 54,415 | -24,833 |
| DOE-2393 | 9 | 61 | 4 | 0 | 0 | 0 | 0 | 0 |
| DOE-2394 | 28 | 68 | 4 | 0 | 0 | 0 | 0 | 0 |
| DOE-3094 | 23 | 43 | 3 | 48,300 | 8,769 | 11,421 | 5,552 | -39,531 |
| DOE-3126 | 5 | 65 | 3 | 0 | 0 | 0 | 0 | 0 |
| EVERS | 18 | 60 | 4 | 118,800 | 8,794 | 0 | 0 | -110,006 |
| HPF | 28 | 58 | 2 | 900 | 0 | 0 | 0 | -900 |
| MW-01D | 11 | 80 | 2 | 0 | 0 | 0 | 0 | 0 |
| MW-01S | 11 | 80 | 4 | 0 | 11,608 | 21,639 | 3,388 | 11,608 |
| MW-02S | 12 | 70 | 4 | 1,800 | 17,084 | 22,206 | 14,995 | 15,284 |
| MW-03S | 13 | 66 | 4 | 81,900 | 69,708 | 76,220 | 63,920 | -12,192 |
| MW-04S | 13 | 66 | 4 | 81,900 | 179,413 | 207,588 | 151,239 | 97,513 |
| MW-05S | 14 | 66 | 4 | 119,100 | 372,739 | 534,455 | 275,296 | 253,639 |
| MW-07S | 14 | 63 | 4 | 51,900 | 4,548 | 34,767 | 0 | -47,352 |
| MW-08S | 15 | 62 | 4 | 230,400 | 45,428 | 74,113 | 5,844 | -184,972 |
| MW-09D | 14 | 61 | 2 | 23,400 | 0 | 0 | 0 | -23,400 |
| MW-10S | 14 | 58 | 4 | 45,300 | 48,113 | 61,935 | 28,526 | 2,813 |
| MW-11S | 15 | 58 | 4 | 115,200 | 185,841 | 225,805 | 111,205 | 70,641 |
| MW-12S | 16 | 58 | 4 | 146,700 | 246,790 | 367,225 | 115,756 | 100,090 |
| MW-13S | 17 | 56 | 4 | 205,200 | 121,255 | 132,848 | 109,662 | -83,945 |
| MW-14I | 14 | 59 | 3 | 30,600 | 0 | 2,158 | 0 | -30,600 |
| MW-14S | 17 | 55 | 4 | 176,700 | 144,473 | 147,982 | 139,857 | -32,227 |
| MW-15D | 16 | 55 | 2 | 89,700 | 0 | 0 | 0 | -89,700 |
| MW-15S | 16 | 56 | 4 | 234,000 | 151,125 | 188,516 | 100,713 | -82,875 |
| MW-16S | 14 | 56 | 4 | 15,600 | 36,680 | 53,812 | 19,657 | 21,080 |

## TABLE 4-26

## SODIUM MODEL CALIBRATION PERFORMANCE
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Well Designation | Model Coordinate | | | Computed Conc. (µg/L) | Stand. OBS Avg. Conc. (µg/L) | Stand. OBS Max. Conc. (µg/L) | Stand. OBS Min. Conc. (µg/L) | Residuals |
|---|---|---|---|---|---|---|---|---|
| | i | j | k | | | | | |
| MW-18D | 15 | 68 | 2 | 49,800 | 0 | 0 | 0 | -49,800 |
| MW-18S | 15 | 68 | 4 | 254,400 | 194,085 | 322,123 | 71,162 | -60,315 |
| MW-19S | 12 | 51 | 4 | 0 | 0 | 0 | 0 | 0 |
| MW-20D | 17 | 48 | 2 | 35,700 | 0 | 0 | 0 | -35,700 |
| MW-20S | 17 | 48 | 4 | 40,200 | 5,137 | 8,477 | 1,680 | -35,063 |
| MW-21D | 21 | 48 | 2 | 67,200 | 34,404 | 42,955 | 28,485 | -32,796 |
| MW-21I | 21 | 48 | 3 | 68,400 | 52,327 | 55,632 | 49,022 | -16,073 |
| MW-21S | 21 | 48 | 4 | 69,600 | 27,631 | 36,564 | 13,400 | -41,969 |
| MW-22S | 28 | 49 | 4 | 6,300 | 0 | 0 | 0 | -6,300 |
| MW-23S | 29 | 40 | 4 | 6,300 | 0 | 0 | 0 | -6,300 |
| MW-24D | 20 | 38 | 2 | 41,400 | 0 | 0 | 0 | -41,400 |
| MW-24I | 20 | 38 | 3 | 40,800 | 0 | 0 | 0 | -40,800 |
| MW-24S | 20 | 38 | 4 | 40,200 | 45,216 | 53,399 | 35,780 | 5,016 |
| MW-25S | 18 | 37 | 4 | 14,100 | 16,241 | 26,197 | 6,286 | 2,141 |
| MW-26S | 16 | 29 | 4 | 6,900 | 0 | 0 | 0 | -6,900 |
| MW-27S | 21 | 29 | 4 | 36,600 | 0 | 0 | 0 | -36,600 |
| MW-28S | 23 | 25 | 4 | 30,300 | 17,246 | 27,161 | 7,330 | -13,054 |
| MW-29S | 14 | 22 | 4 | 8,400 | 11,527 | 17,989 | 6,628 | 3,127 |
| MW-30I | 14 | 54 | 3 | 9,900 | 0 | 0 | 0 | -9,900 |
| MW-30S | 14 | 54 | 4 | 13,800 | 0 | 0 | 0 | -13,800 |
| MW-31I | 22 | 55 | 3 | 45,600 | 42,331 | 42,331 | 42,331 | -3,269 |
| MW-31S | 22 | 55 | 4 | 45,300 | 87,367 | 94,184 | 80,550 | 42,067 |
| MW-32S | 16 | 65 | 4 | 360,600 | 105,471 | 117,081 | 93,860 | -255,129 |
| MW-33I | 15 | 61 | 3 | 106,200 | 93,944 | 105,701 | 82,187 | -12,256 |
| MW-34S | 15 | 57 | 4 | 154,500 | 87,149 | 107,976 | 66,322 | -67,351 |
| MW-35S | 28 | 24 | 4 | 7,500 | 1,022 | 5,054 | 0 | -6,478 |
| MW-36I | 21 | 14 | 3 | 20,700 | 24,933 | 24,933 | 24,933 | 4,233 |
| MW-36S | 21 | 14 | 4 | 20,400 | 14,177 | 17,905 | 10,448 | -6,223 |
| MW-37I | 24 | 14 | 3 | 14,400 | 8,785 | 8,785 | 8,785 | -5,615 |
| MW-37S | 24 | 14 | 4 | 14,100 | 1,142 | 1,965 | 320 | -12,958 |

# TABLE 4-26

## SODIUM MODEL CALIBRATION PERFORMANCE
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Well Designation | Model Coordinate | | | Computed Conc. (µg/L) | Stand. OBS Avg. Conc. (µg/L) | Stand. OBS Max. Conc. (µg/L) | Stand. OBS Min. Conc. (µg/L) | Residuals |
|---|---|---|---|---|---|---|---|---|
| | i | j | k | | | | | |
| MW-38S | 26 | 54 | 4 | 9,000 | 0 | 0 | 0 | -9,000 |
| MW-39S | 20 | 59 | 4 | 64,200 | 76,111 | 76,111 | 76,111 | 11,911 |
| MW-40S | 20 | 56 | 4 | 81,000 | 94,434 | 94,434 | 94,434 | 13,434 |
| MW-41S | 14 | 59 | 4 | 72,900 | 56,952 | 56,952 | 56,952 | -15,948 |
| RNCC | 15 | 60 | 2 | 56,100 | 51,615 | 5,127 | 0 | -4,485 |
| ROLFES | 14 | 32 | 4 | 0 | 0 | 0 | 0 | 0 |
| WEBER 1 | 26 | 56 | 3 | 5,700 | 0 | 0 | 0 | -5,700 |
| WEBER 2 | 24 | 60 | 2 | 6,300 | 0 | 0 | 0 | -6,300 |
| WEBER 3 | 25 | 57 | 2 | 8,100 | 0 | 671 | 0 | -8,100 |

*Notes:*

Source of observed concentration and water level data and monitoring well construction information is ERM (June, 1992).
Source of private well construction data is ENSR (1990).
Average background sodium concentration = 20,650 µg/L (ERM, March 1992).
If average observed concentration was less than the background, the well concentration was set equal to zero for model comparison purposes.
Residual value = standardized observed average concentrations - computed concentration.
Observed results include Round 4 data as discussed in ERM (Sept. 1992).
Refer to Table 4-24 for standardization calculations.

*Governing Equation:*

$$C_{x-n} = C_x * K^{-n}$$

*Parameter Assignments:*

$C_x$ = µg/L (variable)
n = ft (variable)
K = 1.030 (-)
$C_{x-n}$ = µg/L (variable)

*Parameter Definitions:*

$C_x$ = Average observed concentration in well during remedial investigation (µg/L)
n = Distance between midpoint of well and midpoint of model cell (ft)
K = Average slope of semi-log plots of well screen midpoint elevations versus average observed concentrations (-)
$C_{x-n}$ = Standardized well concentration which is the observed concentration projected from the well to the midpoint of the model cell (µg/L)

## TABLE 4-27

## ETHYLBENZENE MODEL CALIBRATIONS PERFORMANCE
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Well Designation | Model Coordinate | | | Computed Concentration (µg/l) | Norm OBS Average Concentration (µg/l) | Norm OBS Maximum Concentration (µg/l) | Norm OBS Minimum Concentration (µg/l) | Residual |
|---|---|---|---|---|---|---|---|---|
| | I | J | K | | | | | |
| AW-1 | 12 | 78 | 2 | 0 | 0 | 0 | 0 | 0 |
| AW-2 | 12 | 75 | 2 | 0 | 0 | 0 | 0 | 0 |
| DOE-2002 | 21 | 81 | 4 | 0 | 0 | 0 | 0 | 0 |
| DOE-2094 | 23 | 43 | 4 | 218 | 0 | 0 | 0 | -218 |
| DOE-2126 | 5 | 65 | 4 | 0 | 0 | 0 | 0 | 0 |
| DOE-2129 | 14 | 61 | 4 | 60 | 0 | 0 | 0 | -60 |
| DOE-2393 | 9 | 61 | 4 | 0 | 0 | 0 | 0 | 0 |
| DOE-2394 | 28 | 68 | 4 | 0 | 0 | 0 | 0 | 0 |
| DOE-3094 | 23 | 43 | 3 | 204 | 0 | 0 | 0 | -204 |
| DOE-3126 | 5 | 65 | 3 | 0 | 0 | 0 | 0 | 0 |
| EVERS | 18 | 60 | 4 | 100 | 0 | 0 | 0 | -100 |
| HPF | 28 | 58 | 2 | 0 | 0 | 0 | 0 | 0 |
| MW-01D | 11 | 80 | 2 | 0 | 0 | 0 | 0 | 0 |
| MW-01S | 11 | 80 | 4 | 0 | 0 | 0 | 0 | 0 |
| MW-02S | 12 | 70 | 4 | 0 | 0 | 0 | 0 | 0 |
| MW-03S | 13 | 66 | 4 | 0 | 0 | 0 | 0 | 0 |
| MW-04S | 13 | 66 | 4 | 0 | 0 | 0 | 0 | 0 |
| MW-05S | 14 | 66 | 4 | 0 | 0 | 0 | 0 | 0 |
| MW-06S | 15 | 65 | 4 | 0 | 0 | 0 | 0 | 0 |
| MW-07S | 14 | 63 | 4 | 2 | 0 | 0 | 0 | -2 |
| MW-08S | 15 | 62 | 4 | 16 | 0 | 0 | 0 | -16 |
| MW-09D | 14 | 61 | 2 | 12 | 0 | 0 | 0 | -12 |
| MW-10S | 14 | 58 | 4 | 4502 | 2242 | 4221 | 760 | -2260 |
| MW-12S | 16 | 58 | 4 | 5728 | 5343 | 7461 | 4698 | -385 |
| MW-13S | 17 | 56 | 4 | 6814 | 4974 | 7194 | 3730 | -1840 |
| MW-14I | 14 | 59 | 3 | 530 | 0 | 0 | 0 | -530 |
| MW-14S | 17 | 55 | 4 | 6348 | 971 | 1124 | 692 | -5377 |
| MW-15D | 16 | 55 | 2 | 2826 | 0 | 0 | 0 | -2826 |

TABLE 4-27

# ETHYLBENZENE MODEL CALIBRATIONS PERFORMANCE
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

| Well Designation | Model Coordinate | | | Computed Concentration (µg/l) | Norm OBS Average Concentration (µg/l) | Norm OBS Maximum Concentration (µg/l) | Norm OBS Minimum Concentration (µg/l) | Residual |
|---|---|---|---|---|---|---|---|---|
| | I | J | K | | | | | |
| MW-15S | 16 | 56 | 4 | 7114 | 255 | 357 | 80 | -6859 |
| MW-16S | 14 | 56 | 4 | 4206 | 72 | 94 | 40 | -4134 |
| MW-18D | 15 | 68 | 2 | 0 | 0 | 0 | 0 | 0 |
| MW-18S | 15 | 68 | 4 | 0 | 0 | 0 | 0 | 0 |
| MW-19S | 12 | 51 | 4 | 8 | 0 | 0 | 0 | -8 |
| MW-20D | 17 | 48 | 2 | 1212 | 1 | 1 | 1 | -1211 |
| MW-20S | 17 | 48 | 4 | 1560 | 0 | 0 | 0 | -1560 |
| MW-21D | 21 | 48 | 2 | 530 | 4 | 8 | 1 | -526 |
| MW-21I | 21 | 48 | 3 | 630 | 473 | 473 | 473 | -157 |
| MW-21S | 21 | 48 | 4 | 740 | 4574 | 5336 | 3811 | 3834 |
| MW-22S | 28 | 49 | 4 | 4 | 0 | 0 | 0 | -4 |
| MW-23S | 29 | 40 | 4 | 2 | 0 | 0 | 0 | -2 |
| MW-24D | 20 | 38 | 2 | 530 | 0 | 0 | 0 | -530 |
| MW-24I | 20 | 38 | 3 | 530 | 1 | 1 | 1 | -529 |
| MW-24S | 20 | 38 | 4 | 528 | 54 | 62 | 45 | -474 |
| MW-25S | 18 | 37 | 4 | 314 | 647 | 647 | 647 | 333 |
| MW-26S | 16 | 29 | 4 | 74 | 0 | 1 | 0 | -74 |
| MW-27S | 21 | 29 | 4 | 212 | 0 | 0 | 0 | -212 |
| MW-28S | 23 | 25 | 4 | 70 | 0 | 1 | 0 | -70 |
| MW-29S | 14 | 22 | 4 | 40 | 0 | 0 | 0 | -40 |
| MW-30I | 14 | 54 | 3 | 1298 | 0 | 0 | 0 | -1298 |
| MW-30S | 14 | 54 | 4 | 2770 | 0 | 0 | 0 | -2770 |
| MW-31S | 22 | 55 | 4 | 114 | 3836 | 3836 | 3836 | 3722 |
| MW-32S | 16 | 65 | 4 | 0 | 0 | 0 | 0 | 0 |
| MW-33I | 15 | 61 | 3 | 46 | 0 | 0 | 0 | -46 |
| MW-34S | 15 | 57 | 4 | 7618 | 4882 | 4882 | 4882 | -2736 |
| MW-35S | 28 | 24 | 4 | 4 | 0 | 1 | 0 | -4 |
| MW-36I | 21 | 14 | 3 | 34 | 0 | 0 | 0 | -34 |

## TABLE 4-27

## ETHYLBENZENE MODEL CALIBRATIONS PERFORMANCE
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Well Designation | Model Coordinate | | | Computed Concentration (µg/l) | Norm OBS Average Concentration (µg/l) | Norm OBS Maxmium Concentration (µg/l) | Norm OBS Minimum Concentration (µg/l) | Residual |
|---|---|---|---|---|---|---|---|---|
| | I | J | K | | | | | |
| MW-36S | 21 | 14 | 4 | 34 | 1 | 1 | 1 | -33 |
| MW-37I | 24 | 14 | 3 | 12 | 0 | 0 | 0 | -12 |
| MW-37S | 24 | 14 | 4 | 12 | 1 | 1 | 1 | -11 |
| RNCC | 15 | 60 | 2 | 90 | 0 | 0 | 0 | -90 |
| ROLFES | 14 | 32 | 4 | 0 | 0 | 0 | 0 | 0 |
| WEBER 1 | 26 | 56 | 3 | 2 | 0 | 0 | 0 | -2 |
| WEBER 2 | 24 | 60 | 2 | 0 | 0 | 0 | 0 | 0 |
| WEBER 3 | 25 | 57 | 2 | 2 | 0 | 0 | 0 | -2 |

*Notes:*

Source of observed concentration and water level data and monitoring well construction information is ERM (June, 1992).
Source of private well construction data is ENSR (1990).
If average observed concentration was less than the background, the well concentration was set equal to zero for model comparison purposes.
Residual value = standardized observed average concentrations - computed concentration.
Observed results do not include Round 4 data as discussed in ERM (Sept. 1992).
Refer to Table 4-25 for standardization calculations.

*Governing Equation:*

$C_{x-n} = C_x * K^{-n}$

*Parameter Assignments:*

$C_x$ = µg/L (variable)
n = Ft (variable)
K = 1.129 (-)
$C_{x-n}$ = µg/L (variable)

*Parameter Definitions:*

$C_x$ = Average observed concentration in well during remedial investigation (µg/L)
n = Distance between midpoint of well and midpoint of model cell (ft.)
K = Average slope of semi-log plots of well screen midpoint elevations versus average observed concentrations (-)
$C_{x-n}$ = Standardized well concentration which is the observed concentration projected from the well to the midpoint of the model cell (µg/L)

TABLE 4-28

# PARAMETERS USED IN TRANSPORT MODEL SENSITIVITY TESTING ON 1991 CALIBRATION MODELS PADDYS RUN ROAD SITE HAMILTON COUNTY, OHIO

| Parameter Tested | Range Tested | Value Chosen for Modeling |
|---|---|---|
| Longitudinal Dispersivity | 5 - 100 feet | 50 feet |
| Transverse Dispersivity | 0.5 - 10 feet | 5 feet |
| Sodium Distribution Coefficient | 0 - 1.9 (unitless) | 0.06 (unitless) |
| Ethylbenzene Distribution Coefficient | 0 - 3.8 (unitless) | 0.63 (unitless) |
| Ethylbenzene Decay Halflife | 0 - 2 x $10^{-9}$ $day^{-1}$ | 5 x $10^{-10}$ $day^{-1}$ |
| Sodium Source Loading Rate | 0 - 600 lb/day (approximately) | variable - see Table 4-16 |
| Ethylbenzene Source Loading Rate | 0 - 15 lb/day (approximately) | variable - see Table 4-17 |

## TABLE 4-29

## PREDICTION OF FUTURE INORGANIC CHEMICAL CONCENTRATIONS
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Inorganic Chemical | T (Days) | Maximum Predicted Concentration (ppb) | Model Coordinants for Cell with Maximum Concentration | | | Predicted Concentration (ppb) | |
|---|---|---|---|---|---|---|---|
| | | | I | J | K | Approximately 790 Feet South of Company Property | Approximately 1,800 Feet South of Company Property |
| Sodium | | | | | | | |
| Dec-1991 | 0 | 380,600 | 16 | 65 | 4 | 60,200 | 34,100 |
| Dec-1994 | 1,095 | 320,900 | 16 | 65 | 4 | 41,900 | 34,700 |
| Dec-1997 | 2,190 | 158,600 | 15 | 64 | 4 | 29,300 | 27,200 |
| Dec-2000 | 3,285 | 96,800 | 15 | 64 | 4 | 24,800 | 23,600 |
| Dec-2003 | 4,380 | 68,600 | 15 | 64 | 4 | 23,000 | 22,100 |
| Dec-2006 | 5,475 | 54,500 | 15 | 64 | 4 | 22,100 | 21,200 |
| Potassium | | | | | | | |
| Dec-1991 | 0 | 255,763 | 16 | 65 | 4 | 36,980 | 20,375 |
| Dec-1994 | 1,095 | 213,860 | 16 | 65 | 4 | 25,288 | 20,751 |
| Dec-1997 | 2,190 | 102,131 | 15 | 64 | 4 | 17,378 | 16,074 |
| Dec-2000 | 3,285 | 60,854 | 15 | 64 | 4 | 14,590 | 13,851 |
| Dec-2003 | 4,380 | 42,408 | 15 | 64 | 4 | 13,482 | 12,929 |
| Dec-2006 | 5,475 | 33,316 | 15 | 64 | 4 | 12,929 | 12,377 |
| Potassium-40 | | | | | | | |
| Dec-1991 | 0 | 274 | 16 | 65 | 4 | 169 | 145 |
| Dec-1994 | 1,095 | 262 | 16 | 65 | 4 | 153 | 146 |
| Dec-1997 | 2,190 | 218 | 15 | 64 | 4 | 140 | 137 |
| Dec-2000 | 3,285 | 191 | 15 | 64 | 4 | 134 | 132 |
| Dec-2003 | 4,380 | 175 | 15 | 64 | 4 | 131 | 130 |
| Dec-2006 | 5,475 | 164 | 15 | 64 | 4 | 130 | 128 |

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TABLE 4-29

# PREDICTION OF FUTURE INORGANIC CHEMICAL CONCENTRATIONS
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Inorganic Chemical | T (Days) | Maximum Predicted Concentration (ppb) | Model Coordinants for Cell with Maximum Concentration | | | Predicted Concentration (ppb) | |
|---|---|---|---|---|---|---|---|
| | | | I | J | K | Approximately 700 Feet South of Company Property | Approximately 1,800 Feet South of Company Property |
| Arsenic | | | | | | | |
| Dec-1991 | 0 | 175 | 16 | 65 | 4 | 35 | 22 |
| Dec-1994 | 1,095 | 151 | 16 | 65 | 4 | 26 | 22 |
| Dec-1997 | 2,190 | 82 | 15 | 64 | 4 | 19 | 18 |
| Dec-2000 | 3,285 | 53 | 15 | 64 | 4 | 16 | 16 |
| Dec-2003 | 4,380 | 40 | 15 | 64 | 4 | 15 | 15 |
| Dec-2006 | 5,475 | 32 | 15 | 64 | 4 | 15 | 14 |

*NOTES*:

ppb = parts per billion

Maximum predicted concentration: Based on nodal comparison of model output within the study area for each three-year period.

## TABLE 4-30

## PREDICTION OF FUTURE ORGANIC CHEMICAL CONCENTRATIONS
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Organic Chemical | T (Days) | Maximum Predicted Concentration (ppb) | Model Coordinants for Cell with Maximum Concentration | | | Predicted Concentration (ppb) | |
|---|---|---|---|---|---|---|---|
| | | | I | J | K | Approximately 700 Feet South of Company Property | Approximately 1,800 Feet South of Company Property |
| Ethylbenzene | | | | | | | |
| Dec-1991 | 0 | 9,314 | 16 | 57 | 4 | 1,830 | 324 |
| Dec-1994 | 1,095 | 8,700 | 15 | 57 | 4 | 2,400 | 660 |
| Dec-1997 | 2,190 | 6,780 | 15 | 57 | 4 | 2,100 | 960 |
| Dec-2000 | 3,285 | 5,340 | 15 | 57 | 4 | 1,620 | 840 |
| Dec-2003 | 4,380 | 4,200 | 15 | 57 | 4 | 1,200 | 720 |
| Dec-2006 | 5,475 | 3,360 | 15 | 57 | 4 | 960 | 540 |
| Benzene | | | | | | | |
| Dec-1991 | 0 | 1,000 | 16 | 57 | 4 | 242 | 54 |
| Dec-1994 | 1,095 | 942 | 15 | 57 | 4 | 307 | 100 |
| Dec-1997 | 2,190 | 758 | 15 | 57 | 4 | 273 | 138 |
| Dec-2000 | 3,285 | 616 | 15 | 57 | 4 | 218 | 123 |
| Dec-2003 | 4,380 | 500 | 15 | 57 | 4 | 168 | 107 |
| Dec-2006 | 5,475 | 411 | 15 | 57 | 4 | 138 | 84 |
| Toluene | | | | | | | |
| Dec-1991 | 0 | 11,195 | 16 | 57 | 4 | 2,128 | 364 |
| Dec-1994 | 1,095 | 10,442 | 15 | 57 | 4 | 2,806 | 752 |
| Dec-1997 | 2,190 | 8,096 | 15 | 57 | 4 | 2,448 | 1,102 |
| Dec-2000 | 3,285 | 6,346 | 15 | 57 | 4 | 1,879 | 961 |
| Dec-2003 | 4,380 | 4,967 | 15 | 57 | 4 | 1,383 | 821 |
| Dec-2006 | 5,475 | 3,955 | 15 | 57 | 4 | 1,102 | 612 |

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TABLE 4-30

# PREDICTION OF FUTURE ORGANIC CHEMICAL CONCENTRATIONS
# PADDYS RUN ROAD SITE
# HAMILTON COUNTY, OHIO

| Organic Chemical | T (Days) | Maximum Predicted Concentration (ppb) | Model Coordinants for Cell with Maximum Concentration | | | Predicted Concentration (ppb) | |
|---|---|---|---|---|---|---|---|
| | | | I | J | K | Approximately 790 Feet South of Company Property | Approximately 1,800 Feet South of Company Property |
| Xylene | | | | | | | |
| Dec-1991 | 0 | 13,093 | 16 | 57 | 4 | 2,452 | 412 |
| Dec-1994 | 1,095 | 12,205 | 15 | 57 | 4 | 3,241 | 858 |
| Dec-1997 | 2,190 | 9,442 | 15 | 57 | 4 | 2,825 | 1,262 |
| Dec-2000 | 3,285 | 7,384 | 15 | 57 | 4 | 2,163 | 1,100 |
| Dec-2003 | 4,380 | 5,767 | 15 | 57 | 4 | 1,588 | 938 |
| Dec-2006 | 5,475 | 4,583 | 15 | 57 | 4 | 1,262 | 698 |
| Cumene | | | | | | | |
| Dec-1991 | 0 | 12,098 | 16 | 57 | 4 | 2,572 | 495 |
| Dec-1994 | 1,095 | 11,338 | 15 | 57 | 4 | 3,329 | 974 |
| Dec-1997 | 2,190 | 8,943 | 15 | 57 | 4 | 2,931 | 1,392 |
| Dec-2000 | 3,285 | 7,125 | 15 | 57 | 4 | 2,290 | 1,226 |
| Dec-2003 | 4,380 | 5,670 | 15 | 57 | 4 | 1,721 | 1,058 |
| Dec-2006 | 5,475 | 4,585 | 15 | 57 | 4 | 1,392 | 805 |

*NOTES*:

ppb = parts per billion

Maximum predicted concentration: Based on nodal comparison of model output within the study area for each three-year period.

*Appendix B*

*Statistical Methods and Equations Used for Model Calibration Performance Evaluation*

## *B.1 STATISTICAL METHODS USED FOR CALIBRATION PERFORMANCE EVALUATION*

The sample size (n = 64) is borderline between being sufficient for statistical evaluation without adjustment for small sample size. In addition, while the areally distributed data may not be normally distributed, deviation between observed and calculated values typically are. To account for these uncertainties, parametric and non-parametric tests, with and without small sample size adjustment, are included in this analysis.

The following equations were used to compute the various primary statistics for evaluation of flow model and transport model calibration performance. These equations can be found in Haan (1977).

Let $o_i$, $c_i$, and $e_i$ be the observed, computed, and the corresponding residual (or error) head at the ith well, i = 1, 2, ...N.

1. Residuals are computed as:

$$e_i = o_i - c_i \; ; \; i = 1, 2, \ldots N$$

2. Mean values ( $\bar{x} = \bar{o}, \bar{c}$, or $\bar{e}$) of $x_i$ ($x_i = o_i$, $c_i$, or $e_i$; i = 1, 2, ...N), are computed using a general formula:

$$\bar{x} = \frac{1}{N} \sum_{i=1}^{N} x_i$$

3. Mean of absolute residuals $e_i$ (i = 1, 2, ...N) is:

$$\overline{|e|} = \frac{1}{N} \sum_{i=1}^{N} |e_i|$$

4. Variance and standard deviation ($S_o^2$ and $S_o$, $S_c^2$ and $S_c$, and $S_e^2$ and $S_e$) of $x_i$ ($x_i = o_i$, $c_i$, or $e_i$; i = 1, 2, ...N) are computed using a general formula with small sample size correction:

$$S_x^2 = \frac{1}{(N-1)} \sum_{i=1}^{N} (x_i - \bar{x})^2$$

$$S_x = \sqrt{S_x^2} \qquad \textit{(positive root)}$$

5. Coefficient of variation C ($C_o$, $C_c$, and $C_e$) of x (x = $o_i$, $c_i$, or $e_i$; i = 1, 2, ...N) is computed using a general formula:

$$C_x = \frac{S_x}{\bar{x}}$$

6. Percent ratio (R1) of residual mean to observed mean is:

$$R1 = \frac{\bar{e}}{\bar{o}} \times 100$$

7. Percent ratio (R2) of absolute residual mean to observed mean is:

$$R2 = \frac{\overline{|e|}}{\bar{o}} \times 100$$

8. Percent ratio of R3 of error variance to observed variance is computed using:

$$R3 = \frac{S_e^2}{S_o^2} \times 100$$

9. Coefficient of correlation (R4) between the observed and computed values is computed using:

$$R4 = \frac{\frac{1}{(N-2)} \Sigma (O_i - \bar{O})(C_i - \bar{C})}{S_o S_c}$$

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## B.2 SUPPLEMENTAL STATISTICAL TESTS FOR COMPARING OBSERVED AND CALCULATED HEAD AND CONCENTRATION POPULATIONS

Statistical tests can be used to test whether the mean values or variances of the computed and observed values are equal or statistically different. In these tests, a null hypothesis ($H_o$) is stated that the population descriptors (mean, variance) are equal. An alternate hypothesis ($H_a$) is formulated that the descriptors are not equal. There are several ways in which a null or alternate hypothesis can be stated (see Haan, 1977). The six hypothesis tests used in this study are:

- Test 1: Z-test - for testing the null hypothesis that the computed mean is equal to observed mean, assuming known variance.
- Test 2: t-test - for testing the null hypothesis that the computed mean is equal to the observed mean, assuming unknown variance.
- Test 3: $\chi^2$ test - for testing the null hypothesis that the computed variance is equal to the observed variance.
- Test 4: Z-test - for testing the null hypothesis that the computed variance is equal to the observed variance.
- Test 5: F-test - for testing the null hypothesis that the computed mean is equal to the observed mean, assuming that the variances are known.
- Test 6: t-test - for testing the null hypothesis that the computed mean is equal to the observed mean, assuming that the variances are equal but unknown.

**Test 1 - Z-test for equality of means, known variance:**

$H_o$: $\mu = \mu_o$, $H_a$: $\mu \neq \mu_o$, *normal distribution, known variance*

Test statistic = $Z = \sqrt{n}\,(\bar{X} - \mu_o)/\sigma_x$

$H_o$ is rejected if:

$$|z| = |\sqrt{n}\,(\bar{X} - \mu_o)/\sigma_x| > Z_{1-\alpha/2}$$

Otherwise, $H_o$ is accepted. Variables are defined as: $\mu_o$ = observed mean, the variable X and its statistics correspond to the computed heads, and $Z_{\alpha/2}$ is the standard normal deviate corresponding to 0.975 cumulative probability, $\alpha = 0.05$ = level of significance.

**Test 2 - t-test, assumes equality of means and an unknown variance:**

$$H_o: \mu = \mu_o, H_a: \mu \neq \mu_o$$

Test statistic = $t = \sqrt{n}\ (\overline{X} - \mu_o)/S_x$

$H_o$ is rejected if:

$$|t| = \left|\sqrt{n}\ \frac{(\overline{X} - \mu_o)}{S_x}\right| > t_{\alpha/2,\, n-1}$$

Otherwise, $H_o$ is accepted where t is the t-distribution variable. Variables are defined as: $\mu_o$ = observed mean, the variable X and its statistics correspond to the computed heads, and $Z_{\alpha/2}$ is the standard normal deviate corresponding to 0.975 cumulative probability, $\alpha = 0.05$ = level of significance.

**Test 3 - $\chi^2$ test for equality of variances**

$$\textit{Test of } H_o: \sigma^2 = \sigma_o^2 \textit{ versus } H_a: \sigma^2 \neq \sigma_o^2$$

$$\textit{Test statistic} = X_c^2 = \Sigma_{i=1}^{n}\ [\ (X_i - \overline{X})^2/\sigma_o^2\ ]$$

$H_o$ is accepted if:

$$X^2_{\alpha/2,\, n-1} < X^2_c < X^2_{1-\alpha/2,\, n-1}$$

Otherwise, $H_o$ is rejected.

**Test 4 - F-test for equality of variances, two samples**

$$\textit{Test of } H_o: \sigma_1^2 = \sigma_2^2 \textit{ Versus } H_a: \sigma_1^2 \neq \sigma_2^2 \textit{ for Two Normal Populations}$$

$$\textit{Test statistic} = F_c = S_1^2/S_2^2\ ,$$

where $S_1^2$ is the larger sample variance. F is distributed as an F distribution with $n_1 - 1$ and $n_2 - 1$ degrees of freedom where $n_1$ is the sample size for the sample having the larger variance and $n_2$ is the sample size for the sample with the smaller variance. $H_o$ is rejected if:

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$$F_c > F_{\alpha, n_1 - 1, n_2 - 1}$$

Otherwise, $H_o$ is accepted.

**Test 5 - Z-test for equality of means, known variances**

$$\textit{Test of } H_o\text{: } \mu_1 - \mu_2 = \delta \textit{ versus } H_a\text{: } \mu_1 - \mu_2 \neq \delta \text{ ; } \delta = 0$$

$$\textit{Test statistic} = Z = (\overline{X_1} - \overline{X_2} - \delta) \,/\, (\sigma_1^2/n_1 + \sigma_2^2/n_2)^{1/2}$$

$H_o$ is rejected if $|Z| > Z_{\alpha/2}$.

Otherwise, $H_o$ is accepted.

**Test 6 - t-test for equality of means with equal but unknown variances**

$$H_o\text{: } \mu_1 - \mu_2 = \delta \textit{ versus } H_a\text{: } \mu_1 - \mu_2 \neq \delta \text{ ; } \delta = 0$$

Test statistic = t =

$$(\overline{X_1} - \overline{X_2} - \delta) \,/\, \{(n_1 + n_2)\, [(n_1 - 1)\, S_1^2 + (n_2 - 1)\, S_2^2] \,/\, [n_1 n_2\, (n_1 + n_2 - 2)]\}^{1/2}$$

$H_o$ is rejected if:

$$|t| > t_{\alpha/2,\, n_1 + n_2 - 2}$$

Otherwise, $H_o$ is accepted.

## B.3 *SUPPLEMENTAL CALIBRATION RESULTS FOR GROUND WATER FLOW MODELING*

The six statistical tests of hypothesis were conducted at a level of significance ($\alpha$) of five percent. The tests involved calculating a test static in each test and comparing it with the corresponding critical value. The critical value is obtained from tables (Haan, 1977). If the test static is less than or within a range of the theoretical value, the null hypothesis described earlier was accepted; if not, it was rejected. Acceptance or rejection of the null hypothesis is indicated by A or R in tables B-1 through B-4. Accepting the null hypothesis indicates that there is no statistical basis for assuming that the mean or variance is not equal to the computed mean or variance. The results given in tables B-1 through B-4 for the regional and local flow models indicate that all six tests show that the mean and variance of the computed and observed heads are statistically equal.

## B.4 SUPPLEMENTAL CALIBRATION RESULTS FOR TRANSPORT MODELING

### *Sodium Transport Model*

The results of hypotheses testing conducted at an $\alpha$ level of 5% for the sodium transport model are summarized in table B-5. Equality of means and variances of the observed and computed values is accepted in all the tests.

### *Ethylbenzene Transport Model*

As with the sodium transport model, the hypothesis testing for the ethylbenzene transport model was conducted at an $\alpha$ level of 5%. The results are summarized in table B-6. The results indicate that the equality of means is accepted in three tests (Tests 2, 5, and 6). Thus, it can be concluded that equality of mean values is established in a statistical sense.

The equality of variances is rejected in Test 3 and Test 4, implying that the variances of the observed and computed values are significantly different.

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## TABLE B-1

## 1986 REGIONAL FLOW MODEL CALIBRATION PERFORMANCE
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Test | Number of Observations | Observed Data | | | Computed Data | | | Test Statistic | Critical Value | Decision |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean (ft) | Standard Deviation (ft) | Variance ($ft^2$) | Mean (ft) | Standard Deviation (ft) | Variance ($ft^2$) | | | |
| Test 1 - Null hypothesis of equality means; known variance (Z-test) | 55 | 521.3 | 5.95 | 35.40 | 521.4 | 6.48 | 41.99 | 0.12 | 1.96 | A |
| Test 2 - Null hypothesis of equality of means; unknown variance (t-test) | 55 | 521.3 | 5.95 | 35.40 | 521.4 | 6.48 | 41.99 | 0.11 | 1.96 | A |
| Test 3 - Null hypothesis of equality of variances; ($X^2$-test) | 55 | 521.3 | 5.95 | 35.40 | 521.4 | 6.48 | 41.99 | 64.04 | 40.5 - 83.3 | A |
| Test 4 - Null hypothesis of equality of variances; (F-test) | 55 | 521.3 | 5.95 | 35.40 | 521.4 | 6.48 | 41.99 | 1.19 | 1.53 | A |
| Test 5 - Null hypothesis of equality of means with known but equal variance; (Z-test) | 55 | 521.3 | 5.95 | 35.40 | 521.4 | 6.48 | 41.99 | 0.08 | 1.96 | A |
| Test 6 - Null hypothesis of equality of means with unknown but equal variance; (t-test) | 55 | 521.3 | 5.95 | 35.40 | 521.4 | 6.48 | 41.99 | 0.08 | 1.98 | A |

NOTE: Accept (A) the null hypothesis of equality of means or equality of variances of the observed and computed data if the test statistic is less than or within the range of critical value; otherwise reject (R) the null hypothesis.

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# TABLE B-2

## 1991 REGIONAL FLOW MODEL CALIBRATION PERFORMANCE
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Test | Number of Observations | Observed Data | | | Computed Data | | | Test Statistic | Critical Value | Decision |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean (ft) | Standard Deviation (ft) | Variance ($ft^2$) | Mean (ft) | Standard Deviation (ft) | Variance ($ft^2$) | | | |
| Test 1 - Null hypothesis of equality means; known variable (Z-test) | 65 | 513.4 | 5.51 | 30.36 | 513.9 | 5.79 | 33.52 | 0.73 | 1.96 | A |
| Test 2 - Null hypothesis of equality of means; unknown variable (t-test) | 65 | 513.4 | 5.51 | 30.36 | 513.9 | 5.79 | 33.52 | 0.67 | 1.96 | A |
| Test 3 - Null hypothesis of equality of variances; ($X^2$-test) | 65 | 513.4 | 5.51 | 30.36 | 513.9 | 5.79 | 33.52 | 70.66 | 48.8 - 106.6 | A |
| Test 4 - Null hypothesis of equality of variances; (F-test) | 65 | 513.4 | 5.51 | 30.36 | 513.9 | 5.79 | 33.52 | 1.10 | 1.35 | A |
| Test 5 - Null hypothesis of equality of means with known but equal variance; (Z-test) | 65 | 513.4 | 5.51 | 30.36 | 513.9 | 5.79 | 33.52 | 0.50 | 1.96 | A |
| Test 6 - Null hypothesis of equality of means with unknown but equal variance; (t-test) | 65 | 513.4 | 5.51 | 30.36 | 513.9 | 5.79 | 33.52 | 0.53 | 1.96 | A |

NOTE: Accept (A) the null hypothesis of equality of means or equality of variances of the observed and computed data if the test statistic is less than or within the range of critical value; otherwise reject (R) the null hypothesis.

## TABLE B-3

## 1986 LOCAL FLOW MODEL CALIBRATION PERFORMANCE
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Test | Number of Observations | Observed Data | | | Computed Data | | | Test Statistic | Critical Value | Decision |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean (ft) | Standard Deviation (ft) | Variance ($ft^2$) | Mean (ft) | Standard Deviation (ft) | Variance ($ft^2$) | | | |
| Test 1 - Null hypothesis of equality means; known variance (Z-test) | 8 | 515.2 | 5.80 | 33.62 | 513.8 | 5.52 | 30.47 | 0.68 | 1.96 | A |
| Test 2 - Null hypothesis of equality of means; unknown variance (t-test) | 8 | 515.2 | 5.80 | 33.62 | 513.8 | 5.52 | 30.47 | 0.72 | 2.36 | A |
| Test 3 - Null hypothesis of equality of variances; ($X^2$-test) | 8 | 515.2 | 5.80 | 33.62 | 513.8 | 5.52 | 30.47 | 7.25 | 1.69<br>16.0 | A |
| Test 4 - Null hypothesis of equality of variances; (F-test) | 8 | 515.2 | 5.80 | 33.62 | 513.8 | 5.52 | 30.47 | 1.10 | 3.79 | A |
| Test 5 - Null hypothesis of equality of means with known but equal variance; (Z-test) | 8 | 515.2 | 5.80 | 33.62 | 513.8 | 5.52 | 30.47 | 0.50 | 1.96 | A |
| Test 6 - Null hypothesis of equality of means with unknown variance; (t-test) | 8 | 515.2 | 5.80 | 33.62 | 513.8 | 5.52 | 30.47 | 0.49 | 2.14 | A |

NOTE: Accept (A) the null hypothesis of equality of means or equality of variances of the observed and computed data if the test statistic is less than or within the range of critical value; otherwise reject (R) the null hypothesis.

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# TABLE B-4

## 1991 LOCAL FLOW MODEL CALIBRATION PERFORMANCE
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Test | Number of Observations | Observed Data | | | Computed Data | | | Test Statistic | Critical Value | Decision |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean (ft) | Standard Deviation (ft) | Variance ($ft^2$) | Mean (ft) | Standard Deviation (ft) | Variance ($ft^2$) | | | |
| Test 1 - Null hypothesis of equality means; known variable (Z-test) | 63 | 513.1 | 5.44 | 29.57 | 513.4 | 4.74 | 22.48 | 0.44 | 1.96 | A |
| Test 2 - Null hypothesis of equality of means; unknown variable (t-test) | 63 | 513.1 | 5.44 | 29.57 | 513.4 | 4.74 | 22.48 | 0.50 | 2.00 | A |
| Test 3 - Null hypothesis of equality of variances; ($X^2$-test) | 63 | 513.1 | 5.44 | 29.57 | 513.4 | 4.74 | 22.48 | 47.9 | 40.5 - 83.3 | A |
| Test 4 - Null hypothesis of equality of variances; (F-test) | 63 | 513.1 | 5.44 | 29.57 | 513.4 | 4.74 | 22.48 | 1.31 | 1.53 | A |
| Test 5 - Null hypothesis of equality of means with known but equal variance; (Z-test) | 63 | 513.1 | 5.44 | 29.57 | 513.4 | 4.74 | 22.48 | 0.33 | 1.96 | A |
| Test 6 - Null hypothesis of equality of means with unknown but equal variance; (t-test) | 63 | 513.1 | 5.44 | 29.57 | 513.4 | 4.74 | 22.48 | 0.32 | 2.00 | A |

NOTE: Accept (A) the null hypothesis of equality of means or equality of variances of the observed and computed data if the test statistic is less than or within the range of critical value; otherwise reject (R) the null hypothesis.

# TABLE B-5

## SODIUM MODEL CALIBRATION PERFORMANCE
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Test | Number of Observations | Observed Data | | | Computed Data | | | Test Statistic | Critical Value | Decision |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean ($\mu g/l$) | Standard Deviation ($\mu g/l$) | Variance $(\mu g/l)^2$ | Mean ($\mu g/l$) | Standard Deviation ($\mu g/l$) | Variance $(\mu g/l)^2$ | | | |
| Test 1 - Null hypothesis of equality means; known variable (Z-test) | 71 | $3.72 \times 10^4$ | $6.8 \times 10^4$ | $4.63 \times 10^9$ | $5.07 \times 10^4$ | $7.2 \times 10^4$ | $5.18 \times 10^9$ | 1.67 | 1.96 | A |
| Test 2 - Null hypothesis of equality of means; unknown variable (t-test) | 71 | $3.72 \times 10^4$ | $6.8 \times 10^4$ | $4.63 \times 10^9$ | $5.07 \times 10^4$ | $7.2 \times 10^4$ | $5.18 \times 10^9$ | 1.58 | 2.00 | A |
| Test 3 - Null hypothesis of equality of variances; ($X^2$-test) | 71 | $3.72 \times 10^4$ | $6.8 \times 10^4$ | $4.63 \times 10^9$ | $5.07 \times 10^4$ | $7.2 \times 10^4$ | $5.18 \times 10^9$ | 79.43 | 40.5 - 83.3 | A |
| Test 4 - Null hypothesis of equality of variances; (F-test) | 71 | $3.72 \times 10^4$ | $6.8 \times 10^4$ | $4.63 \times 10^9$ | $5.07 \times 10^4$ | $7.2 \times 10^4$ | $5.18 \times 10^9$ | 1.55 | 1.53 | A |
| Test 5 - Null hypothesis of equality of means with known but equal variance; (Z-test) | 71 | $3.72 \times 10^4$ | $6.8 \times 10^4$ | $4.63 \times 10^9$ | $5.07 \times 10^4$ | $7.2 \times 10^4$ | $5.18 \times 10^9$ | 1.15 | 1.96 | A |
| Test 6 - Null hypothesis of equality of means with unknown but equal variance; (t-test) | 71 | $3.72 \times 10^4$ | $6.8 \times 10^4$ | $4.63 \times 10^9$ | $5.07 \times 10^4$ | $7.2 \times 10^4$ | $5.18 \times 10^9$ | 1.15 | 2.00 | A |

NOTE: Accept (A) the null hypothesis of equality of means or equality of variances of the observed and computed data if the test statistic is less than or within the range of critical value; otherwise reject (R) the null hypothesis.

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# TABLE B-6

## ETHYLBENZENE MODEL CALIBRATION PERFORMANCE
## PADDYS RUN ROAD SITE
## HAMILTON COUNTY, OHIO

| Test | Number of Observations | Observed Data | | | Computed Data | | | Test Statistic | Critical Value | Decision |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean ($\mu$g/l) | Standard Deviation ($\mu$g/l) | Variance ($\mu$g/l)$^2$ | Mean ($\mu$g/l) | Standard Deviation ($\mu$g/l) | Variance ($\mu$g/l)$^2$ | | | |
| Test 1 - Null hypothesis of equality means; known variable (Z-test) | 64 | 442.7 | 1,302.6 | $1.7 \times 10^7$ | 901.6 | 1,943.6 | $3.8 \times 10^6$ | 2.8 | 1.96 | R |
| Test 2 - Null hypothesis of equality of means; unknown variable (t-test) | 64 | 442.7 | 1,302.6 | $1.7 \times 10^7$ | 901.6 | 1,943.6 | $3.8 \times 10^6$ | 1.89 | 2.00 | A |
| Test 3 - Null hypothesis of equality of variances; ($X^2$-test) | 64 | 442.7 | 1,302.6 | $1.7 \times 10^7$ | 901.6 | 1,943.6 | $3.8 \times 10^6$ | 14.0 | 40.5 - 83.3 | R |
| Test 4 - Null hypothesis of equality of variances; (F-test) | 64 | 442.7 | 1,302.6 | $1.7 \times 10^7$ | 901.6 | 1,943.6 | $3.8 \times 10^6$ | 4.47 | 1.53 | R |
| Test 5 - Null hypothesis of equality of means with known but equal variance; (Z-test) | 64 | 442.7 | 1,302.6 | $1.7 \times 10^7$ | 901.6 | 1,943.6 | $3.8 \times 10^6$ | 0.82 | 1.96 | A |
| Test 6 - Null hypothesis of equality of means with unknown but equal variance; (t-test) | 64 | 442.7 | 1,302.6 | $1.7 \times 10^7$ | 901.6 | 1,943.6 | $3.8 \times 10^6$ | 0.80 | 2.00 | A |

NOTE: Accept (A) the null hypothesis of equality of means or equality of variances of the observed and computed data if the test statistic is less than or within the range of critical value; otherwise reject (R) the null hypothesis.

*Appendix C*

*Sample Regional Flow Model Input/Output Files*

```
 PRRS REGIONAL FLOW MODEL - 3 YRS. (1095 DAYS) -  APRIL 1986 (REG1986.DAT)
 w/MOD. BEDRX ZONES (VORMELKER,1985) & NO PNP @ SW NODES          3-27-92
C...LOWER PNP @ NW (MAX 540.5);
C...START OF DATA FILE
C...
C...(1.3) RESTRT(T/F),  TIMSTRT

              F           0.0
C...
C...(1.4) HEAT, SOLUTE, EEUNIT, CYLIND, SCALMF; ALL (T/F)
            F     F       T       F        F
C...
C...(1.5)  NX,   NY,   NZ,  NCHN
           28    37     4    0
C...
C...(1.6) NPTCBC, NFBC, NAIFC, NLBC, NHCBC, NWEL
C...           44      896    0     91     0     4
           38      907    0     91     0     4
C...
C...(1.7) NPMZ (NUMBER OF POROUS MEDIA ZONES)
          215
C...
C...(1.8) SLMETH(1=D4,2=SOR), LCROSD(T/F)
            2                    T
C...
C...(1.9) IBC (INDEX OF EXCLUDED CELLS = -1)
  0 /
C...
C...(1.10) RDECHO (T=WRITE TO ECHO FILE)
             T
C...
C...STATIC DATA - READ2
C...(2.1) PRTRE(T=PRINTOUT OF READ-ECHO INPUT)
            T
C...
C...(2.2A.1) UNIGRX, UNIGRY, UNIGRZ - (T=UNIFORM GRID SPACING)
               F       F       F
C...
C...(2.2A.2B) X(I), I=1 TO NX FOR NONUNIFORM GRID (IF UNIGRX=F)
    0.00000        2400.00        4050.00        5150.00      5900.00
    6400.00        6900.00        7400.00        7900.00      8400.00
    8900.00        9400.00        9900.00        10400.0      10900.0
    11400.0        12150.0        12900.0        13650.0      14400.0
    15150.0        15900.0        16650.0        17400.0      18150.0
    19250.0        20900.2        23300.0
C...
C...(2.2A.3A) Y(J), J=1 TO NY FOR NONUNIFORM GRID (IF UNIGRY=F)
    0.00000        2400.00        4050.00        5150.00      5900.00
    6400.00        6900.00        7400.00        7900.00      8400.00
    8900.00        9400.00        9900.00        10400.0      10900.0
    11400.0        11900.0        12400.0        12900.0      13400.0
    13900.0        14400.0        14900.0        15400.0      15900.0
    16400.0        16900.0        17650.0        18400.0      19150.0
    19900.0        20650.0        21400.0        22150.0      23250.0
    24900.0        27300.0
C...
C...(2.2A.4B) Z(K), K=1 TO NZ FOR NONUNIFORM GRID (IF UNIGRZ=F)
    380.000        445.000        455.000        523.000
C...
C...(2.3.1) TILT (T/F TRUE TO TILT Z-AXIS)
             F
C...
C...FLUID PROPERTIES
C...(2.4.1) COMPRESSIBILITY OF FLUID
              3.03E-06
C...
C...(2.4.2) PRDEN, TRDEN(REF.TEMP.), WO(MASS FRAC.), DENFO(FLD. DENSITY)
             0.00       60.0            0.0          62.40

C...
C...FLUID VISCOSITY DATA
```

```
C...(2.5.1) NOTVO (#VISC/TEMP. PTS.), TVFO,  VISTFO(FLD. VISC. cP)
             1                          60.0       1.138
C...REFERENCE CONDITION INFORMATION
C...(2.6.1) PAATM (ATM. ABS.-PRESS.; 0=STAND. PRESS OF 1.0132E+5 Pa)
            0.00
C...
C...(2.6.2) POH(PRESS.), TOH (REF TEMP.; CONST. T FOR ISOTHERMAL SIMS.)
            0.0          60.0
C...SOLUTE INFORMATION
C...THESE VARIABLES DEFINE THE RANGE OF POROUS MEDIA ZONES
C...(2.9.1)IPMZ,I1Z(IPMZ),I2Z(IPMZ),J1Z(IPMZ),J2Z(IPMZ),K1Z(IPMZ),K2Z(IPMZ)
   1    1   8  36  37   3   4
   2    1   3  35  36   3   4
   3   14  16  13  16   3   4
   4   16  17  12  15   3   4
   5   17  18  10  12   3   4
   6   18  22   8  10   3   4
   7   18  22  10  12   3   4
   8   22  24   9  11   3   4
   9    3   9  35  36   3   4
  10   11  28  35  36   3   4
  11   18  28  36  37   3   4
  12   24  27  33  35   3   4
  13   25  26  30  33   3   4
  14   24  25  30  33   3   4
  15   24  25  26  28   3   4
  16   24  25  14  21   3   4
  17   21  24  21  24   3   4
  18   22  24  11  21   3   4
  19   20  21  23  24   3   4
  20   22  23   8   9   3   4
  21   19  20   4   8   3   4
  22   18  19   5   8   3   4
  23    5  17   7  10   3   4
  24   16  17  10  12   3   4
  25   14  16  10  13   3   4
  26   17  18   7  10   3   4
  27    7  14  10  18   3   4
  28   21  22   7   8   3   4
  29   20  21   4   8   3   4
  30    5   7  10  11   3   4
  31    4   5   7   9   3   4
  32    8  12   6   7   3   4
  33    3   8   5   7   3   4
  34    5   6   4   5   3   4
  35    2   3   4   6   3   4
  36    3   5   3   5   3   4
  37    1   3   2   4   3   4
  38    1   2   1   2   3   4
  39    1   6  17  18   3   4
  40    6   7  16  18   3   4
  41    1  13  18  24   3   4
  42   13  15  23  24   3   4
  43    1  24  24  35   3   4
  44    6   7  11  16   3   4
  45    1   2  35  37   2   3
  46    2   3  35  37   2   3
  47    3   7  35  36   2   3
  48    2  12  31  35   2   3
  49    2   3  30  31   2   3
  50    3   6  27  31   2   3
  51    3   5  25  27   2   3
  52    6   8  28  29   2   3
  53    6   9  29  31   2   3
  54    9  10  30  31   2   3
  55   12  13  32  34   2   3
  56   13  14  32  33   2   3
  57    1   2  18  35   2   3
  58    2   3  18  30   2   3
  59    3   5  18  25   2   3
  60    5   7  18  27   2   3
```

| | | | | | | |
|---|---|---|---|---|---|---|
| 61 | 6 | 8 | 27 | 28 | 2 | 3 |
| 62 | 7 | 11 | 20 | 27 | 2 | 3 |
| 63 | 9 | 10 | 29 | 30 | 2 | 3 |
| 64 | 10 | 12 | 29 | 31 | 2 | 3 |
| 65 | 12 | 14 | 29 | 32 | 2 | 3 |
| 66 | 8 | 14 | 27 | 29 | 2 | 3 |
| 67 | 11 | 14 | 24 | 27 | 2 | 3 |
| 68 | 11 | 12 | 22 | 24 | 2 | 3 |
| 69 | 14 | 23 | 26 | 35 | 2 | 3 |
| 70 | 13 | 14 | 33 | 34 | 2 | 3 |
| 71 | 12 | 14 | 34 | 35 | 2 | 3 |
| 72 | 17 | 20 | 35 | 36 | 2 | 3 |
| 73 | 20 | 28 | 35 | 37 | 2 | 3 |
| 74 | 23 | 26 | 31 | 35 | 2 | 3 |
| 75 | 26 | 27 | 34 | 35 | 2 | 3 |
| 76 | 14 | 23 | 24 | 26 | 2 | 3 |
| 77 | 23 | 24 | 24 | 31 | 2 | 3 |
| 78 | 20 | 24 | 22 | 24 | 2 | 3 |
| 79 | 22 | 23 | 18 | 22 | 2 | 3 |
| 80 | 7 | 12 | 17 | 18 | 2 | 3 |
| 81 | 9 | 12 | 8 | 17 | 2 | 3 |
| 82 | 12 | 14 | 8 | 16 | 2 | 3 |
| 83 | 14 | 16 | 8 | 14 | 2 | 3 |
| 84 | 16 | 17 | 8 | 11 | 2 | 3 |
| 85 | 17 | 19 | 8 | 10 | 2 | 3 |
| 86 | 8 | 9 | 6 | 12 | 2 | 3 |
| 87 | 9 | 10 | 6 | 8 | 2 | 3 |
| 88 | 10 | 19 | 7 | 8 | 2 | 3 |
| 89 | 7 | 11 | 18 | 20 | 2 | 3 |
| 90 | 7 | 8 | 5 | 11 | 2 | 3 |
| 91 | 6 | 8 | 5 | 9 | 2 | 3 |
| 92 | 4 | 6 | 4 | 7 | 2 | 3 |
| 93 | 3 | 4 | 3 | 5 | 2 | 3 |
| 94 | 2 | 3 | 2 | 4 | 2 | 3 |
| 95 | 1 | 2 | 1 | 3 | 2 | 3 |
| 96 | 1 | 2 | 21 | 30 | 1 | 2 |
| 97 | 2 | 3 | 35 | 36 | 1 | 2 |
| 98 | 2 | 6 | 34 | 35 | 1 | 2 |
| 99 | 2 | 10 | 21 | 34 | 1 | 2 |
| 100 | 10 | 22 | 28 | 34 | 1 | 2 |
| 101 | 11 | 22 | 34 | 35 | 1 | 2 |
| 102 | 18 | 27 | 35 | 36 | 1 | 2 |
| 103 | 21 | 28 | 36 | 37 | 1 | 2 |
| 104 | 22 | 26 | 33 | 35 | 1 | 2 |
| 105 | 22 | 24 | 32 | 33 | 1 | 2 |
| 106 | 18 | 22 | 25 | 28 | 1 | 2 |
| 107 | 20 | 22 | 24 | 25 | 1 | 2 |
| 108 | 14 | 17 | 10 | 12 | 1 | 2 |
| 109 | 22 | 24 | 22 | 27 | 1 | 2 |
| 110 | 10 | 18 | 25 | 28 | 1 | 2 |
| 111 | 9 | 10 | 17 | 19 | 1 | 2 |
| 112 | 10 | 12 | 21 | 25 | 1 | 2 |
| 113 | 9 | 12 | 15 | 17 | 1 | 2 |
| 114 | 8 | 14 | 10 | 15 | 1 | 2 |
| 115 | 7 | 17 | 9 | 10 | 1 | 2 |
| 116 | 1 | 3 | 3 | 4 | 1 | 2 |
| 117 | 7 | 11 | 7 | 9 | 1 | 2 |
| 118 | 5 | 7 | 5 | 8 | 1 | 2 |
| 119 | 4 | 5 | 5 | 6 | 1 | 2 |
| 120 | 2 | 3 | 2 | 3 | 1 | 2 |
| 121 | 21 | 22 | 22 | 24 | 1 | 2 |
| 122 | 1 | 2 | 1 | 3 | 1 | 2 |
| 123 | 1 | 10 | 19 | 21 | 1 | 2 |
| 124 | 3 | 4 | 3 | 4 | 1 | 2 |
| 125 | 8 | 9 | 12 | 14 | 2 | 3 |
| 126 | 8 | 9 | 14 | 17 | 2 | 3 |
| 127 | 8 | 18 | 36 | 37 | 3 | 4 |
| 128 | 9 | 11 | 35 | 36 | 3 | 4 |
| 129 | 1 | 6 | 11 | 17 | 3 | 4 |
| 130 | 1 | 5 | 9 | 11 | 3 | 4 |
| 131 | 1 | 4 | 7 | 9 | 3 | 4 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 132 | 1 | 3 | 6 | 7 | 3 | 4 |
| 133 | 1 | 2 | 4 | 6 | 3 | 4 |
| 134 | 15 | 20 | 23 | 24 | 3 | 4 |
| 135 | 13 | 21 | 18 | 23 | 3 | 4 |
| 136 | 21 | 22 | 14 | 21 | 3 | 4 |
| 137 | 14 | 21 | 16 | 18 | 3 | 4 |
| 138 | 16 | 21 | 15 | 16 | 3 | 4 |
| 139 | 17 | 21 | 14 | 15 | 3 | 4 |
| 140 | 17 | 22 | 13 | 14 | 3 | 4 |
| 141 | 17 | 22 | 12 | 13 | 3 | 4 |
| 142 | 2 | 28 | 1 | 2 | 3 | 4 |
| 143 | 3 | 28 | 2 | 3 | 3 | 4 |
| 144 | 5 | 28 | 3 | 4 | 3 | 4 |
| 145 | 6 | 19 | 4 | 5 | 3 | 4 |
| 146 | 8 | 18 | 5 | 6 | 3 | 4 |
| 147 | 12 | 18 | 6 | 7 | 3 | 4 |
| 148 | 21 | 28 | 4 | 7 | 3 | 4 |
| 149 | 22 | 23 | 7 | 8 | 3 | 4 |
| 150 | 23 | 24 | 7 | 9 | 3 | 4 |
| 151 | 24 | 25 | 7 | 14 | 3 | 4 |
| 152 | 24 | 25 | 21 | 26 | 3 | 4 |
| 153 | 25 | 26 | 7 | 30 | 3 | 4 |
| 154 | 24 | 25 | 28 | 30 | 3 | 4 |
| 155 | 26 | 27 | 7 | 33 | 3 | 4 |
| 156 | 27 | 28 | 7 | 34 | 3 | 4 |
| 157 | 27 | 28 | 34 | 35 | 3 | 4 |
| 158 | 3 | 20 | 36 | 37 | 2 | 3 |
| 159 | 7 | 17 | 35 | 36 | 2 | 3 |
| 160 | 1 | 2 | 17 | 18 | 2 | 3 |
| 161 | 1 | 2 | 3 | 17 | 2 | 3 |
| 162 | 2 | 3 | 4 | 18 | 2 | 3 |
| 163 | 3 | 4 | 5 | 18 | 2 | 3 |
| 164 | 4 | 5 | 7 | 18 | 2 | 3 |
| 165 | 5 | 6 | 7 | 18 | 2 | 3 |
| 166 | 6 | 7 | 9 | 18 | 2 | 3 |
| 167 | 7 | 8 | 11 | 17 | 2 | 3 |
| 168 | 2 | 11 | 1 | 2 | 2 | 3 |
| 169 | 3 | 11 | 2 | 3 | 2 | 3 |
| 170 | 4 | 11 | 3 | 4 | 2 | 3 |
| 171 | 6 | 11 | 4 | 5 | 2 | 3 |
| 172 | 8 | 11 | 5 | 6 | 2 | 3 |
| 173 | 10 | 11 | 6 | 7 | 2 | 3 |
| 174 | 11 | 28 | 1 | 7 | 2 | 3 |
| 175 | 18 | 19 | 10 | 16 | 2 | 3 |
| 176 | 19 | 28 | 7 | 16 | 2 | 3 |
| 177 | 17 | 18 | 10 | 16 | 2 | 3 |
| 178 | 16 | 17 | 11 | 16 | 2 | 3 |
| 179 | 14 | 16 | 14 | 16 | 2 | 3 |
| 180 | 11 | 12 | 18 | 22 | 2 | 3 |
| 181 | 12 | 20 | 16 | 24 | 2 | 3 |
| 182 | 22 | 24 | 16 | 18 | 2 | 3 |
| 183 | 23 | 24 | 18 | 22 | 2 | 3 |
| 184 | 20 | 22 | 16 | 22 | 2 | 3 |
| 185 | 24 | 25 | 25 | 31 | 2 | 3 |
| 186 | 24 | 25 | 16 | 25 | 2 | 3 |
| 187 | 25 | 28 | 16 | 31 | 2 | 3 |
| 188 | 26 | 27 | 31 | 34 | 2 | 3 |
| 189 | 27 | 28 | 31 | 35 | 2 | 3 |
| 190 | 1 | 21 | 36 | 37 | 1 | 2 |
| 191 | 1 | 2 | 30 | 36 | 1 | 2 |
| 192 | 3 | 18 | 35 | 36 | 1 | 2 |
| 193 | 6 | 11 | 34 | 35 | 1 | 2 |
| 194 | 1 | 9 | 15 | 19 | 1 | 2 |
| 195 | 1 | 8 | 10 | 15 | 1 | 2 |
| 196 | 1 | 7 | 8 | 10 | 1 | 2 |
| 197 | 1 | 5 | 6 | 8 | 1 | 2 |
| 198 | 1 | 4 | 4 | 6 | 1 | 2 |
| 199 | 2 | 3 | 1 | 2 | 1 | 2 |
| 200 | 4 | 7 | 1 | 5 | 1 | 2 |
| 201 | 7 | 17 | 1 | 7 | 1 | 2 |
| 202 | 3 | 4 | 1 | 3 | 1 | 2 |

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 203   11  17   7   9   1   2
 204   17  28   1  22   1   2
 205   10  12  17  21   1   2
 206   12  17  15  22   1   2
 207   12  18  22  25   1   2
 208   18  20  24  25   1   2
 209   18  21  22  24   1   2
 210   14  17  12  15   1   2
 211   22  24  28  32   1   2
 212   22  24  27  28   1   2
 213   24  26  22  33   1   2
 214   26  28  22  35   1   2
 215   27  28  35  36   1   2
 0 /
C...
C...POROUS-MEDIA PROPERTIES
C...PERMEABILITIES IN THE X,Y,Z DIRECTIONS
C...(2.10.1) KXX(IPMZ), KYY(IPMZ), KZZ(IPMZ); IPMZ=1 TO NPMZ
C...                                IPMZ = 1-2      (K=350 & 35 fpd)
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
C...                                IPMZ = 3-4      (K=0.67 fpd - BEDROCK)
  2.96E-12  2.96E-12  2.96E-12
  2.96E-12  2.96E-12  2.96E-12
C...                                IPMZ = 5-34      (K=350 & 35 fpd)
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
C...                                IPMZ = 35       (K=0.67 fpd - BEDROCK)
  2.96E-12  2.96E-12  2.96E-12
C...                                IPMZ = 36-43    (K=350 & 35 fpd)
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
C...                                IPMZ = 44       (K=0.67 fpd - BEDROCK)
  2.96E-12  2.96E-12  2.96E-12
C...                                IPMZ = 45-56    (K=0.35 fpd CLAY LAYER)
  1.54E-12  1.54E-12  1.54E-12
  1.54E-12  1.54E-12  1.54E-12
```

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  1.54E-12  1.54E-12  1.54E-12
  1.54E-12  1.54E-12  1.54E-12
  1.54E-12  1.54E-12  1.54E-12
  1.54E-12  1.54E-12  1.54E-12
  1.54E-12  1.54E-12  1.54E-12
  1.54E-12  1.54E-12  1.54E-12
  1.54E-12  1.54E-12  1.54E-12
  1.54E-12  1.54E-12  1.54E-12
  1.54E-12  1.54E-12  1.54E-12
  1.54E-12  1.54E-12  1.54E-12
C...                                IPMZ = 57-95    (K=350 & 35 fpd)
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
  1.54E-09  1.54E-09  1.54E-10
C...                                IPMZ = 96-115   (K=350 fpd)
  1.99E-09  1.99E-09  1.99E-10
  1.99E-09  1.99E-09  1.99E-10
  1.99E-09  1.99E-09  1.99E-10
  1.99E-09  1.99E-09  1.99E-10
  1.99E-09  1.99E-09  1.99E-10
  1.99E-09  1.99E-09  1.99E-10
  1.99E-09  1.99E-09  1.99E-10
  1.99E-09  1.99E-09  1.99E-10
  1.99E-09  1.99E-09  1.99E-10
  1.99E-09  1.99E-09  1.99E-10
  1.99E-09  1.99E-09  1.99E-10
  1.99E-09  1.99E-09  1.99E-10
  1.99E-09  1.99E-09  1.99E-10
  1.99E-09  1.99E-09  1.99E-10
  1.99E-09  1.99E-09  1.99E-10
  1.99E-09  1.99E-09  1.99E-10
  1.99E-09  1.99E-09  1.99E-10
  1.99E-09  1.99E-09  1.99E-10
  1.99E-09  1.99E-09  1.99E-10
  1.99E-09  1.99E-09  1.99E-10
  1.99E-09  1.99E-09  1.99E-10
  1.99E-09  1.99E-09  1.99E-10
  1.99E-09  1.99E-09  1.99E-10
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C...                                        IPMZ =  116 (K=0.67 fpd - BEDROCK)
  2.96E-12   2.96E-12   2.96E-12
C...                                        IPMZ =  117-124  (K=350 fpd)
  1.99E-09   1.99E-09   1.99E-10
  1.99E-09   1.99E-09   1.99E-10
  1.99E-09   1.99E-09   1.99E-10
  1.99E-09   1.99E-09   1.99E-10
  1.99E-09   1.99E-09   1.99E-10
  1.99E-09   1.99E-09   1.99E-10
  1.99E-09   1.99E-09   1.99E-10
  1.99E-09   1.99E-09   1.99E-10
C...                                        IPMZ = 125-126 (K=350 & 35 fpd)
  1.54E-09   1.54E-09   1.54E-10
  1.54E-09   1.54E-09   1.54E-10
C...                                        IPMZ = 127-215 (K=0.67 fpd - BEDROCK)
  2.96E-12   2.96E-12   2.96E-12
  2.96E-12   2.96E-12   2.96E-12
  2.96E-12   2.96E-12   2.96E-12
  2.96E-12   2.96E-12   2.96E-12
  2.96E-12   2.96E-12   2.96E-12
  2.96E-12   2.96E-12   2.96E-12
  2.96E-12   2.96E-12   2.96E-12
  2.96E-12   2.96E-12   2.96E-12
  2.96E-12   2.96E-12   2.96E-12
  2.96E-12   2.96E-12   2.96E-12
  2.96E-12   2.96E-12   2.96E-12
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  2.96E-12   2.96E-12   2.96E-12
  2.96E-12   2.96E-12   2.96E-12
  2.96E-12   2.96E-12   2.96E-12
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  2.96E-12   2.96E-12   2.96E-12
  2.96E-12   2.96E-12   2.96E-12
  2.96E-12   2.96E-12   2.96E-12
  2.96E-12   2.96E-12   2.96E-12
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  2.96E-12   2.96E-12   2.96E-12
  2.96E-12   2.96E-12   2.96E-12
  2.96E-12   2.96E-12   2.96E-12
  2.96E-12   2.96E-12   2.96E-12
  2.96E-12   2.96E-12   2.96E-12
  2.96E-12   2.96E-12   2.96E-12
  2.96E-12   2.96E-12   2.96E-12
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  2.96E-12  2.96E-12  2.96E-12
  2.96E-12  2.96E-12  2.96E-12
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  2.96E-12  2.96E-12  2.96E-12
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  2.96E-12  2.96E-12  2.96E-12
  2.96E-12  2.96E-12  2.96E-12
  2.96E-12  2.96E-12  2.96E-12
  2.96E-12  2.96E-12  2.96E-12
  2.96E-12  2.96E-12  2.96E-12
  2.96E-12  2.96E-12  2.96E-12
  2.96E-12  2.96E-12  2.96E-12
  2.96E-12  2.96E-12  2.96E-12
  2.96E-12  2.96E-12  2.96E-12
  2.96E-12  2.96E-12  2.96E-12
  2.96E-12  2.96E-12  2.96E-12
  2.96E-12  2.96E-12  2.96E-12
  2.96E-12  2.96E-12  2.96E-12
  2.96E-12  2.96E-12  2.96E-12
  2.96E-12  2.96E-12  2.96E-12
  2.96E-12  2.96E-12  2.96E-12
  2.96E-12  2.96E-12  2.96E-12
  2.96E-12  2.96E-12  2.96E-12
C...
C...POROSITY FOR MEDIUM IN ZONE IPMZ(i)
C...POROS(IPMZ), IPMZ=1 TO NPMZ
     215*0.225
C...
C...BULK VERTICAL COMPRESSIBILITY
C...  ABPM(IPMZ), IPMZ=1 TO NPMZ
     215*0.0
C...
C...WELL-MODEL INFORMATION (IF NWEL>0)
C...(2.14.1) RDWDEF (T=READ WELL DEFINITION DATA)
  T
C...(2.14.2) IMPQW (T=SEMI-IMPLICIT CALCS.)
  F
C...(2.14.3)IWEL,  IW,  JW, LCBOTW, LCTOPW, WBOD, WQMETH
C...(2.14.4) WCF (WELL COMPLETION FACTORS IN EA. LEVEL; 1.0=OPENED)
C...WELL #1=COLLECTOR 1; WELL #2=COLLECTOR 2
  1      21  31      2  2       20.0       10
      1.0        1.0        1.0        1.0
  2      21  33      2  2       20.0       10
      1.0        1.0        1.0        1.0
  3       6  22      2  3        2.0       10
      1.0        1.0        1.0        1.0
  4       7  32      1  2        1.0       10
      1.0        1.0        1.0        1.0
  0 /
C...
C...BOUNDARY-CONDITIONS INFORMATION
C...SPECIFIED VALUE
C...(2.15) IBC(i,j,k), MOD.CODE: INDEX OF B.C. TYPE (PRESS,TEMP,MASS-FRAC)
C...  1  1  17 17  4 4
C...  100
  1  1  18 18  4 4
  100
  1  1  19 19  4 4
  100
  1  1  20 20  4 4
  100
```

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```
1  1  21 21  4 4
100
1  1  22 22  4 4
100
1  1  23 23  4 4
100
1  1  24 24  4 4
100
1  1  25 25  4 4
100
1  1  26 26  4 4
100
1  1  27 27  4 4
100
1  1  28 28  4 4
100
1  1  29 29  4 4
100
1  1  30 30  4 4
100
1  1  31 31  4 4
100
1  1  32 32  4 4
100
1  1  33 33  4 4
100
1  1  34 34  4 4
100
1  1  35 35  4 4
100
1  1  36 36  4 4
100
1  1  37 37  4 4
100
2  2  37 37  4 4
100
3  3  37 37  4 4
100
4  4  37 37  4 4
100
5  5  37 37  4 4
100
6  6  37 37  4 4
100
7  7  37 37  4 4
100
19 19  37 37  4 4
100
20 20  37 37  4 4
100
21 21  37 37  4 4
100
22 22  37 37  4 4
100
23 23  37 37  4 4
100
24 24  37 37  4 4
100
25 25  37 37  4 4
100
26 26  37 37  4 4
100
27 27  37 37  4 4
100
28 28  37 37  4 4
100
28 28  36 36  4 4
100
28 28  35 35  4 4
100
0 /
```

```
C...SPECIFIED FLUX VALUE
C...(2.16) IBC(i,j,k) INDEX OF B.C. INDEX (3=z, n4=FLOW EQ.)
C...                                DOE SITE (2"/yr)
  3  13    27 35   4 4
  300200
  12 13    36 36   4 4
  300200
C...                                6"/yr AREAS
  2  7     36 36   4 4
  300200
  19 19    36 36   4 4
  300200
  2  2     27 35   4 4
  300200
  2  4     18 26   4 4
  300200
  6 14     24 26   4 4
  300200
  15 16    25 26   4 4
  300200
  14 16    27 35   4 4
  300200
  17 19    35 35   4 4
  300200
  1  1      1  3   4 4
  300200
  6 16      8  8   4 4
  300200
  5  11     7  7   4 4
  300200
  5  7      6  6   4 4
  300200
  4  5      5  5   4 4
  300200
  4  4      4  4   4 4
  300200
  19 20     6  7   4 4
  300200
  20 20     5  5   4 4
  300200
C...                                14"/yr AREAS
  20 27    36 36   4 4
  300200
  20 26    34 35   4 4
  300200
  20 21    33 33   4 4
  300200
  21 21    24 24   4 4
  300200
  20 20    32 32   4 4
  300200
  17 19    25 34   4 4
  300200
  21 23    29 30   4 4
  300200
  22 22    31 31   4 4
  300200
  23 25    31 32   4 4
  300200
  23 23    28 28   4 4
  300200
  20 21    25 27   4 4
  300200
  22 23    22 26   4 4
  300200
  24 24    15 20   4 4
  300200
  23 23    14 16   4 4
  300200
  6  12    18 23   4 4
  300200
```

```
  8  13   10 17  4 4
  300200
  14 15   10 12  4 4
  300200
  16 17   10 11  4 4
  300200
  18 22    9 11  4 4
  300200
C. ..                          BEDROCK AREAS (6"/yr)
  8  18  37 37   4 4
  300200
  8  11  36 36   4 4
  300200
  14 18  36 36   4 4
  300200
  1  4   10 17   4 4
  300200
  5  6   10 16   4 4
  300200
  1  3    7  9   4 4
  300200
  4  4    9  9   4 4
  300200
  1  2    5  6   4 4
  300200
  1  1    4  4   4 4
  300200
  15 20  24 24   4 4
  300200
  13 21  18 23   4 4
  300200
  14 21  13 17   4 4
  300200
  22 22  18 21   4 4
  300200
  16 22  12 12   4 4
  300200
  3  28   1  3   4 4
  300200
  5   5   4  4   4 4
  300200
  6  19   4  5   4 4
  300200
  8  18   6  6   4 4
  300200
  12 18   7  7   4 4
  300200
  20 20   4  4   4 4
  300200
  21 28   4  7   4 4
  300200
  24 28   8 14   4 4
  300200
  25 28  15 27   4 4
  300200
  24 28  28 30   4 4
  300200
  26 28  31 32   4 4
  300200
  28 28  33 34   4 4
  300200
  0 /
C... AQUIFER LEAKAGE
C...(2.17.1) IBC(i,j,k) IBC INDEX (n1=3 FOR Z-DIRECTION)
  27 27 34 35 4 4
  300300
  22 27 33 33 4 4
  300300
  21 22 32 32 4 4
  300300
  21 21 31 31 4 4
```

```
300300
20 20 28 31 4 4
300300
21 22 28 28 4 4
300300
22 23 27 27 4 4
300300
24 24 21 27 4 4
300300
23 23 17 21 4 4
300300
22 22 13 17 4 4
300300
23 23 8 13  4 4
300300
17 22 8 8  4 4
300300
5 17 9 9   4 4
300300
4 5 8 8    4 4
300300
4 4 6 7    4 4
300300
3 3 4 6    4 4
300300
2 2 1 4    4 4
300300
5 5 26 26  4 4
300300
5 5 25 25  4 4
300300
5 5 24 24 4 4
300300
5 5 23 23 4 4
300300
5 5 22 22 4 4
300300
5 5 21 21 4 4
300300
5 5 20 20 4 4
300300
5 5 19 19 4 4
300300
5 5 18 18 4 4
300300
5 6 17 17 4 4
300300
7 7 17 17 4 4
300300
7 7 16 16 4 4
300300
7 7 15 15 4 4
300300
7 7 14 14 4 4
300300
7 7 13 13 4 4
300300
7 7 12 12 4 4
300300
7 7 11 11 4 4
300300
7 7 10 10 4 4
300300
0 /
0 /
C...RIVER LEAKAGE
C...(k=1.71E-12 fpd; GMR WIDTH=250'; PR WIDTH=20'; BED THICK.=1.0')
C...(2.17.3) I1, I2,   J1, J2,   KRBC,    BBRBC,     ZERBC
C...GREAT MIAMI RIVER:
             27  27    34  35   5.70E-13   1.0
    520.2
```

```
                22  27    33  33   5.70E-13   1.0
     519.7
                21  22    32  32   5.70E-13   1.0
     519.4
                21  21    31  31   5.70E-13   1.0
     519.3
                20  20    28  31   5.70E-13   1.0
     517.8
                21  22    28  28   5.70E-13   1.0
     515.6
                22  23    27  27   5.70E-13   1.0
     513.0
                24  24    21  27   5.70E-13   1.0
     512.3
                23  23    17  21   5.70E-13   1.0
     509.7
                22  22    13  17   5.70E-13   1.0
     507.4
                23  23     8  13   5.70E-13   1.0
     505.7
                17  22     8   8   8.55E-13   1.0
     500.0
                 5  17     9   9   8.55E-13   1.0
     489.0
                 4   5     8   8   8.55E-13   1.0
     488.0
                 4   4     6   7   8.55E-13   1.0
     487.0
                 3   3     4   6   3.11E-13   1.0
     486.0
                 2   2     1   4   2.11E-13   1.0
     485.0
C...PADDYS RUN
                 5   5    26  26   2.74E-14   1.0
     522.9
                 5   5    25  25   5.47E-14   1.0
     521.4
                 5   5    24  24   5.47E-14   1.0
     520.0
                 5   5    23  23   5.47E-14   1.0
     518.6
                 5   5    22  22   5.47E-14   1.0
     517.1
                 5   5    21  21   5.47E-14   1.0
     515.7
                 5   5    20  20   5.47E-14   1.0
     514.3
                 5   5    19  19   5.47E-14   1.0
     512.9
                 5   5    18  18   5.47E-14   1.0
     511.4
                 5   6    17  17   5.47E-14   1.0
     510.0
                 7   7    17  17   6.84E-14   1.0
     509.1
                 7   7    16  16   6.84E-14   1.0
     508.1
                 7   7    15  15   6.84E-14   1.0
     507.2
                 7   7    14  14   6.84E-14   1.0
     504.0
                 7   7    13  13   6.84E-14   1.0
     501.5
                 7   7    12  12   6.84E-14   1.0
     499.0
                 7   7    11  11   6.84E-14   1.0
     496.5
                 7   7    10  10   6.84E-14   1.0
     494.0
  0 /
C...
```

```
C...FREE SURFACE B.C.
C...(2.20) FRESUR(T=UNCONFINED), PRTCCM(T=PRINT MESSAGE)
  T F
C...
C...INITIAL CONDITIONS
C...(2.21.1) ICHYDP, ICT, ICC: (T=HYDROSTATIC P, T, MASS-FRAC. TO BE SPECIFIED)

  F F F
C...
C...(2.21.2) ICHWT (T=INITIAL WT ELEV. TO BE INPUT)
  T
C...
C...(2.21.3C) HWT: WT ELEV. BY i,j,k RANGE
  1 28 1 37 4 4
  510.0    1
  0 /
C...
C...CALCULATION INFORMATION   [DEFAULT VALUES]
C...(2.22.1) FDSMTH(FACTOR FOR SPATIAL-DISCRTZ), FDTMTH(FACTOR FOR TEMPORAL
C...         DISCRTZ.): 0.5=CENTERED-IN-SPACE, 1.0=BACKWARD-IN-TIME
  0.50       1.00
C...
C...(2.22.2) TOLDEN(TOLERANCE), MAXITN(MAXIMUM ITERATIONS)
             1.0E-03                5
C...
C...(2.22.3) NTSORT  (# TIMESTEPS FOR OVERRELAXATION PARAMETER[5]),
C...         EPSSOR  (TOLERANCE FOR SOR...[1.0E-5]),
C...         EPSOMG  (TOLERANCE ON FRAC. CHANGE[0.2]),
C...         MAXITN1 (MAX. ITERATION FOR OVERRELAX. PARAMETER[50]),
C...         MAXITN2 (MAX. ITERATION FOR THE SOLUTION OF MATRIX EQ.[100]).
C...
           2   1.0E-04   0.20    250      250
C...
C...OUTPUT OF STATIC DATA
C...(2.23.1) PRTPMP (PMZ PROP.),     PRTFP (FLD.PROP.),  PRTIC (INIT. COND.),
C...         PRTBC (BOUNDARY COND.), PRTSLM (SOL'N METH.),
C...         PRTWELL (STATIC WELLBORE)
  F F F F F F
C...
C...(2.23.2) IPRTTC (INDEX FOR IC PRINTOUT), PRTDV (T=PRT. OF DENSITY & VISC.)
C...  000  F
C...
C...(2.23.3) ORENPR (INDEX FOR ORIENT. OF ARRAY PRT.)
  12
C...
C...(2.23.4) PLTZON (T=PRT. PMZ PROPERTIES)
  F
C...
C...(2.23.5) OCPLOT (T= PLOTS OF OBSERVED & CALCULATED VALUES)
  F
C...
C... TRANSIENT DATA
C...(3.1) THRU (T=SIMULATION IS THROUGH)
  F
C...
C... WELL INFORMATION
C... RDWFLO(T=READ WELL-FLOW-RATE), RDWHD (T=READ WELL-HEAD)
  T F
C...
C...(3.2.2) IWELL,    QWV,     PWSUR,    PWKT,    TWSRKT,  CWKT
              1   -1.16E+06   0.0       0.0      60.0     0.00
              2   -1.16E+06   0.0       0.0      60.0     0.00
              3   -4.30E+04   0.0       0.0      60.0     0.00
              4   -5.60E+04   0.0       0.0      60.0     0.00
  0 /
C...
C...BOUNDARY CONDITIONS INFORMATION
C...SPECIFIED VALUES
C...(3.3.1) RDSPBC,RDSTBC,RDSCBC (READ SPECIFIED-PRESSURE,TEMP.,MASS-FRAC. DATA)
  T F F
C...
```

```
C...(3.3.2) PNP: PRESSURE AT SPECIFIED PRESSURE B.C. NODES BY i,j,k.
C...   1  1 17 17  4 4
C...        1.5                1
   1  1 18 18  4 4
        1.7                1
   1  1 19 19  4 4
        1.8                1
   1  1 20 20  4 4
        2.0                1
   1  1 21 21  4 4
        2.1                1
   1  1 22 22  4 4
        2.17               1
   1  1 23 23  4 4
        2.21               1
   1  1 24 24  4 4
        2.25               1
   1  1 25 25  4 4
        2.38               1
   1  1 26 26  4 4
        2.25               1
   1  1 27 27  4 4
        2.17               1
   1  1 28 28  4 4
        2.08               1
   1  1 29 29  4 4
        1.73               1
   1  1 30 30  4 4
        1.52               1
   1  1 31 31  4 4
        1.34               1
   1  1 32 32  4 4
        1.30               1
   1  1 33 33  4 4
        1.73               1
   1  1 34 34  4 4
        3.03               1
   1  1 35 35  4 4
        3.90               1
   1  1 36 36  4 4
        5.20               1
   1  1 37 37  4 4
        7.37               1
   2  2 37 37  4 4
        7.46               1
   3  3 37 37  4 4
        7.59               1
   4  4 37 37  4 4
        7.50               1
   5  5 37 37  4 4
        7.46               1
   6  6 37 37  4 4
        7.41               1
   7  7 37 37  4 4
        7.37               1
  19 19 37 37  4 4
        0.9                1
  20 20 37 37  4 4
        1.1                1
  21 21 37 37  4 4
        1.3                1
  22 22 37 37  4 4
        1.7                1
  23 23 37 37  4 4
        2.2                1
  24 24 37 37  4 4
        2.4                1
  25 25 37 37  4 4
        3.5                1
  26 26 37 37  4 4
        3.9                1
```

```
  27 27 37 37  4 4
        4.6                1
  28 28 37 37  4 4
        6.1                1
  28 28 36 36  4 4
        3.3                1
  28 28 35 35  4 4
        2.6                1
  0 /
C... SPECIFIED FLUX
C... RDFLXQ(FLUID), RDFLXH(HEAT), RDFLXS(SOLUTE)
  T F F
C...
C...(3.4.2) QFFX, QFFY, QFFZ, BY (i,j,k)
C...                                          DOE SITE (2"/yr)
  3  13   27 35  4 4
  0.   1    0.   1  -4.57E-04   1
  12 13   36 36  4 4
  0.   1    0.   1  -4.57E-04   1
C...                                          6"/yr AREAS
 19 19    36 36  4 4
  0.   1    0.   1  -0.0014     1
  2  7    36 36  4 4
  0.   1    0.   1  -0.0014     1
  2  2    27 35  4 4
  0.   1    0.   1  -0.0014     1
  2  4    18 26  4 4
  0.   1    0.   1  -0.0014     1
  15 16   25 26  4 4
  0.   1    0.   1  -0.0014     1
  6 14    24 26  4 4
  0.   1    0.   1  -0.0014     1
  14 16   27 35  4 4
  0.   1    0.   1  -0.0014     1
  17 19   35 35  4 4
  0.   1    0.   1  -0.0014     1
  1  1     1  3  4 4
  0.   1    0.   1  -0.0014     1
  5 16     8  8  4 4
  0.   1    0.   1  -0.0014     1
  5  11    7  7  4 4
  0.   1    0.   1  -0.0014     1
  5  7     6  6  4 4
  0.   1    0.   1  -0.0014     1
  4  5     5  5  4 4
  0.   1    0.   1  -0.0014     1
  4  4     4  4  4 4
  0.   1    0.   1  -0.0014     1
  19 20    6  7  4 4
  0.   1    0.   1  -0.0014     1
  20 20    5  5  4 4
  0.   1    0.   1  -0.0014     1
C...                                          14"/yr AREAS
  20 27   36 36  4 4
  0.   1    0.   1  -0.0032     1
  20 26   34 35  4 4
  0.   1    0.   1  -0.0032     1
  20 21   33 33  4 4
  0.   1    0.   1  -0.0032     1
  21 21   24 24  4 4
  0.   1    0.   1  -0.0032     1
  20 20   32 32  4 4
  0.   1    0.   1  -0.0032     1
  17 19   23 34  4 4
  0.   1    0.   1  -0.0032     1
  21 23   29 30  4 4
  0.   1    0.   1  -0.0032     1
  22 22   31 31  4 4
  0.   1    0.   1  -0.0032     1
  23 25   31 32  4 4
  0.   1    0.   1  -0.0032     1
```

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```
  23 23   28 28  4 4
  0.   1    0.   1  -0.0032     1
  20 21   25 27  4 4
  0.   1    0.   1  -0.0032     1
  22 23   22 26  4 4
  0.   1    0.   1  -0.0032     1
  24 24   15 20  4 4
  0.   1    0.   1  -0.0032     1
  23 23   14 16  4 4
  0.   1    0.   1  -0.0032     1
  6  12   18 23  4 4
  0.   1    0.   1  -0.0032     1
  8  13   10 17  4 4
  0.   1    0.   1  -0.0032     1
  14 15   10 12  4 4
  0.   1    0.   1  -0.0032     1
  16 17   10 11  4 4
  0.   1    0.   1  -0.0032     1
  18 22    9 11  4 4
  0.   1    0.   1  -0.0032     1
C...                                    BEDROCK AREAS (6"/yr)
  8 18   37 37   4 4
  0.   1    0.   1  -0.0014     1
  8  11  36 36   4 4
  0.   1    0.   1  -0.0014     1
  14 18  36 36   4 4
  0.   1    0.   1  -0.0014     1
  1  4   10 17   4 4
  0.   1    0.   1  -0.0014     1
  5  6   10 16   4 4
  0.   1    0.   1  -0.0014     1
  1  3    7  9   4 4
  0.   1    0.   1  -0.0014     1
  4  4    9  9   4 4
  0.   1    0.   1  -0.0014     1
  1  2    5  6   4 4
  0.   1    0.   1  -0.0014     1
  1  1    4  4   4 4
  0.   1    0.   1  -0.0014     1
  15 20  24 24   4 4
  0.   1    0.   1  -0.0014     1
  13 21  18 23   4 4
  0.   1    0.   1  -0.0014     1
  14 21  13 17   4 4
  0.   1    0.   1  -0.0014     1
  22 22  18 21   4 4
  0.   1    0.   1  -0.0014     1
  16 22  12 12   4 4
  0.   1    0.   1  -0.0014     1
  3  28   1  3   4 4
  0.   1    0.   1  -0.0014     1
  5   5   4  4   4 4
  0.   1    0.   1  -0.0014     1
  6  19   4  5   4 4
  0.   1    0.   1  -0.0014     1
  8  18   6  6   4 4
  0.   1    0.   1  -0.0014     1
  12 18   7  7   4 4
  0.   1    0.   1  -0.0014     1
  20 20   4  4   4 4
  0.   1    0.   1  -0.0014     1
  21 28   4  7   4 4
  0.   1    0.   1  -0.0014     1
  24 28   8 14   4 4
  0.   1    0.   1  -0.0014     1
  25 28  15 27   4 4
  0.   1    0.   1  -0.0014     1
  24 28  28 30   4 4
  0.   1    0.   1  -0.0014     1
  26 28  31 32   4 4
  0.   1    0.   1  -0.0014     1
```

```
  28 28  33 34   4 4
  0.   1    0.   1  -0.0014     1
  0 /
C...
C...(3.4.3) UDENBC - DENSITY ASSOCIATED WITH SPECIFIED-FLUX (BY i,j,k)
C...
  3  13   27 35  4 4
  62.4     1
  12 13   36 36  4 4
  62.4     1
C...                          6"/yr AREAS
  2  7    36 36  4 4
  62.4     1
  19 19   36 36  4 4
  62.4     1
  2  2    27 35  4 4
  62.4     1
  2  4    18 26  4 4
  62.4     1
  6 14    24 26  4 4
  62.4     1
  15 16   25 26  4 4
  62.0     1
  14 16   27 35  4 4
  62.0     1
  17 19   35 35  4 4
  62.4     1
  1  1     1  3  4 4
  62.4     1
  5 16     8  8  4 4
  62.4     1
  5  11    7  7  4 4
  62.4     1
  5  7     6  6  4 4
  62.4     1
  4  5     5  5  4 4
  62.4     1
  4  4     4  4  4 4
  62.4     1
  19 20    6  7  4 4
  62.4     1
  20 20    5  5  4 4
  62.4     1
C...                          14"/yr AREAS
  20 27   36 36  4 4
  62.4     1
  20 26   34 35  4 4
  62.4     1
  20 21   33 33  4 4
  62.4     1
  21 21   24 24  4 4
  62.4     1
  20 20   32 32  4 4
  62.4     1
  17 19   23 34  4 4
  62.4     1
  21 23   29 30  4 4
  62.4     1
  22 22   31 31  4 4
  62.4     1
  23 25   31 32  4 4
  62.4     1
  23 23   28 28  4 4
  62.4     1
  20 21   25 27  4 4
  62.4     1
  22 23   22 26  4 4
  62.4     1
  24 24   15 20  4 4
  62.4     1
  23 23   14 16  4 4
```

```
  62.4      1
  6  12    18 23   4 4
  62.4      1
  8  13    10 17   4 4
  62.4      1
  14 15    10 12   4 4
  62.4      1
  16 17    10 11   4 4
  62.4      1
  18 22     9 11   4 4
  62.4      1
C...                          BEDROCK AREAS (6"/yr)
  8 18     37 37   4 4
  62.4      1
  8  11    36 36   4 4
  62.4      1
  14 18    36 36   4 4
  62.4      1
  1  4     10 17   4 4
  62.4      1
  5  6     10 16   4 4
  62.4      1
  1  3      7  9   4 4
  62.4      1
  4  4      9  9   4 4
  62.4      1
  1  2      5  6   4 4
  62.4      1
  1  1      4  4   4 4
  62.4      1
  15 20    24 24   4 4
  62.4      1
  13 21    18 23   4 4
  62.4      1
  14 21    13 17   4 4
  62.4      1
  22 22    18 21   4 4
  62.4      1
  16 22    12 12   4 4
  62.4      1
  3  28     1  3   4 4
  62.4      1
  5   5     4  4   4 4
  62.4      1
  6  19     4  5   4 4
  62.4      1
  8  18     6  6   4 4
  62.4      1
  12 18     7  7   4 4
  62.4      1
  20 20     4  4   4 4
  62.4      1
  21 28     4  7   4 4
  62.4      1
  24 28     8 14   4 4
  62.4      1
  25 28    15 27   4 4
  62.4      1
  24 28    28 30   4 4
  62.4      1
  26 28    31 32   4 4
  62.4      1
  28 28    33 34   4 4
  62.4      1
  0 /
   T
  0 /
C...(3.5.5) RIVER LEAKAGE (GMR HRBC = ZERBC+6';)
C... I1,    I2,    J1,    J2    HRBC    DENRBC    VISRBC  TRBC  CRBC
     27     27     34     35    526.2    62.40     1.138   60     0
     22     27     33     33    525.7    62.40     1.138   60     0
```

```
     21      22      32      32     525.4    62.40     1.138    60      0
     21      21      31      31     525.3    62.40     1.138    60      0
     20      20      28      31     523.8    62.40     1.138    60      0
     21      22      28      28     521.6    62.40     1.138    60      0
     22      23      27      27     519.0    62.40     1.138    60      0
     24      24      21      27     518.3    62.40     1.138    60      0
     23      23      17      21     515.7    62.40     1.138    60      0
     22      22      13      17     513.4    62.40     1.138    60      0
     23      23       8      13     511.7    62.40     1.138    60      0
     17      22       8       8     506.0    62.40     1.138    60      0
      5      17       9       9     495.0    62.40     1.138    60      0
      4       5       8       8     494.0    62.40     1.138    60      0
      4       4       6       7     493.0    62.40     1.138    60      0
      3       3       4       6     492.0    62.40     1.138    60      0
      2       2       1       4     491.0    62.40     1.138    60      0
      5       5      26      26     523.9    62.40     1.138    60      0
      5       5      25      25     522.4    62.40     1.138    60      0
      5       5      24      24     521.0    62.40     1.138    60      0
      5       5      23      23     519.6    62.40     1.138    60      0
      5       5      22      22     518.1    62.40     1.138    60      0
      5       5      21      21     516.7    62.40     1.138    60      0
      5       5      20      20     515.3    62.40     1.138    60      0
      5       5      19      19     513.9    62.40     1.138    60      0
      5       5      18      18     512.4    62.40     1.138    60      0
      5       6      17      17     511.0    62.40     1.138    60      0
      7       7      17      17     510.1    62.40     1.138    60      0
      7       7      16      16     509.1    62.40     1.138    60      0
      7       7      15      15     508.2    62.40     1.138    60      0
      7       7      14      14     505.0    62.40     1.138    60      0
      7       7      13      13     502.5    62.40     1.138    60      0
      7       7      12      12     500.0    62.40     1.138    60      0
      7       7      11      11     497.5    62.40     1.138    60      0
      7       7      10      10     495.0    62.40     1.138    60      0
 0 /
C...
C... CALCULATION INFORMATION
C...(3.7.1) RDCALC (T= READ CALCULCTION INFO. AT THIS TIME)
  T
C...
C...(3.7.2) AUTOTS (T=AUTOMATIC TIMESTEP ADJUSTMENT IS DESIRED)
  T
C...
C...(3.7.3B) DPTAS,DTTAS,DCTAS(MAX. CHANGE IN PRESSURE[5.0E+4 Pa], TEMP.[5 C],
C...                           MASS-FRAC.[0.25] ALLOWED), DTIMMN (MIN.TIMESTEP
C...                           REQ.[1.0E+4s]), DTIMMX (MAX.TIMESTEP [1.0E+7s])
     7.2519        9.0       0.25        0.001     100.0
C...
C...(3.7.4) TIMCHG (TIME FOR NEW TRANSIENT DATA WILL BE READ OR TERMINATION)
   1095.
C...
C...PRINTOUT INTERVALS FOR: VELOCITY,FLD. DENSITY, SOLUTION METH., COND. AND
C.. DISPERSION, P-T-C, LFLOW-BALANCE, WELL, B.C. (0=NONE, n=nTH TIMESTEP,
C...-1=ONLY AT NEW DATA READ AND END OF SIMULATION)
C...(3.8.1) PRIVEL, PRIDV, PRISLM, PRIKD, PRIPTC, PRIGFB, PRIWEL, PRIBCF
              0       0      -1      0      -1      -1      -1      -1
C...
C...(3.8.2) IPRPTC (INDEX FOR PRESSURE, TEMP., AND MASS-FRAC. ARRAYS; n1n2n3)
  200
C...
C...(3.8.3) CHKPTD(T=CHKPT. DUMPS), NTSCHK(# OF TIMESTEPS BETWEEN SOR CHKPT.
C...               DUMPS), SAVLDO(T=SAVE LAST CHKPT. DUMP)
  F  0  F
C...
C...(3.9.1) RDMPDT, PRTMPD (T=READ & WRITE CONTROL DATA FOR MAP GENERATION)
  F  F
C...(3.99.1) THRU (T= SIGNIFIES END OF SIMULATION)
  T
C...(3.99.2) PLOTWP, PLOTWT, PLOTWC (T=PLOT OBSERVED AND/OR CALCULATED PRESS.,
C...                                 TEMP., MASS-FRAC.)
  F  F  F
```

```
*****************************************************
*                                                   *
*    THREE DIMENSIONAL FLOW, HEAT AND SOLUTE        *
*  TRANSPORT SIMULATOR - (HST3D):RELEASE - 1.1      *
*                                                   *
*****************************************************
```

PRRS REGIONAL FLOW MODEL - 3 YRS. (1095 DAYS) - APRIL 1986 (REG1986.DAT)
W/MOD. BEDRX ZONES (VORMELKER,1985) & NO PNP @ SW NODES 3-27-92

*** FUNDAMENTAL INFORMATION ***

CARTESIAN COORDINATES
ISOTHERMAL SIMULATION
NO SOLUTE TRANSPORT SIMULATON
WELLBORE MODEL MAY INCLUDE : FLUID PRESSURE DROP
INPUT DATA IS EXPECTED IN ENGLISH UNITS

*** PROBLEM DIMENSIONING INFORMATION ***

| | | |
|---|---|---|
| NUMBER OF NODES IN X-DIRECTION | NX ... | 28 |
| NUMBER OF NODES IN Y-DIRECTION | NY ... | 37 |
| NUMBER OF NODES IN Z-DIRECTION | NZ ... | 4 |
| NUMBER OF POROUS MEDIA ZONES | NPMZ . | 215 |
| NUMBER OF SPECIFIED PRESSURE, TEMPERATURE OR MASS FRACTION B.C. | NPTCBC | 38 |
| NUMBER OF SPECIFIED FLUX B.C. CELLS (FLOW, HEAT OR SOLUTE) | NFBC . | 907 |
| NUMBER OF HEAT CONDUCTION B.C. CELLS | NHCBC | 0 |
| NUMBER OF NODES OUTSIDE REGION FOR EACH HEAT CONDUCTION B.C. CELL | NHCN | 0 |
| NUMBER OF AQUIFER INFLUENCE FUNCTION CELLS | NAIFC | 0 |
| NUMBER OF LEAKAGE CELLS | NLBC . | 91 |
| NUMBER OF WELLS | NWEL . | 4 |

ITERATIVE TWO-LINE-SUCCESSIVE-OVER-RELAXATION SOLVER IS SELECTED
TOTAL LENGTH OF LABELED COMMON BLOCKS ..... 6681 BYTES

| | REQUIRED | | COMPILED | |
|---|---|---|---|---|
| LENGTH OF VARIABLE LENGTH REAL ARRAY (VPA ARRAY) ..... | 156745 | ELEMENTS | 900000 | ELEMENTS |
| LENGTH OF VARIABLE LENGTH INTEGER ARRAY (IVPA ARRAY) ..... | 10635 | ELEMENTS | 50000 | ELEMENTS |

** SPECIFIED VALUE B.C. NODES ** (READ ECHO)

| REGION I1 | I2 | J1 | J2 | K1 | K2 | B.C. CODE |
|---|---|---|---|---|---|---|
| 1 | 1 | 18 | 18 | 4 | 4 | 100 |
| 1 | 1 | 19 | 19 | 4 | 4 | 100 |
| 1 | 1 | 20 | 20 | 4 | 4 | 100 |
| 1 | 1 | 21 | 21 | 4 | 4 | 100 |
| 1 | 1 | 22 | 22 | 4 | 4 | 100 |
| 1 | 1 | 23 | 23 | 4 | 4 | 100 |
| 1 | 1 | 24 | 24 | 4 | 4 | 100 |
| 1 | 1 | 25 | 25 | 4 | 4 | 100 |
| 1 | 1 | 26 | 26 | 4 | 4 | 100 |
| 1 | 1 | 27 | 27 | 4 | 4 | 100 |
| 1 | 1 | 28 | 28 | 4 | 4 | 100 |
| 1 | 1 | 29 | 29 | 4 | 4 | 100 |
| 1 | 1 | 30 | 30 | 4 | 4 | 100 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 1 | 31 | 31 | 4 | 4 | 100 |
| 1 | 1 | 32 | 32 | 4 | 4 | 100 |
| 1 | 1 | 33 | 33 | 4 | 4 | 100 |
| 1 | 1 | 34 | 34 | 4 | 4 | 100 |
| 1 | 1 | 35 | 35 | 4 | 4 | 100 |
| 1 | 1 | 36 | 36 | 4 | 4 | 100 |
| 1 | 1 | 37 | 37 | 4 | 4 | 100 |
| 2 | 2 | 37 | 37 | 4 | 4 | 100 |
| 3 | 3 | 37 | 37 | 4 | 4 | 100 |
| 4 | 4 | 37 | 37 | 4 | 4 | 100 |
| 5 | 5 | 37 | 37 | 4 | 4 | 100 |
| 6 | 6 | 37 | 37 | 4 | 4 | 100 |
| 7 | 7 | 37 | 37 | 4 | 4 | 100 |
| 19 | 19 | 37 | 37 | 4 | 4 | 100 |
| 20 | 20 | 37 | 37 | 4 | 4 | 100 |
| 21 | 21 | 37 | 37 | 4 | 4 | 100 |
| 22 | 22 | 37 | 37 | 4 | 4 | 100 |
| 23 | 23 | 37 | 37 | 4 | 4 | 100 |
| 24 | 24 | 37 | 37 | 4 | 4 | 100 |
| 25 | 25 | 37 | 37 | 4 | 4 | 100 |
| 26 | 26 | 37 | 37 | 4 | 4 | 100 |
| 27 | 27 | 37 | 37 | 4 | 4 | 100 |
| 28 | 28 | 37 | 37 | 4 | 4 | 100 |
| 28 | 28 | 36 | 36 | 4 | 4 | 100 |
| 28 | 28 | 35 | 35 | 4 | 4 | 100 |

** FLUX B.C. CELLS ** (READ ECHO)

| REGION | | | | | | B.C. CODE |
|---|---|---|---|---|---|---|
| I1 | I2 | J1 | J2 | K1 | K2 | |
| 3 | 13 | 27 | 35 | 4 | 4 | 300200 |
| 12 | 13 | 36 | 36 | 4 | 4 | 300200 |
| 2 | 7 | 36 | 36 | 4 | 4 | 300200 |
| 19 | 19 | 36 | 36 | 4 | 4 | 300200 |
| 2 | 2 | 27 | 35 | 4 | 4 | 300200 |
| 2 | 4 | 18 | 26 | 4 | 4 | 300200 |
| 6 | 14 | 24 | 26 | 4 | 4 | 300200 |
| 15 | 16 | 25 | 26 | 4 | 4 | 300200 |
| 14 | 16 | 27 | 35 | 4 | 4 | 300200 |
| 17 | 19 | 35 | 35 | 4 | 4 | 300200 |
| 1 | 1 | 1 | 3 | 4 | 4 | 300200 |
| 6 | 16 | 8 | 8 | 4 | 4 | 300200 |
| 5 | 11 | 7 | 7 | 4 | 4 | 300200 |
| 5 | 7 | 6 | 6 | 4 | 4 | 300200 |
| 4 | 5 | 5 | 5 | 4 | 4 | 300200 |
| 4 | 4 | 4 | 4 | 4 | 4 | 300200 |
| 19 | 20 | 6 | 7 | 4 | 4 | 300200 |
| 20 | 20 | 5 | 5 | 4 | 4 | 300200 |
| 20 | 27 | 36 | 36 | 4 | 4 | 300200 |
| 20 | 26 | 34 | 35 | 4 | 4 | 300200 |
| 20 | 21 | 33 | 33 | 4 | 4 | 300200 |
| 21 | 21 | 24 | 24 | 4 | 4 | 300200 |
| 20 | 20 | 32 | 32 | 4 | 4 | 300200 |
| 17 | 19 | 25 | 34 | 4 | 4 | 300200 |
| 21 | 23 | 29 | 30 | 4 | 4 | 300200 |
| 22 | 22 | 31 | 31 | 4 | 4 | 300200 |
| 23 | 25 | 31 | 32 | 4 | 4 | 300200 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| 23 | 23 | 28 | 28 | 4 | 4 | 300200 |
| 20 | 21 | 25 | 27 | 4 | 4 | 300200 |
| 22 | 23 | 22 | 26 | 4 | 4 | 300200 |
| 24 | 24 | 15 | 20 | 4 | 4 | 300200 |
| 23 | 23 | 14 | 16 | 4 | 4 | 300200 |
| 6 | 12 | 18 | 23 | 4 | 4 | 300200 |
| 8 | 13 | 10 | 17 | 4 | 4 | 300200 |
| 14 | 15 | 10 | 12 | 4 | 4 | 300200 |
| 16 | 17 | 10 | 11 | 4 | 4 | 300200 |
| 18 | 22 | 9 | 11 | 4 | 4 | 300200 |
| 8 | 18 | 37 | 37 | 4 | 4 | 300200 |
| 8 | 11 | 36 | 36 | 4 | 4 | 300200 |
| 14 | 18 | 36 | 36 | 4 | 4 | 300200 |
| 1 | 4 | 10 | 17 | 4 | 4 | 300200 |
| 5 | 6 | 10 | 16 | 4 | 4 | 300200 |
| 1 | 3 | 7 | 9 | 4 | 4 | 300200 |
| 4 | 4 | 9 | 9 | 4 | 4 | 300200 |
| 1 | 2 | 5 | 6 | 4 | 4 | 300200 |
| 1 | 1 | 4 | 4 | 4 | 4 | 300200 |
| 15 | 20 | 24 | 24 | 4 | 4 | 300200 |
| 13 | 21 | 18 | 23 | 4 | 4 | 300200 |
| 14 | 21 | 13 | 17 | 4 | 4 | 300200 |
| 22 | 22 | 18 | 21 | 4 | 4 | 300200 |
| 16 | 22 | 12 | 12 | 4 | 4 | 300200 |
| 3 | 28 | 1 | 3 | 4 | 4 | 300200 |
| 5 | 5 | 4 | 4 | 4 | 4 | 300200 |
| 6 | 19 | 4 | 5 | 4 | 4 | 300200 |
| 8 | 18 | 6 | 6 | 4 | 4 | 300200 |
| 12 | 18 | 7 | 7 | 4 | 4 | 300200 |
| 20 | 20 | 4 | 4 | 4 | 4 | 300200 |
| 21 | 28 | 4 | 7 | 4 | 4 | 300200 |
| 24 | 28 | 8 | 14 | 4 | 4 | 300200 |
| 25 | 28 | 15 | 27 | 4 | 4 | 300200 |
| 24 | 28 | 28 | 30 | 4 | 4 | 300200 |
| 26 | 28 | 31 | 32 | 4 | 4 | 300200 |
| 28 | 28 | 33 | 34 | 4 | 4 | 300200 |

** AQUIFER AND RIVER LEAKAGE B.C. NODES ** (READ ECHO)

| REGION | | | | | | B.C. CODE |
|---|---|---|---|---|---|---|
| I1 | I2 | J1 | J2 | K1 | K2 | |
| 27 | 27 | 34 | 35 | 4 | 4 | 300300 |
| 22 | 27 | 33 | 33 | 4 | 4 | 300300 |
| 21 | 22 | 32 | 32 | 4 | 4 | 300300 |
| 21 | 21 | 31 | 31 | 4 | 4 | 300300 |
| 20 | 20 | 28 | 31 | 4 | 4 | 300300 |
| 21 | 22 | 28 | 28 | 4 | 4 | 300300 |
| 22 | 23 | 27 | 27 | 4 | 4 | 300300 |
| 24 | 24 | 21 | 27 | 4 | 4 | 300300 |
| 23 | 23 | 17 | 21 | 4 | 4 | 300300 |
| 22 | 22 | 13 | 17 | 4 | 4 | 300300 |
| 23 | 23 | 8 | 13 | 4 | 4 | 300300 |
| 17 | 22 | 8 | 8 | 4 | 4 | 300300 |
| 5 | 17 | 9 | 9 | 4 | 4 | 300300 |
| 4 | 5 | 8 | 8 | 4 | 4 | 300300 |
| 4 | 4 | 6 | 7 | 4 | 4 | 300300 |
| 3 | 3 | 4 | 6 | 4 | 4 | 300300 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | 2 | 1 | 4 | 4 | 4 | 300300 |
| 5 | 5 | 26 | 26 | 4 | 4 | 300300 |
| 5 | 5 | 25 | 25 | 4 | 4 | 300300 |
| 5 | 5 | 24 | 24 | 4 | 4 | 300300 |
| 5 | 5 | 23 | 23 | 4 | 4 | 300300 |
| 5 | 5 | 22 | 22 | 4 | 4 | 300300 |
| 5 | 5 | 21 | 21 | 4 | 4 | 300300 |
| 5 | 5 | 20 | 20 | 4 | 4 | 300300 |
| 5 | 5 | 19 | 19 | 4 | 4 | 300300 |
| 5 | 5 | 18 | 18 | 4 | 4 | 300300 |
| 5 | 6 | 17 | 17 | 4 | 4 | 300300 |
| 7 | 7 | 17 | 17 | 4 | 4 | 300300 |
| 7 | 7 | 16 | 16 | 4 | 4 | 300300 |
| 7 | 7 | 15 | 15 | 4 | 4 | 300300 |
| 7 | 7 | 14 | 14 | 4 | 4 | 300300 |
| 7 | 7 | 13 | 13 | 4 | 4 | 300300 |
| 7 | 7 | 12 | 12 | 4 | 4 | 300300 |
| 7 | 7 | 11 | 11 | 4 | 4 | 300300 |
| 7 | 7 | 10 | 10 | 4 | 4 | 300300 |

** AQUIFER LEAKAGE PARAMETERS ** (READ ECHO)

| REGION I1 | I2 | J1 | J2 | K1 | K2 | AQUITARD PERMEABILITY (FT**2) | M.C. | ELEVATION OF OUTER BOUNDARY (FT) | M.C. | THICKNESS OF AQUITARD (FT) | M.C. |
|---|---|---|---|---|---|---|---|---|---|---|---|

M.C.=MODIFICATION CODE

** AQUIFER INITIAL CONDITIONS ** (READ ECHO)

| REGION I1 | I2 | J1 | J2 | K1 | K2 | W.T. ELEV. | MODIFICATION CODE |
|---|---|---|---|---|---|---|---|
| 1 | 28 | 1 | 37 | 4 | 4 | 510.0 | 1 |

*** TIME INVARIANT OR STATIC DATA ***

X-DIRECTION NODE COORDINATES (FT)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| 0.00 | 2400.00 | 4050.00 | 5150.00 | 5900.00 | 6400.00 | 6900.00 | 7400.00 | 7900.00 | 8400.00 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 8900.00 | 9400.00 | 9900.00 | 10400.00 | 10900.00 | 11400.00 | 12150.00 | 12900.00 | 13650.00 | 14400.00 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | | |
| 15150.00 | 15900.00 | 16650.00 | 17400.00 | 18150.00 | 19250.00 | 20900.20 | 23300.00 | | |

Y-DIRECTION NODE COORDINATES (FT)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| 0.00 | 2400.00 | 4050.00 | 5150.00 | 5900.00 | 6400.00 | 6900.00 | 7400.00 | 7900.00 | 8400.00 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 8900.00 | 9400.00 | 9900.00 | 10400.00 | 10900.00 | 11400.00 | 11900.00 | 12400.00 | 12900.00 | 13400.00 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 13900.00 | 14400.00 | 14900.00 | 15400.00 | 15900.00 | 16400.00 | 16900.00 | 17650.00 | 18400.00 | 19150.00 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | | | |
| 19900.00 | 20650.00 | 21400.00 | 22150.00 | 23250.00 | 24900.00 | 27300.00 | | | |

Z-DIRECTION NODE COORDINATES (FT)

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| 380.00 | 445.00 | 455.00 | 523.00 |

Z-AXIS IS POSITIVE VERTICALLY UPWARD

A FREE-SURFACE WATER TABLE IN UPPERMOST LAYER OF CELLS IS SPECIFIED FOR THIS SIMULATON

** SPECIFIED PRESSURE B.C. ** (READ ECHO)

| REGION I1 | I2 | J1 | J2 | K1 | K2 | PRESSURE | MODIFICATION CODE |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 18 | 18 | 4 | 4 | 1.700 | 1 |
| 1 | 1 | 19 | 19 | 4 | 4 | 1.800 | 1 |
| 1 | 1 | 20 | 20 | 4 | 4 | 2.000 | 1 |
| 1 | 1 | 21 | 21 | 4 | 4 | 2.100 | 1 |
| 1 | 1 | 22 | 22 | 4 | 4 | 2.170 | 1 |
| 1 | 1 | 23 | 23 | 4 | 4 | 2.210 | 1 |
| 1 | 1 | 24 | 24 | 4 | 4 | 2.250 | 1 |
| 1 | 1 | 25 | 25 | 4 | 4 | 2.380 | 1 |
| 1 | 1 | 26 | 26 | 4 | 4 | 2.250 | 1 |
| 1 | 1 | 27 | 27 | 4 | 4 | 2.170 | 1 |
| 1 | 1 | 28 | 28 | 4 | 4 | 2.080 | 1 |
| 1 | 1 | 29 | 29 | 4 | 4 | 1.730 | 1 |
| 1 | 1 | 30 | 30 | 4 | 4 | 1.520 | 1 |
| 1 | 1 | 31 | 31 | 4 | 4 | 1.340 | 1 |
| 1 | 1 | 32 | 32 | 4 | 4 | 1.300 | 1 |
| 1 | 1 | 33 | 33 | 4 | 4 | 1.730 | 1 |
| 1 | 1 | 34 | 34 | 4 | 4 | 3.030 | 1 |
| 1 | 1 | 35 | 35 | 4 | 4 | 3.900 | 1 |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 36 | 36 | 4 | 4 | 5.200 | 1 |
| 1 | 1 | 37 | 37 | 4 | 4 | 7.370 | 1 |
| 2 | 2 | 37 | 37 | 4 | 4 | 7.460 | 1 |
| 3 | 3 | 37 | 37 | 4 | 4 | 7.590 | 1 |
| 4 | 4 | 37 | 37 | 4 | 4 | 7.500 | 1 |
| 5 | 5 | 37 | 37 | 4 | 4 | 7.460 | 1 |
| 6 | 6 | 37 | 37 | 4 | 4 | 7.410 | 1 |
| 7 | 7 | 37 | 37 | 4 | 4 | 7.370 | 1 |
| 19 | 19 | 37 | 37 | 4 | 4 | 0.9000 | 1 |
| 20 | 20 | 37 | 37 | 4 | 4 | 1.100 | 1 |
| 21 | 21 | 37 | 37 | 4 | 4 | 1.300 | 1 |
| 22 | 22 | 37 | 37 | 4 | 4 | 1.700 | 1 |
| 23 | 23 | 37 | 37 | 4 | 4 | 2.200 | 1 |
| 24 | 24 | 37 | 37 | 4 | 4 | 2.400 | 1 |
| 25 | 25 | 37 | 37 | 4 | 4 | 3.500 | 1 |
| 26 | 26 | 37 | 37 | 4 | 4 | 3.900 | 1 |
| 27 | 27 | 37 | 37 | 4 | 4 | 4.600 | 1 |
| 28 | 28 | 37 | 37 | 4 | 4 | 6.100 | 1 |
| 28 | 28 | 36 | 36 | 4 | 4 | 3.300 | 1 |
| 28 | 28 | 35 | 35 | 4 | 4 | 2.600 | 1 |

** SPECIFIED FLUX B.C. ** FLOW

| REGION | | | | | | (AMT/FT**2-D) | | M.C.=MODIFICATION CODE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| I1 | I2 | J1 | J2 | K1 | K2 | QFX | M.C. | QFY | M.C. | QFZ | M.C. |
| 3 | 13 | 27 | 35 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -4.5700E-04 | 1 |
| 12 | 13 | 36 | 36 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -4.5700E-04 | 1 |
| 19 | 19 | 36 | 36 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 2 | 7 | 36 | 36 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 2 | 2 | 27 | 35 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 2 | 4 | 18 | 26 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 15 | 16 | 25 | 26 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 6 | 14 | 24 | 26 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 14 | 16 | 27 | 35 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 17 | 19 | 35 | 35 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 1 | 1 | 1 | 3 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 5 | 16 | 8 | 8 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 5 | 11 | 7 | 7 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 5 | 7 | 6 | 6 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 4 | 5 | 5 | 5 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 4 | 4 | 4 | 4 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 19 | 20 | 6 | 7 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 20 | 20 | 5 | 5 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 20 | 27 | 36 | 36 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 20 | 26 | 34 | 35 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 20 | 21 | 33 | 33 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 21 | 21 | 24 | 24 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 20 | 20 | 32 | 32 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 17 | 19 | 23 | 34 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 21 | 23 | 29 | 30 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 22 | 22 | 31 | 31 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 23 | 25 | 31 | 32 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 23 | 23 | 28 | 28 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 20 | 21 | 25 | 27 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 22 | 23 | 22 | 26 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 24 | 24 | 15 | 20 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 23 | 23 | 14 | 16 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |

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| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 12 | 18 | 23 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 8 | 13 | 10 | 17 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 14 | 15 | 10 | 12 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 16 | 17 | 10 | 11 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 18 | 22 | 9 | 11 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 8 | 18 | 37 | 37 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 8 | 11 | 36 | 36 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 14 | 18 | 36 | 36 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 1 | 4 | 10 | 17 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 5 | 6 | 10 | 16 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 1 | 3 | 7 | 9 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 4 | 4 | 9 | 9 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 1 | 2 | 5 | 6 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 1 | 1 | 4 | 4 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 15 | 20 | 24 | 24 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 13 | 21 | 18 | 23 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 14 | 21 | 13 | 17 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 22 | 22 | 18 | 21 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 16 | 22 | 12 | 12 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 3 | 28 | 1 | 3 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 5 | 5 | 4 | 4 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 6 | 19 | 4 | 5 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 8 | 18 | 6 | 6 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 12 | 18 | 7 | 7 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 20 | 20 | 4 | 4 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 21 | 28 | 4 | 7 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 24 | 28 | 8 | 14 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 25 | 28 | 15 | 27 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 24 | 28 | 28 | 30 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 26 | 28 | 31 | 32 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 28 | 28 | 33 | 34 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |

** DENSITY FOR INFLOW AT SPECIFIED FLUID FLUX B.C. ** (READ ECHO)
M.C.=MODIFICATION CODE

| REGION I1 | I2 | J1 | J2 | K1 | K2 | DENSITY | M.C. |
|---|---|---|---|---|---|---|---|
| 3 | 13 | 27 | 35 | 4 | 4 | 62.40 | 1 |
| 12 | 13 | 36 | 36 | 4 | 4 | 62.40 | 1 |
| 2 | 7 | 36 | 36 | 4 | 4 | 62.40 | 1 |
| 19 | 19 | 36 | 36 | 4 | 4 | 62.40 | 1 |
| 2 | 2 | 27 | 35 | 4 | 4 | 62.40 | 1 |
| 2 | 4 | 18 | 26 | 4 | 4 | 62.40 | 1 |
| 6 | 14 | 24 | 26 | 4 | 4 | 62.40 | 1 |
| 15 | 16 | 25 | 26 | 4 | 4 | 62.00 | 1 |
| 14 | 16 | 27 | 35 | 4 | 4 | 62.00 | 1 |
| 17 | 19 | 35 | 35 | 4 | 4 | 62.40 | 1 |
| 1 | 1 | 1 | 3 | 4 | 4 | 62.40 | 1 |
| 5 | 16 | 8 | 8 | 4 | 4 | 62.40 | 1 |
| 5 | 11 | 7 | 7 | 4 | 4 | 62.40 | 1 |
| 5 | 7 | 6 | 6 | 4 | 4 | 62.40 | 1 |
| 4 | 5 | 5 | 5 | 4 | 4 | 62.40 | 1 |
| 4 | 4 | 4 | 4 | 4 | 4 | 62.40 | 1 |
| 19 | 20 | 6 | 7 | 4 | 4 | 62.40 | 1 |
| 20 | 20 | 5 | 5 | 4 | 4 | 62.40 | 1 |
| 20 | 27 | 36 | 36 | 4 | 4 | 62.40 | 1 |
| 20 | 26 | 34 | 35 | 4 | 4 | 62.40 | 1 |
| 20 | 21 | 33 | 33 | 4 | 4 | 62.40 | 1 |

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00 7360

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 21 | 21 | 24 | 24 | 4 | 4 | 62.40 | 1 |
| 20 | 20 | 32 | 32 | 4 | 4 | 62.40 | 1 |
| 17 | 19 | 23 | 34 | 4 | 4 | 62.40 | 1 |
| 21 | 23 | 29 | 30 | 4 | 4 | 62.40 | 1 |
| 22 | 22 | 31 | 31 | 4 | 4 | 62.40 | 1 |
| 23 | 25 | 31 | 32 | 4 | 4 | 62.40 | 1 |
| 23 | 23 | 28 | 28 | 4 | 4 | 62.40 | 1 |
| 20 | 21 | 25 | 27 | 4 | 4 | 62.40 | 1 |
| 22 | 23 | 22 | 26 | 4 | 4 | 62.40 | 1 |
| 24 | 24 | 15 | 20 | 4 | 4 | 62.40 | 1 |
| 23 | 23 | 14 | 16 | 4 | 4 | 62.40 | 1 |
| 6 | 12 | 18 | 23 | 4 | 4 | 62.40 | 1 |
| 8 | 13 | 10 | 17 | 4 | 4 | 62.40 | 1 |
| 14 | 15 | 10 | 12 | 4 | 4 | 62.40 | 1 |
| 16 | 17 | 10 | 11 | 4 | 4 | 62.40 | 1 |
| 18 | 22 | 9 | 11 | 4 | 4 | 62.40 | 1 |
| 8 | 18 | 37 | 37 | 4 | 4 | 62.40 | 1 |
| 8 | 11 | 36 | 36 | 4 | 4 | 62.40 | 1 |
| 14 | 18 | 36 | 36 | 4 | 4 | 62.40 | 1 |
| 1 | 4 | 10 | 17 | 4 | 4 | 62.40 | 1 |
| 5 | 6 | 10 | 16 | 4 | 4 | 62.40 | 1 |
| 1 | 3 | 7 | 9 | 4 | 4 | 62.40 | 1 |
| 4 | 4 | 9 | 9 | 4 | 4 | 62.40 | 1 |
| 1 | 2 | 5 | 6 | 4 | 4 | 62.40 | 1 |
| 1 | 1 | 4 | 4 | 4 | 4 | 62.40 | 1 |
| 15 | 20 | 24 | 24 | 4 | 4 | 62.40 | 1 |
| 13 | 21 | 18 | 23 | 4 | 4 | 62.40 | 1 |
| 14 | 21 | 13 | 17 | 4 | 4 | 62.40 | 1 |
| 22 | 22 | 18 | 21 | 4 | 4 | 62.40 | 1 |
| 16 | 22 | 12 | 12 | 4 | 4 | 62.40 | 1 |
| 3 | 28 | 1 | 3 | 4 | 4 | 62.40 | 1 |
| 5 | 5 | 4 | 4 | 4 | 4 | 62.40 | 1 |
| 6 | 19 | 4 | 5 | 4 | 4 | 62.40 | 1 |
| 8 | 18 | 6 | 6 | 4 | 4 | 62.40 | 1 |
| 12 | 18 | 7 | 7 | 4 | 4 | 62.40 | 1 |
| 20 | 20 | 4 | 4 | 4 | 4 | 62.40 | 1 |
| 21 | 28 | 4 | 7 | 4 | 4 | 62.40 | 1 |
| 24 | 28 | 8 | 14 | 4 | 4 | 62.40 | 1 |
| 25 | 28 | 15 | 27 | 4 | 4 | 62.40 | 1 |
| 24 | 28 | 28 | 30 | 4 | 4 | 62.40 | 1 |
| 26 | 28 | 31 | 32 | 4 | 4 | 62.40 | 1 |
| 28 | 28 | 33 | 34 | 4 | 4 | 62.40 | 1 |

** AQUIFER LEAKAGE PARAMETERS ** (READ ECHO)

M.C.=MODIFICATION CODE

| REGION I1 | I2 | J1 | J2 | K1 | K2 | POTENTIAL (FT-LBF/LBM) | M.C. | DENSITY (LB/FT**3) | M.C. | VISCOSITY (CP ) | M.C. |
|---|---|---|---|---|---|---|---|---|---|---|---|

*** TRANSIENT DATA ***

SPECIFIED BOUNDARY PRESSURES (PSI)

AREAL LAYERS

000259

K = 4

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 7.370 | 7.460 | 7.590 | 7.500 | 7.460 | 7.410 | 7.370 | | | |
| 36 | 5.200 | | | | | | | | | |
| 35 | 3.900 | | | | | | | | | |
| 34 | 3.030 | | | | | | | | | |
| 33 | 1.730 | | | | | | | | | |
| 32 | 1.300 | | | | | | | | | |
| 31 | 1.340 | | | | | | | | | |
| 30 | 1.520 | | | | | | | | | |
| 29 | 1.730 | | | | | | | | | |
| 28 | 2.080 | | | | | | | | | |
| 27 | 2.170 | | | | | | | | | |
| 26 | 2.250 | | | | | | | | | |
| 25 | 2.380 | | | | | | | | | |
| 24 | 2.250 | | | | | | | | | |
| 23 | 2.210 | | | | | | | | | |
| 22 | 2.170 | | | | | | | | | |
| 21 | 2.100 | | | | | | | | | |
| 20 | 2.000 | | | | | | | | | |
| 19 | 1.800 | | | | | | | | | |
| 18 | 1.700 | | | | | | | | | |
| 17 | | | | | | | | | | |
| 16 | | | | | | | | | | |
| 15 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 11 | | | | | | | | | | |
| 10 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 8 | | | | | | | | | | |
| 7 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| 2 | | | | | | | | | | |
| 1 | | | | | | | | | | |

| | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | | | | | | | | | 0.9000 | 1.100 |
| 36 | | | | | | | | | | |
| 35 | | | | | | | | | | |
| 34 | | | | | | | | | | |
| 33 | | | | | | | | | | |
| 32 | | | | | | | | | | |
| 31 | | | | | | | | | | |
| 30 | | | | | | | | | | |
| 29 | | | | | | | | | | |
| 28 | | | | | | | | | | |
| 27 | | | | | | | | | | |
| 26 | | | | | | | | | | |
| 25 | | | | | | | | | | |

002360

002360

| | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|---|---|---|---|---|---|---|---|---|
| 37 | 1.300 | 1.700 | 2.200 | 2.400 | 3.500 | 3.900 | 4.600 | 6.100 |
| 36 | | | | | | | | 3.300 |
| 35 | | | | | | | | 2.600 |



000301

8
7
6
5
4
3
2
1

FLUX B.C. FLUID VOLUMETRIC FLOW RATES (FT**3/D)

AREAL LAYERS

K = 4

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | | | | | | | | 840.0 | 840.0 | 840.0 |
| 36 | | 5741. | 3898. | 2622. | 1772. | 1418. | 1418. | 1418. | 1418. | 1418. |
| 35 | | 3898. | 864.0 | 581.2 | 392.7 | 314.2 | 314.2 | 314.2 | 314.2 | 314.2 |
| 34 | | 2622. | 581.2 | 391.0 | 264.2 | 211.4 | 211.4 | 211.4 | 211.4 | 211.4 |
| 33 | | 2126. | 471.3 | 317.0 | 214.2 | 171.4 | 171.4 | 171.4 | 171.4 | 171.4 |
| 32 | | 2126. | 471.3 | 317.0 | 214.2 | 171.4 | 171.4 | 171.4 | 171.4 | 171.4 |
| 31 | | 2126. | 471.3 | 317.0 | 214.2 | 171.4 | 171.4 | 171.4 | 171.4 | 171.4 |
| 30 | | 2126. | 471.3 | 317.0 | 214.2 | 171.4 | 171.4 | 171.4 | 171.4 | 171.4 |
| 29 | | 2126. | 471.3 | 317.0 | 214.2 | 171.4 | 171.4 | 171.4 | 171.4 | 171.4 |
| 28 | | 2126. | 471.3 | 317.0 | 214.2 | 171.4 | 171.4 | 171.4 | 171.4 | 171.4 |
| 27 | | 1772. | 392.7 | 264.2 | 178.5 | 142.8 | 142.8 | 142.8 | 142.8 | 142.8 |
| 26 | | 1418. | 962.5 | 647.5 | | 350.0 | 350.0 | 350.0 | 350.0 | 350.0 |
| 25 | | 1418. | 962.5 | 647.5 | | 350.0 | 350.0 | 350.0 | 350.0 | 350.0 |
| 24 | | 1418. | 962.5 | 647.5 | | 350.0 | 350.0 | 350.0 | 350.0 | 350.0 |
| 23 | | 1418. | 962.5 | 647.5 | | 800.0 | 800.0 | 800.0 | 800.0 | 800.0 |
| 22 | | 1418. | 962.5 | 647.5 | | 800.0 | 800.0 | 800.0 | 800.0 | 800.0 |
| 21 | | 1418. | 962.5 | 647.5 | | 800.0 | 800.0 | 800.0 | 800.0 | 800.0 |
| 20 | | 1418. | 962.5 | 647.5 | | 800.0 | 800.0 | 800.0 | 800.0 | 800.0 |
| 19 | | 1418. | 962.5 | 647.5 | | 800.0 | 800.0 | 800.0 | 800.0 | 800.0 |
| 18 | | 1418. | 962.5 | 647.5 | | 800.0 | 800.0 | 800.0 | 800.0 | 800.0 |
| 17 | 840.0 | 1418. | 962.5 | 647.5 | | | | 800.0 | 800.0 | 800.0 |
| 16 | 840.0 | 1418. | 962.5 | 647.5 | 437.5 | 350.0 | | 800.0 | 800.0 | 800.0 |
| 15 | 840.0 | 1418. | 962.5 | 647.5 | 437.5 | 350.0 | | 800.0 | 800.0 | 800.0 |
| 14 | 840.0 | 1418. | 962.5 | 647.5 | 437.5 | 350.0 | | 800.0 | 800.0 | 800.0 |
| 13 | 840.0 | 1418. | 962.5 | 647.5 | 437.5 | 350.0 | | 800.0 | 800.0 | 800.0 |
| 12 | 840.0 | 1418. | 962.5 | 647.5 | 437.5 | 350.0 | | 800.0 | 800.0 | 800.0 |
| 11 | 840.0 | 1418. | 962.5 | 647.5 | 437.5 | 350.0 | | 800.0 | 800.0 | 800.0 |
| 10 | 840.0 | 1418. | 962.5 | 647.5 | 437.5 | 350.0 | | 800.0 | 800.0 | 800.0 |
| 9 | 840.0 | 1418. | 962.5 | 647.5 | | | | | | |
| 8 | 840.0 | 1418. | 962.5 | | | 350.0 | 350.0 | 350.0 | 350.0 | 350.0 |
| 7 | 840.0 | 1418. | 962.5 | | 437.5 | 350.0 | 350.0 | 350.0 | 350.0 | 350.0 |
| 6 | 840.0 | 1418. | | | 437.5 | 350.0 | 350.0 | 350.0 | 350.0 | 350.0 |
| 5 | 1050. | 1772. | | 809.4 | 546.9 | 437.5 | 437.5 | 437.5 | 437.5 | 437.5 |
| 4 | 1554. | | | 1198. | 809.4 | 647.5 | 647.5 | 647.5 | 647.5 | 647.5 |
| 3 | 2310. | | 2647. | 1781. | 1203. | 962.5 | 962.5 | 962.5 | 962.5 | 962.5 |
| 2 | 3402. | | 3898. | 2622. | 1772. | 1418. | 1418. | 1418. | 1418. | 1418. |
| 1 | 2016. | | 2310. | 1554. | 1050. | 840.0 | 840.0 | 840.0 | 840.0 | 840.0 |

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| | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 840.0 | 840.0 | 840.0 | 840.0 | 840.0 | 1050. | 1260. | 1260. | | |
| 36 | 1418. | 462.7 | 462.7 | 1418. | 1418. | 1772. | 2126. | 2126. | 2126. | 4860. |
| 35 | 314.2 | 314.2 | 314.2 | 962.5 | 962.5 | 1203. | 1444. | 1444. | 1444. | 3300. |
| 34 | 211.4 | 211.4 | 211.4 | 647.5 | 647.5 | 809.4 | 2220. | 2220. | 2220. | 2220. |
| 33 | 171.4 | 171.4 | 171.4 | 525.0 | 525.0 | 656.3 | 1800. | 1800. | 1800. | 1800. |
| 32 | 171.4 | 171.4 | 171.4 | 525.0 | 525.0 | 656.3 | 1800. | 1800. | 1800. | 1800. |
| 31 | 171.4 | 171.4 | 171.4 | 525.0 | 525.0 | 656.3 | 1800. | 1800. | 1800. | |
| 30 | 171.4 | 171.4 | 171.4 | 525.0 | 525.0 | 656.3 | 1800. | 1800. | 1800. | |
| 29 | 171.4 | 171.4 | 171.4 | 525.0 | 525.0 | 656.3 | 1800. | 1800. | 1800. | |
| 28 | 171.4 | 171.4 | 171.4 | 525.0 | 525.0 | 656.3 | 1800. | 1800. | 1800. | |
| 27 | 142.8 | 142.8 | 142.8 | 437.5 | 437.5 | 546.9 | 1500. | 1500. | 1500. | 1500. |
| 26 | 350.0 | 350.0 | 350.0 | 350.0 | 350.0 | 437.5 | 1200. | 1200. | 1200. | 1200. |
| 25 | 350.0 | 350.0 | 350.0 | 350.0 | 350.0 | 437.5 | 1200. | 1200. | 1200. | 1200. |
| 24 | 350.0 | 350.0 | 350.0 | 350.0 | 350.0 | 437.5 | 525.0 | 525.0 | 525.0 | 525.0 |
| 23 | 800.0 | 800.0 | 350.0 | 350.0 | 350.0 | 437.5 | 525.0 | 525.0 | 525.0 | 525.0 |
| 22 | 800.0 | 800.0 | 350.0 | 350.0 | 350.0 | 437.5 | 525.0 | 525.0 | 525.0 | 525.0 |
| 21 | 800.0 | 800.0 | 350.0 | 350.0 | 350.0 | 437.5 | 525.0 | 525.0 | 525.0 | 525.0 |
| 20 | 800.0 | 800.0 | 350.0 | 350.0 | 350.0 | 437.5 | 525.0 | 525.0 | 525.0 | 525.0 |
| 19 | 800.0 | 800.0 | 350.0 | 350.0 | 350.0 | 437.5 | 525.0 | 525.0 | 525.0 | 525.0 |
| 18 | 800.0 | 800.0 | 350.0 | 350.0 | 350.0 | 437.5 | 525.0 | 525.0 | 525.0 | 525.0 |
| 17 | 800.0 | 800.0 | 800.0 | 350.0 | 350.0 | 437.5 | 525.0 | 525.0 | 525.0 | 525.0 |
| 16 | 800.0 | 800.0 | 800.0 | 350.0 | 350.0 | 437.5 | 525.0 | 525.0 | 525.0 | 525.0 |
| 15 | 800.0 | 800.0 | 800.0 | 350.0 | 350.0 | 437.5 | 525.0 | 525.0 | 525.0 | 525.0 |
| 14 | 800.0 | 800.0 | 800.0 | 350.0 | 350.0 | 437.5 | 525.0 | 525.0 | 525.0 | 525.0 |
| 13 | 800.0 | 800.0 | 800.0 | 350.0 | 350.0 | 437.5 | 525.0 | 525.0 | 525.0 | 525.0 |
| 12 | 800.0 | 800.0 | 800.0 | 800.0 | 800.0 | 437.5 | 525.0 | 525.0 | 525.0 | 525.0 |
| 11 | 800.0 | 800.0 | 800.0 | 800.0 | 800.0 | 1000. | 1200. | 1200. | 1200. | 1200. |
| 10 | 800.0 | 800.0 | 800.0 | 800.0 | 800.0 | 1000. | 1200. | 1200. | 1200. | 1200. |
| 9 | | | | | | | | 1200. | 1200. | 1200. |
| 8 | 350.0 | 350.0 | 350.0 | 350.0 | 350.0 | 437.5 | | | | |
| 7 | 350.0 | 350.0 | 350.0 | 350.0 | 350.0 | 437.5 | 525.0 | 525.0 | 525.0 | 525.0 |
| 6 | 350.0 | 350.0 | 350.0 | 350.0 | 350.0 | 437.5 | 525.0 | 525.0 | 525.0 | 525.0 |
| 5 | 437.5 | 437.5 | 437.5 | 437.5 | 437.5 | 546.9 | 656.3 | 656.3 | 656.3 | 656.3 |
| 4 | 647.5 | 647.5 | 647.5 | 647.5 | 647.5 | 809.4 | 971.3 | 971.3 | 971.3 | 971.3 |
| 3 | 962.5 | 962.5 | 962.5 | 962.5 | 962.5 | 1203. | 1444. | 1444. | 1444. | 1444. |
| 2 | 1418. | 1418. | 1418. | 1418. | 1418. | 1772. | 2126. | 2126. | 2126. | 2126. |
| 1 | 840.0 | 840.0 | 840.0 | 840.0 | 840.0 | 1050. | 1260. | 1260. | 1260. | 1260. |

| | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|---|---|---|---|---|---|---|---|---|
| 37 | | | | | | | | |
| 36 | 4860. | 4860. | 4860. | 4860. | 5994. | 8911. | 1.3122E+04 | |
| 35 | 3300. | 3300. | 3300. | 3300. | 4070. | 6050. | | |
| 34 | 2220. | 2220. | 2220. | 2220. | 2738. | 4070. | | 1554. |
| 33 | 1800. | | | | | | | 1260. |
| 32 | | | 1800. | 1800. | 2220. | 1444. | 2126. | 1260. |
| 31 | | 1800. | 1800. | 1800. | 2220. | 1444. | 2126. | 1260. |
| 30 | 1800. | 1800. | 1800. | 787.5 | 971.3 | 1444. | 2126. | 1260. |
| 29 | 1800. | 1800. | 1800. | 787.5 | 971.3 | 1444. | 2126. | 1260. |
| 28 | | | 1800. | 787.5 | 971.3 | 1444. | 2126. | 1260. |
| 27 | 1500. | | | | 809.4 | 1203. | 1772. | 1050. |
| 26 | 1200. | 1200. | 1200. | | 647.5 | 962.6 | 1418. | 839.9 |
| 25 | 1200. | 1200. | 1200. | | 647.5 | 962.6 | 1418. | 839.9 |
| 24 | 1200. | 1200. | 1200. | | 647.5 | 962.6 | 1418. | 839.9 |
| 23 | 525.0 | 1200. | 1200. | | 647.5 | 962.6 | 1418. | 839.9 |



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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 22 | 525.0 | 1200. | 1200. | | 647.5 | 962.6 | 1418. | 839.9 |
| 21 | 525.0 | 525.0 | | | 647.5 | 962.6 | 1418. | 839.9 |
| 20 | 525.0 | 525.0 | | 1200. | 647.5 | 962.6 | 1418. | 839.9 |
| 19 | 525.0 | 525.0 | | 1200. | 647.5 | 962.6 | 1418. | 839.9 |
| 18 | 525.0 | 525.0 | | 1200. | 647.5 | 962.6 | 1418. | 839.9 |
| 17 | 525.0 | | | 1200. | 647.5 | 962.6 | 1418. | 839.9 |
| 16 | 525.0 | | 1200. | 1200. | 647.5 | 962.6 | 1418. | 839.9 |
| 15 | 525.0 | | 1200. | 1200. | 647.5 | 962.6 | 1418. | 839.9 |
| 14 | 525.0 | | 1200. | 525.0 | 647.5 | 962.6 | 1418. | 839.9 |
| 13 | 525.0 | | | 525.0 | 647.5 | 962.6 | 1418. | 839.9 |
| 12 | 525.0 | 525.0 | | 525.0 | 647.5 | 962.6 | 1418. | 839.9 |
| 11 | 1200. | 1200. | | 525.0 | 647.5 | 962.6 | 1418. | 839.9 |
| 10 | 1200. | 1200. | | 525.0 | 647.5 | 962.6 | 1418. | 839.9 |
| 9 | 1200. | 1200. | | 525.0 | 647.5 | 962.6 | 1418. | 839.9 |
| 8 | | | | 525.0 | 647.5 | 962.6 | 1418. | 839.9 |
| 7 | 525.0 | 525.0 | 525.0 | 525.0 | 647.5 | 962.6 | 1418. | 839.9 |
| 6 | 525.0 | 525.0 | 525.0 | 525.0 | 647.5 | 962.6 | 1418. | 839.9 |
| 5 | 656.3 | 656.3 | 656.3 | 656.3 | 809.4 | 1203. | 1772. | 1050. |
| 4 | 971.3 | 971.3 | 971.3 | 971.3 | 1198. | 1781. | 2622. | 1554. |
| 3 | 1444. | 1444. | 1444. | 1444. | 1781. | 2647. | 3898. | 2310. |
| 2 | 2126. | 2126. | 2126. | 2126. | 2622. | 3898. | 5741. | 3402. |
| 1 | 1260. | 1260. | 1260. | 1260. | 1554. | 2310. | 3402. | 2016. |

ASSOCIATED BOUNDARY DENSITIES FOR INFLOW (LB/FT**3)

AREAL LAYERS

K = 4

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | | | | | | | | 62.40 | 62.40 | 62.40 |
| 36 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 35 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 34 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 33 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 32 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 31 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 30 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 29 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 28 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 27 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 26 | | 62.40 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 25 | | 62.40 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 24 | | 62.40 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 23 | | 62.40 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 22 | | 62.40 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 21 | | 62.40 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 20 | | 62.40 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 19 | | 62.40 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 18 | | 62.40 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 17 | 62.40 | 62.40 | 62.40 | 62.40 | | | | 62.40 | 62.40 | 62.40 |
| 16 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 |
| 15 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 |
| 14 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 |
| 13 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 |

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| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 |
| 11 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 |
| 10 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 |
| 9 | 62.40 | 62.40 | 62.40 | 62.40 | | | | | | |
| 8 | 62.40 | 62.40 | 62.40 | | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 7 | 62.40 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 6 | 62.40 | 62.40 | | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 5 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 4 | 62.40 | | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 3 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 2 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 1 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |

| | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | | |
| 36 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 35 | 62.40 | 62.40 | 62.40 | 62.00 | 62.00 | 62.00 | 62.40 | 62.40 | 62.40 | 62.40 |
| 34 | 62.40 | 62.40 | 62.40 | 62.00 | 62.00 | 62.00 | 62.40 | 62.40 | 62.40 | 62.40 |
| 33 | 62.40 | 62.40 | 62.40 | 62.00 | 62.00 | 62.00 | 62.40 | 62.40 | 62.40 | 62.40 |
| 32 | 62.40 | 62.40 | 62.40 | 62.00 | 62.00 | 62.00 | 62.40 | 62.40 | 62.40 | 62.40 |
| 31 | 62.40 | 62.40 | 62.40 | 62.00 | 62.00 | 62.00 | 62.40 | 62.40 | 62.40 | |
| 30 | 62.40 | 62.40 | 62.40 | 62.00 | 62.00 | 62.00 | 62.40 | 62.40 | 62.40 | |
| 29 | 62.40 | 62.40 | 62.40 | 62.00 | 62.00 | 62.00 | 62.40 | 62.40 | 62.40 | |
| 28 | 62.40 | 62.40 | 62.40 | 62.00 | 62.00 | 62.00 | 62.40 | 62.40 | 62.40 | |
| 27 | 62.40 | 62.40 | 62.40 | 62.00 | 62.00 | 62.00 | 62.40 | 62.40 | 62.40 | 62.40 |
| 26 | 62.40 | 62.40 | 62.40 | 62.40 | 62.00 | 62.00 | 62.40 | 62.40 | 62.40 | 62.40 |
| 25 | 62.40 | 62.40 | 62.40 | 62.40 | 62.00 | 62.00 | 62.40 | 62.40 | 62.40 | 62.40 |
| 24 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 23 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 22 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 21 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 20 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 19 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 18 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 17 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 16 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 15 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 14 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 13 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 12 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 11 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 10 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 9 | | | | | | | | 62.40 | 62.40 | 62.40 |
| 8 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | | | | |
| 7 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 6 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 5 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 4 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 3 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 2 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 1 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |

| | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|---|---|---|---|---|---|---|---|---|

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 37 | | | | | | | | |
| 36 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | |
| 35 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | | |
| 34 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | | 62.40 |
| 33 | 62.40 | | | | | | | 62.40 |
| 32 | | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 31 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 30 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 29 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 28 | | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 27 | 62.40 | | | | 62.40 | 62.40 | 62.40 | 62.40 |
| 26 | 62.40 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 |
| 25 | 62.40 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 |
| 24 | 62.40 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 |
| 23 | 62.40 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 |
| 22 | 62.40 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 |
| 21 | 62.40 | 62.40 | | | 62.40 | 62.40 | 62.40 | 62.40 |
| 20 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 19 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 18 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 17 | 62.40 | | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 16 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 15 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 14 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 13 | 62.40 | | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 12 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 11 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 10 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 9 | 62.40 | 62.40 | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 8 | | | | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 7 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 6 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 5 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 4 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 3 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 2 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |
| 1 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 | 62.40 |

EXTERIOR AQUIFER OR RIVER POTENTIAL DISTRIBUTION (FT-LBF/LBM)

AREAL LAYERS

K = 4

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | | | | | | | | | | |
| 36 | | | | | | | | | | |
| 35 | | | | | | | | | | |
| 34 | | | | | | | | | | |
| 33 | | | | | | | | | | |
| 32 | | | | | | | | | | |
| 31 | | | | | | | | | | |
| 30 | | | | | | | | | | |
| 29 | | | | | | | | | | |
| 28 | | | | | | | | | | |

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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 27 | | | | | | | | | |
| 26 | | | | 1.6857E+04 | | | | | |
| 25 | | | | 1.6808E+04 | | | | | |
| 24 | | | | 1.6763E+04 | | | | | |
| 23 | | | | 1.6718E+04 | | | | | |
| 22 | | | | 1.6670E+04 | | | | | |
| 21 | | | | 1.6625E+04 | | | | | |
| 20 | | | | 1.6580E+04 | | | | | |
| 19 | | | | 1.6535E+04 | | | | | |
| 18 | | | | 1.6487E+04 | | | | | |
| 17 | | | | 1.6442E+04 | 1.6442E+04 | 1.6413E+04 | | | |
| 16 | | | | | | 1.6380E+04 | | | |
| 15 | | | | | | 1.6351E+04 | | | |
| 14 | | | | | | 1.6248E+04 | | | |
| 13 | | | | | | 1.6168E+04 | | | |
| 12 | | | | | | 1.6088E+04 | | | |
| 11 | | | | | | 1.6007E+04 | | | |
| 10 | | | | | | 1.5927E+04 | | | |
| 9 | | | | 1.5927E+04 | 1.5927E+04 | 1.5927E+04 | 1.5927E+04 | 1.5927E+04 | 1.5927E+04 |
| 8 | | | 1.5895E+04 | 1.5895E+04 | | | | | |
| 7 | | | 1.5862E+04 | | | | | | |
| 6 | | 1.5830E+04 | 1.5862E+04 | | | | | | |
| 5 | | 1.5830E+04 | | | | | | | |
| 4 | 1.5798E+04 | 1.5830E+04 | | | | | | | |
| 3 | 1.5798E+04 | | | | | | | | |
| 2 | 1.5798E+04 | | | | | | | | |
| 1 | 1.5798E+04 | | | | | | | | |

| | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | | | | | | | | | | |
| 36 | | | | | | | | | | |
| 35 | | | | | | | | | | |
| 34 | | | | | | | | | | |
| 33 | | | | | | | | | | |
| 32 | | | | | | | | | | |
| 31 | | | | | | | | | | 1.6853E+04 |
| 30 | | | | | | | | | | 1.6853E+04 |
| 29 | | | | | | | | | | 1.6853E+04 |
| 28 | | | | | | | | | | 1.6853E+04 |
| 27 | | | | | | | | | | |
| 26 | | | | | | | | | | |
| 25 | | | | | | | | | | |
| 24 | | | | | | | | | | |
| 23 | | | | | | | | | | |
| 22 | | | | | | | | | | |
| 21 | | | | | | | | | | |
| 20 | | | | | | | | | | |
| 19 | | | | | | | | | | |
| 18 | | | | | | | | | | |
| 17 | | | | | | | | | | |
| 16 | | | | | | | | | | |
| 15 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 12 | | | | | | | | | | |



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| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 11 | | | | | | | | | | |
| 10 | | | | | | | | | | |
| 9 | 1.5927E+04 | 1.5927E+04 | 1.5927E+04 | 1.5927E+04 | 1.5927E+04 | 1.5927E+04 | 1.5927E+04 | | | |
| 8 | | | | | | | 1.6281E+04 | 1.6281E+04 | 1.6281E+04 | 1.6281E+04 |
| 7 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| 2 | | | | | | | | | | |
| 1 | | | | | | | | | | |

| | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|---|---|---|---|---|---|---|---|---|
| 37 | | | | | | | | |
| 36 | | | | | | | | |
| 35 | | | | | | | 1.6931E+04 | |
| 34 | | | | | | | 1.6931E+04 | |
| 33 | | 1.6915E+04 | 1.6915E+04 | 1.6915E+04 | 1.6915E+04 | 1.6915E+04 | 1.6915E+04 | |
| 32 | 1.6905E+04 | 1.6905E+04 | | | | | | |
| 31 | 1.6902E+04 | | | | | | | |
| 30 | | | | | | | | |
| 29 | | | | | | | | |
| 28 | 1.6783E+04 | 1.6783E+04 | | | | | | |
| 27 | | 1.6699E+04 | 1.6699E+04 | 1.6676E+04 | | | | |
| 26 | | | | 1.6676E+04 | | | | |
| 25 | | | | 1.6676E+04 | | | | |
| 24 | | | | 1.6676E+04 | | | | |
| 23 | | | | 1.6676E+04 | | | | |
| 22 | | | | 1.6676E+04 | | | | |
| 21 | | | 1.6593E+04 | 1.6676E+04 | | | | |
| 20 | | | 1.6593E+04 | | | | | |
| 19 | | | 1.6593E+04 | | | | | |
| 18 | | | 1.6593E+04 | | | | | |
| 17 | | 1.6519E+04 | 1.6593E+04 | | | | | |
| 16 | | 1.6519E+04 | | | | | | |
| 15 | | 1.6519E+04 | | | | | | |
| 14 | | 1.6519E+04 | | | | | | |
| 13 | | 1.6519E+04 | 1.6464E+04 | | | | | |
| 12 | | | 1.6464E+04 | | | | | |
| 11 | | | 1.6464E+04 | | | | | |
| 10 | | | 1.6464E+04 | | | | | |
| 9 | | | 1.6464E+04 | | | | | |
| 8 | 1.6281E+04 | 1.6281E+04 | 1.6464E+04 | | | | | |
| 7 | | | | | | | | |
| 6 | | | | | | | | |
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| 3 | | | | | | | | |
| 2 | | | | | | | | |
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*** TRANSIENT WELL DATA ***

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| WELL NO. | FLOW RATE (FT**3/D) | SURFACE PRESSURE (PSI) | WELL DATUM PRESSURE (PSI) | PRESSURE LIMITED? | INJECTION TEMPERATURE (DEG.F) | INJECTION MASS FRACTION (-) |
|---|---|---|---|---|---|---|
| 1 | -1.1600E+06 | | | NO | | |
| 2 | -1.1600E+06 | | | NO | | |
| 3 | -4.3000E+04 | | | NO | | |
| 4 | -5.6000E+04 | | | NO | | |

*** CALCULATION INFORMATION ***

AUTOMATIC TIME STEP CONTROL PARAMETERS

MAXIMUM PRESSURE CHANGE ALLOWED PER TIME STEP..... DPTAS 7.3 (PSI)
MAXIMUM TEMPERATURE CHANGE ALLOWED PER TIME STEP ..... DTTAS 9.0 (DEG.F)
MAXIMUM MASS FRACTION CHANGE ALLOWED PER TIME STEP .. DCTAS 0.25 (-)
MINIMUM TIME STEP REQUIRED ..... DTIMMN 1.00E-03 (D)
MAXIMUM TIME STEP ALLOWED ..... DTIMMX 1.00E+02 (D)
TIME AT WHICH NEXT SET OF TIME VARYING
PARAMETERS WILL BE READ ..... TIMCHG 9.461E+07 (S); 1.095E+03 (D)

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PRESSURE EQUATION ; X-DIRECTION NEW SOR ACCELERATION PARAMETER ... 1.1563 5 POWER METHOD ITERATIONS USED
SPECTRAL RADIUS ESTIMATE ... 0.4675

PRESSURE EQUATION ; Y-DIRECTION NEW SOR ACCELERATION PARAMETER ... 1.1593 5 POWER METHOD ITERATIONS USED
SPECTRAL RADIUS ESTIMATE ... 0.4740

PRESSURE EQUATION ; Z-DIRECTION NEW SOR ACCELERATION PARAMETER ... 1.0661 5 POWER METHOD ITERATIONS USED
SPECTRAL RADIUS ESTIMATE ... 0.2327

PRESSURE EQUATION ; X-DIRECTION NEW SOR ACCELERATION PARAMETER ... 1.4695 6 POWER METHOD ITERATIONS USED
SPECTRAL RADIUS ESTIMATE ... 0.8697

PRESSURE EQUATION ; Y-DIRECTION NEW SOR ACCELERATION PARAMETER ... 1.4683 6 POWER METHOD ITERATIONS USED
SPECTRAL RADIUS ESTIMATE ... 0.8689

PRESSURE EQUATION ; Z-DIRECTION NEW SOR ACCELERATION PARAMETER ... 1.2249 6 POWER METHOD ITERATIONS USED
SPECTRAL RADIUS ESTIMATE ... 0.5995

PRESSURE EQUATION ; X-DIRECTION NEW SOR ACCELERATION PARAMETER ... 1.0980 5 POWER METHOD ITERATIONS USED
SPECTRAL RADIUS ESTIMATE ... 0.3252

PRESSURE EQUATION ; Y-DIRECTION NEW SOR ACCELERATION PARAMETER ... 1.0975 5 POWER METHOD ITERATIONS USED
SPECTRAL RADIUS ESTIMATE ... 0.3239

PRESSURE EQUATION ; Z-DIRECTION NEW SOR ACCELERATION PARAMETER ... 1.2553 6 POWER METHOD ITERATIONS USED
SPECTRAL RADIUS ESTIMATE ... 0.6480

PRESSURE EQUATION ; X-DIRECTION NEW SOR ACCELERATION PARAMETER ... 1.1314 5 POWER METHOD ITERATIONS USED
SPECTRAL RADIUS ESTIMATE ... 0.4106

PRESSURE EQUATION ; Y-DIRECTION NEW SOR ACCELERATION PARAMETER ... 1.1323 5 POWER METHOD ITERATIONS USED
SPECTRAL RADIUS ESTIMATE ... 0.4128

PRESSURE EQUATION ; Z-DIRECTION NEW SOR ACCELERATION PARAMETER ... 1.1053 5 POWER METHOD ITERATIONS USED

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                    SPECTRAL RADIUS ESTIMATE ...    0.3448

PRESSURE EQUATION ; X-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.1294        5  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.4058

PRESSURE EQUATION ; Y-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.1305        5  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.4084

PRESSURE EQUATION ; Z-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.0937        5  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.3134

PRESSURE EQUATION ; X-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.1306        5  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.4087

PRESSURE EQUATION ; Y-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.1317        5  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.4114

PRESSURE EQUATION ; Z-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.0932        5  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.3120

PRESSURE EQUATION ; X-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.1359        5  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.4213

PRESSURE EQUATION ; Y-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.1370        5  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.4239

PRESSURE EQUATION ; Z-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.0967        5  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.3217

PRESSURE EQUATION ; X-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.1487        5  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.4507

PRESSURE EQUATION ; Y-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.1496        5  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.4529

PRESSURE EQUATION ; Z-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.1055        5  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.3452

PRESSURE EQUATION ; X-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.2059        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.5664

PRESSURE EQUATION ; Y-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.2059        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.5664

PRESSURE EQUATION ; Z-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.1241        5  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.3928

PRESSURE EQUATION ; X-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.2317        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.6108

PRESSURE EQUATION ; Y-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.2317        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.6109

PRESSURE EQUATION ; Z-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.1592        5  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.4739

PRESSURE EQUATION ; X-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.2975        6  POWER METHOD ITERATIONS USED
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                    SPECTRAL RADIUS ESTIMATE ...    0.7068

PRESSURE EQUATION ; Y-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.2968        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.7060

PRESSURE EQUATION ; Z-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.2240        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.5981

PRESSURE EQUATION ; X-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.3958        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.8127

PRESSURE EQUATION ; Y-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.3932        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.8103

PRESSURE EQUATION ; Z-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.2911        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.6985

PRESSURE EQUATION ; X-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.4900        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.8828

PRESSURE EQUATION ; Y-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.4847        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.8795

PRESSURE EQUATION ; Z-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.3571        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.7755

PRESSURE EQUATION ; X-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.5585        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.9198

PRESSURE EQUATION ; Y-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.5544        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.9178

PRESSURE EQUATION ; Z-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.4282        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.8397

PRESSURE EQUATION ; X-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.6221        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.9457

PRESSURE EQUATION ; Y-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.6207        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.9452

PRESSURE EQUATION ; Z-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.5095        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.8944

PRESSURE EQUATION ; X-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.7027        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.9695

PRESSURE EQUATION ; Y-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.7037        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.9698

PRESSURE EQUATION ; Z-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.5830        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.9306

PRESSURE EQUATION ; X-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.7346        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.9766

PRESSURE EQUATION ; Y-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.7348        6  POWER METHOD ITERATIONS USED
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                    SPECTRAL RADIUS ESTIMATE ...    0.9766

PRESSURE EQUATION ; Z-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.5966        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.9362

PRESSURE EQUATION ; X-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.7412        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.9779

PRESSURE EQUATION ; Y-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.7411        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.9779

PRESSURE EQUATION ; Z-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.5876        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.9325

PRESSURE EQUATION ; X-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.7437        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.9784

PRESSURE EQUATION ; Y-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.7436        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.9784

PRESSURE EQUATION ; Z-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.5986        7  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.9369

PRESSURE EQUATION ; X-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.7449        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.9786

PRESSURE EQUATION ; Y-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.7448        6  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.9786

PRESSURE EQUATION ; Z-DIRECTION NEW SOR ACCELERATION PARAMETER ...    1.5546        7  POWER METHOD ITERATIONS USED
                    SPECTRAL RADIUS ESTIMATE ...    0.9179

                    *** OUTPUT AT END OF TIME STEP NO.    39 ***

                    TIME ..............................................  9.461E+07 (S);     1.095E+03 (D)

               CURRENT TIME STEP LENGTH ...............................  3.398E+06 (S);      39.3     (D)
               NO. OF TWO-LINE SOR ITERATIONS USED
                    PRESSURE EQUATION (Z-DIRECTION) ....................  45
               MAXIMUM CHANGE IN PRESSURE .............................  1.9496E-01 (PSI)   AT LOCATION (10,37, 4)

                    PRESSURE   (PSI)

          AREAL LAYERS

                                                K =  1
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| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 69.327 | 69.413 | 69.538 | 69.452 | 69.409 | 69.360 | 69.312 | 69.163 | 65.963 | 63.004 |
| 36 | 67.174 | 66.759 | 66.601 | 66.721 | 66.614 | 66.513 | 66.391 | 66.244 | 66.024 | 64.201 |
| 35 | 65.867 | 65.574 | 65.253 | 64.750 | 64.535 | 64.481 | 64.444 | 64.183 | 63.827 | 62.978 |
| 34 | 64.975 | 64.842 | 64.573 | 64.222 | 63.950 | 63.740 | 63.326 | 63.020 | 62.737 | 62.445 |
| 33 | 63.757 | 64.386 | 64.168 | 63.847 | 63.559 | 63.323 | 63.046 | 62.815 | 62.586 | 62.352 |
| 32 | 63.310 | 64.021 | 63.820 | 63.511 | 63.219 | 62.960 | 62.597 | 62.538 | 62.390 | 62.210 |
| 31 | 63.329 | 63.750 | 63.531 | 63.231 | 62.969 | 62.770 | 62.564 | 62.400 | 62.236 | 62.069 |
| 30 | 63.532 | 63.554 | 63.295 | 62.992 | 62.747 | 62.575 | 62.402 | 62.237 | 62.078 | 61.924 |

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| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 29 | 63.715 | 63.467 | 63.107 | 62.779 | 62.536 | 62.372 | 62.211 | 62.056 | 61.910 | 61.774 |
| 28 | 63.995 | 63.404 | 62.942 | 62.577 | 62.325 | 62.160 | 62.005 | 61.860 | 61.729 | 61.608 |
| 27 | 64.113 | 63.341 | 62.786 | 62.377 | 62.105 | 61.937 | 61.785 | 61.646 | 61.523 | 61.417 |
| 26 | 64.187 | 63.297 | 62.683 | 62.239 | 61.949 | 61.777 | 61.620 | 61.482 | 61.363 | 61.266 |
| 25 | 64.250 | 63.249 | 62.577 | 62.096 | 61.781 | 61.598 | 61.435 | 61.294 | 61.177 | 61.089 |
| 24 | 64.192 | 63.195 | 62.474 | 61.953 | 61.601 | 61.397 | 61.225 | 61.078 | 60.960 | 60.875 |
| 23 | 64.144 | 63.139 | 62.375 | 61.804 | 61.402 | 61.163 | 60.984 | 60.831 | 60.706 | 60.621 |
| 22 | 64.093 | 63.086 | 62.281 | 61.658 | 61.192 | 60.874 | 60.713 | 60.546 | 60.407 | 60.321 |
| 21 | 64.022 | 63.036 | 62.199 | 61.523 | 61.014 | 60.705 | 60.453 | 60.227 | 60.048 | 59.985 |
| 20 | 63.923 | 62.994 | 62.132 | 61.404 | 60.835 | 60.488 | 60.163 | 59.856 | 59.577 | 59.422 |
| 19 | 63.807 | 62.967 | 62.091 | 61.318 | 60.677 | 60.276 | 59.883 | 59.488 | 58.993 | 58.740 |
| 18 | 63.679 | 62.932 | 62.033 | 61.163 | 60.301 | 59.686 | 59.094 | 58.570 | 58.022 | 57.836 |
| 17 | 63.631 | 62.906 | 62.003 | 61.086 | 60.036 | 58.991 | 58.247 | 57.660 | 57.053 | 56.767 |
| 16 | 62.327 | 61.816 | 61.219 | 60.559 | 59.603 | 58.160 | 57.262 | 56.626 | 56.158 | 55.984 |
| 15 | 60.923 | 60.625 | 60.284 | 59.812 | 58.977 | 57.761 | 55.741 | 55.270 | 55.234 | 55.199 |
| 14 | 60.012 | 59.866 | 59.660 | 59.192 | 58.263 | 57.005 | 54.718 | 54.594 | 54.550 | 54.491 |
| 13 | 59.566 | 59.496 | 59.290 | 58.565 | 57.248 | 55.999 | 53.848 | 53.845 | 53.839 | 53.812 |
| 12 | 59.382 | 59.333 | 58.976 | 57.613 | 55.288 | 54.330 | 52.959 | 53.091 | 53.133 | 53.153 |
| 11 | 59.311 | 59.239 | 58.523 | 56.030 | 51.100 | 51.223 | 51.853 | 52.318 | 52.438 | 52.516 |
| 10 | 59.269 | 59.130 | 57.720 | 53.907 | 50.760 | 50.898 | 51.235 | 51.555 | 51.785 | 51.914 |
| 9 | 59.203 | 58.936 | 56.229 | 49.857 | 50.107 | 50.405 | 50.846 | 51.053 | 51.246 | 51.383 |
| 8 | 59.037 | 58.575 | 53.729 | 49.572 | 50.050 | 50.276 | 50.619 | 50.868 | 51.084 | 51.240 |
| 7 | 58.610 | 57.928 | 49.096 | 49.318 | 49.977 | 50.190 | 50.450 | 50.759 | 51.011 | 51.187 |
| 6 | 57.593 | 56.874 | 48.881 | 49.349 | 49.824 | 50.060 | 50.251 | 50.555 | 50.962 | 51.189 |
| 5 | 55.412 | 54.807 | 48.813 | 49.344 | 49.736 | 49.969 | 50.174 | 50.460 | 53.592 | 54.833 |
| 4 | 48.455 | 48.303 | 48.726 | 49.037 | 49.418 | 49.679 | 53.609 | 55.686 | 57.086 | 57.823 |
| 3 | 48.345 | 48.298 | 48.621 | 48.926 | 49.267 | 54.020 | 56.736 | 58.098 | 58.736 | 59.014 |
| 2 | 48.308 | 48.259 | 48.510 | 56.269 | 57.945 | 58.596 | 58.965 | 59.150 | 59.233 | 59.268 |
| 1 | 48.276 | 48.206 | 56.994 | 58.731 | 59.100 | 59.206 | 59.255 | 59.278 | 59.287 | 59.290 |

| | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 61.128 | 60.253 | 59.922 | 59.855 | 59.966 | 60.303 | 61.387 | 62.770 | 62.870 | 63.069 |
| 36 | 62.029 | 61.947 | 61.869 | 61.790 | 61.714 | 61.654 | 61.621 | 61.709 | 61.797 | 61.998 |
| 35 | 62.132 | 62.018 | 61.855 | 61.696 | 61.545 | 61.405 | 61.218 | 61.091 | 61.033 | 61.025 |
| 34 | 62.136 | 61.981 | 61.797 | 61.620 | 61.445 | 61.271 | 61.001 | 60.702 | 60.348 | 59.927 |
| 33 | 62.124 | 61.924 | 61.734 | 61.549 | 61.367 | 61.178 | 60.869 | 60.483 | 59.939 | 59.013 |
| 32 | 62.021 | 61.835 | 61.655 | 61.476 | 61.298 | 61.110 | 60.796 | 60.406 | 59.887 | 59.190 |
| 31 | 61.901 | 61.734 | 61.572 | 61.410 | 61.244 | 61.071 | 60.786 | 60.440 | 59.987 | 59.264 |
| 30 | 61.776 | 61.631 | 61.488 | 61.346 | 61.202 | 61.054 | 60.820 | 60.562 | 60.283 | 59.978 |
| 29 | 61.644 | 61.519 | 61.398 | 61.280 | 61.162 | 61.043 | 60.864 | 60.689 | 60.544 | 60.466 |
| 28 | 61.497 | 61.395 | 61.299 | 61.208 | 61.117 | 61.026 | 60.892 | 60.768 | 60.685 | 60.690 |
| 27 | 61.327 | 61.253 | 61.189 | 61.128 | 61.066 | 61.000 | 60.897 | 60.790 | 60.692 | 60.607 |
| 26 | 61.193 | 61.145 | 61.111 | 61.075 | 61.033 | 60.983 | 60.894 | 60.791 | 60.681 | 60.559 |
| 25 | 61.033 | 61.024 | 61.039 | 61.030 | 61.007 | 60.971 | 60.891 | 60.790 | 60.670 | 60.508 |
| 24 | 60.826 | 60.818 | 60.870 | 60.934 | 60.961 | 60.956 | 60.887 | 60.788 | 60.658 | 60.447 |
| 23 | 60.574 | 60.565 | 60.660 | 60.859 | 60.911 | 60.847 | 60.646 | 60.600 | 60.658 | 60.366 |
| 22 | 60.279 | 60.257 | 60.216 | 60.559 | 60.490 | 60.284 | 60.083 | 60.091 | 60.293 | 60.328 |
| 21 | 59.994 | 60.012 | 59.696 | 59.998 | 59.922 | 59.777 | 59.662 | 59.698 | 59.919 | 60.256 |
| 20 | 59.215 | 59.056 | 58.986 | 59.357 | 59.429 | 59.428 | 59.423 | 59.471 | 59.632 | 59.935 |
| 19 | 58.422 | 58.209 | 58.095 | 58.443 | 58.899 | 59.145 | 59.284 | 59.352 | 59.457 | 59.655 |
| 18 | 57.469 | 57.215 | 56.915 | 56.550 | 58.179 | 58.834 | 59.164 | 59.278 | 59.357 | 59.478 |
| 17 | 56.340 | 56.197 | 56.172 | 56.071 | 57.672 | 58.471 | 58.997 | 59.192 | 59.279 | 59.360 |
| 16 | 55.760 | 55.610 | 55.391 | 55.324 | 56.942 | 57.809 | 58.665 | 59.021 | 59.159 | 59.237 |
| 15 | 55.048 | 54.821 | 54.516 | 54.425 | 55.676 | 56.391 | 57.989 | 58.642 | 58.884 | 59.005 |
| 14 | 54.387 | 54.241 | 54.078 | 53.984 | 53.329 | 53.277 | 56.788 | 57.848 | 58.246 | 58.473 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 13 | 53.752 | 53.655 | 53.529 | 53.394 | 52.905 | 52.796 | 55.275 | 56.323 | 56.878 | 57.293 |
| 12 | 53.138 | 53.086 | 52.992 | 52.827 | 52.585 | 52.507 | 52.607 | 53.522 | 54.265 | 54.952 |
| 11 | 52.550 | 52.547 | 52.510 | 52.445 | 52.377 | 52.384 | 52.560 | 53.475 | 54.221 | 54.892 |
| 10 | 51.989 | 52.034 | 52.049 | 52.053 | 52.076 | 52.159 | 52.419 | 53.481 | 54.208 | 54.829 |
| 9 | 51.487 | 51.595 | 51.644 | 51.687 | 51.757 | 51.891 | 52.248 | 53.580 | 54.244 | 54.754 |
| 8 | 51.330 | 51.460 | 51.576 | 51.703 | 51.888 | 52.203 | 53.134 | 53.938 | 54.368 | 54.681 |
| 7 | 51.290 | 51.431 | 51.615 | 51.783 | 52.006 | 52.352 | 53.210 | 54.046 | 54.413 | 54.674 |
| 6 | 51.357 | 51.498 | 54.257 | 55.203 | 55.579 | 55.757 | 55.715 | 54.346 | 54.511 | 54.682 |
| 5 | 55.394 | 55.870 | 56.819 | 57.377 | 57.620 | 57.644 | 57.125 | 54.486 | 54.597 | 54.707 |
| 4 | 58.187 | 58.419 | 58.649 | 58.802 | 58.864 | 58.827 | 58.480 | 57.278 | 54.752 | 54.771 |
| 3 | 59.130 | 59.184 | 59.217 | 59.236 | 59.241 | 59.230 | 59.162 | 58.969 | 58.658 | 58.606 |
| 2 | 59.281 | 59.287 | 59.289 | 59.290 | 59.290 | 59.289 | 59.285 | 59.274 | 59.258 | 59.254 |
| 1 | 59.292 | 59.292 | 59.293 | 59.293 | 59.293 | 59.293 | 59.292 | 59.292 | 59.291 | 59.291 |

| | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|---|---|---|---|---|---|---|---|---|
| 37 | 63.319 | 63.656 | 64.105 | 64.451 | 65.319 | 65.814 | 66.520 | 67.912 |
| 36 | 62.337 | 62.656 | 63.028 | 63.419 | 63.826 | 64.333 | 64.934 | 65.327 |
| 35 | 61.165 | 61.567 | 62.055 | 62.529 | 62.950 | 63.440 | 63.800 | 64.578 |
| 34 | 59.615 | 60.548 | 61.389 | 62.025 | 62.513 | 62.947 | 63.345 | 61.626 |
| 33 | 57.079 | 59.867 | 61.116 | 61.808 | 62.378 | 62.798 | 63.173 | 60.428 |
| 32 | 58.467 | 59.724 | 60.725 | 61.310 | 61.825 | 62.160 | 61.515 | 59.752 |
| 31 | 56.984 | 58.715 | 60.138 | 60.875 | 61.450 | 61.780 | 60.282 | 59.456 |
| 30 | 59.104 | 59.391 | 60.086 | 60.568 | 61.276 | 61.628 | 59.770 | 59.352 |
| 29 | 60.031 | 60.000 | 60.175 | 60.300 | 60.984 | 60.671 | 59.496 | 59.314 |
| 28 | 60.474 | 60.401 | 60.276 | 60.237 | 60.236 | 60.004 | 59.378 | 59.300 |
| 27 | 60.462 | 60.345 | 60.227 | 60.156 | 60.186 | 59.772 | 59.339 | 59.296 |
| 26 | 60.421 | 60.301 | 60.199 | 60.134 | 60.179 | 59.684 | 59.326 | 59.295 |
| 25 | 60.365 | 60.245 | 60.149 | 60.090 | 60.371 | 59.607 | 59.317 | 59.294 |
| 24 | 60.292 | 60.171 | 60.080 | 60.032 | 60.248 | 59.541 | 59.312 | 59.294 |
| 23 | 60.182 | 60.079 | 59.988 | 59.957 | 60.140 | 59.513 | 59.309 | 59.294 |
| 22 | 60.096 | 59.987 | 59.882 | 59.873 | 59.985 | 59.514 | 59.310 | 59.294 |
| 21 | 59.980 | 59.700 | 59.472 | 59.520 | 59.332 | 59.505 | 59.312 | 59.294 |
| 20 | 60.037 | 59.309 | 59.191 | 59.261 | 59.211 | 59.499 | 59.313 | 59.294 |
| 19 | 59.778 | 59.004 | 58.970 | 59.034 | 59.034 | 59.475 | 59.312 | 59.294 |
| 18 | 59.534 | 58.714 | 58.769 | 58.819 | 58.837 | 59.438 | 59.310 | 59.294 |
| 17 | 59.332 | 58.314 | 58.535 | 58.601 | 58.635 | 59.397 | 59.307 | 59.294 |
| 16 | 59.168 | 58.087 | 58.269 | 58.377 | 58.439 | 59.355 | 59.304 | 59.294 |
| 15 | 58.954 | 57.912 | 58.019 | 58.157 | 58.275 | 59.319 | 59.301 | 59.293 |
| 14 | 58.533 | 57.707 | 57.739 | 57.928 | 58.196 | 59.294 | 59.299 | 59.293 |
| 13 | 57.609 | 57.367 | 57.372 | 57.517 | 58.834 | 59.299 | 59.297 | 59.293 |
| 12 | 55.675 | 56.659 | 57.056 | 57.201 | 58.906 | 59.284 | 59.294 | 59.293 |
| 11 | 55.567 | 56.321 | 56.842 | 56.979 | 58.850 | 59.267 | 59.293 | 59.293 |
| 10 | 55.415 | 56.056 | 56.692 | 56.840 | 58.809 | 59.256 | 59.292 | 59.293 |
| 9 | 55.212 | 55.762 | 56.581 | 56.806 | 58.837 | 59.256 | 59.292 | 59.293 |
| 8 | 54.953 | 55.337 | 56.538 | 58.113 | 59.022 | 59.268 | 59.292 | 59.293 |
| 7 | 54.886 | 55.241 | 57.717 | 58.724 | 59.154 | 59.279 | 59.292 | 59.293 |
| 6 | 54.807 | 56.947 | 58.418 | 59.012 | 59.225 | 59.286 | 59.292 | 59.293 |
| 5 | 54.794 | 57.624 | 58.762 | 59.144 | 59.260 | 59.289 | 59.293 | 59.293 |
| 4 | 54.850 | 57.998 | 58.959 | 59.216 | 59.278 | 59.291 | 59.293 | 59.293 |
| 3 | 58.685 | 59.048 | 59.221 | 59.275 | 59.289 | 59.292 | 59.293 | 59.293 |
| 2 | 59.260 | 59.277 | 59.288 | 59.291 | 59.292 | 59.293 | 59.293 | 59.293 |
| 1 | 59.291 | 59.292 | 59.292 | 59.293 | 59.293 | 59.293 | 59.293 | 59.293 |

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| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 41.156 | 41.243 | 41.368 | 41.282 | 41.239 | 41.190 | 41.143 | 41.019 | 37.788 | 34.822 |
| 36 | 39.002 | 38.606 | 38.447 | 38.549 | 38.442 | 38.342 | 38.219 | 38.073 | 37.867 | 36.033 |
| 35 | 37.696 | 37.406 | 37.083 | 36.592 | 36.378 | 36.324 | 36.274 | 36.012 | 35.658 | 34.806 |
| 34 | 36.805 | 36.673 | 36.402 | 36.052 | 35.779 | 35.571 | 35.165 | 34.861 | 34.577 | 34.282 |
| 33 | 35.582 | 36.214 | 35.996 | 35.676 | 35.388 | 35.153 | 34.877 | 34.645 | 34.416 | 34.182 |
| 32 | 35.136 | 35.848 | 35.648 | 35.340 | 35.048 | 34.790 | 34.430 | 34.369 | 34.219 | 34.039 |
| 31 | 35.157 | 35.578 | 35.359 | 35.060 | 34.797 | 34.599 | 34.393 | 34.229 | 34.065 | 33.898 |
| 30 | 35.346 | 35.385 | 35.124 | 34.820 | 34.576 | 34.403 | 34.230 | 34.066 | 33.906 | 33.752 |
| 29 | 35.542 | 35.295 | 34.936 | 34.607 | 34.364 | 34.201 | 34.040 | 33.884 | 33.738 | 33.602 |
| 28 | 35.833 | 35.232 | 34.770 | 34.406 | 34.153 | 33.988 | 33.833 | 33.688 | 33.557 | 33.436 |
| 27 | 35.947 | 35.169 | 34.615 | 34.205 | 33.933 | 33.764 | 33.613 | 33.474 | 33.351 | 33.245 |
| 26 | 36.022 | 35.125 | 34.511 | 34.068 | 33.777 | 33.605 | 33.449 | 33.310 | 33.191 | 33.095 |
| 25 | 36.096 | 35.077 | 34.406 | 33.924 | 33.608 | 33.427 | 33.264 | 33.123 | 33.006 | 32.917 |
| 24 | 36.027 | 35.023 | 34.303 | 33.781 | 33.429 | 33.226 | 33.054 | 32.907 | 32.789 | 32.704 |
| 23 | 35.979 | 34.968 | 34.203 | 33.633 | 33.230 | 32.991 | 32.813 | 32.660 | 32.535 | 32.450 |
| 22 | 35.931 | 34.914 | 34.110 | 33.487 | 33.018 | 32.678 | 32.541 | 32.375 | 32.236 | 32.149 |
| 21 | 35.859 | 34.864 | 34.027 | 33.352 | 32.840 | 32.532 | 32.282 | 32.056 | 31.876 | 31.799 |
| 20 | 35.759 | 34.822 | 33.961 | 33.232 | 32.659 | 32.315 | 31.989 | 31.682 | 31.404 | 31.235 |
| 19 | 35.622 | 34.793 | 33.915 | 33.135 | 32.477 | 32.069 | 31.665 | 31.264 | 30.811 | 30.545 |
| 18 | 35.507 | 34.760 | 33.862 | 32.991 | 32.128 | 31.515 | 30.923 | 30.399 | 29.881 | 29.648 |
| 17 | 35.470 | 34.744 | 33.838 | 32.919 | 31.868 | 30.818 | 30.076 | 29.490 | 28.924 | 28.616 |
| 16 | 34.156 | 33.645 | 33.049 | 32.391 | 31.439 | 29.980 | 29.093 | 28.456 | 28.018 | 27.817 |
| 15 | 32.747 | 32.450 | 32.110 | 31.641 | 30.810 | 29.600 | 27.553 | 27.213 | 27.090 | 27.031 |
| 14 | 31.837 | 31.691 | 31.487 | 31.023 | 30.098 | 28.844 | 26.528 | 26.436 | 26.382 | 26.322 |
| 13 | 31.392 | 31.323 | 31.119 | 30.399 | 29.087 | 27.841 | 25.659 | 25.676 | 25.669 | 25.643 |
| 12 | 31.210 | 31.161 | 30.807 | 29.451 | 27.132 | 26.175 | 24.777 | 24.914 | 24.962 | 24.983 |
| 11 | 31.139 | 31.068 | 30.357 | 27.873 | 22.873 | 23.024 | 23.680 | 24.126 | 24.267 | 24.346 |
| 10 | 31.098 | 30.960 | 29.558 | 25.754 | 22.577 | 22.727 | 23.075 | 23.389 | 23.614 | 23.741 |
| 9 | 31.032 | 30.768 | 28.072 | 21.641 | 21.930 | 22.230 | 22.627 | 22.856 | 23.049 | 23.182 |
| 8 | 30.868 | 30.409 | 25.578 | 21.391 | 21.855 | 22.109 | 22.445 | 22.693 | 22.911 | 23.067 |
| 7 | 30.444 | 29.766 | 20.880 | 21.144 | 21.778 | 22.019 | 22.284 | 22.575 | 22.834 | 23.013 |
| 6 | 29.432 | 28.716 | 20.701 | 21.146 | 21.649 | 21.890 | 22.102 | 22.382 | 22.770 | 22.988 |
| 5 | 27.257 | 26.655 | 20.636 | 21.146 | 21.553 | 21.786 | 22.023 | 22.241 | 25.439 | 26.679 |
| 4 | 20.264 | 20.112 | 20.548 | 20.880 | 21.247 | 21.467 | 25.458 | 27.532 | 28.928 | 29.661 |
| 3 | 20.175 | 20.126 | 20.451 | 20.761 | 21.058 | 25.868 | 28.579 | 29.935 | 30.569 | 30.845 |
| 2 | 20.138 | 20.087 | 20.340 | 28.113 | 29.782 | 30.429 | 30.796 | 30.980 | 31.062 | 31.097 |
| 1 | 20.105 | 20.034 | 28.835 | 30.564 | 30.931 | 31.035 | 31.084 | 31.106 | 31.115 | 31.119 |

| | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 32.948 | 32.076 | 31.747 | 31.680 | 31.791 | 32.128 | 33.214 | 34.604 | 34.699 | 34.897 |
| 36 | 33.840 | 33.776 | 33.698 | 33.619 | 33.543 | 33.483 | 33.450 | 33.540 | 33.633 | 33.836 |
| 35 | 33.978 | 33.852 | 33.684 | 33.526 | 33.376 | 33.236 | 33.052 | 32.924 | 32.862 | 32.855 |
| 34 | 33.969 | 33.812 | 33.626 | 33.448 | 33.274 | 33.099 | 32.830 | 32.531 | 32.177 | 31.756 |
| 33 | 33.953 | 33.753 | 33.562 | 33.378 | 33.196 | 33.007 | 32.698 | 32.312 | 31.768 | 30.839 |
| 32 | 33.849 | 33.664 | 33.483 | 33.305 | 33.127 | 32.938 | 32.625 | 32.235 | 31.717 | 31.023 |
| 31 | 33.729 | 33.562 | 33.401 | 33.239 | 33.073 | 32.899 | 32.614 | 32.269 | 31.819 | 31.127 |
| 30 | 33.604 | 33.459 | 33.316 | 33.174 | 33.030 | 32.882 | 32.649 | 32.391 | 32.114 | 31.836 |
| 29 | 33.472 | 33.347 | 33.226 | 33.108 | 32.990 | 32.872 | 32.693 | 32.518 | 32.374 | 32.318 |
| 28 | 33.325 | 33.223 | 33.128 | 33.036 | 32.946 | 32.855 | 32.721 | 32.597 | 32.515 | 32.539 |
| 27 | 33.156 | 33.082 | 33.018 | 32.957 | 32.894 | 32.829 | 32.725 | 32.619 | 32.521 | 32.438 |
| 26 | 33.022 | 32.973 | 32.939 | 32.903 | 32.861 | 32.811 | 32.723 | 32.620 | 32.510 | 32.388 |
| 25 | 32.862 | 32.849 | 32.857 | 32.852 | 32.833 | 32.798 | 32.720 | 32.619 | 32.498 | 32.338 |
| 24 | 32.655 | 32.649 | 32.698 | 32.762 | 32.790 | 32.786 | 32.718 | 32.618 | 32.486 | 32.276 |
| 23 | 32.403 | 32.396 | 32.490 | 32.691 | 32.743 | 32.680 | 32.476 | 32.431 | 32.490 | 32.194 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 22 | 32.105 | 32.076 | 32.042 | 32.393 | 32.320 | 32.112 | 31.909 | 31.918 | 32.122 | 32.158 |
| 21 | 31.774 | 31.804 | 31.521 | 31.830 | 31.750 | 31.604 | 31.488 | 31.524 | 31.746 | 32.089 |
| 20 | 31.043 | 30.883 | 30.812 | 31.190 | 31.259 | 31.256 | 31.251 | 31.298 | 31.459 | 31.763 |
| 19 | 30.251 | 30.038 | 29.922 | 30.279 | 30.731 | 30.975 | 31.112 | 31.180 | 31.284 | 31.482 |
| 18 | 29.299 | 29.044 | 28.741 | 28.350 | 30.014 | 30.666 | 30.994 | 31.106 | 31.185 | 31.306 |
| 17 | 28.241 | 28.098 | 28.002 | 27.888 | 29.509 | 30.305 | 30.828 | 31.021 | 31.108 | 31.189 |
| 16 | 27.594 | 27.431 | 27.219 | 27.139 | 28.782 | 29.646 | 30.499 | 30.852 | 30.989 | 31.067 |
| 15 | 26.879 | 26.663 | 26.399 | 26.310 | 27.518 | 28.232 | 29.826 | 30.475 | 30.716 | 30.837 |
| 14 | 26.217 | 26.072 | 25.911 | 25.809 | 25.136 | 25.067 | 28.629 | 29.685 | 30.082 | 30.308 |
| 13 | 25.582 | 25.485 | 25.358 | 25.198 | 24.730 | 24.611 | 27.119 | 28.164 | 28.718 | 29.132 |
| 12 | 24.969 | 24.916 | 24.822 | 24.663 | 24.435 | 24.346 | 24.449 | 25.328 | 26.072 | 26.761 |
| 11 | 24.380 | 24.377 | 24.340 | 24.275 | 24.208 | 24.214 | 24.410 | 25.304 | 26.050 | 26.721 |
| 10 | 23.816 | 23.859 | 23.874 | 23.878 | 23.902 | 23.986 | 24.270 | 25.311 | 26.037 | 26.658 |
| 9 | 23.274 | 23.356 | 23.406 | 23.453 | 23.527 | 23.669 | 24.074 | 25.409 | 26.073 | 26.583 |
| 8 | 23.164 | 23.288 | 23.404 | 23.531 | 23.716 | 24.031 | 24.970 | 25.770 | 26.198 | 26.509 |
| 7 | 23.129 | 23.259 | 23.422 | 23.584 | 23.805 | 24.152 | 25.018 | 25.875 | 26.242 | 26.503 |
| 6 | 23.153 | 23.269 | 26.101 | 27.047 | 27.422 | 27.600 | 27.558 | 26.171 | 26.339 | 26.511 |
| 5 | 27.239 | 27.712 | 28.660 | 29.217 | 29.459 | 29.483 | 28.965 | 26.293 | 26.425 | 26.536 |
| 4 | 30.024 | 30.254 | 30.482 | 30.635 | 30.697 | 30.660 | 30.315 | 29.116 | 26.564 | 26.591 |
| 3 | 30.960 | 31.014 | 31.046 | 31.065 | 31.070 | 31.059 | 30.991 | 30.800 | 30.491 | 30.439 |
| 2 | 31.110 | 31.115 | 31.117 | 31.118 | 31.119 | 31.118 | 31.113 | 31.103 | 31.087 | 31.083 |
| 1 | 31.120 | 31.121 | 31.121 | 31.121 | 31.121 | 31.121 | 31.121 | 31.120 | 31.119 | 31.119 |

| | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|---|---|---|---|---|---|---|---|---|
| 37 | 35.129 | 35.487 | 35.945 | 36.267 | 37.174 | 37.653 | 38.358 | 39.769 |
| 36 | 34.163 | 34.485 | 34.857 | 35.248 | 35.655 | 36.162 | 36.760 | 37.139 |
| 35 | 32.994 | 33.396 | 33.884 | 34.358 | 34.779 | 35.267 | 35.616 | 36.410 |
| 34 | 31.442 | 32.379 | 33.219 | 33.854 | 34.343 | 34.785 | 35.174 | 33.450 |
| 33 | 28.584 | 31.733 | 32.969 | 33.658 | 34.205 | 34.629 | 35.008 | 32.252 |
| 32 | 30.329 | 31.608 | 32.539 | 33.144 | 33.654 | 33.988 | 33.342 | 31.578 |
| 31 | 28.527 | 30.609 | 31.967 | 32.704 | 33.279 | 33.609 | 32.107 | 31.283 |
| 30 | 30.933 | 31.243 | 31.915 | 32.395 | 33.106 | 33.462 | 31.597 | 31.180 |
| 29 | 31.862 | 31.834 | 32.003 | 32.126 | 32.816 | 32.499 | 31.323 | 31.142 |
| 28 | 32.314 | 32.241 | 32.104 | 32.066 | 32.062 | 31.831 | 31.206 | 31.129 |
| 27 | 32.292 | 32.173 | 32.058 | 31.983 | 32.015 | 31.600 | 31.167 | 31.125 |
| 26 | 32.250 | 32.130 | 32.028 | 31.959 | 32.007 | 31.512 | 31.155 | 31.124 |
| 25 | 32.194 | 32.074 | 31.978 | 31.915 | 32.205 | 31.434 | 31.146 | 31.123 |
| 24 | 32.121 | 32.000 | 31.909 | 31.858 | 32.079 | 31.368 | 31.140 | 31.122 |
| 23 | 32.016 | 31.907 | 31.816 | 31.784 | 31.970 | 31.341 | 31.138 | 31.122 |
| 22 | 31.918 | 31.800 | 31.689 | 31.687 | 31.819 | 31.342 | 31.139 | 31.122 |
| 21 | 31.806 | 31.529 | 31.298 | 31.348 | 31.155 | 31.334 | 31.140 | 31.122 |
| 20 | 31.871 | 31.134 | 31.018 | 31.089 | 31.040 | 31.328 | 31.141 | 31.123 |
| 19 | 31.610 | 30.830 | 30.798 | 30.862 | 30.862 | 31.304 | 31.140 | 31.123 |
| 18 | 31.365 | 30.541 | 30.598 | 30.647 | 30.665 | 31.268 | 31.138 | 31.122 |
| 17 | 31.164 | 30.137 | 30.365 | 30.429 | 30.462 | 31.226 | 31.136 | 31.122 |
| 16 | 31.001 | 29.910 | 30.098 | 30.206 | 30.266 | 31.185 | 31.133 | 31.122 |
| 15 | 30.788 | 29.736 | 29.847 | 29.986 | 30.101 | 31.148 | 31.130 | 31.122 |
| 14 | 30.369 | 29.534 | 29.567 | 29.758 | 30.017 | 31.124 | 31.127 | 31.122 |
| 13 | 29.449 | 29.197 | 29.200 | 29.341 | 30.671 | 31.128 | 31.125 | 31.122 |
| 12 | 27.488 | 28.487 | 28.884 | 29.023 | 30.740 | 31.114 | 31.123 | 31.121 |
| 11 | 27.395 | 28.150 | 28.671 | 28.800 | 30.684 | 31.096 | 31.121 | 31.121 |
| 10 | 27.244 | 27.885 | 28.523 | 28.661 | 30.642 | 31.085 | 31.120 | 31.121 |
| 9 | 27.041 | 27.591 | 28.411 | 28.617 | 30.669 | 31.085 | 31.120 | 31.121 |
| 8 | 26.780 | 27.160 | 28.355 | 29.949 | 30.854 | 31.097 | 31.120 | 31.121 |
| 7 | 26.715 | 27.047 | 29.555 | 30.557 | 30.984 | 31.108 | 31.121 | 31.121 |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6 | 26.627 | 28.786 | 30.253 | 30.843 | 31.055 | 31.114 | 31.121 | 31.121 |
| 5 | 26.613 | 29.462 | 30.594 | 30.974 | 31.089 | 31.118 | 31.121 | 31.121 |
| 4 | 26.659 | 29.834 | 30.790 | 31.045 | 31.107 | 31.120 | 31.121 | 31.121 |
| 3 | 30.517 | 30.879 | 31.050 | 31.104 | 31.118 | 31.121 | 31.121 | 31.121 |
| 2 | 31.089 | 31.106 | 31.116 | 31.120 | 31.121 | 31.121 | 31.121 | 31.121 |
| 1 | 31.120 | 31.120 | 31.121 | 31.121 | 31.121 | 31.121 | 31.121 | 31.121 |

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| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 36.823 | 36.910 | 37.035 | 36.948 | 36.906 | 36.857 | 36.810 | 36.694 | 33.454 | 30.485 |
| 36 | 34.669 | 34.409 | 34.260 | 34.216 | 34.108 | 34.008 | 33.885 | 33.739 | 33.538 | 31.701 |
| 35 | 33.362 | 33.076 | 32.816 | 32.493 | 32.275 | 32.125 | 31.941 | 31.678 | 31.326 | 30.472 |
| 34 | 32.471 | 32.339 | 32.092 | 31.773 | 31.504 | 31.291 | 31.030 | 30.751 | 30.444 | 30.088 |
| 33 | 31.247 | 31.880 | 31.675 | 31.367 | 31.091 | 30.877 | 30.640 | 30.402 | 30.155 | 29.901 |
| 32 | 30.801 | 31.514 | 31.322 | 31.023 | 30.752 | 30.543 | 30.319 | 30.127 | 29.931 | 29.729 |
| 31 | 30.822 | 31.245 | 31.030 | 30.736 | 30.483 | 30.298 | 30.109 | 29.927 | 29.748 | 29.565 |
| 30 | 31.010 | 31.052 | 30.790 | 30.493 | 30.252 | 30.082 | 29.910 | 29.741 | 29.573 | 29.418 |
| 29 | 31.207 | 30.962 | 30.602 | 30.278 | 30.036 | 29.872 | 29.710 | 29.550 | 29.404 | 29.268 |
| 28 | 31.504 | 30.898 | 30.437 | 30.076 | 29.822 | 29.654 | 29.499 | 29.354 | 29.223 | 29.102 |
| 27 | 31.615 | 30.835 | 30.281 | 29.875 | 29.599 | 29.431 | 29.279 | 29.141 | 29.017 | 28.911 |
| 26 | 31.691 | 30.791 | 30.178 | 29.738 | 29.443 | 29.272 | 29.115 | 28.976 | 28.857 | 28.761 |
| 25 | 31.770 | 30.744 | 30.072 | 29.591 | 29.274 | 29.093 | 28.930 | 28.789 | 28.672 | 28.583 |
| 24 | 31.696 | 30.689 | 29.969 | 29.447 | 29.095 | 28.892 | 28.720 | 28.573 | 28.455 | 28.370 |
| 23 | 31.648 | 30.634 | 29.869 | 29.299 | 28.895 | 28.657 | 28.480 | 28.326 | 28.202 | 28.116 |
| 22 | 31.601 | 30.580 | 29.776 | 29.153 | 28.684 | 28.344 | 28.208 | 28.042 | 27.902 | 27.815 |
| 21 | 31.529 | 30.531 | 29.694 | 29.018 | 28.505 | 28.199 | 27.948 | 27.722 | 27.542 | 27.461 |
| 20 | 31.429 | 30.489 | 29.627 | 28.898 | 28.324 | 27.980 | 27.655 | 27.348 | 27.070 | 26.898 |
| 19 | 31.285 | 30.458 | 29.581 | 28.799 | 28.138 | 27.728 | 27.321 | 26.920 | 26.474 | 26.206 |
| 18 | 31.173 | 30.426 | 29.528 | 28.657 | 27.793 | 27.179 | 26.589 | 26.065 | 25.554 | 25.310 |
| 17 | 31.140 | 30.413 | 29.506 | 28.587 | 27.535 | 26.483 | 25.741 | 25.156 | 24.598 | 24.287 |
| 16 | 29.823 | 29.312 | 28.716 | 28.058 | 27.107 | 25.644 | 24.760 | 24.124 | 23.690 | 23.485 |
| 15 | 28.412 | 28.114 | 27.775 | 27.308 | 26.478 | 25.269 | 23.213 | 22.906 | 22.764 | 22.698 |
| 14 | 27.502 | 27.356 | 27.152 | 26.689 | 25.767 | 24.514 | 22.187 | 22.106 | 22.049 | 21.988 |
| 13 | 27.058 | 26.989 | 26.785 | 26.067 | 24.757 | 23.512 | 21.319 | 21.342 | 21.336 | 21.309 |
| 12 | 26.876 | 26.827 | 26.474 | 25.121 | 22.803 | 21.846 | 20.439 | 20.578 | 20.629 | 20.650 |
| 11 | 26.805 | 26.735 | 26.025 | 23.544 | 18.521 | 18.681 | 19.347 | 19.787 | 19.933 | 20.013 |
| 10 | 26.764 | 26.627 | 25.228 | 21.426 | 18.239 | 18.393 | 18.743 | 19.058 | 19.280 | 19.408 |
| 9 | 26.699 | 26.435 | 23.743 | 17.292 | 17.595 | 17.895 | 18.282 | 18.514 | 18.703 | 18.835 |
| 8 | 26.535 | 26.076 | 21.250 | 17.054 | 17.406 | 17.777 | 18.111 | 18.359 | 18.577 | 18.733 |
| 7 | 26.112 | 25.435 | 16.531 | 16.809 | 17.435 | 17.685 | 17.951 | 18.239 | 18.500 | 18.679 |
| 6 | 25.102 | 24.387 | 16.364 | 16.804 | 17.314 | 17.556 | 17.771 | 18.049 | 18.436 | 18.654 |
| 5 | 22.929 | 22.327 | 16.301 | 16.809 | 17.218 | 17.449 | 17.691 | 17.907 | 21.112 | 22.351 |
| 4 | 15.923 | 15.778 | 16.214 | 16.549 | 16.912 | 17.133 | 21.131 | 23.204 | 24.598 | 25.331 |
| 3 | 15.842 | 15.792 | 16.117 | 16.430 | 16.711 | 21.540 | 24.249 | 25.604 | 26.237 | 26.512 |
| 2 | 15.805 | 15.753 | 16.007 | 23.784 | 25.451 | 26.097 | 26.463 | 26.646 | 26.729 | 26.763 |
| 1 | 15.772 | 15.700 | 24.505 | 26.231 | 26.597 | 26.702 | 26.751 | 26.772 | 26.782 | 26.785 |

| | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 28.611 | 27.740 | 27.412 | 27.345 | 27.456 | 27.793 | 28.880 | 30.272 | 30.365 | 30.563 |
| 36 | 29.501 | 29.442 | 29.364 | 29.285 | 29.209 | 29.149 | 29.116 | 29.207 | 29.302 | 29.504 |
| 35 | 29.746 | 29.522 | 29.351 | 29.193 | 29.043 | 28.904 | 28.719 | 28.591 | 28.528 | 28.521 |
| 34 | 29.750 | 29.484 | 29.292 | 29.114 | 28.940 | 28.765 | 28.497 | 28.198 | 27.843 | 27.423 |
| 33 | 29.655 | 29.432 | 29.229 | 29.044 | 28.862 | 28.673 | 28.364 | 27.979 | 27.434 | 26.506 |
| 32 | 29.528 | 29.331 | 29.150 | 28.971 | 28.793 | 28.605 | 28.292 | 27.902 | 27.383 | 26.691 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 31 | 29.396 | 29.228 | 29.067 | 28.905 | 28.739 | 28.566 | 28.281 | 27.936 | 27.486 | 26.811 |
| 30 | 29.271 | 29.125 | 28.982 | 28.840 | 28.697 | 28.548 | 28.315 | 28.058 | 27.781 | 27.515 |
| 29 | 29.138 | 29.013 | 28.892 | 28.775 | 28.657 | 28.538 | 28.360 | 28.184 | 28.041 | 27.994 |
| 28 | 28.991 | 28.889 | 28.794 | 28.702 | 28.612 | 28.521 | 28.387 | 28.263 | 28.181 | 28.213 |
| 27 | 28.822 | 28.748 | 28.684 | 28.623 | 28.561 | 28.495 | 28.392 | 28.285 | 28.188 | 28.104 |
| 26 | 28.688 | 28.640 | 28.605 | 28.569 | 28.527 | 28.477 | 28.389 | 28.287 | 28.176 | 28.054 |
| 25 | 28.528 | 28.514 | 28.521 | 28.517 | 28.498 | 28.464 | 28.386 | 28.285 | 28.164 | 28.004 |
| 24 | 28.321 | 28.315 | 28.364 | 28.428 | 28.456 | 28.452 | 28.384 | 28.284 | 28.153 | 27.943 |
| 23 | 28.069 | 28.063 | 28.156 | 28.358 | 28.411 | 28.347 | 28.143 | 28.098 | 28.158 | 27.860 |
| 22 | 27.770 | 27.734 | 27.707 | 28.061 | 27.987 | 27.777 | 27.575 | 27.583 | 27.789 | 27.824 |
| 21 | 27.420 | 27.269 | 27.186 | 27.498 | 27.416 | 27.269 | 27.154 | 27.190 | 27.412 | 27.757 |
| 20 | 26.708 | 26.548 | 26.478 | 26.858 | 26.925 | 26.922 | 26.917 | 26.964 | 27.125 | 27.430 |
| 19 | 25.917 | 25.704 | 25.587 | 25.948 | 26.398 | 26.642 | 26.778 | 26.846 | 26.950 | 27.148 |
| 18 | 24.966 | 24.713 | 24.406 | 24.006 | 25.683 | 26.333 | 26.660 | 26.772 | 26.851 | 26.972 |
| 17 | 23.922 | 23.779 | 23.668 | 23.550 | 25.178 | 25.973 | 26.495 | 26.688 | 26.774 | 26.855 |
| 16 | 23.261 | 23.094 | 22.888 | 22.808 | 24.452 | 25.315 | 26.167 | 26.519 | 26.655 | 26.733 |
| 15 | 22.546 | 22.333 | 22.077 | 21.987 | 23.189 | 23.902 | 25.495 | 26.143 | 26.383 | 26.504 |
| 14 | 21.884 | 21.739 | 21.578 | 21.476 | 20.803 | 20.734 | 24.299 | 25.354 | 25.750 | 25.976 |
| 13 | 21.248 | 21.152 | 21.024 | 20.859 | 20.396 | 20.276 | 22.790 | 23.834 | 24.388 | 24.802 |
| 12 | 20.635 | 20.583 | 20.488 | 20.331 | 20.106 | 20.017 | 20.184 | 20.987 | 21.731 | 22.421 |
| 11 | 20.047 | 20.044 | 20.006 | 19.941 | 19.875 | 19.881 | 20.094 | 20.970 | 21.716 | 22.387 |
| 10 | 19.482 | 19.525 | 19.540 | 19.544 | 19.568 | 19.652 | 19.942 | 20.977 | 21.704 | 22.324 |
| 9 | 18.926 | 19.007 | 19.057 | 19.104 | 19.179 | 19.322 | 19.737 | 21.075 | 21.740 | 22.250 |
| 8 | 18.831 | 18.954 | 19.070 | 19.197 | 19.382 | 19.697 | 20.638 | 21.438 | 21.865 | 22.175 |
| 7 | 18.798 | 18.925 | 19.088 | 19.250 | 19.471 | 19.818 | 20.684 | 21.542 | 21.909 | 22.169 |
| 6 | 18.808 | 18.915 | 21.773 | 22.719 | 23.094 | 23.271 | 23.229 | 21.836 | 22.006 | 22.177 |
| 5 | 22.910 | 23.383 | 24.330 | 24.886 | 25.129 | 25.152 | 24.635 | 21.952 | 22.092 | 22.202 |
| 4 | 25.692 | 25.922 | 26.150 | 26.302 | 26.364 | 26.327 | 25.983 | 24.786 | 22.224 | 22.255 |
| 3 | 26.627 | 26.680 | 26.712 | 26.731 | 26.737 | 26.725 | 26.658 | 26.467 | 26.158 | 26.106 |
| 2 | 26.776 | 26.781 | 26.784 | 26.785 | 26.785 | 26.784 | 26.780 | 26.769 | 26.753 | 26.749 |
| 1 | 26.786 | 26.787 | 26.787 | 26.787 | 26.787 | 26.787 | 26.787 | 26.786 | 26.786 | 26.785 |

| | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|---|---|---|---|---|---|---|---|---|
| 37 | 30.792 | 31.155 | 31.616 | 31.927 | 32.852 | 33.324 | 34.028 | 35.448 |
| 36 | 29.828 | 30.151 | 30.523 | 30.914 | 31.321 | 31.828 | 32.426 | 32.801 |
| 35 | 28.660 | 29.062 | 29.550 | 30.024 | 30.446 | 30.933 | 31.280 | 32.076 |
| 34 | 27.109 | 28.046 | 28.886 | 29.521 | 30.009 | 30.453 | 30.840 | 29.115 |
| 33 | 24.357 | 27.418 | 28.647 | 29.331 | 29.871 | 30.297 | 30.676 | 27.917 |
| 32 | 26.015 | 27.293 | 28.203 | 28.811 | 29.320 | 29.654 | 29.007 | 27.243 |
| 31 | 24.318 | 26.291 | 27.633 | 28.370 | 28.944 | 29.275 | 27.772 | 26.948 |
| 30 | 26.602 | 26.914 | 27.581 | 28.062 | 28.773 | 29.130 | 27.263 | 26.846 |
| 29 | 27.529 | 27.501 | 27.669 | 27.792 | 28.484 | 28.165 | 26.989 | 26.808 |
| 28 | 27.985 | 27.910 | 27.770 | 27.732 | 27.727 | 27.496 | 26.872 | 26.795 |
| 27 | 27.959 | 27.838 | 27.725 | 27.648 | 27.682 | 27.266 | 26.833 | 26.791 |
| 26 | 27.916 | 27.796 | 27.694 | 27.624 | 27.673 | 27.178 | 26.821 | 26.790 |
| 25 | 27.860 | 27.740 | 27.644 | 27.580 | 27.872 | 27.100 | 26.812 | 26.789 |
| 24 | 27.787 | 27.667 | 27.575 | 27.524 | 27.745 | 27.034 | 26.806 | 26.789 |
| 23 | 27.683 | 27.573 | 27.482 | 27.450 | 27.637 | 27.007 | 26.804 | 26.788 |
| 22 | 27.582 | 27.462 | 27.349 | 27.347 | 27.487 | 27.008 | 26.805 | 26.788 |
| 21 | 27.472 | 27.195 | 26.964 | 27.015 | 26.820 | 27.001 | 26.807 | 26.789 |
| 20 | 27.539 | 26.801 | 26.684 | 26.756 | 26.706 | 26.994 | 26.807 | 26.789 |
| 19 | 27.277 | 26.496 | 26.464 | 26.529 | 26.528 | 26.970 | 26.807 | 26.789 |
| 18 | 27.033 | 26.206 | 26.263 | 26.314 | 26.330 | 26.934 | 26.804 | 26.789 |
| 17 | 26.832 | 25.801 | 26.031 | 26.096 | 26.127 | 26.893 | 26.802 | 26.788 |
| 16 | 26.668 | 25.575 | 25.764 | 25.872 | 25.931 | 26.852 | 26.799 | 26.788 |



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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 15 | 26.456 | 25.401 | 25.514 | 25.652 | 25.767 | 26.815 | 26.796 | 26.788 |
| 14 | 26.038 | 25.199 | 25.234 | 25.425 | 25.681 | 26.790 | 26.793 | 26.788 |
| 13 | 25.118 | 24.864 | 24.866 | 25.005 | 26.339 | 26.795 | 26.791 | 26.788 |
| 12 | 23.148 | 24.153 | 24.551 | 24.687 | 26.408 | 26.780 | 26.789 | 26.788 |
| 11 | 23.062 | 23.816 | 24.338 | 24.464 | 26.351 | 26.762 | 26.787 | 26.787 |
| 10 | 22.911 | 23.552 | 24.189 | 24.325 | 26.309 | 26.751 | 26.787 | 26.787 |
| 9 | 22.708 | 23.257 | 24.078 | 24.277 | 26.337 | 26.751 | 26.786 | 26.787 |
| 8 | 22.446 | 22.824 | 24.017 | 25.618 | 26.521 | 26.763 | 26.787 | 26.787 |
| 7 | 22.381 | 22.705 | 25.224 | 26.225 | 26.651 | 26.774 | 26.787 | 26.787 |
| 6 | 22.291 | 24.456 | 25.922 | 26.510 | 26.721 | 26.780 | 26.787 | 26.787 |
| 5 | 22.275 | 25.131 | 26.262 | 26.641 | 26.755 | 26.784 | 26.787 | 26.787 |
| 4 | 22.319 | 25.503 | 26.457 | 26.712 | 26.773 | 26.786 | 26.787 | 26.787 |
| 3 | 26.185 | 26.546 | 26.716 | 26.770 | 26.784 | 26.787 | 26.787 | 26.787 |
| 2 | 26.755 | 26.772 | 26.782 | 26.786 | 26.787 | 26.787 | 26.787 | 26.787 |
| 1 | 26.786 | 26.787 | 26.787 | 26.787 | 26.787 | 26.787 | 26.787 | 26.787 |

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| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 7.3700 | 7.4600 | 7.5900 | 7.5000 | 7.4600 | 7.4100 | 7.3700 | 7.2307 | 3.9766 | 0.97997 |
| 36 | 5.2000 | 4.9465 | 4.7991 | 4.7478 | 4.6402 | 4.5398 | 4.4170 | 4.2717 | 4.0741 | 2.2465 |
| 35 | 3.9000 | 3.6109 | 3.3503 | 3.0332 | 2.8151 | 2.6614 | 2.4728 | 2.2102 | 1.8589 | 1.0055 |
| 34 | 3.0300 | 2.8725 | 2.6237 | 2.3059 | 2.0377 | 1.8244 | 1.5687 | 1.2908 | 0.98256 | 0.62488 |
| 33 | 1.7300 | 2.4120 | 2.2065 | 1.8990 | 1.6240 | 1.4101 | 1.1752 | 0.93627 | 0.68945 | 0.43466 |
| 32 | 1.3000 | 2.0456 | 1.8531 | 1.5544 | 1.2845 | 1.0769 | 0.85739 | 0.66185 | 0.46414 | 0.26150 |
| 31 | 1.3400 | 1.7764 | 1.5611 | 1.2678 | 1.0153 | 0.83074 | 0.64159 | 0.45969 | 0.27960 | 9.84762E-02 |
| 30 | 1.5200 | 1.5861 | 1.3216 | 1.0241 | 0.78324 | 0.61369 | 0.44215 | 0.27289 | 0.10609 | -4.97574E-02 |
| 29 | 1.7300 | 1.4936 | 1.1331 | 0.80906 | 0.56749 | 0.40367 | 0.24163 | 8.27877E-02 | -6.41798E-02 | -0.20040 |
| 28 | 2.0800 | 1.4303 | 0.96766 | 0.60700 | 0.35358 | 0.18687 | 3.15355E-02 | -0.11361 | -0.24511 | -0.36627 |
| 27 | 2.1700 | 1.3674 | 0.81185 | 0.40641 | 0.13139 | -3.69588E-02 | -0.18893 | -0.32791 | -0.45105 | -0.55741 |
| 26 | 2.2500 | 1.3233 | 0.70938 | 0.26942 | -2.35725E-02 | -0.19626 | -0.35266 | -0.49154 | -0.61042 | -0.70709 |
| 25 | 2.3800 | 1.2758 | 0.60427 | 0.12368 | -0.19356 | -0.37476 | -0.53765 | -0.67892 | -0.79569 | -0.88437 |
| 24 | 2.2500 | 1.2216 | 0.50126 | -2.03513E-02 | -0.37622 | -0.57561 | -0.74780 | -0.89420 | -1.0124 | -1.0977 |
| 23 | 2.2100 | 1.1663 | 0.40164 | -0.16853 | -0.57759 | -0.80887 | -0.98672 | -1.1404 | -1.2647 | -1.3505 |
| 22 | 2.1700 | 1.1125 | 0.30844 | -0.31501 | -0.79087 | -1.0988 | -1.2577 | -1.4245 | -1.5639 | -1.6519 |
| 21 | 2.1000 | 1.0628 | 0.22596 | -0.44976 | -0.97253 | -1.2675 | -1.5180 | -1.7438 | -1.9244 | -2.0162 |
| 20 | 2.0000 | 1.0205 | 0.15886 | -0.57041 | -1.1574 | -1.4883 | -1.8135 | -2.1204 | -2.3963 | -2.5759 |
| 19 | 1.8000 | 0.98844 | 0.11010 | -0.67523 | -1.3565 | -1.7585 | -2.1691 | -2.5727 | -2.9980 | -3.2701 |
| 18 | 1.7000 | 0.95741 | 5.92761E-02 | -0.81228 | -1.6900 | -2.2939 | -2.8779 | -3.3988 | -3.8942 | -4.1613 |
| 17 | 1.6719 | 0.94515 | 3.87611E-02 | -0.88028 | -1.9544 | -2.9928 | -3.7338 | -4.3076 | -4.8452 | -5.1633 |
| 16 | 0.35805 | -0.15403 | -0.74717 | -1.3988 | -2.3365 | -3.8195 | -4.7099 | -5.3307 | -5.7586 | -5.9758 |
| 15 | -1.0706 | -1.3670 | -1.7016 | -2.1597 | -2.9726 | -4.1639 | -6.2496 | -6.5278 | -6.6836 | -6.7642 |
| 14 | -1.9803 | -2.1237 | -2.3224 | -2.7728 | -3.6780 | -4.9158 | -7.2832 | -7.3525 | -7.4125 | -7.4747 |
| 13 | -2.4186 | -2.4856 | -2.6828 | -3.3833 | -4.6747 | -5.9091 | -8.1550 | -8.1211 | -8.1269 | -8.1541 |
| 12 | -2.5961 | -2.6430 | -2.9851 | -4.3142 | -6.6118 | -7.5655 | -9.0361 | -8.8877 | -8.8342 | -8.8133 |
| 11 | -2.6644 | -2.7323 | -3.4233 | -5.8734 | -10.944 | -10.784 | -10.125 | -9.6810 | -9.5303 | -9.4505 |
| 10 | -2.7038 | -2.8362 | -4.2065 | -7.9770 | -11.226 | -11.074 | -10.734 | -10.405 | -10.186 | -10.060 |
| 9 | -2.7663 | -3.0233 | -5.6727 | -12.173 | -11.904 | -11.620 | -11.276 | -11.063 | -10.891 | -10.771 |
| 8 | -2.9251 | -3.3739 | -8.1482 | -12.443 | -12.107 | -11.691 | -11.358 | -11.110 | -10.893 | -10.738 |
| 7 | -3.3375 | -4.0032 | -12.933 | -12.701 | -12.036 | -11.782 | -11.515 | -11.229 | -10.969 | -10.789 |
| 6 | -4.3305 | -5.0350 | -13.131 | -12.697 | -12.153 | -11.910 | -11.692 | -11.416 | -11.029 | -10.811 |
| 5 | -6.4787 | -7.0742 | -13.189 | -12.659 | -12.250 | -12.020 | -11.771 | -11.556 | -8.2912 | -7.0576 |
| 4 | -13.543 | -13.698 | -13.263 | -12.916 | -12.554 | -12.330 | -8.2672 | -6.2060 | -4.8255 | -4.1038 |
| 3 | -13.625 | -13.681 | -13.349 | -13.034 | -12.753 | -7.8595 | -5.1711 | -3.8347 | -3.2147 | -2.9471 |
| 2 | -13.662 | -13.720 | -13.456 | -5.6334 | -3.9889 | -3.3540 | -2.9955 | -2.8172 | -2.7375 | -2.7048 |
| 1 | -13.695 | -13.772 | -4.9216 | -3.2222 | -2.8650 | -2.7637 | -2.7165 | -2.6956 | -2.6869 | -2.6835 |



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| | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | -0.89020 | -1.7496 | -2.0700 | -2.1336 | -2.0236 | -1.6889 | -0.59390 | 0.80478 | 0.90000 | 1.1000 |
| 36 | 3.24055E-02 | -2.66429E-02 | -0.10411 | -0.18227 | -0.25814 | -0.31817 | -0.35192 | -0.25918 | -0.16130 | 4.11314E-02 |
| 35 | 0.28497 | 5.75104E-02 | -0.11664 | -0.27431 | -0.42324 | -0.56219 | -0.74572 | -0.87401 | -0.93929 | -0.94491 |
| 34 | 0.28584 | 2.05596E-02 | -0.17543 | -0.35338 | -0.52781 | -0.70235 | -0.96997 | -1.2686 | -1.6225 | -2.0414 |
| 33 | 0.18772 | -3.64870E-02 | -0.23849 | -0.42357 | -0.60574 | -0.79458 | -1.1025 | -1.4874 | -2.0307 | -2.9485 |
| 32 | 6.02939E-02 | -0.13642 | -0.31865 | -0.49665 | -0.67502 | -0.86315 | -1.1749 | -1.5647 | -2.0822 | -2.7639 |
| 31 | -7.22499E-02 | -0.23984 | -0.40167 | -0.56310 | -0.72873 | -0.90227 | -1.1857 | -1.5306 | -1.9752 | -2.4793 |
| 30 | -0.19790 | -0.34350 | -0.48633 | -0.62753 | -0.77141 | -0.91940 | -1.1513 | -1.4086 | -1.6813 | -1.8238 |
| 29 | -0.33054 | -0.45547 | -0.57614 | -0.69349 | -0.81143 | -0.93004 | -1.1071 | -1.2827 | -1.4228 | -1.3738 |
| 28 | -0.47733 | -0.57943 | -0.67476 | -0.76553 | -0.85625 | -0.94691 | -1.0794 | -1.2037 | -1.2826 | -1.1684 |
| 27 | -0.64677 | -0.72085 | -0.78486 | -0.84494 | -0.90735 | -0.97294 | -1.0750 | -1.1817 | -1.2788 | -1.3593 |
| 26 | -0.77977 | -0.82876 | -0.86390 | -0.89927 | -0.94101 | -0.99065 | -1.0778 | -1.1802 | -1.2903 | -1.4125 |
| 25 | -0.94041 | -0.95761 | -0.95259 | -0.95453 | -0.97182 | -1.0047 | -1.0808 | -1.1817 | -1.3033 | -1.4626 |
| 24 | -1.1463 | -1.1522 | -1.1065 | -1.0413 | -1.0127 | -1.0157 | -1.0835 | -1.1838 | -1.3149 | -1.5245 |
| 23 | -1.3971 | -1.4017 | -1.3114 | -1.1095 | -1.0559 | -1.1064 | -1.3182 | -1.3630 | -1.2952 | -1.6040 |
| 22 | -1.7002 | -1.7400 | -1.7603 | -1.3875 | -1.4732 | -1.6949 | -1.9010 | -1.8916 | -1.6776 | -1.5898 |
| 21 | -2.0750 | -2.2089 | -2.2812 | -1.9572 | -2.0530 | -2.2058 | -2.3226 | -2.2867 | -2.0612 | -1.6964 |
| 20 | -2.7601 | -2.9175 | -2.9878 | -2.5939 | -2.5403 | -2.5485 | -2.5559 | -2.5096 | -2.3489 | -2.0378 |
| 19 | -3.5500 | -3.7600 | -3.8762 | -3.4937 | -3.0588 | -2.8226 | -2.6900 | -2.6246 | -2.5222 | -2.3225 |
| 18 | -4.4933 | -4.7462 | -5.0579 | -5.4599 | -3.7625 | -3.1241 | -2.8042 | -2.6955 | -2.6191 | -2.4978 |
| 17 | -5.5089 | -5.6685 | -5.7954 | -5.9154 | -4.2597 | -3.4766 | -2.9645 | -2.7772 | -2.6930 | -2.6120 |
| 16 | -6.1997 | -6.3718 | -6.5690 | -6.6495 | -4.9780 | -4.1246 | -3.2854 | -2.9408 | -2.8083 | -2.7302 |
| 15 | -6.9163 | -7.1242 | -7.3659 | -7.4552 | -6.2316 | -5.5229 | -3.9461 | -3.3081 | -3.0730 | -2.9536 |
| 14 | -7.5797 | -7.7247 | -7.8845 | -7.9844 | -8.5943 | -8.6523 | -5.1273 | -4.0845 | -3.6947 | -3.4714 |
| 13 | -8.2154 | -8.3123 | -8.4405 | -8.6176 | -9.0764 | -9.1938 | -6.6259 | -5.5889 | -5.0410 | -4.6303 |
| 12 | -8.8285 | -8.8813 | -8.9756 | -9.1312 | -9.3532 | -9.4451 | -9.2768 | -8.4790 | -7.7353 | -7.0458 |
| 11 | -9.4171 | -9.4208 | -9.4583 | -9.5236 | -9.5903 | -9.5833 | -9.3634 | -8.4948 | -7.7494 | -7.0786 |
| 10 | -9.9857 | -9.9434 | -9.9290 | -9.9250 | -9.9020 | -9.8181 | -9.5182 | -8.4882 | -7.7600 | -7.1416 |
| 9 | -10.688 | -10.615 | -10.569 | -10.525 | -10.454 | -10.320 | -9.9149 | -8.3889 | -7.7229 | -7.2167 |
| 8 | -10.637 | -10.516 | -10.400 | -10.273 | -10.088 | -9.7702 | -8.7198 | -7.9800 | -7.5851 | -7.2977 |
| 7 | -10.668 | -10.542 | -10.378 | -10.217 | -9.9958 | -9.6477 | -8.7752 | -7.9204 | -7.5568 | -7.2982 |
| 6 | -10.659 | -10.551 | -7.6364 | -6.6948 | -6.3225 | -6.1468 | -6.1885 | -7.6310 | -7.4617 | -7.2901 |
| 5 | -6.5033 | -6.0343 | -5.0948 | -4.5438 | -4.3048 | -4.2818 | -4.7934 | -7.5145 | -7.3756 | -7.2651 |
| 4 | -3.7495 | -3.5250 | -3.3011 | -3.1516 | -3.0913 | -3.1271 | -3.4650 | -4.6473 | -7.2419 | -7.2118 |
| 3 | -2.8357 | -2.7845 | -2.7533 | -2.7352 | -2.7300 | -2.7409 | -2.8062 | -2.9928 | -3.2966 | -3.3476 |
| 2 | -2.6921 | -2.6872 | -2.6850 | -2.6840 | -2.6838 | -2.6847 | -2.6888 | -2.6993 | -2.7144 | -2.7183 |
| 1 | -2.6822 | -2.6818 | -2.6816 | -2.6815 | -2.6815 | -2.6816 | -2.6818 | -2.6824 | -2.6831 | -2.6833 |

| | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|---|---|---|---|---|---|---|---|---|
| 37 | 1.3000 | 1.7000 | 2.2000 | 2.4000 | 3.5000 | 3.9000 | 4.6000 | 6.1000 |
| 36 | 0.35921 | 0.68489 | 1.0572 | 1.4476 | 1.8554 | 2.3620 | 2.9569 | 3.3000 |
| 35 | -0.80482 | -0.40337 | 8.42744E-02 | 0.55783 | 0.97912 | 1.4648 | 1.7860 | 2.6000 |
| 34 | -2.3444 | -1.4128 | -0.57630 | 5.71434E-02 | 0.54336 | 0.98992 | 1.3709 | -0.36682 |
| 33 | -4.8326 | -1.8586 | -0.71115 | -6.65766E-02 | 0.43253 | 0.84858 | 1.2030 | -1.5659 |
| 32 | -3.2530 | -1.9930 | -1.2661 | -0.65216 | -0.14640 | 0.18782 | -0.46600 | -2.2353 |
| 31 | -4.7010 | -3.1212 | -1.8314 | -1.0954 | -0.52407 | -0.19355 | -1.7086 | -2.5251 |
| 30 | -2.8439 | -2.5389 | -1.8851 | -1.4022 | -0.69481 | -0.33603 | -2.2129 | -2.6246 |
| 29 | -1.9310 | -1.9623 | -1.7978 | -1.6758 | -0.96919 | -1.3058 | -2.4844 | -2.6612 |
| 28 | -1.4340 | -1.5140 | -1.6960 | -1.7367 | -1.7390 | -1.9772 | -2.5994 | -2.6741 |
| 27 | -1.5066 | -1.6345 | -1.7426 | -1.8296 | -1.7860 | -2.2048 | -2.6368 | -2.6780 |
| 26 | -1.5502 | -1.6709 | -1.7730 | -1.8574 | -1.7933 | -2.2919 | -2.6490 | -2.6792 |
| 25 | -1.6065 | -1.7267 | -1.8228 | -1.9037 | -1.5783 | -2.3720 | -2.6577 | -2.6799 |
| 24 | -1.6799 | -1.8002 | -1.8920 | -1.9545 | -1.7166 | -2.4388 | -2.6634 | -2.6803 |



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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 23 | -1.7802 | -1.8940 | -1.9865 | -2.0216 | -1.8238 | -2.4655 | -2.6654 | -2.6804 |
| 22 | -1.8919 | -2.0146 | -2.1321 | -2.1251 | -1.9614 | -2.4622 | -2.6644 | -2.6803 |
| 21 | -1.9949 | -2.2706 | -2.5308 | -2.4347 | -2.6462 | -2.4668 | -2.6626 | -2.6802 |
| 20 | -1.9090 | -2.6670 | -2.8006 | -2.7110 | -2.7615 | -2.4720 | -2.6617 | -2.6801 |
| 19 | -2.1805 | -2.9719 | -3.0113 | -2.9387 | -2.9391 | -2.4954 | -2.6625 | -2.6801 |
| 18 | -2.4258 | -3.2661 | -3.2044 | -3.1535 | -3.1367 | -2.5310 | -2.6646 | -2.6802 |
| 17 | -2.6252 | -3.7035 | -3.4274 | -3.3713 | -3.3397 | -2.5718 | -2.6672 | -2.6804 |
| 16 | -2.7858 | -3.9144 | -3.7029 | -3.5946 | -3.5356 | -2.6126 | -2.6700 | -2.6805 |
| 15 | -2.9935 | -4.0747 | -3.9533 | -3.8145 | -3.7006 | -2.6489 | -2.6728 | -2.6807 |
| 14 | -3.4041 | -4.2602 | -4.2334 | -4.0425 | -3.7856 | -2.6739 | -2.6754 | -2.6809 |
| 13 | -4.3121 | -4.5701 | -4.6135 | -4.4623 | -3.1013 | -2.6711 | -2.6776 | -2.6811 |
| 12 | -6.3176 | -5.3121 | -4.9168 | -4.7804 | -3.0410 | -2.6870 | -2.6797 | -2.6812 |
| 11 | -6.4040 | -5.6494 | -5.1202 | -5.0031 | -3.1006 | -2.7052 | -2.6813 | -2.6813 |
| 10 | -6.5554 | -5.9140 | -5.2621 | -5.1418 | -3.1437 | -2.7158 | -2.6822 | -2.6814 |
| 9 | -6.7590 | -6.2094 | -5.3611 | -5.1893 | -3.1178 | -2.7158 | -2.6824 | -2.6814 |
| 8 | -7.0453 | -6.7022 | -5.3722 | -3.8198 | -2.9386 | -2.7047 | -2.6822 | -2.6814 |
| 7 | -7.0874 | -6.7650 | -4.2096 | -3.2264 | -2.8125 | -2.6943 | -2.6819 | -2.6814 |
| 6 | -7.1763 | -4.9717 | -3.5249 | -2.9494 | -2.7449 | -2.6879 | -2.6817 | -2.6814 |
| 5 | -7.1918 | -4.3052 | -3.1917 | -2.8225 | -2.7124 | -2.6845 | -2.6815 | -2.6814 |
| 4 | -7.1470 | -3.9404 | -3.0019 | -2.7544 | -2.6950 | -2.6826 | -2.6815 | -2.6814 |
| 3 | -3.2709 | -2.9163 | -2.7500 | -2.6979 | -2.6845 | -2.6817 | -2.6814 | -2.6814 |
| 2 | -2.7128 | -2.6958 | -2.6861 | -2.6826 | -2.6817 | -2.6814 | -2.6814 | -2.6814 |
| 1 | -2.6830 | -2.6822 | -2.6817 | -2.6815 | -2.6814 | -2.6814 | -2.6814 | -2.6814 |

FLUID HEAD (BASED ON LOCAL CELL P,C CONDITIONS) (FT)
MAXIMUM SPATIAL DENSITY VARIATION ..... 1.58E-02 (LB/FT**3)

AREAL LAYERS

K = 1

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 539.95 | 540.15 | 540.43 | 540.23 | 540.14 | 540.02 | 539.91 | 539.57 | 532.19 | 525.36 |
| 36 | 534.98 | 534.02 | 533.66 | 533.94 | 533.69 | 533.46 | 533.17 | 532.84 | 532.33 | 528.12 |
| 35 | 531.97 | 531.29 | 530.55 | 529.39 | 528.89 | 528.77 | 528.68 | 528.08 | 527.26 | 525.30 |
| 34 | 529.91 | 529.60 | 528.98 | 528.17 | 527.54 | 527.06 | 526.10 | 525.40 | 524.74 | 524.07 |
| 33 | 527.10 | 528.55 | 528.05 | 527.31 | 526.64 | 526.10 | 525.46 | 524.92 | 524.40 | 523.86 |
| 32 | 526.07 | 527.71 | 527.24 | 526.53 | 525.86 | 525.26 | 524.42 | 524.29 | 523.94 | 523.53 |
| 31 | 526.11 | 527.08 | 526.58 | 525.89 | 525.28 | 524.82 | 524.35 | 523.97 | 523.59 | 523.20 |
| 30 | 526.58 | 526.63 | 526.03 | 525.33 | 524.77 | 524.37 | 523.97 | 523.59 | 523.23 | 522.87 |
| 29 | 527.00 | 526.43 | 525.60 | 524.84 | 524.28 | 523.90 | 523.53 | 523.17 | 522.84 | 522.52 |
| 28 | 527.65 | 526.28 | 525.22 | 524.38 | 523.79 | 523.41 | 523.06 | 522.72 | 522.42 | 522.14 |
| 27 | 527.92 | 526.14 | 524.86 | 523.91 | 523.29 | 522.90 | 522.55 | 522.23 | 521.94 | 521.70 |
| 26 | 528.09 | 526.04 | 524.62 | 523.60 | 522.93 | 522.53 | 522.17 | 521.85 | 521.57 | 521.35 |
| 25 | 528.24 | 525.93 | 524.38 | 523.27 | 522.54 | 522.12 | 521.74 | 521.42 | 521.15 | 520.94 |
| 24 | 528.10 | 525.80 | 524.14 | 522.94 | 522.12 | 521.66 | 521.26 | 520.92 | 520.65 | 520.45 |
| 23 | 527.99 | 525.67 | 523.91 | 522.59 | 521.67 | 521.11 | 520.70 | 520.35 | 520.06 | 519.86 |
| 22 | 527.87 | 525.55 | 523.69 | 522.26 | 521.18 | 520.45 | 520.08 | 519.69 | 519.37 | 519.17 |
| 21 | 527.71 | 525.43 | 523.50 | 521.95 | 520.77 | 520.06 | 519.48 | 518.96 | 518.54 | 518.40 |
| 20 | 527.48 | 525.34 | 523.35 | 521.67 | 520.36 | 519.56 | 518.81 | 518.10 | 517.46 | 517.10 |
| 19 | 527.21 | 525.28 | 523.26 | 521.47 | 519.99 | 519.07 | 518.16 | 517.25 | 516.11 | 515.52 |
| 18 | 526.92 | 525.19 | 523.12 | 521.11 | 519.12 | 517.71 | 516.34 | 515.13 | 513.87 | 513.44 |
| 17 | 526.81 | 525.14 | 523.05 | 520.94 | 518.51 | 516.10 | 514.39 | 513.03 | 511.63 | 510.97 |
| 16 | 523.80 | 522.62 | 521.24 | 519.72 | 517.52 | 514.19 | 512.12 | 510.65 | 509.57 | 509.17 |
| 15 | 520.56 | 519.87 | 519.09 | 518.00 | 516.07 | 513.27 | 508.61 | 507.52 | 507.44 | 507.36 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 14 | 518.46 | 518.12 | 517.65 | 516.57 | 514.42 | 511.52 | 506.25 | 505.96 | 505.86 | 505.72 |
| 13 | 517.43 | 517.27 | 516.79 | 515.12 | 512.08 | 509.20 | 504.24 | 504.23 | 504.22 | 504.16 |
| 12 | 517.01 | 516.89 | 516.07 | 512.93 | 507.56 | 505.35 | 502.19 | 502.49 | 502.59 | 502.64 |
| 11 | 516.84 | 516.68 | 515.02 | 509.27 | 497.90 | 498.18 | 499.64 | 500.71 | 500.99 | 501.17 |
| 10 | 516.74 | 516.43 | 513.17 | 504.38 | 497.12 | 497.43 | 498.21 | 498.95 | 499.48 | 499.78 |
| 9 | 516.59 | 515.98 | 509.73 | 495.03 | 495.61 | 496.30 | 497.31 | 497.79 | 498.24 | 498.55 |
| 8 | 516.21 | 515.14 | 503.97 | 494.38 | 495.48 | 496.00 | 496.79 | 497.37 | 497.86 | 498.22 |
| 7 | 515.23 | 513.65 | 493.28 | 493.79 | 495.31 | 495.80 | 496.40 | 497.11 | 497.70 | 498.10 |
| 6 | 512.88 | 511.22 | 492.78 | 493.86 | 494.96 | 495.50 | 495.94 | 496.64 | 497.58 | 498.11 |
| 5 | 507.85 | 506.45 | 492.62 | 493.85 | 494.76 | 495.29 | 495.77 | 496.43 | 503.65 | 506.51 |
| 4 | 491.80 | 491.45 | 492.42 | 493.14 | 494.02 | 494.62 | 503.69 | 508.48 | 511.71 | 513.41 |
| 3 | 491.55 | 491.44 | 492.18 | 492.89 | 493.67 | 504.64 | 510.90 | 514.04 | 515.52 | 516.16 |
| 2 | 491.46 | 491.35 | 491.92 | 509.83 | 513.69 | 515.19 | 516.04 | 516.47 | 516.66 | 516.74 |
| 1 | 491.39 | 491.22 | 511.50 | 515.50 | 516.36 | 516.60 | 516.71 | 516.76 | 516.79 | 516.79 |

| | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 521.03 | 519.02 | 518.25 | 518.10 | 518.35 | 519.13 | 521.63 | 524.82 | 525.05 | 525.51 |
| 36 | 523.11 | 522.92 | 522.74 | 522.56 | 522.39 | 522.25 | 522.17 | 522.37 | 522.58 | 523.04 |
| 35 | 523.35 | 523.09 | 522.71 | 522.34 | 522.00 | 521.67 | 521.24 | 520.95 | 520.81 | 520.80 |
| 34 | 523.36 | 523.00 | 522.58 | 522.17 | 521.77 | 521.36 | 520.74 | 520.05 | 519.23 | 518.26 |
| 33 | 523.33 | 522.87 | 522.43 | 522.01 | 521.59 | 521.15 | 520.44 | 519.55 | 518.29 | 516.16 |
| 32 | 523.09 | 522.67 | 522.25 | 521.84 | 521.43 | 520.99 | 520.27 | 519.37 | 518.17 | 516.56 |
| 31 | 522.82 | 522.43 | 522.06 | 521.68 | 521.30 | 520.90 | 520.24 | 519.45 | 518.40 | 516.73 |
| 30 | 522.53 | 522.19 | 521.86 | 521.54 | 521.20 | 520.86 | 520.32 | 519.73 | 519.09 | 518.38 |
| 29 | 522.22 | 521.93 | 521.66 | 521.38 | 521.11 | 520.84 | 520.43 | 520.02 | 519.69 | 519.51 |
| 28 | 521.88 | 521.65 | 521.43 | 521.22 | 521.01 | 520.80 | 520.49 | 520.20 | 520.01 | 520.02 |
| 27 | 521.49 | 521.32 | 521.17 | 521.03 | 520.89 | 520.74 | 520.50 | 520.25 | 520.03 | 519.83 |
| 26 | 521.18 | 521.07 | 520.99 | 520.91 | 520.81 | 520.70 | 520.49 | 520.26 | 520.00 | 519.72 |
| 25 | 520.81 | 520.79 | 520.83 | 520.81 | 520.76 | 520.67 | 520.49 | 520.25 | 519.98 | 519.60 |
| 24 | 520.34 | 520.32 | 520.44 | 520.59 | 520.65 | 520.64 | 520.48 | 520.25 | 519.95 | 519.46 |
| 23 | 519.76 | 519.73 | 519.95 | 520.41 | 520.53 | 520.39 | 519.92 | 519.82 | 519.95 | 519.28 |
| 22 | 519.08 | 519.02 | 518.93 | 519.72 | 519.56 | 519.09 | 518.62 | 518.64 | 519.11 | 519.19 |
| 21 | 518.42 | 518.46 | 517.73 | 518.43 | 518.25 | 517.92 | 517.65 | 517.73 | 518.24 | 519.02 |
| 20 | 516.62 | 516.25 | 516.09 | 516.95 | 517.12 | 517.11 | 517.10 | 517.21 | 517.58 | 518.28 |
| 19 | 514.79 | 514.30 | 514.04 | 514.84 | 515.89 | 516.46 | 516.78 | 516.94 | 517.18 | 517.63 |
| 18 | 512.59 | 512.01 | 511.32 | 510.47 | 514.23 | 515.74 | 516.50 | 516.76 | 516.95 | 517.23 |
| 17 | 509.99 | 509.66 | 509.60 | 509.37 | 513.06 | 514.90 | 516.12 | 516.57 | 516.77 | 516.96 |
| 16 | 508.65 | 508.30 | 507.80 | 507.64 | 511.38 | 513.38 | 515.35 | 516.17 | 516.49 | 516.67 |
| 15 | 507.01 | 506.49 | 505.78 | 505.57 | 508.46 | 510.11 | 513.79 | 515.30 | 515.86 | 516.14 |
| 14 | 505.48 | 505.15 | 504.77 | 504.55 | 503.04 | 502.92 | 511.02 | 513.47 | 514.39 | 514.91 |
| 13 | 504.02 | 503.79 | 503.50 | 503.19 | 502.07 | 501.81 | 507.53 | 509.95 | 511.23 | 512.19 |
| 12 | 502.60 | 502.48 | 502.26 | 501.89 | 501.33 | 501.15 | 501.38 | 503.49 | 505.20 | 506.79 |
| 11 | 501.25 | 501.24 | 501.15 | 501.00 | 500.85 | 500.86 | 501.27 | 503.38 | 505.10 | 506.65 |
| 10 | 499.95 | 500.06 | 500.09 | 500.10 | 500.15 | 500.34 | 500.94 | 503.39 | 505.07 | 506.50 |
| 9 | 498.79 | 499.04 | 499.16 | 499.25 | 499.42 | 499.73 | 500.55 | 503.62 | 505.15 | 506.33 |
| 8 | 498.43 | 498.73 | 499.00 | 499.29 | 499.72 | 500.44 | 502.59 | 504.45 | 505.44 | 506.16 |
| 7 | 498.34 | 498.66 | 499.09 | 499.48 | 499.99 | 500.79 | 502.77 | 504.70 | 505.54 | 506.15 |
| 6 | 498.49 | 498.82 | 505.18 | 507.37 | 508.23 | 508.64 | 508.55 | 505.39 | 505.77 | 506.16 |
| 5 | 507.81 | 508.90 | 511.09 | 512.38 | 512.94 | 513.00 | 511.80 | 505.71 | 505.97 | 506.22 |
| 4 | 514.25 | 514.78 | 515.31 | 515.67 | 515.81 | 515.73 | 514.93 | 512.15 | 506.33 | 506.37 |
| 3 | 516.43 | 516.55 | 516.62 | 516.67 | 516.68 | 516.65 | 516.50 | 516.05 | 515.34 | 515.22 |
| 2 | 516.77 | 516.79 | 516.79 | 516.79 | 516.79 | 516.79 | 516.78 | 516.76 | 516.72 | 516.71 |
| 1 | 516.80 | 516.80 | 516.80 | 516.80 | 516.80 | 516.80 | 516.80 | 516.80 | 516.80 | 516.80 |

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| | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|---|---|---|---|---|---|---|---|---|
| 37 | 526.09 | 526.87 | 527.90 | 528.70 | 530.70 | 531.84 | 533.47 | 536.68 |
| 36 | 523.82 | 524.56 | 525.42 | 526.32 | 527.26 | 528.43 | 529.81 | 530.72 |
| 35 | 521.12 | 522.05 | 523.17 | 524.26 | 525.24 | 526.37 | 527.20 | 528.99 |
| 34 | 517.54 | 519.70 | 521.63 | 523.10 | 524.23 | 525.23 | 526.15 | 522.18 |
| 33 | 511.69 | 518.12 | 521.01 | 522.60 | 523.92 | 524.88 | 525.75 | 519.42 |
| 32 | 514.90 | 517.79 | 520.10 | 521.45 | 522.64 | 523.41 | 521.93 | 517.86 |
| 31 | 511.47 | 515.47 | 518.75 | 520.45 | 521.78 | 522.54 | 519.08 | 517.18 |
| 30 | 516.36 | 517.03 | 518.63 | 519.74 | 521.37 | 522.19 | 517.90 | 516.94 |
| 29 | 518.50 | 518.43 | 518.83 | 519.12 | 520.70 | 519.98 | 517.27 | 516.85 |
| 28 | 519.52 | 519.36 | 519.07 | 518.98 | 518.98 | 518.44 | 517.00 | 516.82 |
| 27 | 519.50 | 519.23 | 518.95 | 518.79 | 518.86 | 517.91 | 516.91 | 516.81 |
| 26 | 519.40 | 519.13 | 518.89 | 518.74 | 518.85 | 517.70 | 516.88 | 516.81 |
| 25 | 519.27 | 519.00 | 518.78 | 518.64 | 519.29 | 517.52 | 516.86 | 516.80 |
| 24 | 519.11 | 518.83 | 518.62 | 518.51 | 519.00 | 517.37 | 516.84 | 516.80 |
| 23 | 518.85 | 518.61 | 518.40 | 518.33 | 518.75 | 517.31 | 516.84 | 516.80 |
| 22 | 518.65 | 518.40 | 518.16 | 518.14 | 518.40 | 517.31 | 516.84 | 516.80 |
| 21 | 518.38 | 517.74 | 517.21 | 517.32 | 516.89 | 517.29 | 516.84 | 516.80 |
| 20 | 518.52 | 516.84 | 516.56 | 516.73 | 516.61 | 517.28 | 516.85 | 516.80 |
| 19 | 517.92 | 516.13 | 516.06 | 516.20 | 516.20 | 517.22 | 516.84 | 516.80 |
| 18 | 517.36 | 515.47 | 515.59 | 515.71 | 515.75 | 517.14 | 516.84 | 516.80 |
| 17 | 516.89 | 514.54 | 515.05 | 515.20 | 515.28 | 517.04 | 516.83 | 516.80 |
| 16 | 516.51 | 514.02 | 514.44 | 514.69 | 514.83 | 516.94 | 516.83 | 516.80 |
| 15 | 516.02 | 513.61 | 513.86 | 514.18 | 514.45 | 516.86 | 516.82 | 516.80 |
| 14 | 515.05 | 513.14 | 513.21 | 513.65 | 514.27 | 516.80 | 516.81 | 516.80 |
| 13 | 512.92 | 512.36 | 512.37 | 512.70 | 515.74 | 516.81 | 516.81 | 516.80 |
| 12 | 508.46 | 510.73 | 511.64 | 511.97 | 515.91 | 516.78 | 516.80 | 516.80 |
| 11 | 508.20 | 509.94 | 511.15 | 511.46 | 515.78 | 516.74 | 516.80 | 516.80 |
| 10 | 507.86 | 509.33 | 510.80 | 511.14 | 515.68 | 516.72 | 516.80 | 516.80 |
| 9 | 507.39 | 508.66 | 510.54 | 511.06 | 515.75 | 516.72 | 516.80 | 516.80 |
| 8 | 506.79 | 507.68 | 510.45 | 514.08 | 516.18 | 516.74 | 516.80 | 516.80 |
| 7 | 506.64 | 507.45 | 513.16 | 515.49 | 516.48 | 516.77 | 516.80 | 516.80 |
| 6 | 506.45 | 511.39 | 514.78 | 516.15 | 516.64 | 516.78 | 516.80 | 516.80 |
| 5 | 506.42 | 512.95 | 515.58 | 516.46 | 516.72 | 516.79 | 516.80 | 516.80 |
| 4 | 506.55 | 513.81 | 516.03 | 516.62 | 516.77 | 516.80 | 516.80 | 516.80 |
| 3 | 515.40 | 516.24 | 516.63 | 516.76 | 516.79 | 516.80 | 516.80 | 516.80 |
| 2 | 516.72 | 516.76 | 516.79 | 516.80 | 516.80 | 516.80 | 516.80 | 516.80 |
| 1 | 516.80 | 516.80 | 516.80 | 516.80 | 516.80 | 516.80 | 516.80 | 516.80 |

K = 2

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 539.96 | 540.16 | 540.45 | 540.25 | 540.15 | 540.04 | 539.93 | 539.64 | 532.19 | 525.35 |
| 36 | 534.99 | 534.08 | 533.71 | 533.95 | 533.70 | 533.47 | 533.18 | 532.85 | 532.37 | 528.14 |
| 35 | 531.98 | 531.31 | 530.56 | 529.43 | 528.94 | 528.81 | 528.70 | 528.09 | 527.28 | 525.31 |
| 34 | 529.92 | 529.62 | 528.99 | 528.18 | 527.56 | 527.07 | 526.14 | 525.44 | 524.78 | 524.10 |
| 33 | 527.10 | 528.56 | 528.06 | 527.32 | 526.65 | 526.11 | 525.47 | 524.94 | 524.41 | 523.87 |
| 32 | 526.07 | 527.71 | 527.25 | 526.54 | 525.87 | 525.27 | 524.44 | 524.30 | 523.96 | 523.54 |
| 31 | 526.12 | 527.09 | 526.59 | 525.90 | 525.29 | 524.83 | 524.36 | 523.98 | 523.60 | 523.21 |
| 30 | 526.56 | 526.65 | 526.04 | 525.34 | 524.78 | 524.38 | 523.98 | 523.60 | 523.23 | 522.88 |
| 29 | 527.01 | 526.44 | 525.61 | 524.85 | 524.29 | 523.91 | 523.54 | 523.18 | 522.85 | 522.53 |
| 28 | 527.68 | 526.29 | 525.23 | 524.39 | 523.80 | 523.42 | 523.07 | 522.73 | 522.43 | 522.15 |
| 27 | 527.94 | 526.15 | 524.87 | 523.92 | 523.30 | 522.91 | 522.56 | 522.24 | 521.95 | 521.71 |
| 26 | 528.12 | 526.05 | 524.63 | 523.61 | 522.94 | 522.54 | 522.18 | 521.86 | 521.58 | 521.36 |
| 25 | 528.29 | 525.94 | 524.39 | 523.28 | 522.55 | 522.13 | 521.75 | 521.43 | 521.16 | 520.95 |
| 24 | 528.13 | 525.81 | 524.15 | 522.95 | 522.13 | 521.66 | 521.27 | 520.93 | 520.66 | 520.46 |
| 23 | 528.02 | 525.68 | 523.92 | 522.60 | 521.67 | 521.12 | 520.71 | 520.36 | 520.07 | 519.87 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 22 | 527.91 | 525.56 | 523.70 | 522.27 | 521.19 | 520.40 | 520.09 | 519.70 | 519.38 | 519.18 |
| 21 | 527.74 | 525.44 | 523.51 | 521.96 | 520.77 | 520.06 | 519.49 | 518.97 | 518.55 | 518.37 |
| 20 | 527.51 | 525.35 | 523.36 | 521.68 | 520.36 | 519.56 | 518.81 | 518.10 | 517.46 | 517.07 |
| 19 | 527.19 | 525.28 | 523.26 | 521.46 | 519.94 | 519.00 | 518.06 | 517.14 | 516.09 | 515.48 |
| 18 | 526.93 | 525.20 | 523.13 | 521.12 | 519.13 | 517.72 | 516.35 | 515.14 | 513.95 | 513.41 |
| 17 | 526.84 | 525.17 | 523.08 | 520.96 | 518.53 | 516.11 | 514.40 | 513.04 | 511.74 | 511.03 |
| 16 | 523.81 | 522.63 | 521.26 | 519.74 | 517.54 | 514.18 | 512.13 | 510.66 | 509.65 | 509.19 |
| 15 | 520.56 | 519.87 | 519.09 | 518.01 | 516.09 | 513.30 | 508.58 | 507.79 | 507.51 | 507.37 |
| 14 | 518.46 | 518.12 | 517.65 | 516.58 | 514.45 | 511.56 | 506.21 | 506.00 | 505.88 | 505.74 |
| 13 | 517.43 | 517.28 | 516.80 | 515.14 | 512.12 | 509.24 | 504.21 | 504.24 | 504.23 | 504.17 |
| 12 | 517.01 | 516.90 | 516.08 | 512.96 | 507.60 | 505.40 | 502.17 | 502.49 | 502.60 | 502.65 |
| 11 | 516.85 | 516.69 | 515.05 | 509.31 | 497.78 | 498.13 | 499.64 | 500.67 | 500.99 | 501.18 |
| 10 | 516.75 | 516.44 | 513.20 | 504.43 | 497.10 | 497.44 | 498.24 | 498.97 | 499.49 | 499.78 |
| 9 | 516.60 | 515.99 | 509.77 | 494.93 | 495.60 | 496.29 | 497.21 | 497.74 | 498.18 | 498.49 |
| 8 | 516.22 | 515.16 | 504.02 | 494.36 | 495.43 | 496.02 | 496.79 | 497.36 | 497.87 | 498.23 |
| 7 | 515.25 | 513.68 | 493.18 | 493.79 | 495.25 | 495.81 | 496.42 | 497.09 | 497.69 | 498.10 |
| 6 | 512.91 | 511.26 | 492.77 | 493.79 | 494.95 | 495.51 | 496.00 | 496.65 | 497.54 | 498.04 |
| 5 | 507.89 | 506.50 | 492.62 | 493.79 | 494.73 | 495.27 | 495.82 | 496.32 | 503.70 | 506.56 |
| 4 | 491.76 | 491.41 | 492.41 | 493.18 | 494.03 | 494.54 | 503.74 | 508.53 | 511.75 | 513.44 |
| 3 | 491.55 | 491.44 | 492.19 | 492.91 | 493.59 | 504.69 | 510.94 | 514.07 | 515.54 | 516.17 |
| 2 | 491.47 | 491.35 | 491.93 | 509.87 | 513.72 | 515.21 | 516.06 | 516.48 | 516.67 | 516.75 |
| 1 | 491.39 | 491.23 | 511.53 | 515.52 | 516.37 | 516.61 | 516.72 | 516.77 | 516.80 | 516.80 |

| | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 521.02 | 519.01 | 518.25 | 518.10 | 518.36 | 519.13 | 521.64 | 524.84 | 525.06 | 525.52 |
| 36 | 523.08 | 522.93 | 522.75 | 522.57 | 522.40 | 522.26 | 522.18 | 522.39 | 522.60 | 523.07 |
| 35 | 523.40 | 523.11 | 522.72 | 522.36 | 522.01 | 521.69 | 521.26 | 520.97 | 520.82 | 520.81 |
| 34 | 523.38 | 523.02 | 522.59 | 522.18 | 521.78 | 521.37 | 520.75 | 520.06 | 519.24 | 518.27 |
| 33 | 523.34 | 522.88 | 522.44 | 522.01 | 521.60 | 521.16 | 520.45 | 519.56 | 518.30 | 516.16 |
| 32 | 523.10 | 522.67 | 522.26 | 521.85 | 521.44 | 521.00 | 520.28 | 519.38 | 518.18 | 516.58 |
| 31 | 522.83 | 522.44 | 522.07 | 521.69 | 521.31 | 520.91 | 520.25 | 519.46 | 518.42 | 516.82 |
| 30 | 522.54 | 522.20 | 521.87 | 521.55 | 521.21 | 520.87 | 520.33 | 519.74 | 519.10 | 518.46 |
| 29 | 522.23 | 521.94 | 521.67 | 521.39 | 521.12 | 520.85 | 520.44 | 520.03 | 519.70 | 519.57 |
| 28 | 521.89 | 521.66 | 521.44 | 521.23 | 521.02 | 520.81 | 520.50 | 520.21 | 520.02 | 520.08 |
| 27 | 521.50 | 521.33 | 521.18 | 521.04 | 520.90 | 520.75 | 520.51 | 520.26 | 520.04 | 519.85 |
| 26 | 521.19 | 521.08 | 521.00 | 520.92 | 520.82 | 520.71 | 520.50 | 520.27 | 520.01 | 519.73 |
| 25 | 520.82 | 520.79 | 520.81 | 520.80 | 520.76 | 520.68 | 520.50 | 520.26 | 519.99 | 519.62 |
| 24 | 520.35 | 520.33 | 520.45 | 520.59 | 520.66 | 520.65 | 520.49 | 520.26 | 519.96 | 519.47 |
| 23 | 519.77 | 519.75 | 519.97 | 520.43 | 520.55 | 520.40 | 519.94 | 519.83 | 519.97 | 519.28 |
| 22 | 519.08 | 519.01 | 518.93 | 519.74 | 519.58 | 519.09 | 518.63 | 518.65 | 519.12 | 519.20 |
| 21 | 518.32 | 518.39 | 517.73 | 518.45 | 518.26 | 517.92 | 517.66 | 517.74 | 518.25 | 519.04 |
| 20 | 516.63 | 516.26 | 516.10 | 516.97 | 517.13 | 517.12 | 517.11 | 517.22 | 517.59 | 518.29 |
| 19 | 514.80 | 514.31 | 514.04 | 514.87 | 515.91 | 516.47 | 516.79 | 516.94 | 517.19 | 517.64 |
| 18 | 512.60 | 512.02 | 511.32 | 510.41 | 514.25 | 515.76 | 516.51 | 516.77 | 516.96 | 517.24 |
| 17 | 510.16 | 509.83 | 509.61 | 509.35 | 513.09 | 514.93 | 516.13 | 516.58 | 516.78 | 516.97 |
| 16 | 508.67 | 508.29 | 507.81 | 507.62 | 511.41 | 513.40 | 515.37 | 516.19 | 516.50 | 516.68 |
| 15 | 507.02 | 506.52 | 505.91 | 505.71 | 508.50 | 510.14 | 513.82 | 515.32 | 515.87 | 516.15 |
| 14 | 505.49 | 505.16 | 504.79 | 504.55 | 503.00 | 502.84 | 511.06 | 513.49 | 514.41 | 514.93 |
| 13 | 504.03 | 503.80 | 503.51 | 503.14 | 502.06 | 501.79 | 507.57 | 509.99 | 511.26 | 512.22 |
| 12 | 502.61 | 502.49 | 502.27 | 501.91 | 501.38 | 501.18 | 501.42 | 503.44 | 505.16 | 506.75 |
| 11 | 501.26 | 501.25 | 501.16 | 501.01 | 500.86 | 500.87 | 501.32 | 503.39 | 505.11 | 506.66 |
| 10 | 499.95 | 500.05 | 500.09 | 500.10 | 500.15 | 500.35 | 501.00 | 503.40 | 505.08 | 506.51 |
| 9 | 498.70 | 498.89 | 499.01 | 499.12 | 499.29 | 499.61 | 500.55 | 503.63 | 505.16 | 506.34 |
| 8 | 498.45 | 498.74 | 499.00 | 499.30 | 499.72 | 500.45 | 502.62 | 504.46 | 505.45 | 506.17 |
| 7 | 498.37 | 498.67 | 499.05 | 499.42 | 499.93 | 500.73 | 502.73 | 504.70 | 505.55 | 506.15 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 498.42 | 498.69 | 505.23 | 507.41 | 508.28 | 508.68 | 508.59 | 505.39 | 505.78 | 506.17 |
| 5 | 507.85 | 508.94 | 511.13 | 512.41 | 512.97 | 513.03 | 511.83 | 505.67 | 505.97 | 506.23 |
| 4 | 514.28 | 514.81 | 515.33 | 515.69 | 515.83 | 515.74 | 514.95 | 512.18 | 506.29 | 506.36 |
| 3 | 516.44 | 516.56 | 516.64 | 516.68 | 516.69 | 516.67 | 516.51 | 516.07 | 515.35 | 515.23 |
| 2 | 516.78 | 516.79 | 516.80 | 516.80 | 516.80 | 516.80 | 516.79 | 516.77 | 516.73 | 516.72 |
| 1 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 | 516.80 | 516.80 |

| | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|---|---|---|---|---|---|---|---|---|
| 37 | 526.06 | 526.88 | 527.94 | 528.68 | 530.77 | 531.88 | 533.50 | 536.76 |
| 36 | 523.83 | 524.57 | 525.43 | 526.33 | 527.27 | 528.44 | 529.82 | 530.69 |
| 35 | 521.13 | 522.06 | 523.18 | 524.28 | 525.25 | 526.37 | 527.18 | 529.01 |
| 34 | 517.55 | 519.71 | 521.65 | 523.12 | 524.24 | 525.26 | 526.16 | 522.18 |
| 33 | 510.95 | 518.22 | 521.07 | 522.66 | 523.92 | 524.90 | 525.78 | 519.42 |
| 32 | 514.98 | 517.93 | 520.08 | 521.48 | 522.65 | 523.42 | 521.93 | 517.86 |
| 31 | 510.82 | 515.63 | 518.76 | 520.46 | 521.79 | 522.55 | 519.08 | 517.18 |
| 30 | 516.38 | 517.09 | 518.64 | 519.75 | 521.39 | 522.21 | 517.91 | 516.94 |
| 29 | 518.52 | 518.45 | 518.84 | 519.13 | 520.72 | 519.99 | 517.27 | 516.86 |
| 28 | 519.56 | 519.39 | 519.08 | 518.99 | 518.98 | 518.45 | 517.00 | 516.83 |
| 27 | 519.51 | 519.23 | 518.97 | 518.80 | 518.87 | 517.91 | 516.91 | 516.82 |
| 26 | 519.41 | 519.14 | 518.90 | 518.74 | 518.85 | 517.71 | 516.89 | 516.81 |
| 25 | 519.28 | 519.01 | 518.79 | 518.64 | 519.31 | 517.53 | 516.87 | 516.81 |
| 24 | 519.12 | 518.84 | 518.63 | 518.51 | 519.02 | 517.38 | 516.85 | 516.81 |
| 23 | 518.87 | 518.62 | 518.41 | 518.34 | 518.77 | 517.32 | 516.85 | 516.81 |
| 22 | 518.65 | 518.38 | 518.12 | 518.11 | 518.42 | 517.32 | 516.85 | 516.81 |
| 21 | 518.39 | 517.75 | 517.22 | 517.33 | 516.89 | 517.30 | 516.85 | 516.81 |
| 20 | 518.54 | 516.84 | 516.57 | 516.74 | 516.62 | 517.29 | 516.86 | 516.81 |
| 19 | 517.94 | 516.14 | 516.06 | 516.21 | 516.21 | 517.23 | 516.85 | 516.81 |
| 18 | 517.37 | 515.47 | 515.60 | 515.72 | 515.76 | 517.15 | 516.85 | 516.81 |
| 17 | 516.91 | 514.54 | 515.06 | 515.21 | 515.29 | 517.05 | 516.84 | 516.81 |
| 16 | 516.53 | 514.02 | 514.45 | 514.70 | 514.84 | 516.96 | 516.84 | 516.81 |
| 15 | 516.04 | 513.61 | 513.87 | 514.19 | 514.46 | 516.87 | 516.83 | 516.81 |
| 14 | 515.07 | 513.15 | 513.22 | 513.66 | 514.26 | 516.81 | 516.82 | 516.81 |
| 13 | 512.95 | 512.37 | 512.38 | 512.70 | 515.77 | 516.83 | 516.82 | 516.81 |
| 12 | 508.43 | 510.73 | 511.65 | 511.97 | 515.93 | 516.79 | 516.81 | 516.81 |
| 11 | 508.21 | 509.95 | 511.16 | 511.45 | 515.80 | 516.75 | 516.81 | 516.81 |
| 10 | 507.86 | 509.34 | 510.81 | 511.13 | 515.70 | 516.73 | 516.81 | 516.81 |
| 9 | 507.40 | 508.66 | 510.56 | 511.03 | 515.77 | 516.73 | 516.81 | 516.81 |
| 8 | 506.79 | 507.67 | 510.43 | 514.11 | 516.19 | 516.75 | 516.81 | 516.81 |
| 7 | 506.64 | 507.41 | 513.20 | 515.51 | 516.49 | 516.78 | 516.81 | 516.81 |
| 6 | 506.44 | 511.42 | 514.81 | 516.17 | 516.66 | 516.79 | 516.81 | 516.81 |
| 5 | 506.41 | 512.98 | 515.59 | 516.47 | 516.73 | 516.80 | 516.81 | 516.81 |
| 4 | 506.51 | 513.84 | 516.05 | 516.63 | 516.78 | 516.81 | 516.81 | 516.81 |
| 3 | 515.42 | 516.25 | 516.64 | 516.77 | 516.80 | 516.81 | 516.81 | 516.81 |
| 2 | 516.73 | 516.77 | 516.80 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 |
| 1 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 |

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| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 539.96 | 540.16 | 540.45 | 540.25 | 540.15 | 540.04 | 539.93 | 539.67 | 532.19 | 525.34 |
| 36 | 534.99 | 534.40 | 534.05 | 533.95 | 533.70 | 533.47 | 533.18 | 532.85 | 532.39 | 528.15 |
| 35 | 531.98 | 531.32 | 530.72 | 529.97 | 529.47 | 529.12 | 528.70 | 528.09 | 527.28 | 525.31 |
| 34 | 529.92 | 529.62 | 529.05 | 528.31 | 527.69 | 527.20 | 526.60 | 525.96 | 525.25 | 524.43 |
| 33 | 527.10 | 528.56 | 528.09 | 527.38 | 526.74 | 526.24 | 525.70 | 525.15 | 524.58 | 523.99 |
| 32 | 526.07 | 527.72 | 527.27 | 526.58 | 525.96 | 525.47 | 524.96 | 524.52 | 524.06 | 523.60 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 31 | 526.12 | 527.09 | 526.60 | 525.92 | 525.34 | 524.91 | 524.47 | 524.05 | 523.64 | 523.22 |
| 30 | 526.55 | 526.65 | 526.04 | 525.36 | 524.80 | 524.41 | 524.02 | 523.62 | 523.24 | 522.88 |
| 29 | 527.01 | 526.44 | 525.61 | 524.86 | 524.31 | 523.93 | 523.55 | 523.18 | 522.85 | 522.53 |
| 28 | 527.69 | 526.29 | 525.23 | 524.40 | 523.81 | 523.42 | 523.07 | 522.73 | 522.43 | 522.15 |
| 27 | 527.95 | 526.15 | 524.87 | 523.93 | 523.30 | 522.91 | 522.56 | 522.24 | 521.96 | 521.71 |
| 26 | 528.12 | 526.05 | 524.63 | 523.62 | 522.94 | 522.54 | 522.18 | 521.86 | 521.59 | 521.36 |
| 25 | 528.31 | 525.94 | 524.39 | 523.28 | 522.55 | 522.13 | 521.75 | 521.43 | 521.16 | 520.95 |
| 24 | 528.13 | 525.81 | 524.15 | 522.95 | 522.13 | 521.67 | 521.27 | 520.93 | 520.66 | 520.46 |
| 23 | 528.03 | 525.69 | 523.92 | 522.61 | 521.67 | 521.12 | 520.71 | 520.36 | 520.07 | 519.88 |
| 22 | 527.92 | 525.56 | 523.71 | 522.27 | 521.18 | 520.40 | 520.09 | 519.70 | 519.38 | 519.18 |
| 21 | 527.75 | 525.45 | 523.52 | 521.96 | 520.77 | 520.07 | 519.49 | 518.97 | 518.55 | 518.37 |
| 20 | 527.52 | 525.35 | 523.36 | 521.68 | 520.35 | 519.56 | 518.81 | 518.10 | 517.46 | 517.07 |
| 19 | 527.19 | 525.28 | 523.25 | 521.45 | 519.92 | 518.98 | 518.04 | 517.12 | 516.09 | 515.47 |
| 18 | 526.93 | 525.21 | 523.13 | 521.12 | 519.13 | 517.71 | 516.35 | 515.14 | 513.96 | 513.40 |
| 17 | 526.85 | 525.17 | 523.08 | 520.96 | 518.54 | 516.11 | 514.40 | 513.04 | 511.76 | 511.04 |
| 16 | 523.81 | 522.63 | 521.26 | 519.74 | 517.55 | 514.17 | 512.13 | 510.67 | 509.66 | 509.19 |
| 15 | 520.56 | 519.87 | 519.09 | 518.01 | 516.10 | 513.31 | 508.56 | 507.85 | 507.53 | 507.37 |
| 14 | 518.46 | 518.12 | 517.65 | 516.58 | 514.45 | 511.56 | 506.20 | 506.01 | 505.88 | 505.74 |
| 13 | 517.43 | 517.27 | 516.80 | 515.15 | 512.13 | 509.25 | 504.19 | 504.25 | 504.23 | 504.17 |
| 12 | 517.01 | 516.90 | 516.09 | 512.96 | 507.62 | 505.41 | 502.16 | 502.48 | 502.60 | 502.65 |
| 11 | 516.85 | 516.69 | 515.05 | 509.33 | 497.74 | 498.11 | 499.64 | 500.66 | 501.00 | 501.18 |
| 10 | 516.76 | 516.44 | 513.21 | 504.44 | 497.09 | 497.44 | 498.25 | 498.97 | 499.49 | 499.78 |
| 9 | 516.61 | 516.00 | 509.79 | 494.90 | 495.60 | 496.29 | 497.19 | 497.72 | 498.16 | 498.46 |
| 8 | 516.23 | 515.17 | 504.03 | 494.35 | 495.17 | 496.02 | 496.79 | 497.36 | 497.87 | 498.23 |
| 7 | 515.25 | 513.69 | 493.14 | 493.79 | 495.23 | 495.81 | 496.42 | 497.09 | 497.69 | 498.10 |
| 6 | 512.92 | 511.27 | 492.76 | 493.78 | 494.95 | 495.51 | 496.01 | 496.65 | 497.54 | 498.04 |
| 5 | 507.91 | 506.52 | 492.62 | 493.79 | 494.73 | 495.26 | 495.82 | 496.32 | 503.71 | 506.57 |
| 4 | 491.74 | 491.41 | 492.41 | 493.19 | 494.03 | 494.53 | 503.76 | 508.54 | 511.76 | 513.45 |
| 3 | 491.56 | 491.44 | 492.19 | 492.91 | 493.56 | 504.70 | 510.95 | 514.08 | 515.54 | 516.17 |
| 2 | 491.47 | 491.35 | 491.94 | 509.88 | 513.73 | 515.22 | 516.06 | 516.48 | 516.67 | 516.75 |
| 1 | 491.39 | 491.23 | 511.54 | 515.53 | 516.37 | 516.61 | 516.73 | 516.78 | 516.80 | 516.80 |

| | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 521.02 | 519.01 | 518.25 | 518.10 | 518.35 | 519.13 | 521.64 | 524.85 | 525.06 | 525.52 |
| 36 | 523.07 | 522.93 | 522.76 | 522.57 | 522.40 | 522.26 | 522.18 | 522.39 | 522.61 | 523.08 |
| 35 | 523.64 | 523.12 | 522.72 | 522.36 | 522.02 | 521.69 | 521.27 | 520.97 | 520.83 | 520.81 |
| 34 | 523.65 | 523.03 | 522.59 | 522.18 | 521.78 | 521.37 | 520.75 | 520.06 | 519.25 | 518.28 |
| 33 | 523.43 | 522.91 | 522.44 | 522.02 | 521.60 | 521.16 | 520.45 | 519.56 | 518.30 | 516.16 |
| 32 | 523.13 | 522.68 | 522.26 | 521.85 | 521.44 | 521.00 | 520.28 | 519.38 | 518.18 | 516.59 |
| 31 | 522.83 | 522.44 | 522.07 | 521.70 | 521.31 | 520.91 | 520.26 | 519.46 | 518.42 | 516.86 |
| 30 | 522.54 | 522.20 | 521.87 | 521.55 | 521.21 | 520.87 | 520.34 | 519.74 | 519.10 | 518.49 |
| 29 | 522.23 | 521.95 | 521.67 | 521.39 | 521.12 | 520.85 | 520.44 | 520.03 | 519.70 | 519.59 |
| 28 | 521.89 | 521.66 | 521.44 | 521.23 | 521.02 | 520.81 | 520.50 | 520.21 | 520.03 | 520.10 |
| 27 | 521.50 | 521.33 | 521.19 | 521.05 | 520.90 | 520.75 | 520.51 | 520.27 | 520.04 | 519.85 |
| 26 | 521.20 | 521.08 | 521.00 | 520.92 | 520.82 | 520.71 | 520.51 | 520.27 | 520.01 | 519.73 |
| 25 | 520.83 | 520.79 | 520.81 | 520.80 | 520.76 | 520.68 | 520.50 | 520.27 | 519.99 | 519.62 |
| 24 | 520.35 | 520.34 | 520.45 | 520.60 | 520.66 | 520.65 | 520.49 | 520.26 | 519.96 | 519.48 |
| 23 | 519.77 | 519.75 | 519.97 | 520.43 | 520.56 | 520.41 | 519.94 | 519.83 | 519.97 | 519.28 |
| 22 | 519.08 | 518.99 | 518.93 | 519.75 | 519.58 | 519.09 | 518.63 | 518.65 | 519.12 | 519.20 |
| 21 | 518.27 | 517.92 | 517.73 | 518.45 | 518.26 | 517.92 | 517.65 | 517.74 | 518.25 | 519.05 |
| 20 | 516.63 | 516.26 | 516.10 | 516.97 | 517.13 | 517.12 | 517.11 | 517.22 | 517.59 | 518.29 |
| 19 | 514.80 | 514.31 | 514.04 | 514.87 | 515.91 | 516.47 | 516.79 | 516.95 | 517.19 | 517.64 |
| 18 | 512.61 | 512.02 | 511.32 | 510.39 | 514.26 | 515.76 | 516.52 | 516.78 | 516.96 | 517.24 |
| 17 | 510.20 | 509.87 | 509.61 | 509.34 | 513.10 | 514.93 | 516.14 | 516.58 | 516.78 | 516.97 |
| 16 | 508.67 | 508.29 | 507.81 | 507.63 | 511.42 | 513.41 | 515.38 | 516.19 | 516.50 | 516.69 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 507.02 | 506.53 | 505.94 | 505.73 | 508.51 | 510.15 | 513.83 | 515.32 | 515.88 | 516.16 |
| 14 | 505.50 | 505.16 | 504.79 | 504.55 | 503.00 | 502.84 | 511.07 | 513.50 | 514.42 | 514.94 |
| 13 | 504.03 | 503.81 | 503.51 | 503.13 | 502.06 | 501.79 | 507.59 | 510.00 | 511.27 | 512.23 |
| 12 | 502.62 | 502.49 | 502.28 | 501.91 | 501.39 | 501.19 | 501.57 | 503.43 | 505.14 | 506.73 |
| 11 | 501.26 | 501.25 | 501.16 | 501.01 | 500.86 | 500.88 | 501.37 | 503.39 | 505.11 | 506.66 |
| 10 | 499.95 | 500.05 | 500.09 | 500.10 | 500.15 | 500.35 | 501.02 | 503.40 | 505.08 | 506.51 |
| 9 | 498.67 | 498.86 | 498.97 | 499.08 | 499.26 | 499.58 | 500.54 | 503.63 | 505.16 | 506.34 |
| 8 | 498.45 | 498.74 | 499.00 | 499.30 | 499.72 | 500.45 | 502.62 | 504.47 | 505.45 | 506.17 |
| 7 | 498.38 | 498.67 | 499.05 | 499.42 | 499.93 | 500.73 | 502.73 | 504.71 | 505.55 | 506.16 |
| 6 | 498.40 | 498.65 | 505.24 | 507.42 | 508.29 | 508.70 | 508.60 | 505.38 | 505.78 | 506.17 |
| 5 | 507.86 | 508.96 | 511.14 | 512.42 | 512.98 | 513.04 | 511.84 | 505.65 | 505.98 | 506.23 |
| 4 | 514.28 | 514.81 | 515.34 | 515.69 | 515.83 | 515.75 | 514.95 | 512.19 | 506.28 | 506.35 |
| 3 | 516.44 | 516.56 | 516.64 | 516.68 | 516.69 | 516.67 | 516.51 | 516.07 | 515.36 | 515.24 |
| 2 | 516.78 | 516.80 | 516.80 | 516.80 | 516.80 | 516.80 | 516.79 | 516.77 | 516.73 | 516.72 |
| 1 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 |

| | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|---|---|---|---|---|---|---|---|---|
| 37 | 526.05 | 526.89 | 527.95 | 528.67 | 530.80 | 531.89 | 533.52 | 536.79 |
| 36 | 523.83 | 524.57 | 525.43 | 526.33 | 527.27 | 528.44 | 529.82 | 530.69 |
| 35 | 521.13 | 522.06 | 523.18 | 524.28 | 525.25 | 526.38 | 527.18 | 529.01 |
| 34 | 517.55 | 519.71 | 521.65 | 523.12 | 524.24 | 525.27 | 526.16 | 522.18 |
| 33 | 511.20 | 518.26 | 521.10 | 522.68 | 523.93 | 524.91 | 525.78 | 519.42 |
| 32 | 515.03 | 517.98 | 520.08 | 521.48 | 522.65 | 523.42 | 521.93 | 517.86 |
| 31 | 511.11 | 515.66 | 518.76 | 520.46 | 521.79 | 522.55 | 519.08 | 517.18 |
| 30 | 516.38 | 517.10 | 518.64 | 519.75 | 521.39 | 522.21 | 517.91 | 516.95 |
| 29 | 518.52 | 518.46 | 518.84 | 519.13 | 520.72 | 519.99 | 517.27 | 516.86 |
| 28 | 519.57 | 519.40 | 519.08 | 518.99 | 518.98 | 518.45 | 517.00 | 516.83 |
| 27 | 519.51 | 519.23 | 518.97 | 518.80 | 518.87 | 517.91 | 516.92 | 516.82 |
| 26 | 519.41 | 519.14 | 518.90 | 518.74 | 518.85 | 517.71 | 516.89 | 516.82 |
| 25 | 519.29 | 519.01 | 518.79 | 518.64 | 519.31 | 517.53 | 516.87 | 516.81 |
| 24 | 519.12 | 518.84 | 518.63 | 518.51 | 519.02 | 517.38 | 516.85 | 516.81 |
| 23 | 518.88 | 518.62 | 518.41 | 518.34 | 518.77 | 517.32 | 516.85 | 516.81 |
| 22 | 518.64 | 518.37 | 518.11 | 518.10 | 518.43 | 517.32 | 516.85 | 516.81 |
| 21 | 518.39 | 517.75 | 517.22 | 517.33 | 516.88 | 517.30 | 516.85 | 516.81 |
| 20 | 518.54 | 516.84 | 516.57 | 516.74 | 516.62 | 517.29 | 516.86 | 516.81 |
| 19 | 517.94 | 516.14 | 516.06 | 516.21 | 516.21 | 517.23 | 516.85 | 516.81 |
| 18 | 517.38 | 515.47 | 515.60 | 515.72 | 515.76 | 517.15 | 516.85 | 516.81 |
| 17 | 516.91 | 514.53 | 515.07 | 515.21 | 515.29 | 517.05 | 516.84 | 516.81 |
| 16 | 516.53 | 514.01 | 514.45 | 514.70 | 514.84 | 516.96 | 516.84 | 516.81 |
| 15 | 516.05 | 513.61 | 513.87 | 514.19 | 514.45 | 516.87 | 516.83 | 516.81 |
| 14 | 515.08 | 513.15 | 513.22 | 513.67 | 514.26 | 516.82 | 516.82 | 516.81 |
| 13 | 512.96 | 512.37 | 512.38 | 512.70 | 515.78 | 516.83 | 516.82 | 516.81 |
| 12 | 508.41 | 510.73 | 511.65 | 511.96 | 515.94 | 516.79 | 516.81 | 516.81 |
| 11 | 508.21 | 509.95 | 511.16 | 511.45 | 515.80 | 516.75 | 516.81 | 516.81 |
| 10 | 507.86 | 509.34 | 510.82 | 511.13 | 515.71 | 516.73 | 516.81 | 516.81 |
| 9 | 507.40 | 508.67 | 510.56 | 511.02 | 515.77 | 516.73 | 516.81 | 516.81 |
| 8 | 506.79 | 507.67 | 510.42 | 514.11 | 516.19 | 516.75 | 516.81 | 516.81 |
| 7 | 506.64 | 507.39 | 513.20 | 515.51 | 516.49 | 516.78 | 516.81 | 516.81 |
| 6 | 506.43 | 511.43 | 514.81 | 516.17 | 516.66 | 516.79 | 516.81 | 516.81 |
| 5 | 506.40 | 512.99 | 515.60 | 516.47 | 516.73 | 516.80 | 516.81 | 516.81 |
| 4 | 506.50 | 513.85 | 516.05 | 516.63 | 516.78 | 516.81 | 516.81 | 516.81 |
| 3 | 515.42 | 516.25 | 516.65 | 516.77 | 516.80 | 516.81 | 516.81 | 516.81 |
| 2 | 516.73 | 516.78 | 516.80 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 |
| 1 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 |

K = 4

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 540.01 | 540.21 | 540.51 | 540.31 | 540.21 | 540.10 | 540.01 | 539.69 | 532.18 | 525.26 |
| 36 | 535.00 | 534.41 | 534.07 | 533.96 | 533.71 | 533.48 | 533.19 | 532.86 | 532.40 | 528.18 |
| 35 | 532.00 | 531.33 | 530.73 | 530.00 | 529.50 | 529.14 | 528.71 | 528.10 | 527.29 | 525.32 |
| 34 | 529.99 | 529.63 | 529.05 | 528.32 | 527.70 | 527.21 | 526.62 | 525.98 | 525.27 | 524.44 |
| 33 | 526.99 | 528.57 | 528.09 | 527.38 | 526.75 | 526.25 | 525.71 | 525.16 | 524.59 | 524.00 |
| 32 | 526.00 | 527.72 | 527.28 | 526.59 | 525.96 | 525.49 | 524.98 | 524.53 | 524.07 | 523.60 |
| 31 | 526.09 | 527.10 | 526.60 | 525.93 | 525.34 | 524.92 | 524.48 | 524.06 | 523.65 | 523.23 |
| 30 | 526.51 | 526.66 | 526.05 | 525.36 | 524.81 | 524.42 | 524.02 | 523.63 | 523.24 | 522.89 |
| 29 | 526.99 | 526.45 | 525.61 | 524.87 | 524.31 | 523.93 | 523.56 | 523.19 | 522.85 | 522.54 |
| 28 | 527.80 | 526.30 | 525.23 | 524.40 | 523.82 | 523.43 | 523.07 | 522.74 | 522.43 | 522.15 |
| 27 | 528.01 | 526.16 | 524.87 | 523.94 | 523.30 | 522.91 | 522.56 | 522.24 | 521.96 | 521.71 |
| 26 | 528.19 | 526.05 | 524.64 | 523.62 | 522.95 | 522.55 | 522.19 | 521.87 | 521.59 | 521.37 |
| 25 | 528.49 | 525.94 | 524.39 | 523.29 | 522.55 | 522.14 | 521.76 | 521.43 | 521.16 | 520.96 |
| 24 | 528.19 | 525.82 | 524.16 | 522.95 | 522.13 | 521.67 | 521.27 | 520.94 | 520.66 | 520.47 |
| 23 | 528.10 | 525.69 | 523.93 | 522.61 | 521.67 | 521.13 | 520.72 | 520.37 | 520.08 | 519.88 |
| 22 | 528.01 | 525.57 | 523.71 | 522.27 | 521.17 | 520.46 | 520.10 | 519.71 | 519.39 | 519.19 |
| 21 | 527.85 | 525.45 | 523.52 | 521.96 | 520.76 | 520.08 | 519.50 | 518.98 | 518.56 | 518.35 |
| 20 | 527.62 | 525.35 | 523.37 | 521.68 | 520.33 | 519.57 | 518.82 | 518.11 | 517.47 | 517.06 |
| 19 | 527.15 | 525.28 | 523.25 | 521.44 | 519.87 | 518.94 | 517.99 | 517.06 | 516.08 | 515.45 |
| 18 | 526.92 | 525.21 | 523.14 | 521.13 | 519.10 | 517.71 | 516.36 | 515.16 | 514.01 | 513.40 |
| 17 | 526.86 | 525.18 | 523.09 | 520.97 | 518.49 | 516.09 | 514.38 | 513.06 | 511.82 | 511.08 |
| 16 | 523.83 | 522.64 | 521.28 | 519.77 | 517.61 | 514.19 | 512.13 | 510.70 | 509.71 | 509.21 |
| 15 | 520.53 | 519.85 | 519.07 | 518.02 | 516.14 | 513.39 | 508.58 | 507.94 | 507.58 | 507.39 |
| 14 | 518.43 | 518.10 | 517.64 | 516.60 | 514.51 | 511.66 | 506.19 | 506.03 | 505.89 | 505.75 |
| 13 | 517.42 | 517.26 | 516.81 | 515.19 | 512.21 | 509.36 | 504.18 | 504.26 | 504.25 | 504.18 |
| 12 | 517.01 | 516.90 | 516.11 | 513.04 | 507.74 | 505.54 | 502.15 | 502.49 | 502.61 | 502.66 |
| 11 | 516.85 | 516.69 | 515.10 | 509.45 | 497.74 | 498.11 | 499.63 | 500.66 | 501.01 | 501.19 |
| 10 | 516.76 | 516.46 | 513.29 | 504.59 | 497.09 | 497.45 | 498.23 | 498.99 | 499.49 | 499.79 |
| 9 | 516.62 | 516.02 | 509.91 | 494.91 | 495.53 | 496.18 | 496.98 | 497.47 | 497.87 | 498.14 |
| 8 | 516.25 | 515.21 | 504.20 | 494.29 | 495.06 | 496.02 | 496.79 | 497.36 | 497.86 | 498.22 |
| 7 | 515.30 | 513.76 | 493.15 | 493.69 | 495.22 | 495.81 | 496.43 | 497.09 | 497.69 | 498.10 |
| 6 | 513.01 | 511.38 | 492.70 | 493.70 | 494.95 | 495.51 | 496.02 | 496.66 | 497.55 | 498.05 |
| 5 | 508.05 | 506.68 | 492.56 | 493.79 | 494.73 | 495.26 | 495.84 | 496.33 | 503.87 | 506.71 |
| 4 | 491.75 | 491.39 | 492.39 | 493.19 | 494.03 | 494.55 | 503.92 | 508.68 | 511.86 | 513.53 |
| 3 | 491.56 | 491.43 | 492.19 | 492.92 | 493.57 | 504.86 | 511.07 | 514.15 | 515.58 | 516.20 |
| 2 | 491.47 | 491.34 | 491.95 | 510.00 | 513.79 | 515.26 | 516.09 | 516.50 | 516.68 | 516.76 |
| 1 | 491.40 | 491.22 | 511.64 | 515.56 | 516.39 | 516.62 | 516.73 | 516.78 | 516.80 | 516.81 |

| | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 520.95 | 518.96 | 518.22 | 518.08 | 518.33 | 519.10 | 521.63 | 524.86 | 525.08 | 525.54 |
| 36 | 523.07 | 522.94 | 522.76 | 522.58 | 522.40 | 522.27 | 522.19 | 522.40 | 522.63 | 523.09 |
| 35 | 523.66 | 523.13 | 522.73 | 522.37 | 522.02 | 521.70 | 521.28 | 520.98 | 520.83 | 520.82 |
| 34 | 523.66 | 523.05 | 522.60 | 522.18 | 521.78 | 521.38 | 520.76 | 520.07 | 519.26 | 518.29 |
| 33 | 523.43 | 522.92 | 522.45 | 522.02 | 521.60 | 521.17 | 520.46 | 519.57 | 518.31 | 516.20 |
| 32 | 523.14 | 522.69 | 522.26 | 521.85 | 521.44 | 521.01 | 520.29 | 519.39 | 518.20 | 516.62 |
| 31 | 522.83 | 522.45 | 522.07 | 521.70 | 521.32 | 520.92 | 520.26 | 519.47 | 518.44 | 517.28 |
| 30 | 522.54 | 522.21 | 521.88 | 521.55 | 521.22 | 520.88 | 520.34 | 519.75 | 519.12 | 518.79 |
| 29 | 522.24 | 521.95 | 521.67 | 521.40 | 521.13 | 520.85 | 520.45 | 520.04 | 519.72 | 519.83 |
| 28 | 521.90 | 521.66 | 521.44 | 521.23 | 521.02 | 520.81 | 520.51 | 520.22 | 520.04 | 520.30 |
| 27 | 521.51 | 521.34 | 521.19 | 521.05 | 520.91 | 520.75 | 520.52 | 520.27 | 520.05 | 519.86 |
| 26 | 521.20 | 521.09 | 521.01 | 520.92 | 520.83 | 520.71 | 520.51 | 520.28 | 520.02 | 519.74 |
| 25 | 520.83 | 520.79 | 520.80 | 520.80 | 520.76 | 520.68 | 520.51 | 520.27 | 519.99 | 519.62 |

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| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 24 | 520.35 | 520.34 | 520.45 | 520.60 | 520.66 | 520.66 | 520.50 | 520.27 | 519.97 | 519.48 |
| 23 | 519.78 | 519.77 | 519.97 | 520.44 | 520.56 | 520.45 | 519.96 | 519.85 | 520.01 | 519.30 |
| 22 | 519.08 | 518.98 | 518.94 | 519.80 | 519.60 | 519.09 | 518.61 | 518.63 | 519.13 | 519.33 |
| 21 | 518.21 | 517.90 | 517.74 | 518.48 | 518.26 | 517.91 | 517.64 | 517.72 | 518.24 | 519.09 |
| 20 | 516.63 | 516.27 | 516.11 | 517.01 | 517.14 | 517.12 | 517.10 | 517.21 | 517.58 | 518.30 |
| 19 | 514.81 | 514.32 | 514.06 | 514.94 | 515.94 | 516.49 | 516.79 | 516.94 | 517.18 | 517.64 |
| 18 | 512.63 | 512.05 | 511.33 | 510.40 | 514.32 | 515.79 | 516.53 | 516.78 | 516.96 | 517.24 |
| 17 | 510.29 | 509.92 | 509.63 | 509.35 | 513.17 | 514.98 | 516.16 | 516.59 | 516.79 | 516.97 |
| 16 | 508.69 | 508.30 | 507.84 | 507.66 | 511.51 | 513.48 | 515.42 | 516.21 | 516.52 | 516.70 |
| 15 | 507.04 | 506.56 | 506.00 | 505.80 | 508.62 | 510.26 | 513.89 | 515.37 | 515.91 | 516.18 |
| 14 | 505.51 | 505.17 | 504.81 | 504.57 | 503.17 | 503.03 | 511.17 | 513.57 | 514.47 | 514.99 |
| 13 | 504.04 | 503.82 | 503.52 | 503.11 | 502.05 | 501.78 | 507.71 | 510.10 | 511.37 | 512.31 |
| 12 | 502.63 | 502.50 | 502.29 | 501.93 | 501.42 | 501.20 | 501.59 | 503.43 | 505.15 | 506.74 |
| 11 | 501.27 | 501.26 | 501.17 | 501.02 | 500.87 | 500.88 | 501.39 | 503.40 | 505.12 | 506.67 |
| 10 | 499.96 | 500.05 | 500.09 | 500.10 | 500.15 | 500.34 | 501.04 | 503.41 | 505.09 | 506.52 |
| 9 | 498.34 | 498.50 | 498.61 | 498.71 | 498.87 | 499.18 | 500.12 | 503.64 | 505.18 | 506.35 |
| 8 | 498.45 | 498.73 | 499.00 | 499.29 | 499.72 | 500.45 | 502.88 | 504.58 | 505.50 | 506.16 |
| 7 | 498.38 | 498.67 | 499.05 | 499.42 | 499.93 | 500.74 | 502.75 | 504.72 | 505.56 | 506.16 |
| 6 | 498.40 | 498.65 | 505.38 | 507.55 | 508.41 | 508.82 | 508.72 | 505.39 | 505.78 | 506.18 |
| 5 | 507.99 | 509.07 | 511.24 | 512.51 | 513.07 | 513.12 | 511.94 | 505.66 | 505.98 | 506.23 |
| 4 | 514.35 | 514.87 | 515.38 | 515.73 | 515.87 | 515.78 | 515.00 | 512.28 | 506.29 | 506.36 |
| 3 | 516.46 | 516.57 | 516.65 | 516.69 | 516.70 | 516.67 | 516.52 | 516.09 | 515.39 | 515.27 |
| 2 | 516.79 | 516.80 | 516.80 | 516.81 | 516.81 | 516.80 | 516.80 | 516.77 | 516.74 | 516.73 |
| 1 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 |

| | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|---|---|---|---|---|---|---|---|---|
| 37 | 526.00 | 526.92 | 528.08 | 528.54 | 531.08 | 532.00 | 533.61 | 537.08 |
| 36 | 523.83 | 524.58 | 525.44 | 526.34 | 527.28 | 528.45 | 529.82 | 530.62 |
| 35 | 521.14 | 522.07 | 523.19 | 524.29 | 525.26 | 526.38 | 527.12 | 529.00 |
| 34 | 517.59 | 519.74 | 521.67 | 523.13 | 524.25 | 525.28 | 526.16 | 522.15 |
| 33 | 511.85 | 518.71 | 521.36 | 522.85 | 524.00 | 524.96 | 525.78 | 519.39 |
| 32 | 515.49 | 518.40 | 520.08 | 521.50 | 522.66 | 523.43 | 521.92 | 517.84 |
| 31 | 512.15 | 515.80 | 518.77 | 520.47 | 521.79 | 522.55 | 519.06 | 517.17 |
| 30 | 516.44 | 517.14 | 518.65 | 519.76 | 521.40 | 522.22 | 517.89 | 516.94 |
| 29 | 518.54 | 518.47 | 518.85 | 519.13 | 520.76 | 519.99 | 517.27 | 516.86 |
| 28 | 519.69 | 519.51 | 519.09 | 518.99 | 518.99 | 518.44 | 517.00 | 516.83 |
| 27 | 519.52 | 519.23 | 518.98 | 518.78 | 518.88 | 517.91 | 516.92 | 516.82 |
| 26 | 519.42 | 519.14 | 518.91 | 518.71 | 518.86 | 517.71 | 516.89 | 516.82 |
| 25 | 519.29 | 519.02 | 518.79 | 518.61 | 519.36 | 517.53 | 516.87 | 516.82 |
| 24 | 519.12 | 518.85 | 518.63 | 518.49 | 519.04 | 517.37 | 516.85 | 516.81 |
| 23 | 518.89 | 518.63 | 518.42 | 518.33 | 518.79 | 517.31 | 516.85 | 516.81 |
| 22 | 518.63 | 518.35 | 518.08 | 518.10 | 518.47 | 517.32 | 516.85 | 516.81 |
| 21 | 518.40 | 517.76 | 517.16 | 517.38 | 516.89 | 517.31 | 516.86 | 516.82 |
| 20 | 518.59 | 516.85 | 516.54 | 516.74 | 516.63 | 517.30 | 516.86 | 516.82 |
| 19 | 517.97 | 516.14 | 516.05 | 516.22 | 516.22 | 517.24 | 516.86 | 516.82 |
| 18 | 517.40 | 515.46 | 515.61 | 515.72 | 515.76 | 517.16 | 516.85 | 516.82 |
| 17 | 516.94 | 514.45 | 515.09 | 515.22 | 515.29 | 517.07 | 516.85 | 516.81 |
| 16 | 516.57 | 513.97 | 514.46 | 514.70 | 514.84 | 516.97 | 516.84 | 516.81 |
| 15 | 516.09 | 513.60 | 513.88 | 514.20 | 514.46 | 516.89 | 516.83 | 516.81 |
| 14 | 515.14 | 513.17 | 513.23 | 513.67 | 514.26 | 516.83 | 516.83 | 516.81 |
| 13 | 513.05 | 512.45 | 512.35 | 512.70 | 515.84 | 516.84 | 516.82 | 516.81 |
| 12 | 508.42 | 510.74 | 511.65 | 511.97 | 515.98 | 516.80 | 516.82 | 516.81 |
| 11 | 508.22 | 509.96 | 511.18 | 511.45 | 515.84 | 516.76 | 516.81 | 516.81 |
| 10 | 507.87 | 509.35 | 510.86 | 511.13 | 515.75 | 516.73 | 516.81 | 516.81 |
| 9 | 507.40 | 508.67 | 510.63 | 511.02 | 515.81 | 516.73 | 516.81 | 516.81 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8 | 506.74 | 507.53 | 510.60 | 514.19 | 516.22 | 516.76 | 516.81 | 516.81 |
| 7 | 506.64 | 507.39 | 513.29 | 515.55 | 516.51 | 516.78 | 516.81 | 516.81 |
| 6 | 506.44 | 511.53 | 514.87 | 516.19 | 516.67 | 516.80 | 516.81 | 516.81 |
| 5 | 506.40 | 513.07 | 515.63 | 516.49 | 516.74 | 516.81 | 516.81 | 516.81 |
| 4 | 506.51 | 513.91 | 516.07 | 516.64 | 516.78 | 516.81 | 516.81 | 516.81 |
| 3 | 515.45 | 516.27 | 516.65 | 516.77 | 516.81 | 516.81 | 516.81 | 516.81 |
| 2 | 516.74 | 516.78 | 516.80 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 |
| 1 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 | 516.81 |

FRACTION OF CELL THAT IS SATURATED (-)

AREAL LAYERS

K = 4

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 1.5002 | 1.5063 | 1.5151 | 1.5090 | 1.5063 | 1.5029 | 1.5002 | 1.4907 | 1.2699 | 1.0665 |
| 36 | 1.3529 | 1.3357 | 1.3257 | 1.3222 | 1.3149 | 1.3081 | 1.2998 | 1.2899 | 1.2765 | 1.1525 |
| 35 | 1.2647 | 1.2451 | 1.2274 | 1.2059 | 1.1911 | 1.1806 | 1.1678 | 1.1500 | 1.1262 | 1.0682 |
| 34 | 1.2056 | 1.1950 | 1.1781 | 1.1565 | 1.1383 | 1.1238 | 1.1065 | 1.0876 | 1.0667 | 1.0424 |
| 33 | 1.1174 | 1.1637 | 1.1498 | 1.1289 | 1.1102 | 1.0957 | 1.0798 | 1.0635 | 1.0468 | 1.0295 |
| 32 | 1.0882 | 1.1388 | 1.1258 | 1.1055 | 1.0872 | 1.0731 | 1.0582 | 1.0449 | 1.0315 | 1.0177 |
| 31 | 1.0909 | 1.1206 | 1.1060 | 1.0860 | 1.0689 | 1.0564 | 1.0435 | 1.0312 | 1.0190 | 1.0067 |
| 30 | 1.1032 | 1.1076 | 1.0897 | 1.0695 | 1.0532 | 1.0417 | 1.0300 | 1.0185 | 1.0072 | 0.9966 |
| 29 | 1.1174 | 1.1014 | 1.0769 | 1.0549 | 1.0385 | 1.0274 | 1.0164 | 1.0056 | 0.9956 | 0.9864 |
| 28 | 1.1412 | 1.0971 | 1.0657 | 1.0412 | 1.0240 | 1.0127 | 1.0021 | 0.9923 | 0.9834 | 0.9751 |
| 27 | 1.1473 | 1.0928 | 1.0551 | 1.0276 | 1.0089 | 0.9975 | 0.9872 | 0.9777 | 0.9694 | 0.9622 |
| 26 | 1.1527 | 1.0898 | 1.0481 | 1.0183 | 0.9984 | 0.9867 | 0.9761 | 0.9666 | 0.9586 | 0.9520 |
| 25 | 1.1615 | 1.0866 | 1.0410 | 1.0084 | 0.9869 | 0.9746 | 0.9635 | 0.9539 | 0.9460 | 0.9400 |
| 24 | 1.1527 | 1.0829 | 1.0340 | 0.9986 | 0.9745 | 0.9609 | 0.9492 | 0.9393 | 0.9313 | 0.9255 |
| 23 | 1.1500 | 1.0792 | 1.0273 | 0.9886 | 0.9608 | 0.9451 | 0.9330 | 0.9226 | 0.9142 | 0.9083 |
| 22 | 1.1473 | 1.0755 | 1.0209 | 0.9786 | 0.9463 | 0.9254 | 0.9146 | 0.9033 | 0.8939 | 0.8879 |
| 21 | 1.1425 | 1.0721 | 1.0153 | 0.9695 | 0.9340 | 0.9140 | 0.8970 | 0.8816 | 0.8694 | 0.8632 |
| 20 | 1.1357 | 1.0693 | 1.0108 | 0.9613 | 0.9214 | 0.8990 | 0.8769 | 0.8561 | 0.8374 | 0.8252 |
| 19 | 1.1222 | 1.0671 | 1.0075 | 0.9542 | 0.9079 | 0.8807 | 0.8528 | 0.8254 | 0.7965 | 0.7781 |
| 18 | 1.1154 | 1.0650 | 1.0040 | 0.9449 | 0.8853 | 0.8443 | 0.8047 | 0.7693 | 0.7357 | 0.7176 |
| 17 | 1.1135 | 1.0641 | 1.0026 | 0.9403 | 0.8673 | 0.7969 | 0.7466 | 0.7076 | 0.6711 | 0.6496 |
| 16 | 1.0243 | 0.9895 | 0.9493 | 0.9051 | 0.8414 | 0.7408 | 0.6803 | 0.6382 | 0.6091 | 0.5944 |
| 15 | 0.9273 | 0.9072 | 0.8845 | 0.8534 | 0.7982 | 0.7174 | 0.5758 | 0.5569 | 0.5464 | 0.5409 |
| 14 | 0.8656 | 0.8559 | 0.8424 | 0.8118 | 0.7504 | 0.6664 | 0.5057 | 0.5010 | 0.4969 | 0.4927 |
| 13 | 0.8358 | 0.8313 | 0.8179 | 0.7704 | 0.6827 | 0.5989 | 0.4465 | 0.4488 | 0.4484 | 0.4466 |
| 12 | 0.8238 | 0.8206 | 0.7974 | 0.7072 | 0.5512 | 0.4865 | 0.3867 | 0.3968 | 0.4004 | 0.4018 |
| 11 | 0.8192 | 0.8146 | 0.7677 | 0.6014 | 0.2572 | 0.2681 | 0.3128 | 0.3429 | 0.3532 | 0.3586 |
| 10 | 0.8165 | 0.8075 | 0.7145 | 0.4586 | 0.2381 | 0.2484 | 0.2715 | 0.2938 | 0.3086 | 0.3172 |
| 9 | 0.8122 | 0.7948 | 0.6150 | 0.1738 | 0.1921 | 0.2113 | 0.2347 | 0.2491 | 0.2608 | 0.2690 |
| 8 | 0.8015 | 0.7710 | 0.4470 | 0.1555 | 0.1783 | 0.2065 | 0.2291 | 0.2460 | 0.2607 | 0.2712 |
| 7 | 0.7735 | 0.7283 | 0.1222 | 0.1379 | 0.1831 | 0.2003 | 0.2184 | 0.2379 | 0.2555 | 0.2677 |
| 6 | 0.7061 | 0.6583 | 0.1088 | 0.1382 | 0.1751 | 0.1916 | 0.2064 | 0.2252 | 0.2514 | 0.2662 |
| 5 | 0.5603 | 0.5199 | 0.1048 | 0.1408 | 0.1685 | 0.1842 | 0.2011 | 0.2157 | 0.4373 | 0.5210 |
| 4 | 0.0808 | 0.0703 | 0.0998 | 0.1234 | 0.1479 | 0.1631 | 0.4389 | 0.5788 | 0.6725 | 0.7215 |
| 3 | 0.0753 | 0.0714 | 0.0940 | 0.1153 | 0.1344 | 0.4666 | 0.6490 | 0.7397 | 0.7818 | 0.8000 |
| 2 | 0.0727 | 0.0687 | 0.0867 | 0.6176 | 0.7293 | 0.7724 | 0.7967 | 0.8088 | 0.8142 | 0.8164 |
| 1 | 0.0705 | 0.0652 | 0.6660 | 0.7813 | 0.8055 | 0.8124 | 0.8156 | 0.8170 | 0.8176 | 0.8179 |

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| | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 0.9396 | 0.8813 | 0.8595 | 0.8552 | 0.8627 | 0.8854 | 0.9597 | 1.0546 | 1.0611 | 1.0747 |
| 36 | 1.0022 | 0.9982 | 0.9929 | 0.9876 | 0.9825 | 0.9784 | 0.9761 | 0.9824 | 0.9891 | 1.0028 |
| 35 | 1.0193 | 1.0039 | 0.9921 | 0.9814 | 0.9713 | 0.9618 | 0.9494 | 0.9407 | 0.9362 | 0.9359 |
| 34 | 1.0194 | 1.0014 | 0.9881 | 0.9760 | 0.9642 | 0.9523 | 0.9342 | 0.9139 | 0.8899 | 0.8614 |
| 33 | 1.0127 | 0.9975 | 0.9838 | 0.9713 | 0.9589 | 0.9461 | 0.9252 | 0.8991 | 0.8622 | 0.7999 |
| 32 | 1.0041 | 0.9907 | 0.9784 | 0.9663 | 0.9542 | 0.9414 | 0.9203 | 0.8938 | 0.8587 | 0.8124 |
| 31 | 0.9951 | 0.9837 | 0.9727 | 0.9618 | 0.9505 | 0.9388 | 0.9195 | 0.8961 | 0.8659 | 0.8317 |
| 30 | 0.9866 | 0.9767 | 0.9670 | 0.9574 | 0.9476 | 0.9376 | 0.9219 | 0.9044 | 0.8859 | 0.8762 |
| 29 | 0.9776 | 0.9691 | 0.9609 | 0.9529 | 0.9449 | 0.9369 | 0.9249 | 0.9129 | 0.9034 | 0.9068 |
| 28 | 0.9676 | 0.9607 | 0.9542 | 0.9480 | 0.9419 | 0.9357 | 0.9267 | 0.9183 | 0.9129 | 0.9207 |
| 27 | 0.9561 | 0.9511 | 0.9467 | 0.9427 | 0.9384 | 0.9340 | 0.9270 | 0.9198 | 0.9132 | 0.9077 |
| 26 | 0.9471 | 0.9438 | 0.9414 | 0.9390 | 0.9361 | 0.9328 | 0.9268 | 0.9199 | 0.9124 | 0.9041 |
| 25 | 0.9362 | 0.9350 | 0.9353 | 0.9352 | 0.9340 | 0.9318 | 0.9266 | 0.9198 | 0.9115 | 0.9007 |
| 24 | 0.9222 | 0.9218 | 0.9249 | 0.9293 | 0.9313 | 0.9311 | 0.9265 | 0.9197 | 0.9108 | 0.8965 |
| 23 | 0.9052 | 0.9049 | 0.9110 | 0.9247 | 0.9283 | 0.9249 | 0.9105 | 0.9075 | 0.9121 | 0.8911 |
| 22 | 0.8846 | 0.8819 | 0.8805 | 0.9058 | 0.9000 | 0.8850 | 0.8710 | 0.8716 | 0.8861 | 0.8921 |
| 21 | 0.8592 | 0.8501 | 0.8452 | 0.8672 | 0.8607 | 0.8503 | 0.8424 | 0.8448 | 0.8601 | 0.8849 |
| 20 | 0.8127 | 0.8020 | 0.7972 | 0.8239 | 0.8276 | 0.8270 | 0.8265 | 0.8297 | 0.8406 | 0.8617 |
| 19 | 0.7591 | 0.7448 | 0.7369 | 0.7629 | 0.7924 | 0.8084 | 0.8174 | 0.8219 | 0.8288 | 0.8424 |
| 18 | 0.6950 | 0.6779 | 0.6567 | 0.6294 | 0.7446 | 0.7880 | 0.8097 | 0.8170 | 0.8222 | 0.8305 |
| 17 | 0.6261 | 0.6153 | 0.6067 | 0.5985 | 0.7109 | 0.7640 | 0.7988 | 0.8115 | 0.8172 | 0.8227 |
| 16 | 0.5792 | 0.5675 | 0.5541 | 0.5487 | 0.6621 | 0.7201 | 0.7770 | 0.8004 | 0.8094 | 0.8147 |
| 15 | 0.5306 | 0.5165 | 0.5001 | 0.4940 | 0.5770 | 0.6251 | 0.7322 | 0.7755 | 0.7914 | 0.7995 |
| 14 | 0.4855 | 0.4757 | 0.4649 | 0.4581 | 0.4167 | 0.4127 | 0.6520 | 0.7228 | 0.7492 | 0.7644 |
| 13 | 0.4424 | 0.4358 | 0.4271 | 0.4151 | 0.3840 | 0.3760 | 0.5503 | 0.6207 | 0.6579 | 0.6857 |
| 12 | 0.4008 | 0.3972 | 0.3908 | 0.3802 | 0.3652 | 0.3589 | 0.3704 | 0.4245 | 0.4750 | 0.5218 |
| 11 | 0.3608 | 0.3606 | 0.3580 | 0.3536 | 0.3491 | 0.3496 | 0.3645 | 0.4234 | 0.4740 | 0.5196 |
| 10 | 0.3222 | 0.3251 | 0.3261 | 0.3264 | 0.3279 | 0.3336 | 0.3540 | 0.4239 | 0.4733 | 0.5153 |
| 9 | 0.2746 | 0.2795 | 0.2827 | 0.2857 | 0.2904 | 0.2995 | 0.3270 | 0.4306 | 0.4758 | 0.5102 |
| 8 | 0.2780 | 0.2862 | 0.2941 | 0.3027 | 0.3153 | 0.3369 | 0.4082 | 0.4584 | 0.4852 | 0.5047 |
| 7 | 0.2759 | 0.2845 | 0.2956 | 0.3066 | 0.3216 | 0.3452 | 0.4044 | 0.4624 | 0.4871 | 0.5047 |
| 6 | 0.2765 | 0.2839 | 0.4817 | 0.5456 | 0.5709 | 0.5828 | 0.5800 | 0.4821 | 0.4936 | 0.5052 |
| 5 | 0.5586 | 0.5904 | 0.6542 | 0.6916 | 0.7078 | 0.7094 | 0.6747 | 0.4900 | 0.4994 | 0.5069 |
| 4 | 0.7455 | 0.7608 | 0.7759 | 0.7861 | 0.7902 | 0.7878 | 0.7648 | 0.6846 | 0.5085 | 0.5105 |
| 3 | 0.8075 | 0.8110 | 0.8131 | 0.8144 | 0.8147 | 0.8140 | 0.8095 | 0.7969 | 0.7763 | 0.7728 |
| 2 | 0.8173 | 0.8176 | 0.8178 | 0.8178 | 0.8178 | 0.8178 | 0.8175 | 0.8168 | 0.8158 | 0.8155 |
| 1 | 0.8180 | 0.8180 | 0.8180 | 0.8180 | 0.8180 | 0.8180 | 0.8180 | 0.8179 | 0.8179 | 0.8179 |

| | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|---|---|---|---|---|---|---|---|---|
| 37 | 1.0882 | 1.1154 | 1.1493 | 1.1629 | 1.2375 | 1.2647 | 1.3122 | 1.4140 |
| 36 | 1.0244 | 1.0465 | 1.0717 | 1.0982 | 1.1259 | 1.1603 | 1.2007 | 1.2240 |
| 35 | 0.9454 | 0.9726 | 1.0057 | 1.0379 | 1.0665 | 1.0994 | 1.1212 | 1.1765 |
| 34 | 0.8409 | 0.9041 | 0.9609 | 1.0039 | 1.0369 | 1.0672 | 1.0930 | 0.9751 |
| 33 | 0.6720 | 0.8739 | 0.9517 | 0.9955 | 1.0294 | 1.0576 | 1.0816 | 0.8937 |
| 32 | 0.7792 | 0.8647 | 0.9141 | 0.9557 | 0.9901 | 1.0127 | 0.9684 | 0.8483 |
| 31 | 0.6809 | 0.7882 | 0.8757 | 0.9257 | 0.9644 | 0.9869 | 0.8840 | 0.8286 |
| 30 | 0.8070 | 0.8277 | 0.8721 | 0.9048 | 0.9528 | 0.9772 | 0.8498 | 0.8219 |
| 29 | 0.8689 | 0.8668 | 0.8780 | 0.8863 | 0.9342 | 0.9114 | 0.8314 | 0.8194 |
| 28 | 0.9027 | 0.8972 | 0.8849 | 0.8821 | 0.8820 | 0.8658 | 0.8236 | 0.8185 |
| 27 | 0.8977 | 0.8891 | 0.8817 | 0.8758 | 0.8788 | 0.8504 | 0.8210 | 0.8182 |
| 26 | 0.8948 | 0.8866 | 0.8797 | 0.8739 | 0.8783 | 0.8444 | 0.8202 | 0.8182 |
| 25 | 0.8910 | 0.8828 | 0.8763 | 0.8708 | 0.8929 | 0.8390 | 0.8196 | 0.8181 |
| 24 | 0.8860 | 0.8778 | 0.8716 | 0.8673 | 0.8835 | 0.8345 | 0.8192 | 0.8181 |
| 23 | 0.8792 | 0.8715 | 0.8652 | 0.8628 | 0.8762 | 0.8327 | 0.8191 | 0.8181 |



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|---|---|---|---|---|---|---|---|---|
| 22 | 0.8716 | 0.8633 | 0.8553 | 0.8558 | 0.8669 | 0.8329 | 0.8192 | 0.8181 |
| 21 | 0.8646 | 0.8459 | 0.8282 | 0.8348 | 0.8204 | 0.8326 | 0.8193 | 0.8181 |
| 20 | 0.8704 | 0.8190 | 0.8099 | 0.8160 | 0.8126 | 0.8322 | 0.8193 | 0.8181 |
| 19 | 0.8520 | 0.7983 | 0.7956 | 0.8005 | 0.8005 | 0.8306 | 0.8193 | 0.8181 |
| 18 | 0.8354 | 0.7783 | 0.7825 | 0.7860 | 0.7871 | 0.8282 | 0.8192 | 0.8181 |
| 17 | 0.8218 | 0.7486 | 0.7674 | 0.7712 | 0.7733 | 0.8255 | 0.8190 | 0.8181 |
| 16 | 0.8109 | 0.7343 | 0.7487 | 0.7560 | 0.7600 | 0.8227 | 0.8188 | 0.8181 |
| 15 | 0.7968 | 0.7234 | 0.7317 | 0.7411 | 0.7488 | 0.8202 | 0.8186 | 0.8181 |
| 14 | 0.7690 | 0.7109 | 0.7127 | 0.7256 | 0.7431 | 0.8185 | 0.8184 | 0.8180 |
| 13 | 0.7073 | 0.6898 | 0.6869 | 0.6971 | 0.7895 | 0.8187 | 0.8183 | 0.8180 |
| 12 | 0.5712 | 0.6395 | 0.6663 | 0.6755 | 0.7936 | 0.8176 | 0.8181 | 0.8180 |
| 11 | 0.5653 | 0.6166 | 0.6525 | 0.6604 | 0.7896 | 0.8164 | 0.8180 | 0.8180 |
| 10 | 0.5551 | 0.5986 | 0.6429 | 0.6510 | 0.7866 | 0.8157 | 0.8180 | 0.8180 |
| 9 | 0.5412 | 0.5786 | 0.6361 | 0.6478 | 0.7884 | 0.8157 | 0.8179 | 0.8180 |
| 8 | 0.5218 | 0.5451 | 0.6354 | 0.7407 | 0.8006 | 0.8164 | 0.8180 | 0.8180 |
| 7 | 0.5190 | 0.5408 | 0.7143 | 0.7810 | 0.8091 | 0.8171 | 0.8180 | 0.8180 |
| 6 | 0.5129 | 0.6626 | 0.7608 | 0.7998 | 0.8137 | 0.8176 | 0.8180 | 0.8180 |
| 5 | 0.5119 | 0.7078 | 0.7834 | 0.8084 | 0.8159 | 0.8178 | 0.8180 | 0.8180 |
| 4 | 0.5149 | 0.7326 | 0.7963 | 0.8131 | 0.8171 | 0.8179 | 0.8180 | 0.8180 |
| 3 | 0.7780 | 0.8021 | 0.8134 | 0.8169 | 0.8178 | 0.8180 | 0.8180 | 0.8180 |
| 2 | 0.8159 | 0.8170 | 0.8177 | 0.8179 | 0.8180 | 0.8180 | 0.8180 | 0.8180 |
| 1 | 0.8179 | 0.8180 | 0.8180 | 0.8180 | 0.8180 | 0.8180 | 0.8180 | 0.8180 |

*** GLOBAL FLOW BALANCE SUMMARY ***

| CURRENT TIME STEP | RATES | | AMOUNTS | |
|---|---|---|---|---|
| FLUID INFLOW | 2.718285E+08 | (LB/D) | 1.069181E+10 | (LB) |
| FLUID OUTFLOW | 2.525239E+08 | (LB/D) | 9.932499E+09 | (LB) |
| CHANGE IN FLUID IN REGION | 1.929562E+07 | (LB/D) | 7.589530E+08 | (LB) |
| RESIDUAL IMBALANCE | -9.001965E+03 | (LB/D) | -3.540735E+05 | (LB) |
| FRACTIONAL IMBALANCE | | | 0.0000 | |

CUMULATIVE SUMMARY

| | AMOUNTS | |
|---|---|---|
| FLUID INFLOW | 3.518622E+11 | (LB) |
| FLUID OUTFLOW | 2.788480E+11 | (LB) |
| CHANGE IN FLUID IN REGION | 6.984357E+10 | (LB) |
| FLUID IN REGION | 1.231073E+12 | (LB) |
| RESIDUAL IMBALANCE | -3.170667E+09 | (LB) |
| FRACTIONAL IMBALANCE | -0.0090 | |
| CUMULATIVE SPECIFIED P CELL FLUID NET INFLOW | 1.364786E+11 | (LB) |
| CUMULATIVE FLUX B.C. FLUID NET INFLOW | 6.045797E+10 | (LB) |
| CUMULATIVE LEAKAGE B.C. FLUID NET INFLOW | 4.137739E+10 | (LB) |
| CUMULATIVE AQUIFER INFLUENCE FLUID NET INFLOW | 0.000000E+00 | (LB) |

*** WELL SUMMARY ***

| WELL LOCATION NO. I J K | FLOW RATES (POSITIVE IS INJECTION) FLUID (LB/D) | HEAT (BTU/D) | SOLUTE (LB/D) | CUMULATIVE PRODUCTION FLUID (LB) | HEAT (BTU) | SOLUTE (LB) | CUMULATIVE INJECTION FLUID (LB) | HEAT (BTU) | SOLUTE (LB) |
|---|---|---|---|---|---|---|---|---|---|
| 1 21 31 2- 2 | -7.239E+07 | | | 7.93E+10 | | | 0.00 | | |

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| | | | | | |
|---|---|---|---|---|---|
| 2 | 21 33 2- 2 | -7.239E+07 | 7.93E+10 | 0.00 |
| 3 | 6 22 2- 3 | -2.683E+06 | 2.94E+09 | 0.00 |
| 4 | 7 32 1- 2 | -3.495E+06 | 3.83E+09 | 0.00 |

TOTAL - PRODUCTION 1.510E+08 1.65E+11
- INJECTION 0.000 0.00

THE FOLLOWING PARAMETERS WERE IN EFFECT DURING THE TIME STEP JUST COMPLETED

| WELL NO. | TOP COMPLETION LAYER CELL PRESSURE (PSI) | WELL DATUM PRESSURE (PSI) | WELL HEAD PRESSURE (PSI) | WELL DATUM TEMPERATURE (DEG.F) | WELL HEAD TEMPERATURE (DEG.F) | MASS FRACTION (-) |
|---|---|---|---|---|---|---|
| 1 | 28.53 | 10.82 | | | | |
| 2 | 28.58 | 10.87 | | | | |
| 3 | 28.34 | 23.98 | | | | |
| 4 | 34.43 | 33.63 | | | | |

PER LAYER FLUID PRODUCTION/INJECTION RATES- (LB/D) (INJECTION IS POSITIVE)

| LAYER NO. | WELL NUMBER 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 4 | | | | |
| 3 | | | -1.342E+06 | |
| 2 | -7.239E+07 | -7.239E+07 | -1.342E+06 | -1.752E+06 |
| 1 | | | | -1.743E+06 |

SPECIFIED PRESSURE, TEMPERATURE, OR MASS FRACTION B.C. FLOW RATES
POSITIVE IS INTO THE REGION

FLUID (LB/D)

AREAL LAYERS

K = 4

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 4.3068E+06 | 8.5683E+06 | 7.4310E+06 | 4.2432E+06 | 3.2507E+06 | 2.3880E+06 | 3.4100E+06 | | | |
| 36 | 1.1847E+05 | | | | | | | | | |
| 35 | 1.0861E+06 | | | | | | | | | |
| 34 | 4.5531E+06 | | | | | | | | | |
| 33 | -6.4525E+06 | | | | | | | | | |
| 32 | -4.0129E+06 | | | | | | | | | |
| 31 | -1.5634E+06 | | | | | | | | | |
| 30 | -1.4967E+06 | | | | | | | | | |
| 29 | -8.1288E+05 | | | | | | | | | |
| 28 | 4.1993E+06 | | | | | | | | | |
| 27 | 1.6260E+06 | | | | | | | | | |
| 26 | 1.3759E+06 | | | | | | | | | |
| 25 | 5.1915E+06 | | | | | | | | | |
| 24 | 1.0298E+06 | | | | | | | | | |
| 23 | 1.7823E+06 | | | | | | | | | |
| 22 | 2.2701E+06 | | | | | | | | | |
| 21 | 2.3140E+06 | | | | | | | | | |

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|---|---|
| 20 | 2.6108E+06 |
| 19 | -8.5182E+05 |
| 18 | -2.0007E+05 |
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| | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | | | | | | | | | 5.5243E+05 | 9.6478E+05 |
| 36 | | | | | | | | | | |
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| | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|---|---|---|---|---|---|---|---|---|
| 37 | -1.5921E+06 | 1.1950E+06 | 5.1168E+06 | -6.2596E+06 | 1.3603E+07 | 7.2164E+06 | 9.7876E+06 | 1.7876E+07 |
| 36 | | | | | | | | -7.2598E+06 |
| 35 | | | | | | | | -1.0108E+06 |
| 34 | | | | | | | | |
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SPECIFIED FLUX B.C. FLOW RATES
POSITIVE IS INTO THE REGION

FLUID MASS (LB/D)

AREAL LAYERS

K = 4

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | | | | | | | | 5.2416E+04 | 5.2416E+04 | 5.2416E+04 |
| 36 | | 3.5823E+05 | 2.4324E+05 | 1.6364E+05 | 1.1056E+05 | 8.8452E+04 | 8.8452E+04 | 8.8452E+04 | 8.8452E+04 | 8.8452E+04 |
| 35 | | 2.4324E+05 | 5.3915E+04 | 3.6270E+04 | 2.4507E+04 | 1.9605E+04 | 1.9605E+04 | 1.9605E+04 | 1.9605E+04 | 1.9605E+04 |
| 34 | | 1.6364E+05 | 3.6270E+04 | 2.4400E+04 | 1.6486E+04 | 1.3189E+04 | 1.3189E+04 | 1.3189E+04 | 1.3189E+04 | 1.3189E+04 |
| 33 | | 1.3268E+05 | 2.9408E+04 | 1.9784E+04 | 1.3367E+04 | 1.0694E+04 | 1.0694E+04 | 1.0694E+04 | 1.0694E+04 | 1.0694E+04 |
| 32 | | 1.3268E+05 | 2.9408E+04 | 1.9784E+04 | 1.3367E+04 | 1.0694E+04 | 1.0694E+04 | 1.0694E+04 | 1.0694E+04 | 1.0694E+04 |
| 31 | | 1.3268E+05 | 2.9408E+04 | 1.9784E+04 | 1.3367E+04 | 1.0694E+04 | 1.0694E+04 | 1.0694E+04 | 1.0694E+04 | 1.0694E+04 |
| 30 | | 1.3268E+05 | 2.9408E+04 | 1.9784E+04 | 1.3367E+04 | 1.0694E+04 | 1.0694E+04 | 1.0694E+04 | 1.0694E+04 | 1.0694E+04 |
| 29 | | 1.3268E+05 | 2.9408E+04 | 1.9784E+04 | 1.3367E+04 | 1.0694E+04 | 1.0694E+04 | 1.0694E+04 | 1.0694E+04 | 1.0694E+04 |
| 28 | | 1.3268E+05 | 2.9408E+04 | 1.9784E+04 | 1.3367E+04 | 1.0694E+04 | 1.0694E+04 | 1.0694E+04 | 1.0694E+04 | 1.0694E+04 |
| 27 | | 1.1056E+05 | 2.4507E+04 | 1.6486E+04 | 1.1139E+04 | 8911. | 8911. | 8911. | 8911. | 8911. |
| 26 | | 8.8452E+04 | 6.0060E+04 | 4.0404E+04 | | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 |
| 25 | | 8.8452E+04 | 6.0060E+04 | 4.0404E+04 | | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 |
| 24 | | 8.8452E+04 | 6.0060E+04 | 4.0404E+04 | | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 |
| 23 | | 8.8452E+04 | 6.0060E+04 | 4.0404E+04 | | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 |
| 22 | | 8.8452E+04 | 6.0060E+04 | 4.0404E+04 | | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 |
| 21 | | 8.8452E+04 | 6.0060E+04 | 4.0404E+04 | | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 |
| 20 | | 8.8452E+04 | 6.0060E+04 | 4.0404E+04 | | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 |
| 19 | | 8.8452E+04 | 6.0060E+04 | 4.0404E+04 | | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 |
| 18 | | 8.8452E+04 | 6.0060E+04 | 4.0404E+04 | | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 |
| 17 | 5.2416E+04 | 8.8452E+04 | 6.0060E+04 | 4.0404E+04 | | | | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 |
| 16 | 5.2416E+04 | 8.8452E+04 | 6.0060E+04 | 4.0404E+04 | 2.7300E+04 | 2.1840E+04 | | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 |
| 15 | 5.2416E+04 | 8.8452E+04 | 6.0060E+04 | 4.0404E+04 | 2.7300E+04 | 2.1840E+04 | | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 |
| 14 | 5.2416E+04 | 8.8452E+04 | 6.0060E+04 | 4.0404E+04 | 2.7300E+04 | 2.1840E+04 | | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 |
| 13 | 5.2416E+04 | 8.8452E+04 | 6.0060E+04 | 4.0404E+04 | 2.7300E+04 | 2.1840E+04 | | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 |
| 12 | 5.2416E+04 | 8.8452E+04 | 6.0060E+04 | 4.0404E+04 | 2.7300E+04 | 2.1840E+04 | | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 |
| 11 | 5.2416E+04 | 8.8452E+04 | 6.0060E+04 | 4.0404E+04 | 2.7300E+04 | 2.1840E+04 | | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 |
| 10 | 5.2416E+04 | 8.8452E+04 | 6.0060E+04 | 4.0404E+04 | 2.7300E+04 | 2.1840E+04 | | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 |
| 9 | 5.2416E+04 | 8.8452E+04 | 6.0060E+04 | 4.0404E+04 | | | | | | |
| 8 | 5.2416E+04 | 8.8452E+04 | 6.0060E+04 | | | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 |
| 7 | 5.2416E+04 | 8.8452E+04 | 6.0060E+04 | | 2.7300E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 |
| 6 | 5.2416E+04 | 8.8452E+04 | | | 2.7300E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 |
| 5 | 6.5520E+04 | 1.1056E+05 | | 5.0505E+04 | 3.4125E+04 | 2.7300E+04 | 2.7300E+04 | 2.7300E+04 | 2.7300E+04 | 2.7300E+04 |
| 4 | 9.6970E+04 | | | 7.4747E+04 | 5.0505E+04 | 4.0404E+04 | 4.0404E+04 | 4.0404E+04 | 4.0404E+04 | 4.0404E+04 |
| 3 | 1.4414E+05 | | 1.6516E+05 | 1.1111E+05 | 7.5075E+04 | 6.0060E+04 | 6.0060E+04 | 6.0060E+04 | 6.0060E+04 | 6.0060E+04 |
| 2 | 2.1228E+05 | | 2.4324E+05 | 1.6364E+05 | 1.1056E+05 | 8.8452E+04 | 8.8452E+04 | 8.8452E+04 | 8.8452E+04 | 8.8452E+04 |
| 1 | 1.2580E+05 | | 1.4414E+05 | 9.6970E+04 | 6.5520E+04 | 5.2416E+04 | 5.2416E+04 | 5.2416E+04 | 5.2416E+04 | 5.2416E+04 |

| | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 5.2416E+04 | 5.2416E+04 | 5.2416E+04 | 5.2416E+04 | 5.2416E+04 | 6.5520E+04 | 7.8624E+04 | 7.8624E+04 | | |
| 36 | 8.8452E+04 | 2.8873E+04 | 2.8873E+04 | 8.8452E+04 | 8.8452E+04 | 1.1056E+05 | 1.3268E+05 | 1.3268E+05 | 1.3268E+05 | 3.0326E+05 |
| 35 | 1.9605E+04 | 1.9605E+04 | 1.9605E+04 | 5.9675E+04 | 5.9675E+04 | 7.4594E+04 | 9.0090E+04 | 9.0090E+04 | 9.0090E+04 | 2.0592E+05 |
| 34 | 1.3189E+04 | 1.3189E+04 | 1.3189E+04 | 4.0145E+04 | 4.0145E+04 | 5.0181E+04 | 1.3853E+05 | 1.3853E+05 | 1.3853E+05 | 1.3853E+05 |
| 33 | 1.0694E+04 | 1.0694E+04 | 1.0694E+04 | 3.2550E+04 | 3.2550E+04 | 4.0687E+04 | 1.1232E+05 | 1.1232E+05 | 1.1232E+05 | 1.1232E+05 |
| 32 | 1.0694E+04 | 1.0694E+04 | 1.0694E+04 | 3.2550E+04 | 3.2550E+04 | 4.0687E+04 | 1.1232E+05 | 1.1232E+05 | 1.1232E+05 | 1.1232E+05 |
| 31 | 1.0694E+04 | 1.0694E+04 | 1.0694E+04 | 3.2550E+04 | 3.2550E+04 | 4.0687E+04 | 1.1232E+05 | 1.1232E+05 | 1.1232E+05 | |
| 30 | 1.0694E+04 | 1.0694E+04 | 1.0694E+04 | 3.2550E+04 | 3.2550E+04 | 4.0687E+04 | 1.1232E+05 | 1.1232E+05 | 1.1232E+05 | |
| 29 | 1.0694E+04 | 1.0694E+04 | 1.0694E+04 | 3.2550E+04 | 3.2550E+04 | 4.0687E+04 | 1.1232E+05 | 1.1232E+05 | 1.1232E+05 | |
| 28 | 1.0694E+04 | 1.0694E+04 | 1.0694E+04 | 3.2550E+04 | 3.2550E+04 | 4.0687E+04 | 1.1232E+05 | 1.1232E+05 | 1.1232E+05 | |
| 27 | 8911. | 8911. | 8911. | 2.7125E+04 | 2.7125E+04 | 3.3906E+04 | 9.3600E+04 | 9.3600E+04 | 9.3600E+04 | 9.3600E+04 |
| 26 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.1700E+04 | 2.7125E+04 | 7.4880E+04 | 7.4880E+04 | 7.4880E+04 | 7.4880E+04 |
| 25 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.1700E+04 | 2.7125E+04 | 7.4880E+04 | 7.4880E+04 | 7.4880E+04 | 7.4880E+04 |
| 24 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.7300E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 |
| 23 | 4.9920E+04 | 4.9920E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.7300E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 |

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| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 22 | 4.9920E+04 | 4.9920E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.7300E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 |
| 21 | 4.9920E+04 | 4.9920E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.7300E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 |
| 20 | 4.9920E+04 | 4.9920E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.7300E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 |
| 19 | 4.9920E+04 | 4.9920E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.7300E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 |
| 18 | 4.9920E+04 | 4.9920E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.7300E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 |
| 17 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 2.1840E+04 | 2.1840E+04 | 2.7300E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 |
| 16 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 2.1840E+04 | 2.1840E+04 | 2.7300E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 |
| 15 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 2.1840E+04 | 2.1840E+04 | 2.7300E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 |
| 14 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 2.1840E+04 | 2.1840E+04 | 2.7300E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 |
| 13 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 2.1840E+04 | 2.1840E+04 | 2.7300E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 |
| 12 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 2.7300E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 |
| 11 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 6.2400E+04 | 7.4880E+04 | 7.4880E+04 | 7.4880E+04 | 7.4880E+04 |
| 10 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 4.9920E+04 | 6.2400E+04 | 7.4880E+04 | 7.4880E+04 | 7.4880E+04 | 7.4880E+04 |
| 9 | | | | | | | | 7.4880E+04 | 7.4880E+04 | 7.4880E+04 |
| 8 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.7300E+04 | | | | |
| 7 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.7300E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 |
| 6 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.1840E+04 | 2.7300E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 |
| 5 | 2.7300E+04 | 2.7300E+04 | 2.7300E+04 | 2.7300E+04 | 2.7300E+04 | 3.4125E+04 | 4.0950E+04 | 4.0950E+04 | 4.0950E+04 | 4.0950E+04 |
| 4 | 4.0404E+04 | 4.0404E+04 | 4.0404E+04 | 4.0404E+04 | 4.0404E+04 | 5.0505E+04 | 6.0606E+04 | 6.0606E+04 | 6.0606E+04 | 6.0606E+04 |
| 3 | 6.0060E+04 | 6.0060E+04 | 6.0060E+04 | 6.0060E+04 | 6.0060E+04 | 7.5075E+04 | 9.0090E+04 | 9.0090E+04 | 9.0090E+04 | 9.0090E+04 |
| 2 | 8.8452E+04 | 8.8452E+04 | 8.8452E+04 | 8.8452E+04 | 8.8452E+04 | 1.1056E+05 | 1.3268E+05 | 1.3268E+05 | 1.3268E+05 | 1.3268E+05 |
| 1 | 5.2416E+04 | 5.2416E+04 | 5.2416E+04 | 5.2416E+04 | 5.2416E+04 | 6.5520E+04 | 7.8624E+04 | 7.8624E+04 | 7.8624E+04 | 7.8624E+04 |

| | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|---|---|---|---|---|---|---|---|---|
| 37 | | | | | | | | |
| 36 | 3.0326E+05 | 3.0326E+05 | 3.0326E+05 | 3.0326E+05 | 3.7403E+05 | 5.5602E+05 | 8.1881E+05 | |
| 35 | 2.0592E+05 | 2.0592E+05 | 2.0592E+05 | 2.0592E+05 | 2.5397E+05 | 3.7755E+05 | | |
| 34 | 1.3853E+05 | 1.3853E+05 | 1.3853E+05 | 1.3853E+05 | 1.7085E+05 | 2.5399E+05 | | 9.6962E+04 |
| 33 | 1.1232E+05 | | | | | | | 7.8617E+04 |
| 32 | | | 1.1232E+05 | 1.1232E+05 | 1.3853E+05 | 9.0097E+04 | 1.3268E+05 | 7.8617E+04 |
| 31 | | 1.1232E+05 | 1.1232E+05 | 1.1232E+05 | 1.3853E+05 | 9.0097E+04 | 1.3268E+05 | 7.8617E+04 |
| 30 | 1.1232E+05 | 1.1232E+05 | 1.1232E+05 | 4.9140E+04 | 6.0606E+04 | 9.0097E+04 | 1.3268E+05 | 7.8617E+04 |
| 29 | 1.1232E+05 | 1.1232E+05 | 1.1232E+05 | 4.9140E+04 | 6.0606E+04 | 9.0097E+04 | 1.3268E+05 | 7.8617E+04 |
| 28 | | | 1.1232E+05 | 4.9140E+04 | 6.0606E+04 | 9.0097E+04 | 1.3268E+05 | 7.8617E+04 |
| 27 | 9.3600E+04 | | | | 5.0505E+04 | 7.5080E+04 | 1.1056E+05 | 6.5515E+04 |
| 26 | 7.4880E+04 | 7.4880E+04 | 7.4880E+04 | | 4.0404E+04 | 6.0064E+04 | 8.8452E+04 | 5.2412E+04 |
| 25 | 7.4880E+04 | 7.4880E+04 | 7.4880E+04 | | 4.0404E+04 | 6.0064E+04 | 8.8452E+04 | 5.2412E+04 |
| 24 | 7.4880E+04 | 7.4880E+04 | 7.4880E+04 | | 4.0404E+04 | 6.0064E+04 | 8.8452E+04 | 5.2412E+04 |
| 23 | 3.2760E+04 | 7.4880E+04 | 7.4880E+04 | | 4.0404E+04 | 6.0064E+04 | 8.8452E+04 | 5.2412E+04 |
| 22 | 3.2760E+04 | 7.4880E+04 | 7.4880E+04 | | 4.0404E+04 | 6.0064E+04 | 8.8452E+04 | 5.2412E+04 |
| 21 | 3.2760E+04 | 3.2760E+04 | | | 4.0404E+04 | 6.0064E+04 | 8.8452E+04 | 5.2412E+04 |
| 20 | 3.2760E+04 | 3.2760E+04 | | 7.4880E+04 | 4.0404E+04 | 6.0064E+04 | 8.8452E+04 | 5.2412E+04 |
| 19 | 3.2760E+04 | 3.2760E+04 | | 7.4880E+04 | 4.0404E+04 | 6.0064E+04 | 8.8452E+04 | 5.2412E+04 |
| 18 | 3.2760E+04 | 3.2760E+04 | | 7.4880E+04 | 4.0404E+04 | 6.0064E+04 | 8.8452E+04 | 5.2412E+04 |
| 17 | 3.2760E+04 | | | 7.4880E+04 | 4.0404E+04 | 6.0064E+04 | 8.8452E+04 | 5.2412E+04 |
| 16 | 3.2760E+04 | | 7.4880E+04 | 7.4880E+04 | 4.0404E+04 | 6.0064E+04 | 8.8452E+04 | 5.2412E+04 |
| 15 | 3.2760E+04 | | 7.4880E+04 | 7.4880E+04 | 4.0404E+04 | 6.0064E+04 | 8.8452E+04 | 5.2412E+04 |
| 14 | 3.2760E+04 | | 7.4880E+04 | 3.2760E+04 | 4.0404E+04 | 6.0064E+04 | 8.8452E+04 | 5.2412E+04 |
| 13 | 3.2760E+04 | | | 3.2760E+04 | 4.0404E+04 | 6.0064E+04 | 8.8452E+04 | 5.2412E+04 |
| 12 | 3.2760E+04 | 3.2760E+04 | | 3.2760E+04 | 4.0404E+04 | 6.0064E+04 | 8.8452E+04 | 5.2412E+04 |
| 11 | 7.4880E+04 | 7.4880E+04 | | 3.2760E+04 | 4.0404E+04 | 6.0064E+04 | 8.8452E+04 | 5.2412E+04 |
| 10 | 7.4880E+04 | 7.4880E+04 | | 3.2760E+04 | 4.0404E+04 | 6.0064E+04 | 8.8452E+04 | 5.2412E+04 |
| 9 | 7.4880E+04 | 7.4880E+04 | | 3.2760E+04 | 4.0404E+04 | 6.0064E+04 | 8.8452E+04 | 5.2412E+04 |
| 8 | | | | 3.2760E+04 | 4.0404E+04 | 6.0064E+04 | 8.8452E+04 | 5.2412E+04 |
| 7 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 | 4.0404E+04 | 6.0064E+04 | 8.8452E+04 | 5.2412E+04 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 | 3.2760E+04 | 4.0404E+04 | 6.0064E+04 | 8.8452E+04 | 5.2412E+04 |
| 5 | 4.0950E+04 | 4.0950E+04 | 4.0950E+04 | 4.0950E+04 | 5.0505E+04 | 7.5080E+04 | 1.1056E+05 | 6.5515E+04 |
| 4 | 6.0606E+04 | 6.0606E+04 | 6.0606E+04 | 6.0606E+04 | 7.4747E+04 | 1.1112E+05 | 1.6364E+05 | 9.6962E+04 |
| 3 | 9.0090E+04 | 9.0090E+04 | 9.0090E+04 | 9.0090E+04 | 1.1111E+05 | 1.6518E+05 | 2.4324E+05 | 1.4413E+05 |
| 2 | 1.3268E+05 | 1.3268E+05 | 1.3268E+05 | 1.3268E+05 | 1.6364E+05 | 2.4326E+05 | 3.5823E+05 | 2.1227E+05 |
| 1 | 7.8624E+04 | 7.8624E+04 | 7.8624E+04 | 7.8624E+04 | 9.6970E+04 | 1.4415E+05 | 2.1228E+05 | 1.2579E+05 |

AQUIFER OR RIVER LEAKAGE FLOW RATES
POSITIVE IS INTO THE REGION

FLUID (LB/D)

AREAL LAYERS

K = 4

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | | | | | | | | | | |
| 36 | | | | | | | | | | |
| 35 | | | | | | | | | | |
| 34 | | | | | | | | | | |
| 33 | | | | | | | | | | |
| 32 | | | | | | | | | | |
| 31 | | | | | | | | | | |
| 30 | | | | | | | | | | |
| 29 | | | | | | | | | | |
| 28 | | | | | | | | | | |
| 27 | | | | | | | | | | |
| 26 | | | | | 3.5258E+04 | | | | | |
| 25 | | | | | -1.1309E+04 | | | | | |
| 24 | | | | | -8.3472E+04 | | | | | |
| 23 | | | | | -1.5245E+05 | | | | | |
| 22 | | | | | -2.2678E+05 | | | | | |
| 21 | | | | | -2.9911E+05 | | | | | |
| 20 | | | | | -3.7091E+05 | | | | | |
| 19 | | | | | -4.4026E+05 | | | | | |
| 18 | | | | | -4.9413E+05 | | | | | |
| 17 | | | | | -5.5238E+05 | -3.0053E+05 | -3.1604E+05 | | | |
| 16 | | | | | | | -2.2362E+05 | | | |
| 15 | | | | | | | -2.7883E+04 | | | |
| 14 | | | | | | | -8.8002E+04 | | | |
| 13 | | | | | | | -1.2401E+05 | | | |
| 12 | | | | | | | -1.5843E+05 | | | |
| 11 | | | | | | | -1.5745E+05 | | | |
| 10 | | | | | | | -2.3831E+05 | | | |
| 9 | | | | | -6.1080E+05 | -1.0922E+06 | -1.8240E+06 | -2.2783E+06 | -2.6436E+06 | -2.8996E+06 |
| 8 | | | | -4.8782E+05 | -1.2235E+06 | | | | | |
| 7 | | | | -1.1771E+06 | | | | | | |
| 6 | | | -6.4374E+05 | -1.1938E+06 | | | | | | |
| 5 | | | -6.5057E+05 | | | | | | | |
| 4 | | -6.6456E+05 | -6.6953E+05 | | | | | | | |
| 3 | | -1.0849E+06 | | | | | | | | |
| 2 | | -1.2584E+06 | | | | | | | | |
| 1 | | -4.8165E+05 | | | | | | | | |

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| | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | | | | | | | | | | |
| 36 | | | | | | | | | | |
| 35 | | | | | | | | | | |
| 34 | | | | | | | | | | |
| 33 | | | | | | | | | | |
| 32 | | | | | | | | | | |
| 31 | | | | | | | | | | 9.0212E+06 |
| 30 | | | | | | | | | | 6.9287E+06 |
| 29 | | | | | | | | | | 5.4921E+06 |
| 28 | | | | | | | | | | 4.8363E+06 |
| 27 | | | | | | | | | | |
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| 11 | | | | | | | | | | |
| 10 | | | | | | | | | | |
| 9 | -3.0761E+06 | -3.2305E+06 | -3.3296E+06 | -3.4231E+06 | -3.5731E+06 | -4.8222E+06 | -7.0813E+06 | | | |
| 8 | | | | | | | 4.3196E+06 | 1.9579E+06 | 6.9734E+05 | -2.2030E+05 |
| 7 | | | | | | | | | | |
| 6 | | | | | | | | | | |
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| 2 | | | | | | | | | | |
| 1 | | | | | | | | | | |

| | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|---|---|---|---|---|---|---|---|---|
| 37 | | | | | | | | |
| 36 | | | | | | | | |
| 35 | | | | | | | -6.3086E+06 | |
| 34 | | | | | | | 1.6760E+05 | |
| 33 | | 9.6679E+06 | 6.0051E+06 | 3.9475E+06 | 2.9036E+06 | 1.8814E+06 | -2.8432E+05 | |
| 32 | 9.6880E+06 | 9.6821E+06 | | | | | | |
| 31 | 9.6888E+06 | | | | | | | |
| 30 | | | | | | | | |
| 29 | | | | | | | | |
| 28 | 2.6411E+06 | 2.8962E+06 | | | | | | |
| 27 | | -2.6298E+05 | 2.4634E+04 | -5.5107E+05 | | | | |
| 26 | | | | -3.8162E+05 | | | | |
| 25 | | | | -2.8297E+05 | | | | |
| 24 | | | | -1.7499E+05 | | | | |

| | | | |
|---|---|---|---|
| 23 | | | -3.2088E+04 |
| 22 | | | 1.8802E+05 |
| 21 | | -1.3463E+06 | 8.4705E+05 |
| 20 | | -7.7213E+05 | |
| 19 | | -3.2363E+05 | |
| 18 | | 8.7260E+04 | |
| 17 | -9.7156E+05 | 5.6192E+05 | |
| 16 | -5.2285E+05 | | |
| 15 | -1.8174E+05 | | |
| 14 | 2.1305E+05 | | |
| 13 | 8.7263E+05 | -6.0275E+05 | |
| 12 | | 4.2674E+04 | |
| 11 | | 4.7559E+05 | |
| 10 | | 7.7751E+05 | |
| 9 | | 9.8821E+05 | |
| 8 | -1.0260E+06 -2.1213E+06 | 1.0120E+06 | |
| 7 | | | |
| 6 | | | |
| 5 | | | |
| 4 | | | |
| 3 | | | |
| 2 | | | |
| 1 | | | |

***** JOB COMPLETED *****

LAST TIME PLANE CALCULATED ..... 9.46E+07 (S)

LAST TIME PLANE INDEX ..... 39

00236 0

00340

*Appendix D*

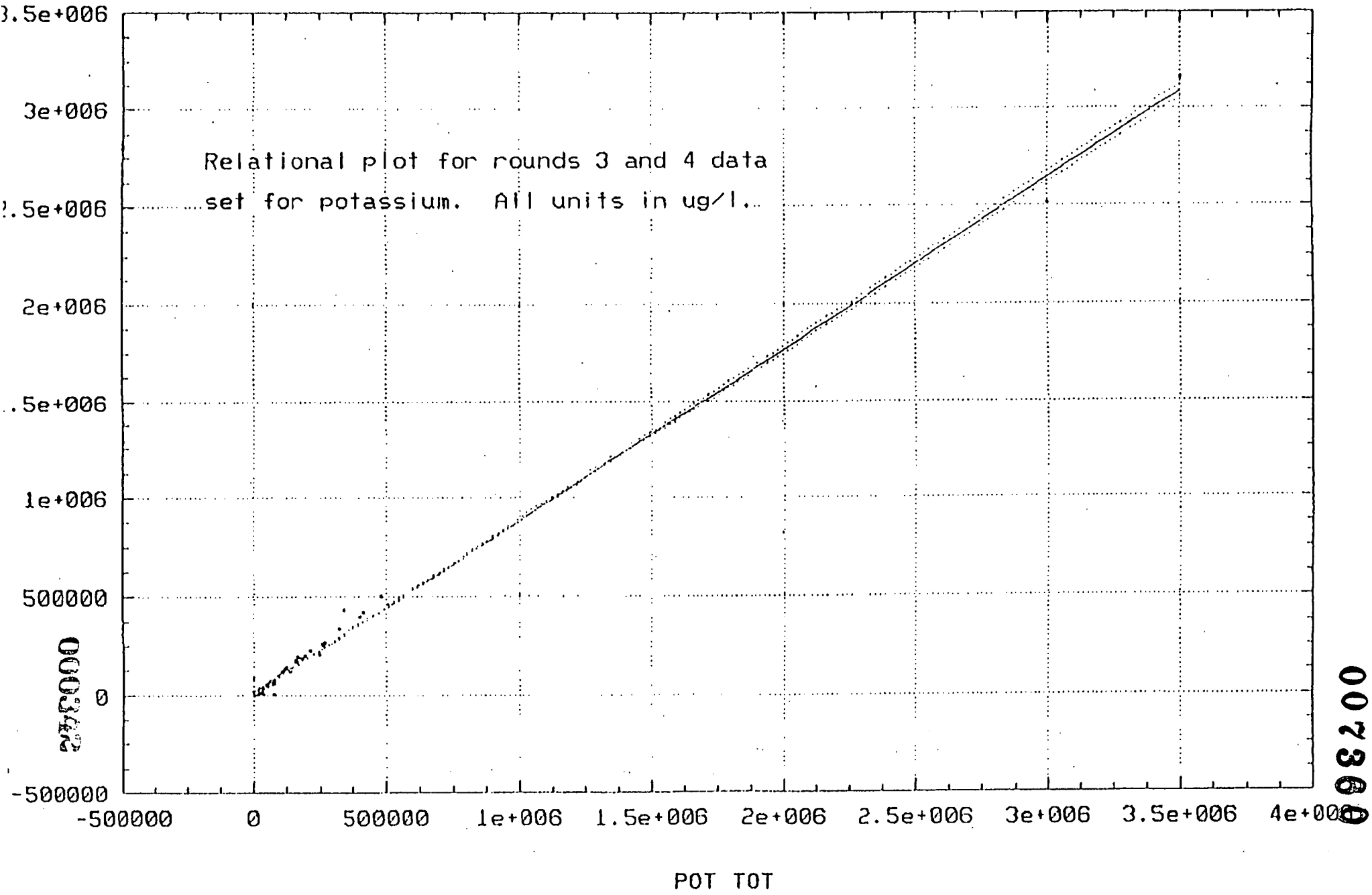
*Regressional Analysis of Nine Modeling Chemical Ground Water Concentrations*

POT_TOT vs. POT_DIS

POT_DIS = 6844.6 + .88105 * POT_TOT

Correlation: r = .99762

DRAFT




01-14-93 04:51PM FROM FBM MIDWEST TO 918136218504 PAGE 008

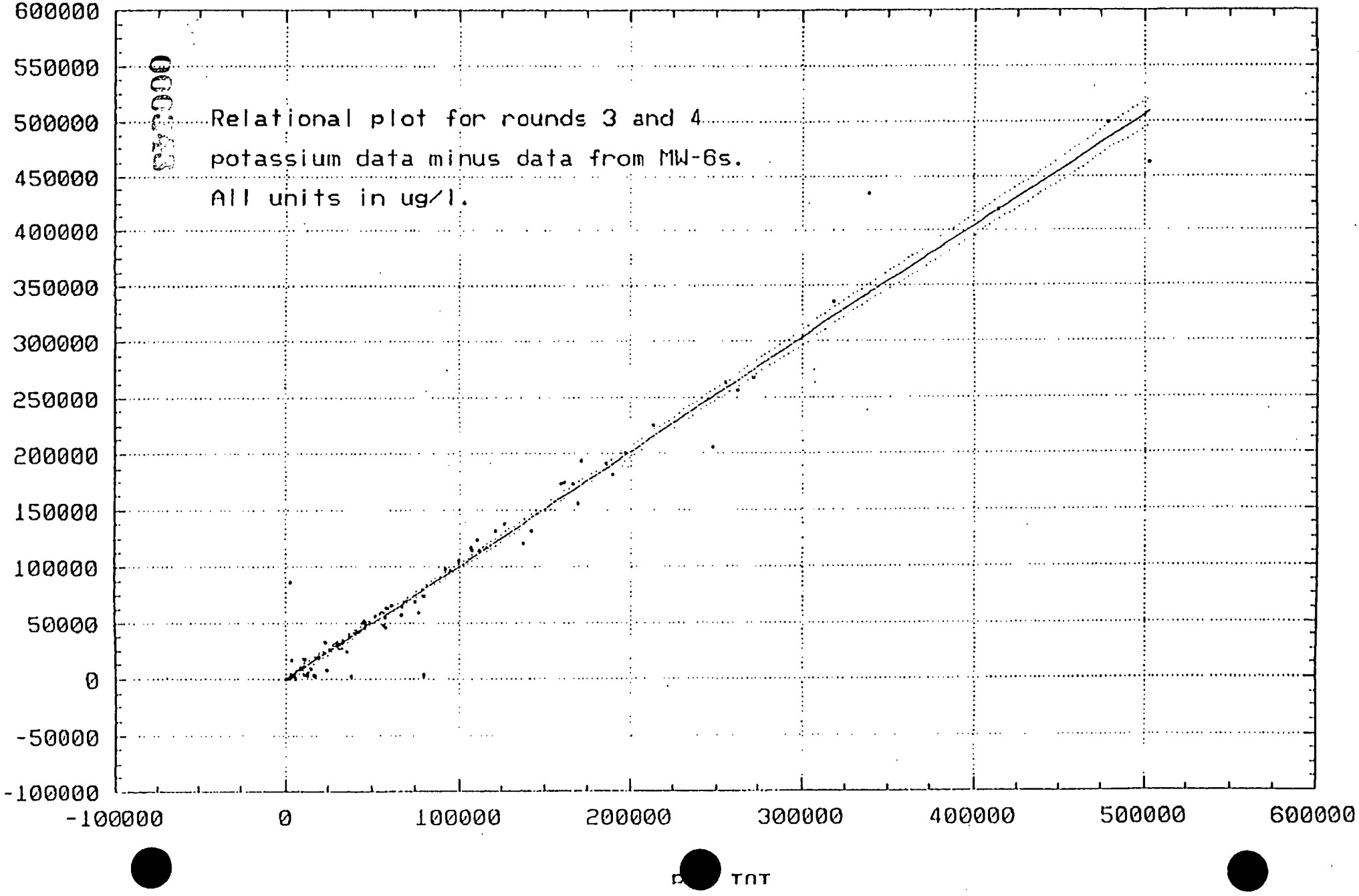
00073600

POT_TOT vs. POT_DIS

POT_DIS = -1230. + 1.0146 * POT_TOT

Correlation: r = .98818

DRAFT



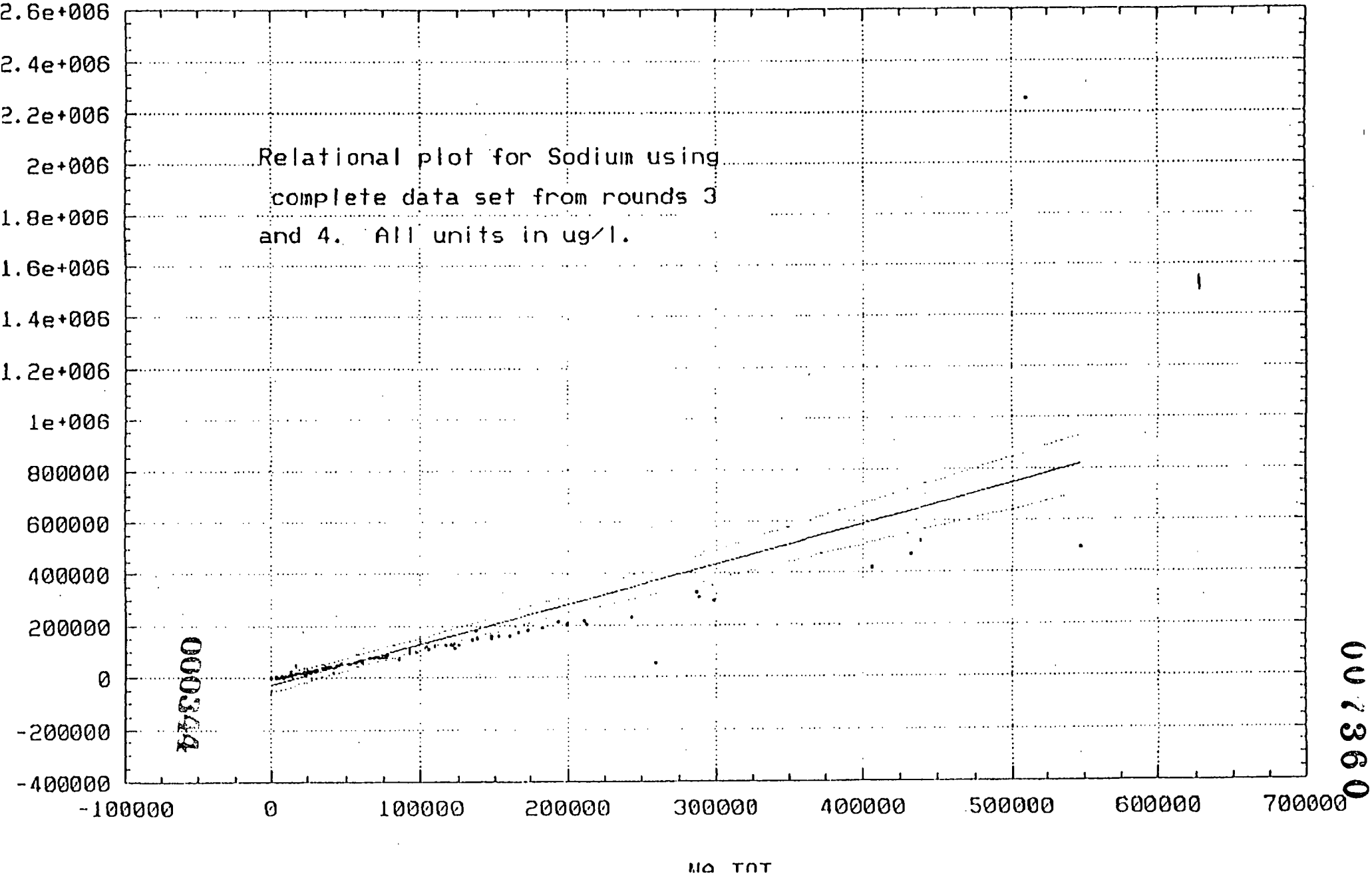

01-14-92 04:51PM FROM FEM MIDWEST TO 91836218504 P003 003

NA_TOT vs. NA_DIS

NA_DIS = -251E2 + 1.5372 * NA_TOT

Correlation: r = .74760

DRAFT




01-14-93 04:51PM FROM ERM MIDWEST TO 918136210604 P004/006

000344

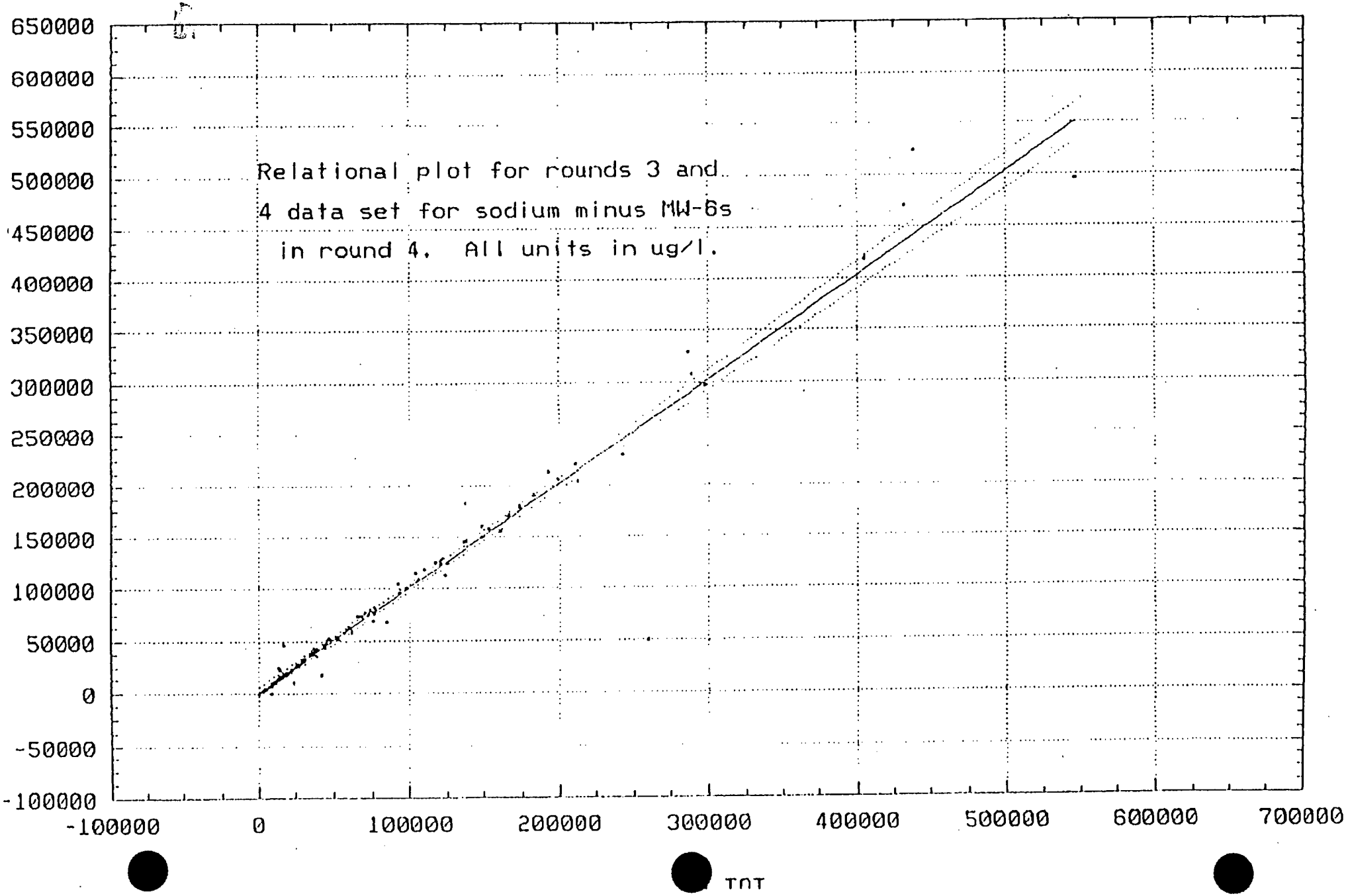
007360

NA_TOT vs. NA_DIS

NA_DIS = 1204.5 + 1.0035 * NA_TOT

Correlation: r = .97514

DRAFT

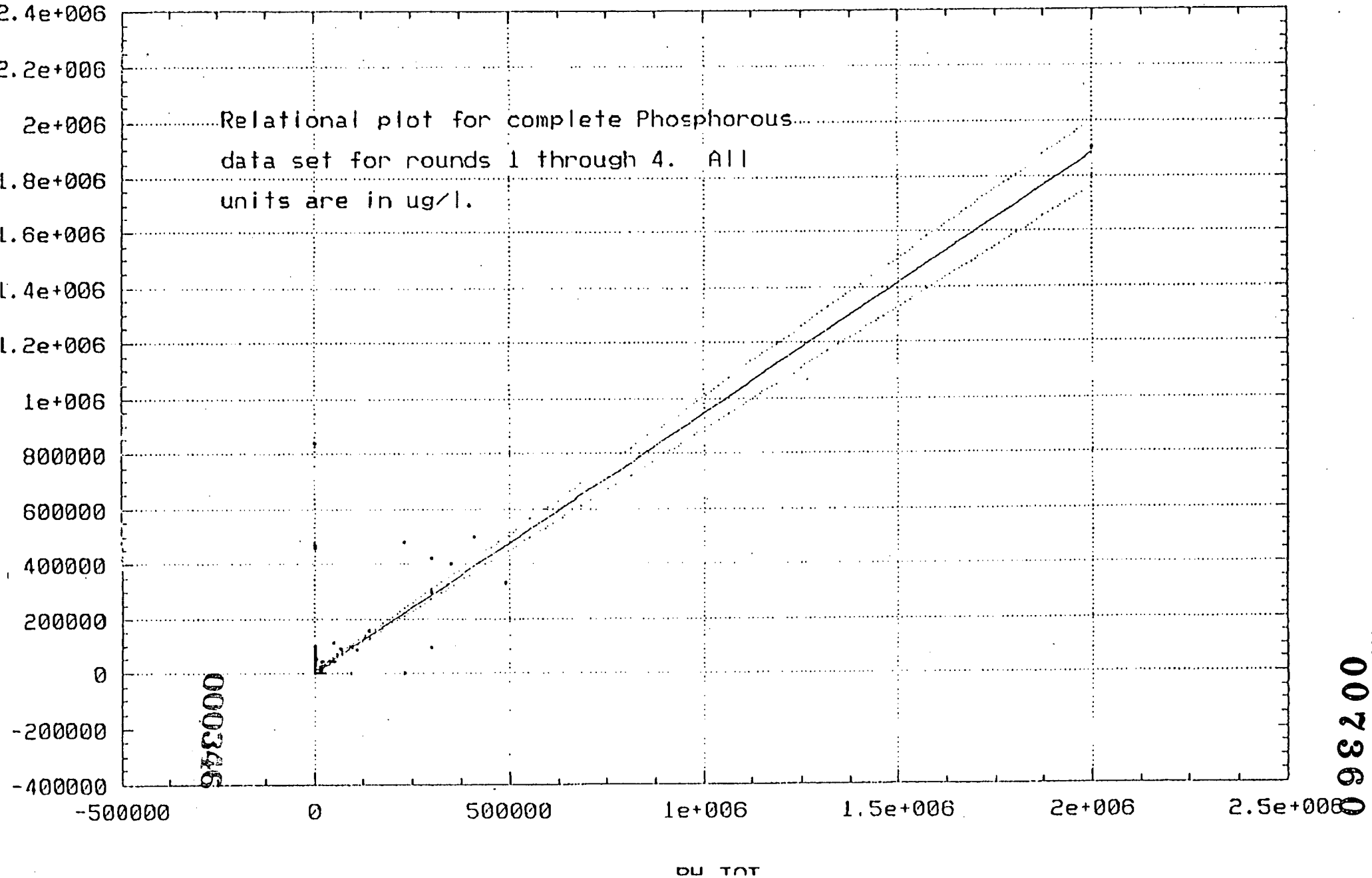


PH_TOT vs. PH_DIS

PH_DIS = 10405. + .93696 * PH_TOT

Correlation: r = .86952

DRAFT




0003346

01-14-93 04:51PM FROM EBM MIDWEST TO 918136218504 P006/008

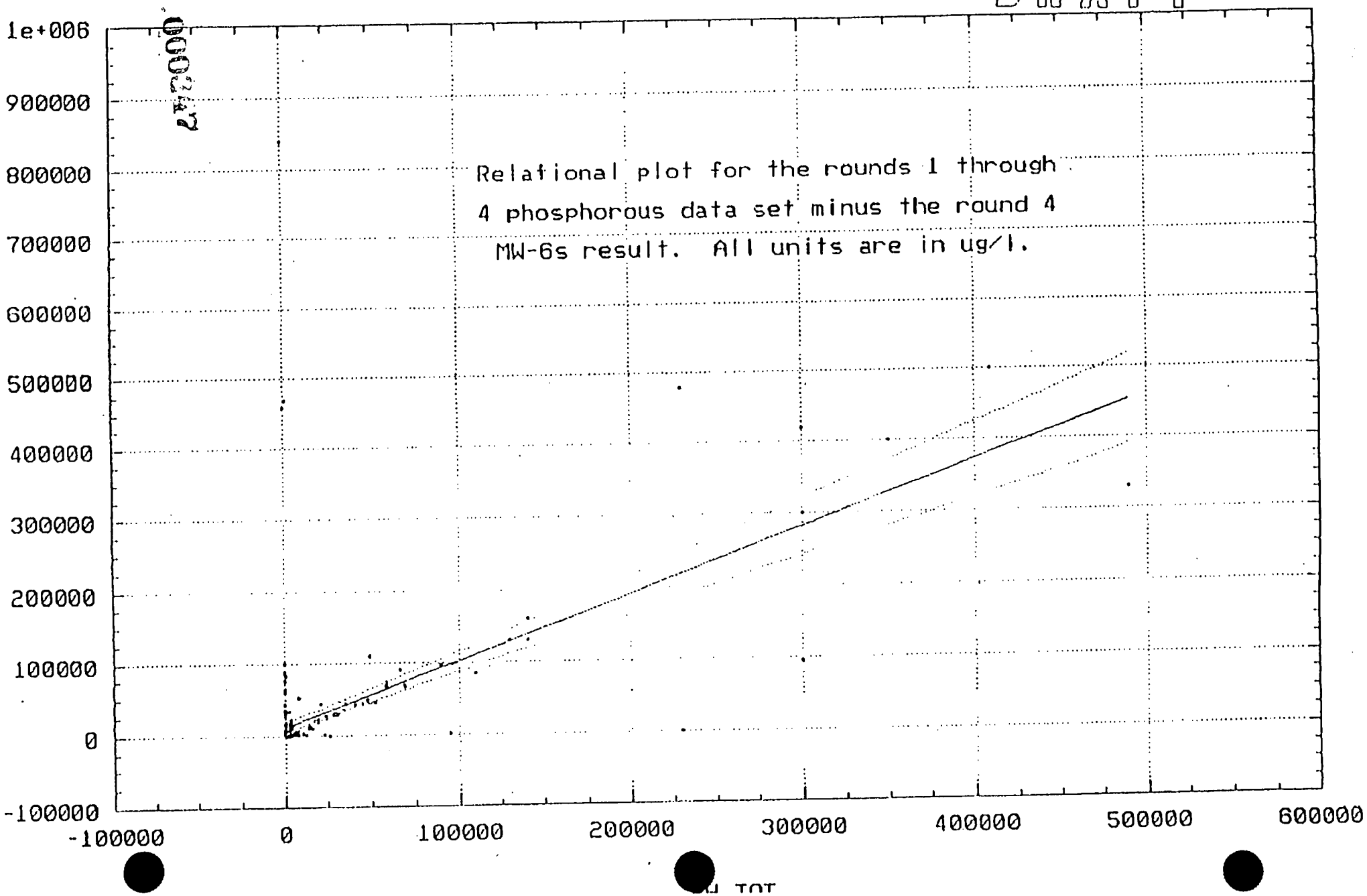
007390

PH_TOT vs. PH_DIS

PH_DIS = 10856. +.90521 * PH_TOT

Correlation: r = .60541

DRAFT



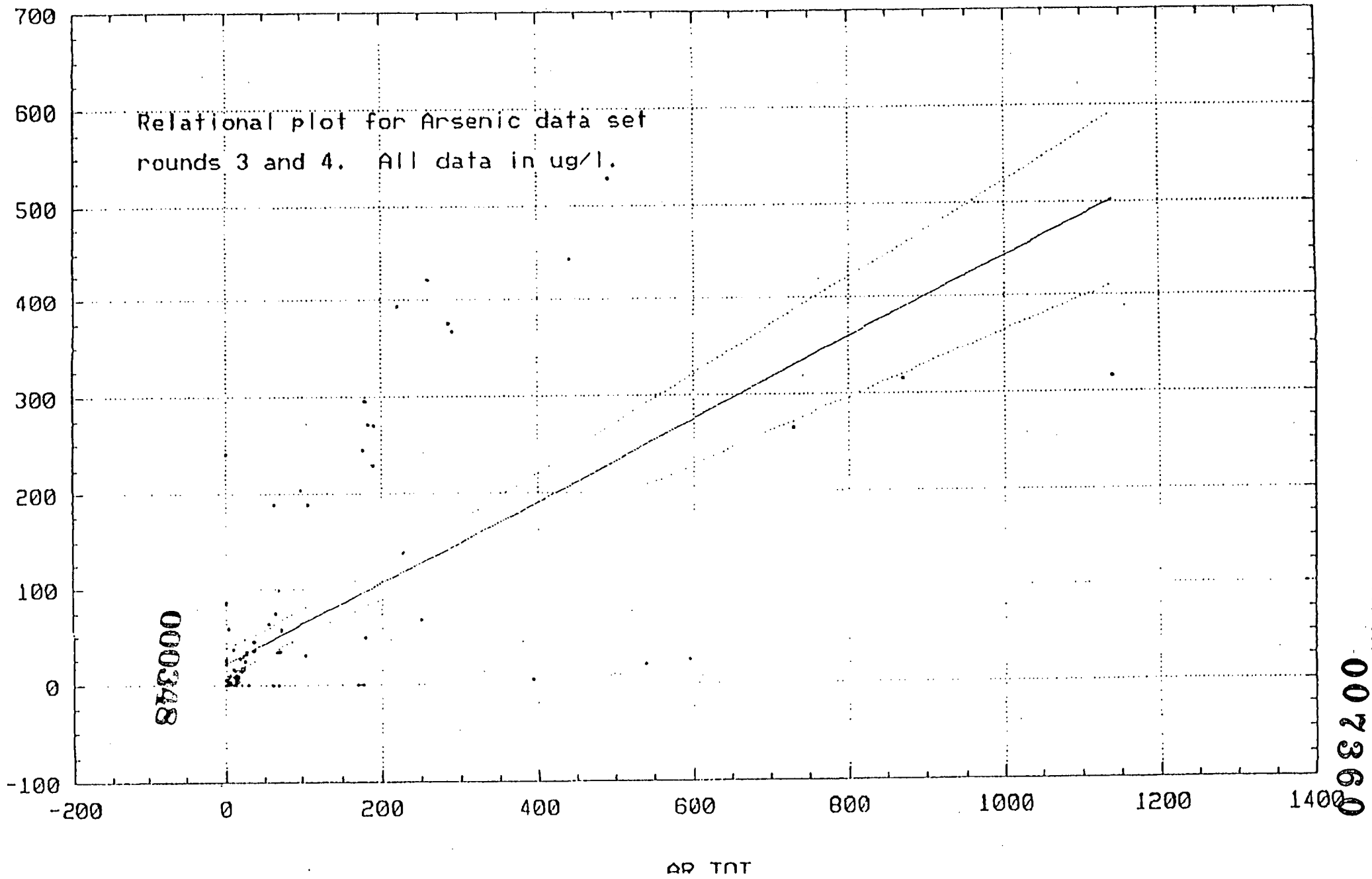

000242

AR_TOT vs. AR_DIS

AR_DIS = 22.082 + .42098 * AR_TOT

Correlation: r = .64564

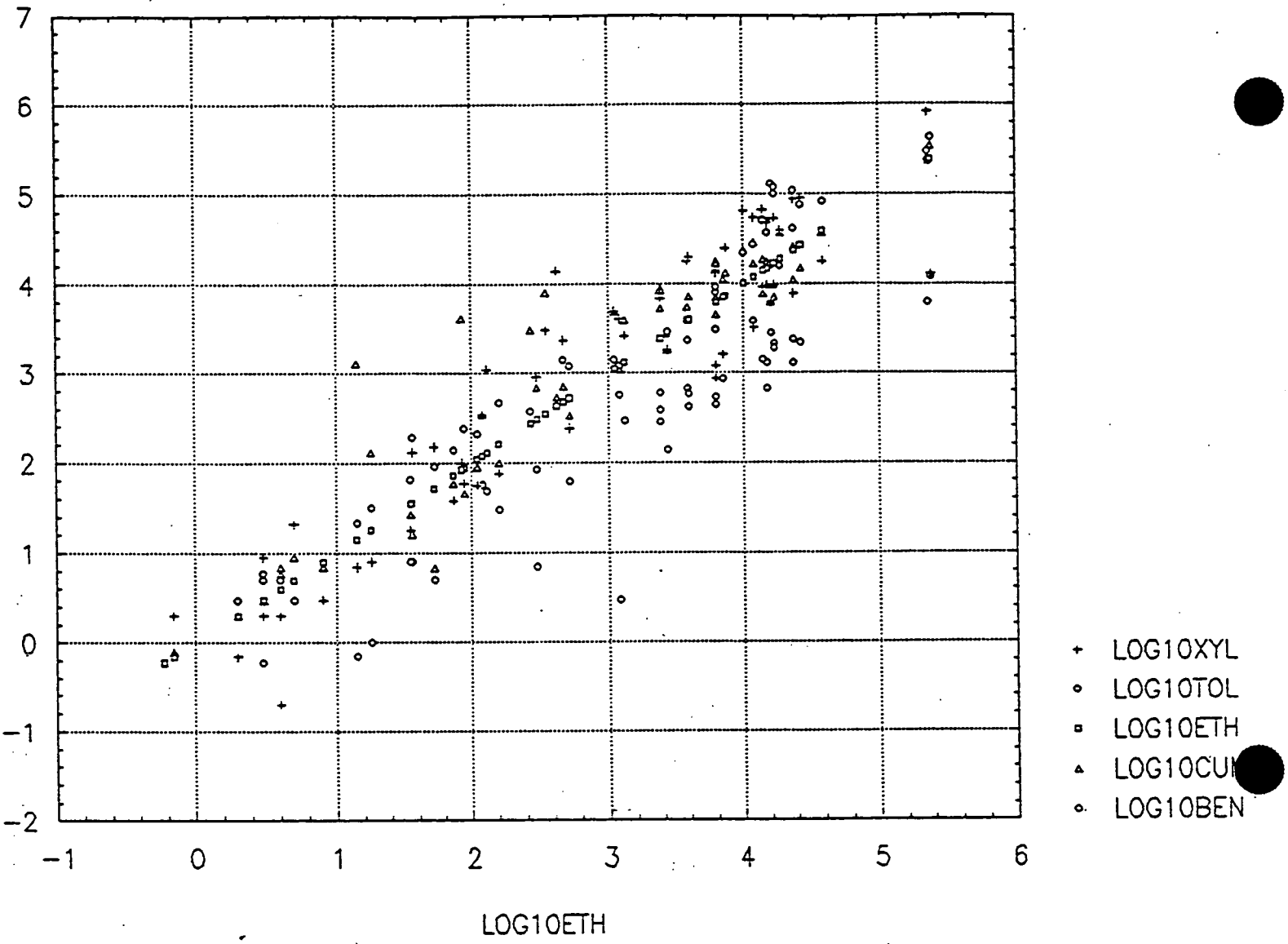
DRAFT




000348

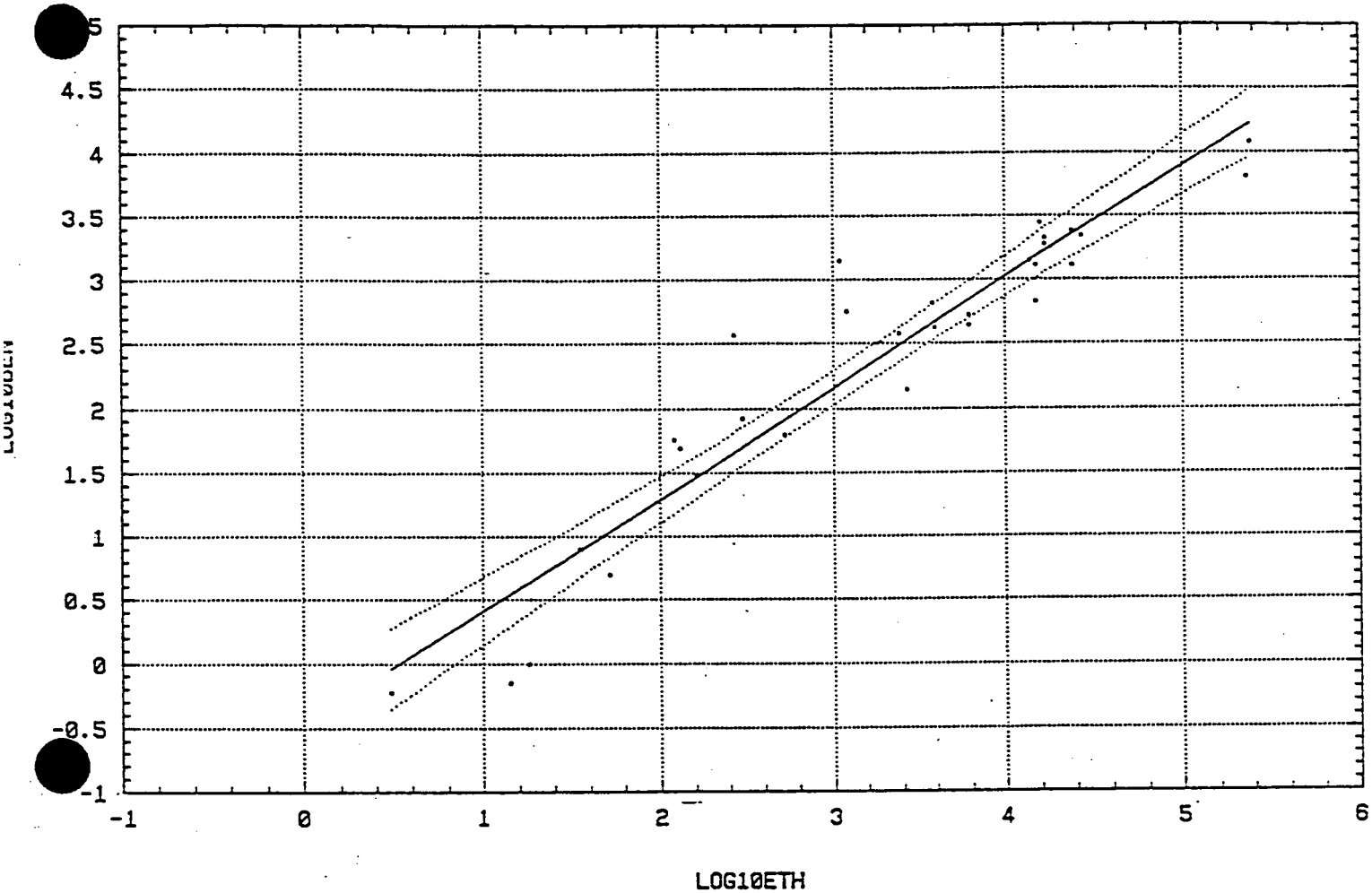
00236 0

ERM-Midwest, inc.

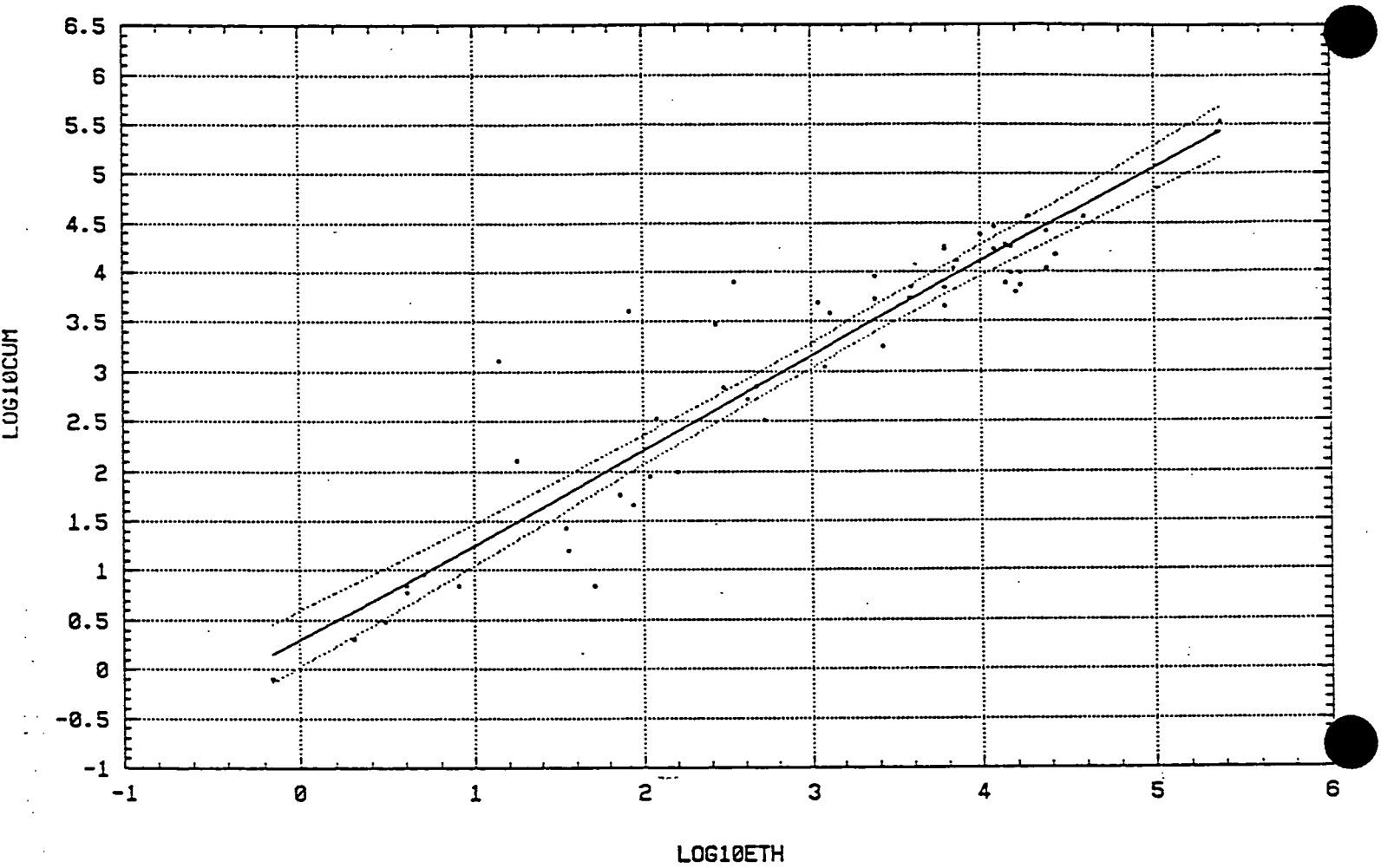



000249

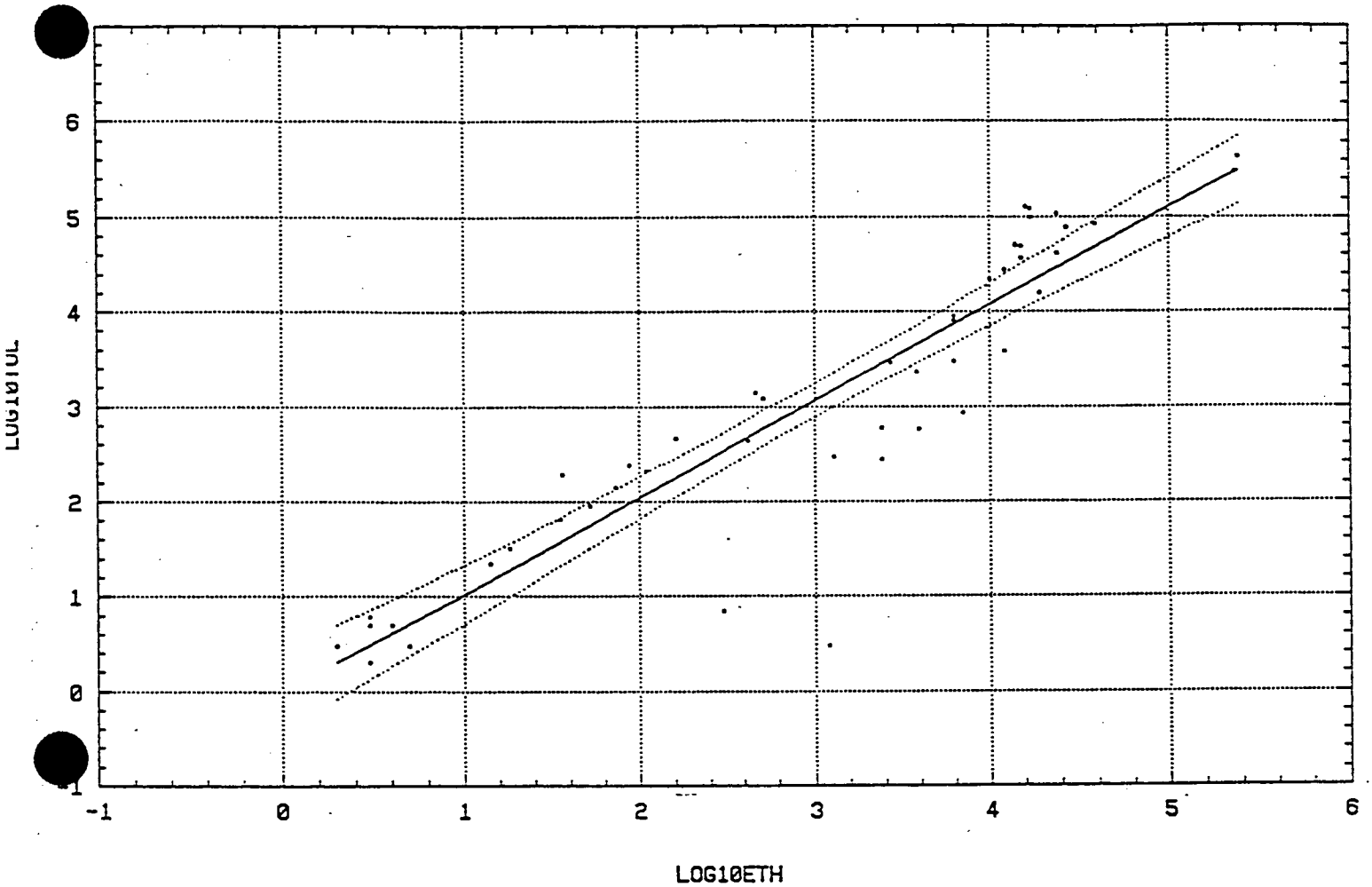
LOG10ETH vs. LOG10BEN
LOG10BEN = -.4580 + .87122 * LOG10ETH
Correlation: r = .94905



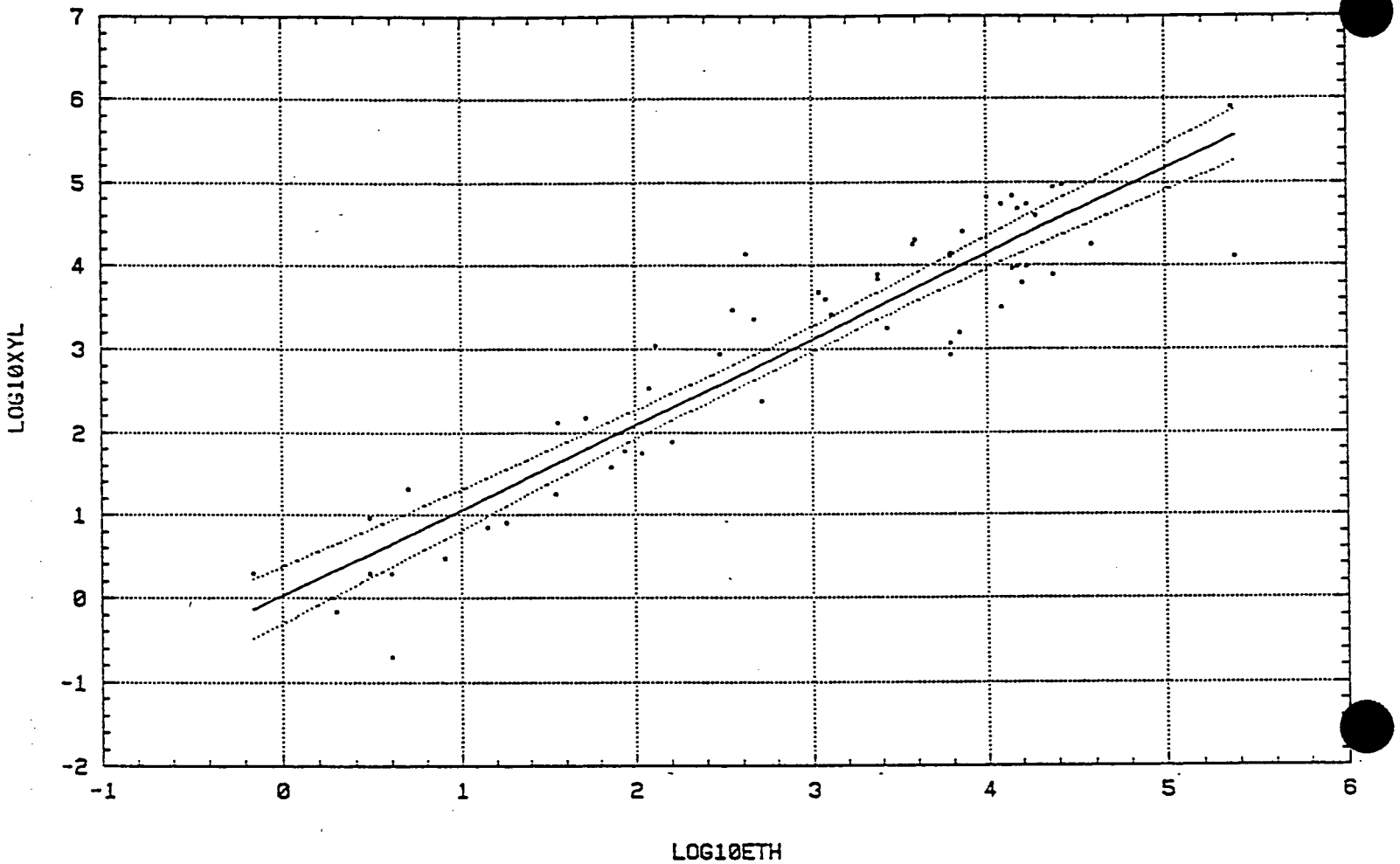
LOG10ETH vs. LOG10CUM
LOG10CUM = .30541 + .95167 * LOG10ETH
Correlation: r = .94311



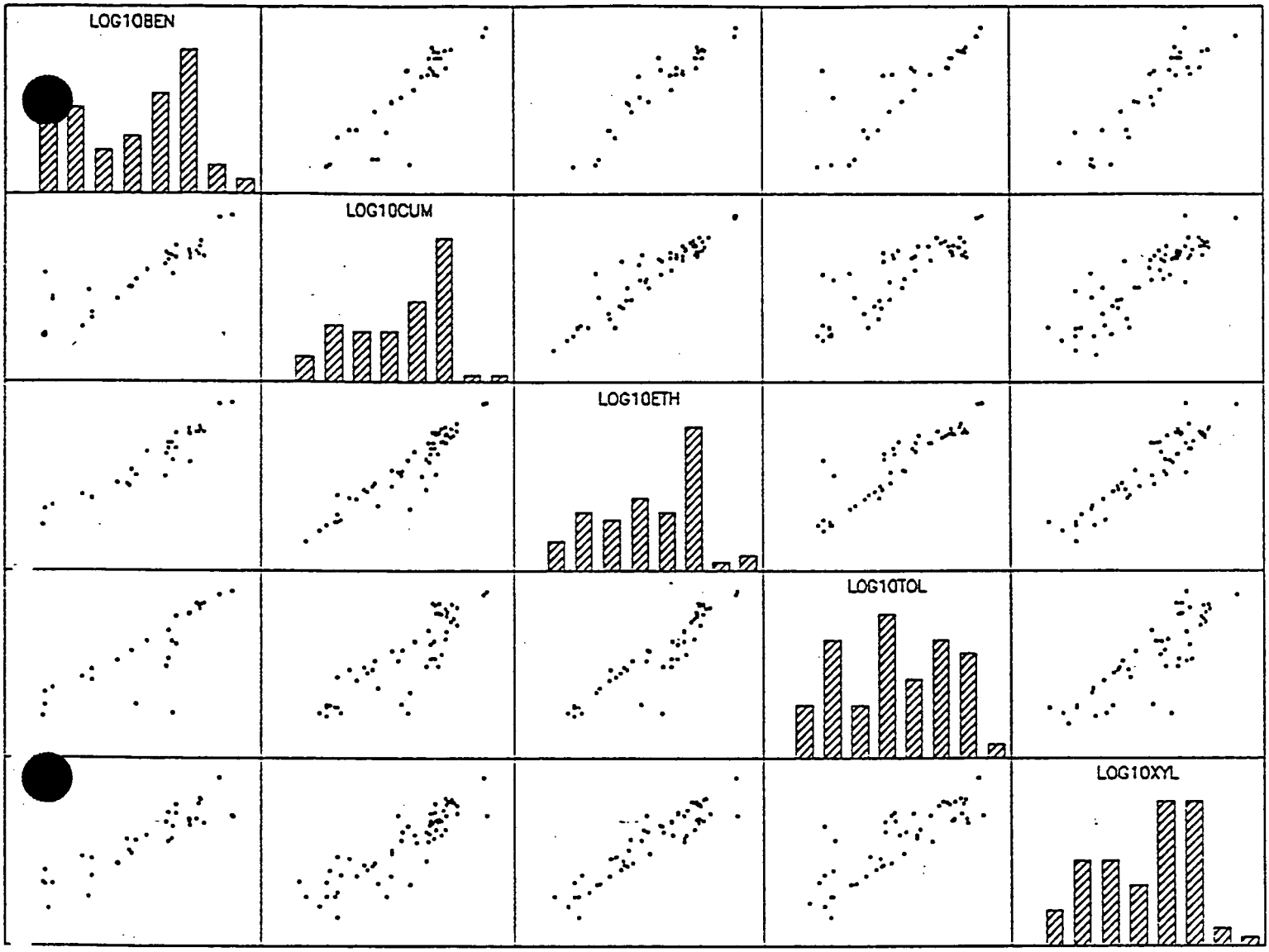
LOG10ETH vs. LOG10TOL
LOG10TOL = -.0011 + 1.0204 * LOG10ETH
Correlation: r = .91786

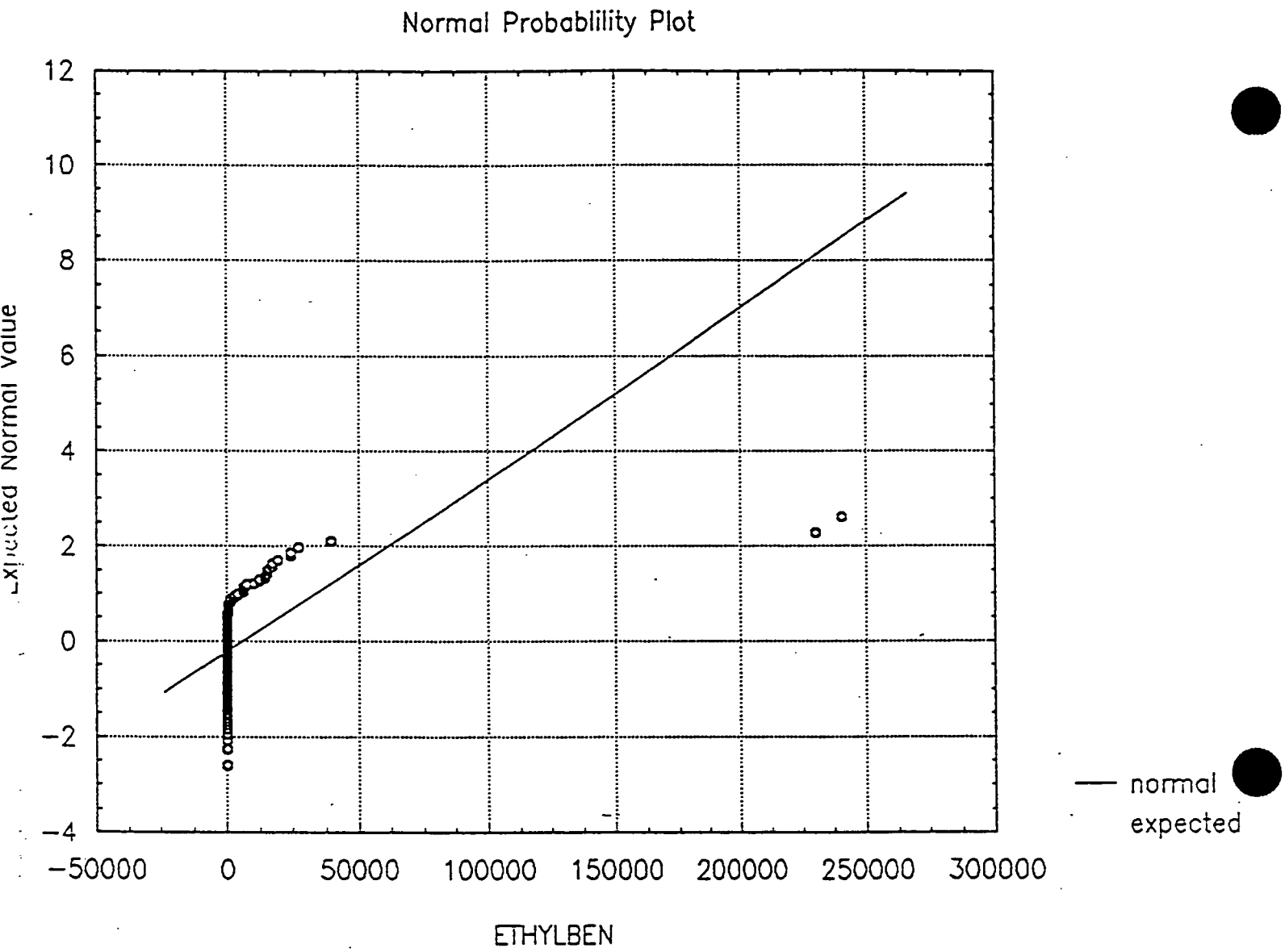


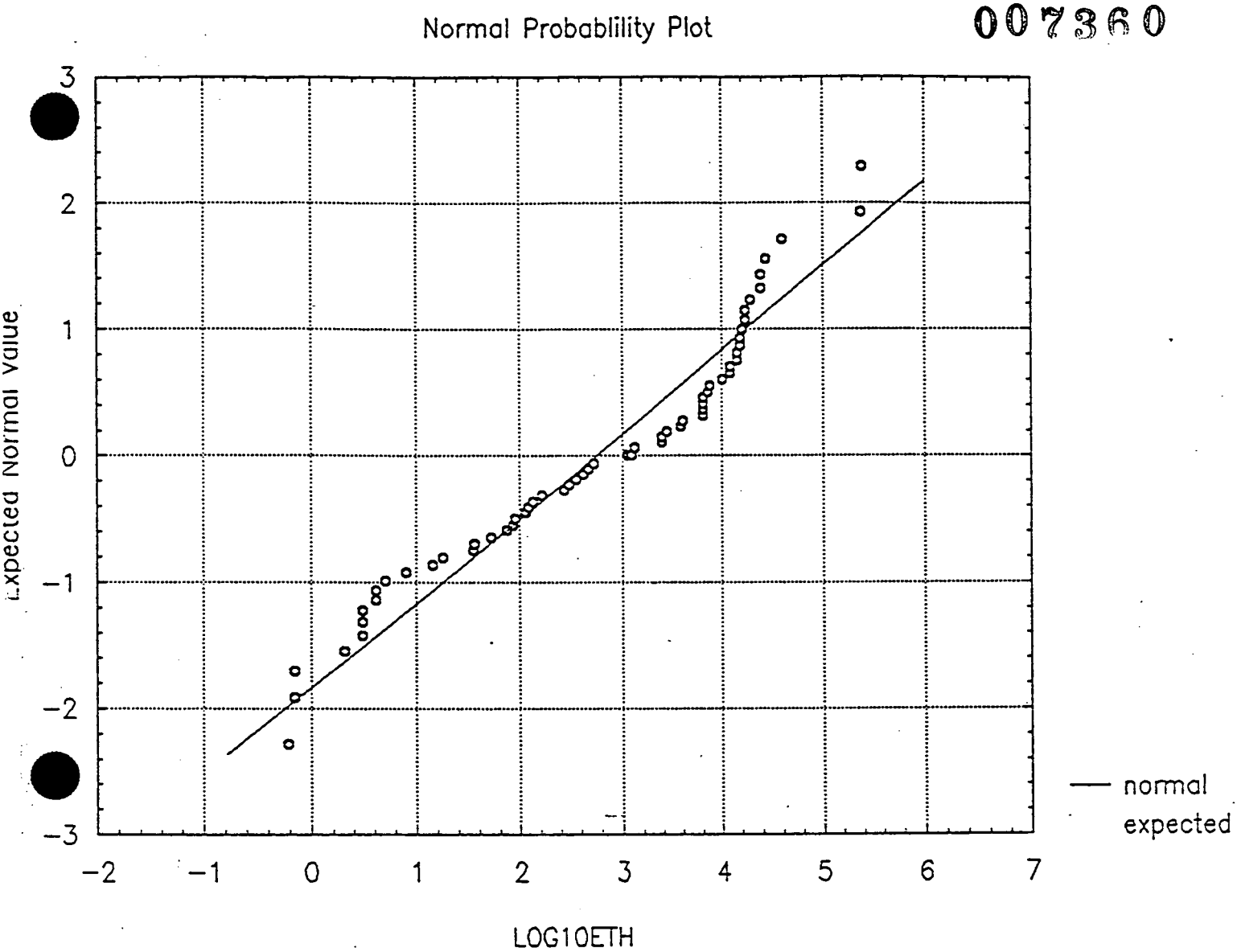
LOG10ETH vs. LOG10XYL
LOG10XYL = .03081 + 1.0295 * LOG10ETH
Correlation: r = .93229




000353


LOG10BEN
LOG10CUM
LOG10ETH
LOG10TOL
LOG10XYL

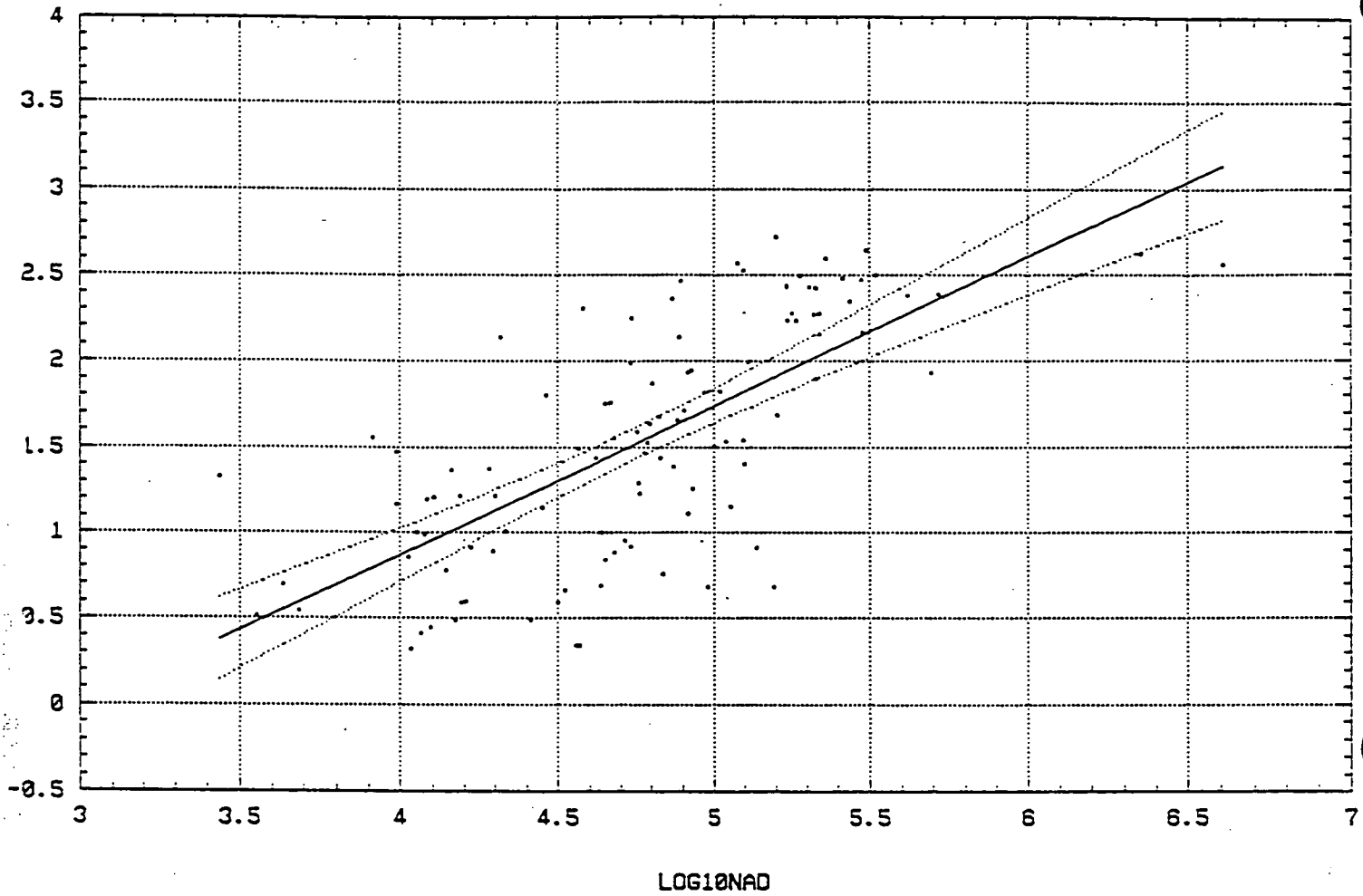

Normal Probablility Plot
Expected Normal Value
12
10
8
6
4
2
0
−2
−4
−50000
0
50000
100000
150000
200000
250000
300000
ETHYLBEN
normal
expected


Normal Probablility Plot
Expected Normal Value
LOG10ETH
3
2
1
0
−1
−2
−3
−2
−1
0
1
2
3
4
5
6
7
normal
expected

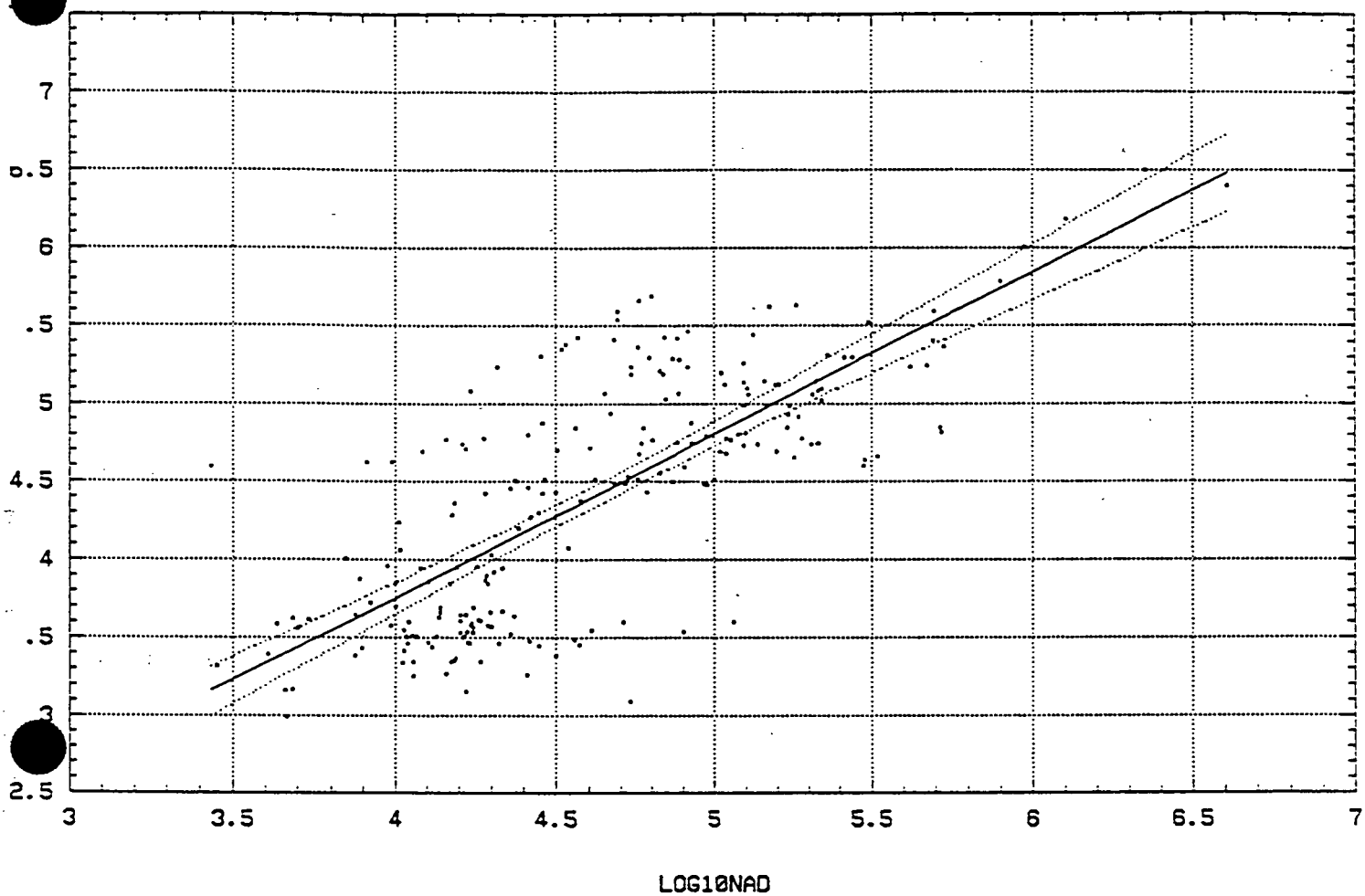
LOG10NAD vs. LOG10ARD

LOG10ARD = -2.603 + .86837 * LOG10NAD

Correlation: r = .70665



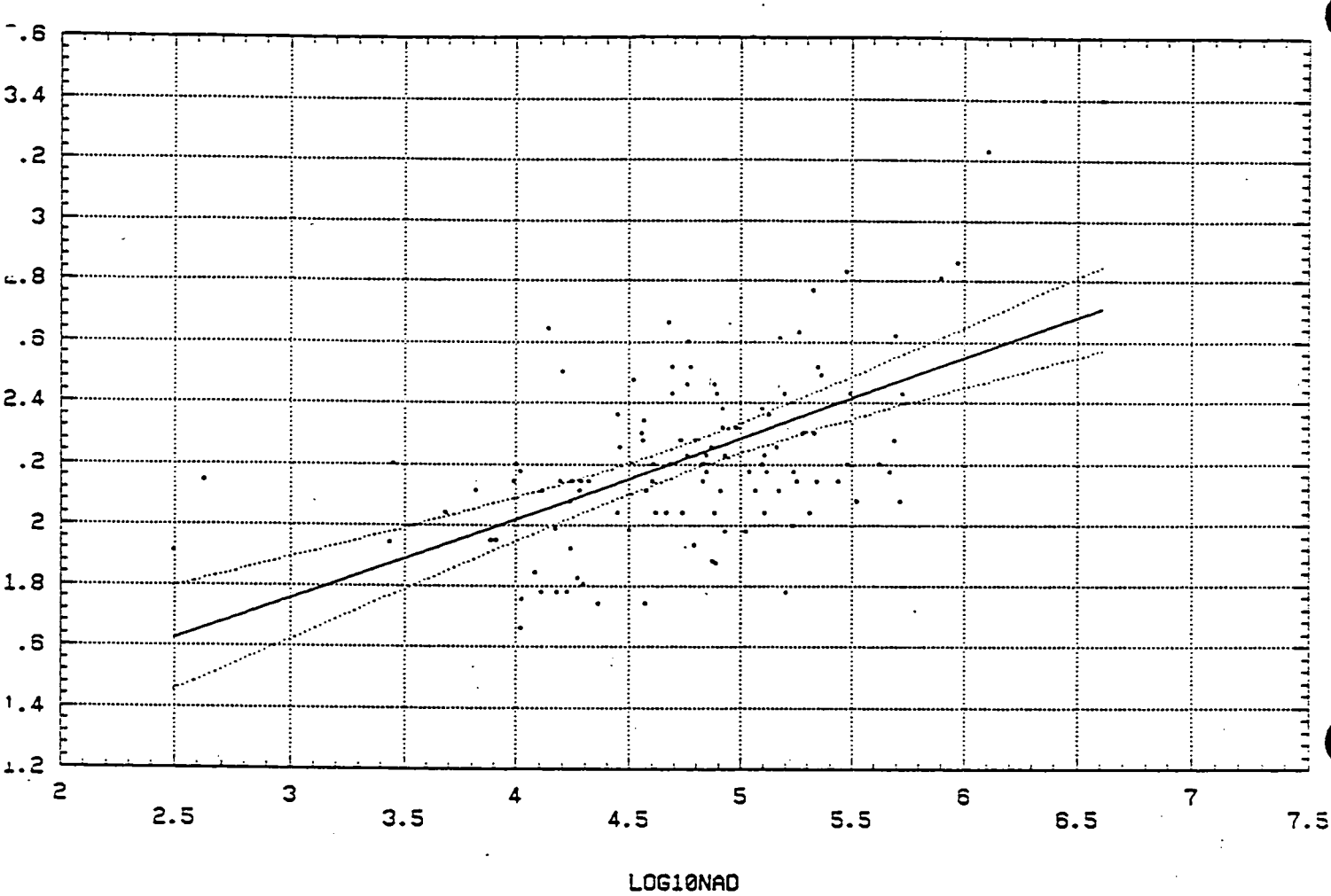
LOG10NAD vs. LOG10KD
LOG10KD = -.4444 + 1.0487 * LOG10NAD
Correlation: r = .75761



LOG10NAD vs. LOG10K4D

LOG10K4D = .96674 + .26369 * LOG10NAD

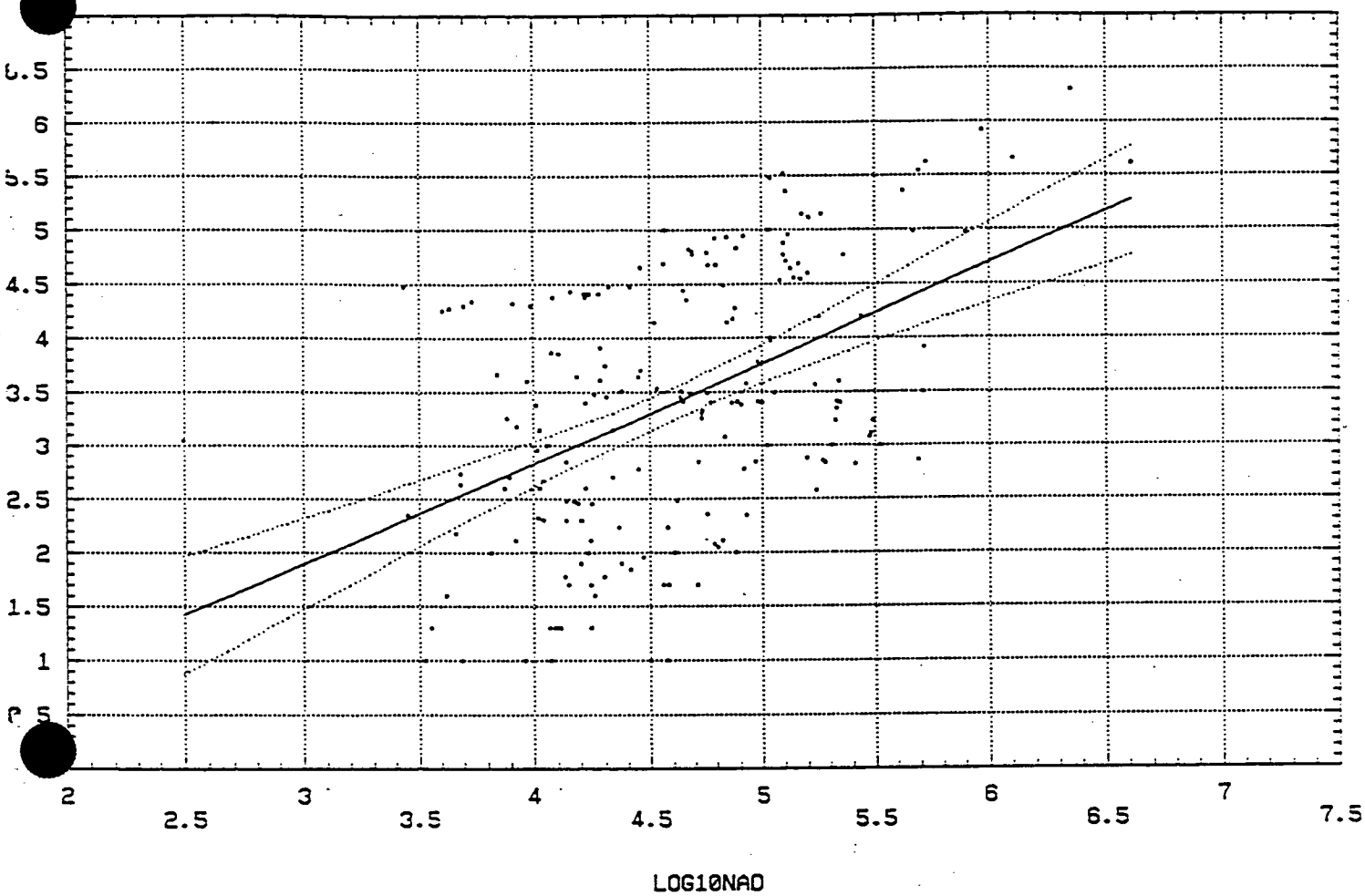
Correlation: r = .55969




000329

LOG10NAD vs. LOG10PHD
LOG10PHD = -.9082 + .93420 * LOG10NAD
Correlation: r = .47980

007360




000360

11102.07/02/MODEL.COV/BAI/1/061692

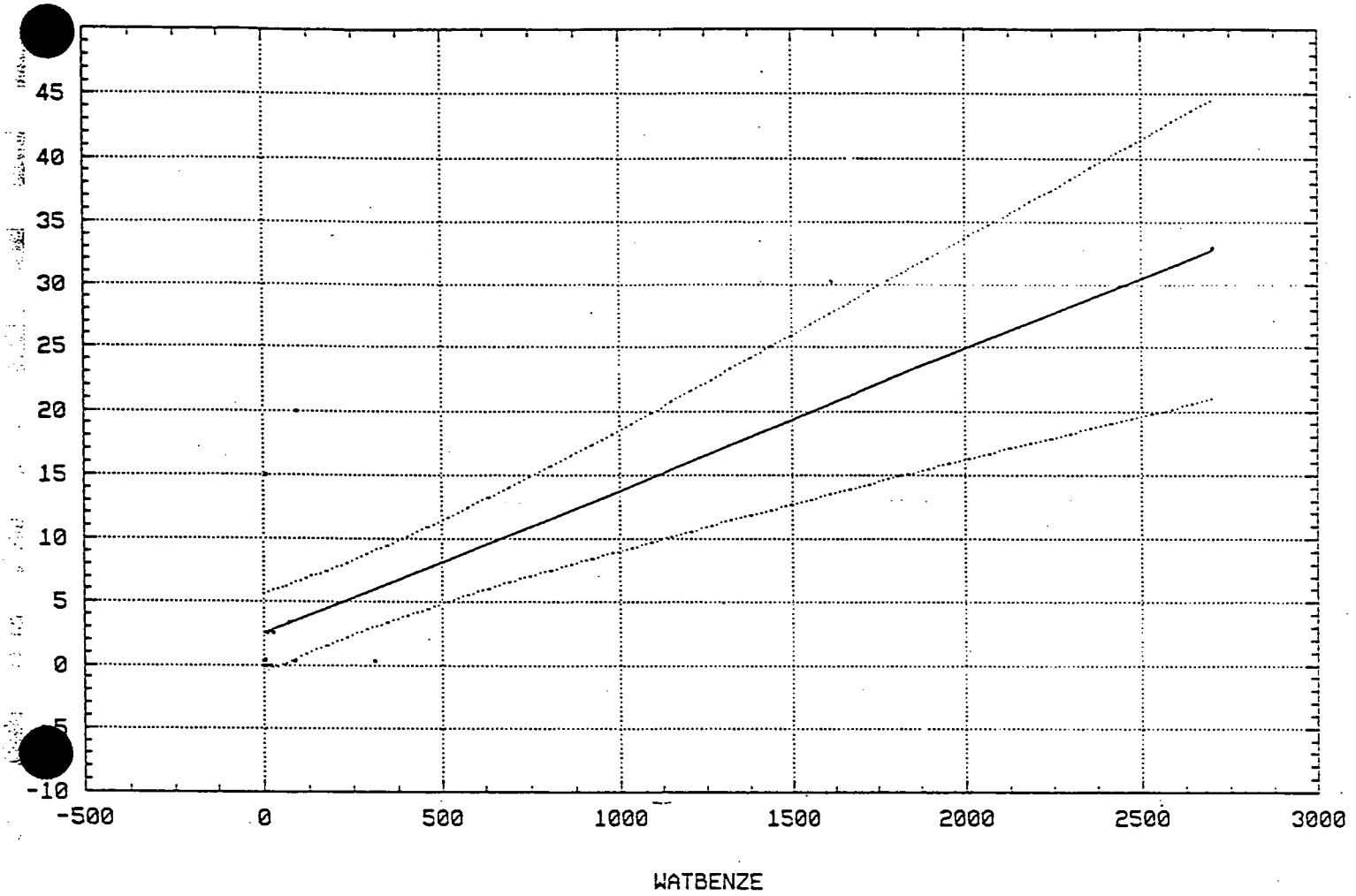
*Appendix E*

*Retardation Factor Calculations for Inorganic Chemicals*

WATBENZE vs. SOILBENZ

SOILBENZ = 2.5552 + .01119 * WATBENZE

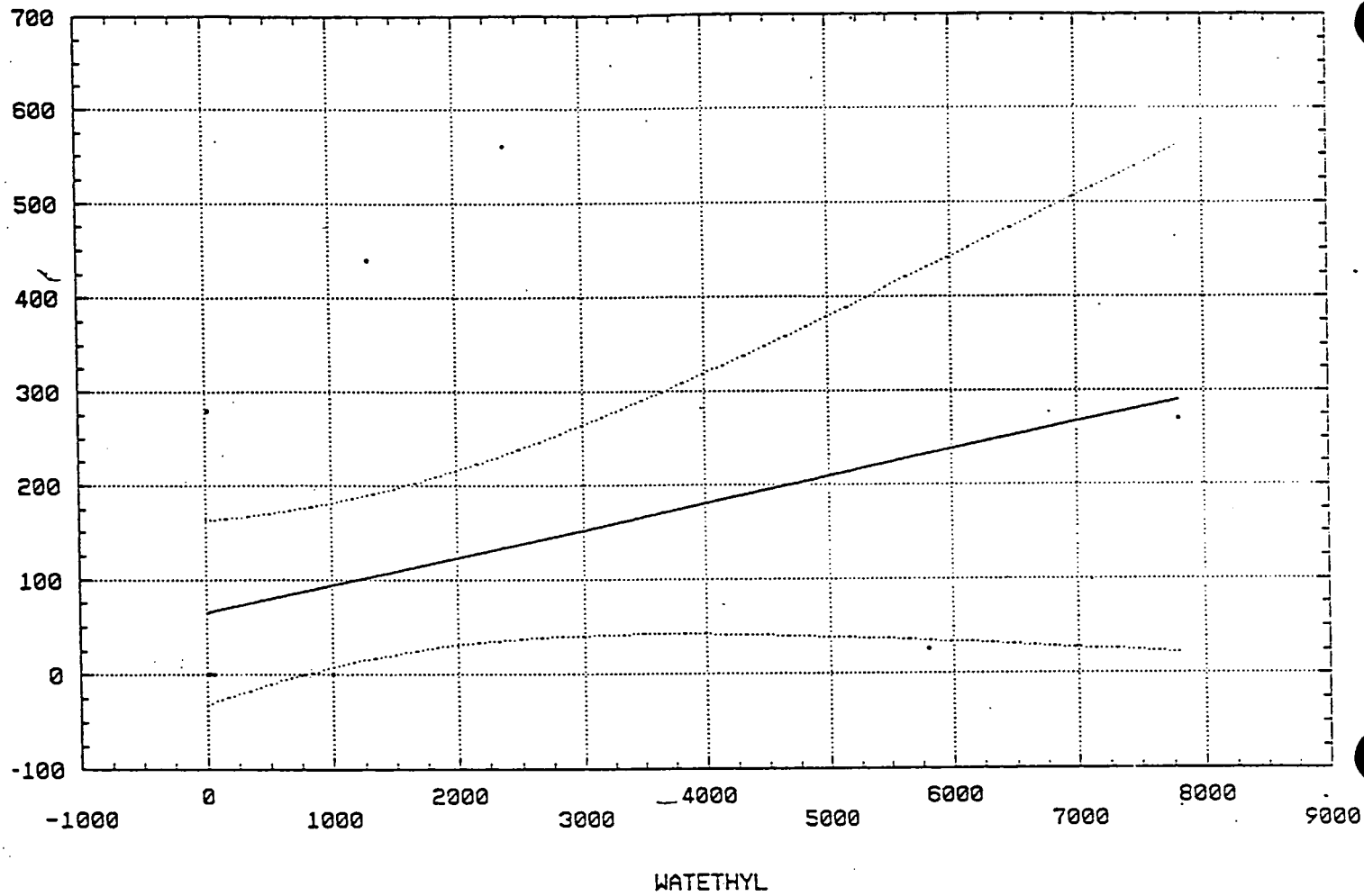
Correlation: r = .78743



WATETHYL vs. SOILETHY

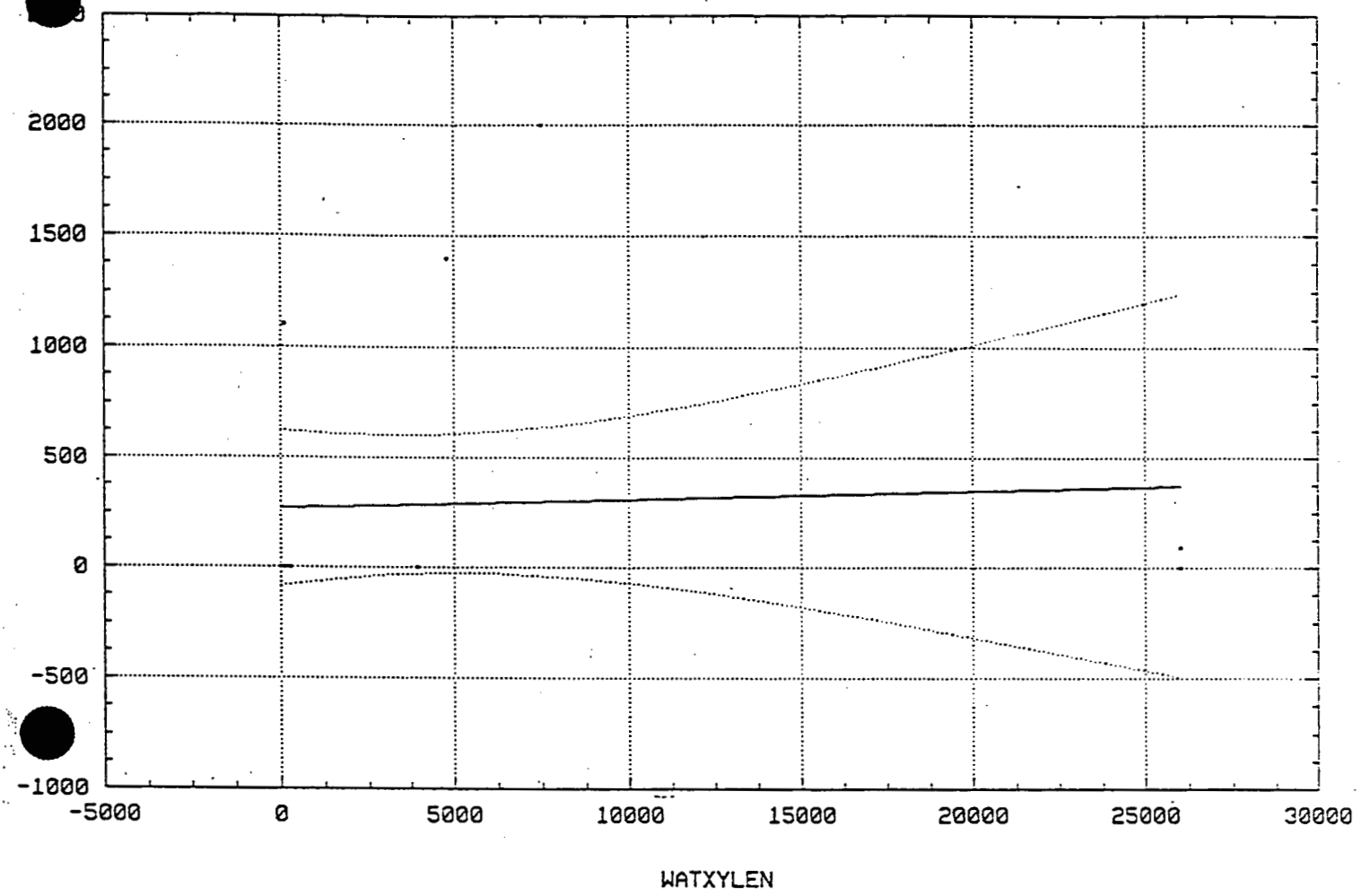
SOILETHY = 65.630 + .02879 * WATETHYL

Correlation: r = .36666




000363

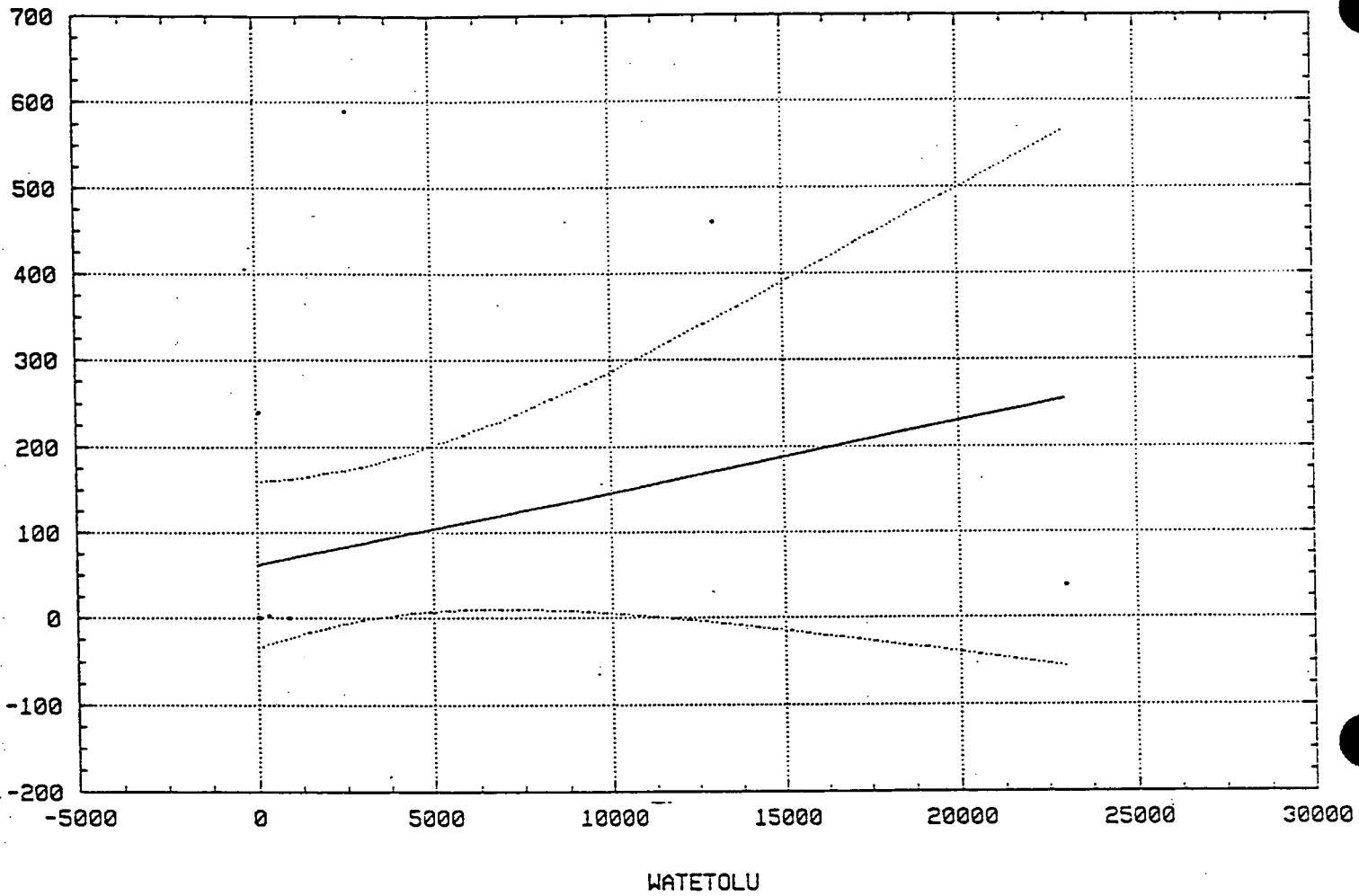
WATXYLEN vs. SOILXYLE
SOILXYLE = 271.02 + .00387 * WATXYLEN
Correlation: r = .05418



WATETOLU vs. SOILTOLU

SOILTOLU = 62.705 + .00835 * WATETOLU

Correlation: r = .28868



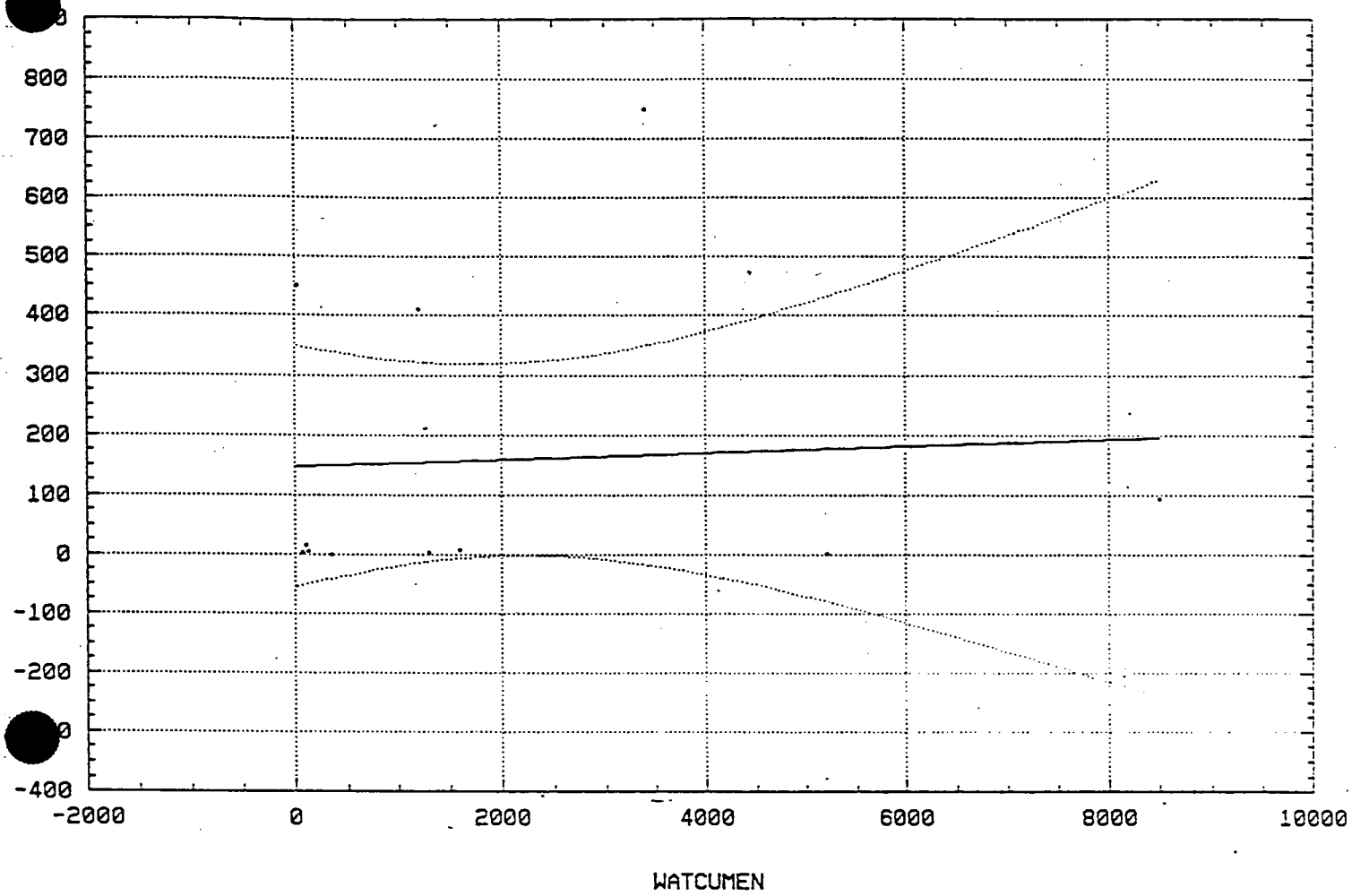

000365

007360

WATCUMEN vs. SOILCUME

SOILCUME = 147.01 + .00559 * WATCUMEN

Correlation: r = .05857

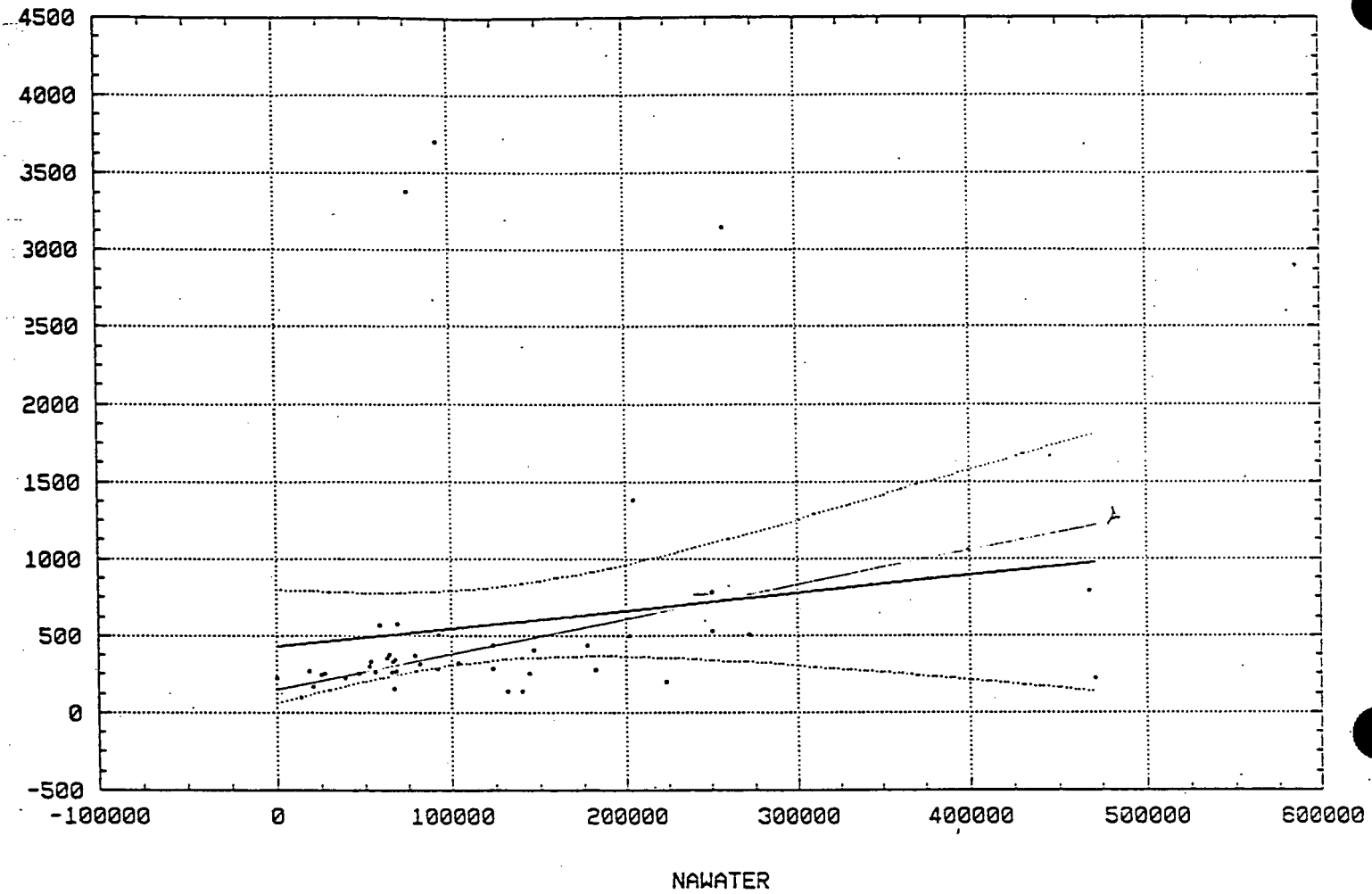



000366

NAWATER vs. NASOIL

NASOIL = 431.05 + .00116 * NAWATER

Correlation: r = .15079




Thus A: $kD = \frac{130}{10,000} = 0.0250$

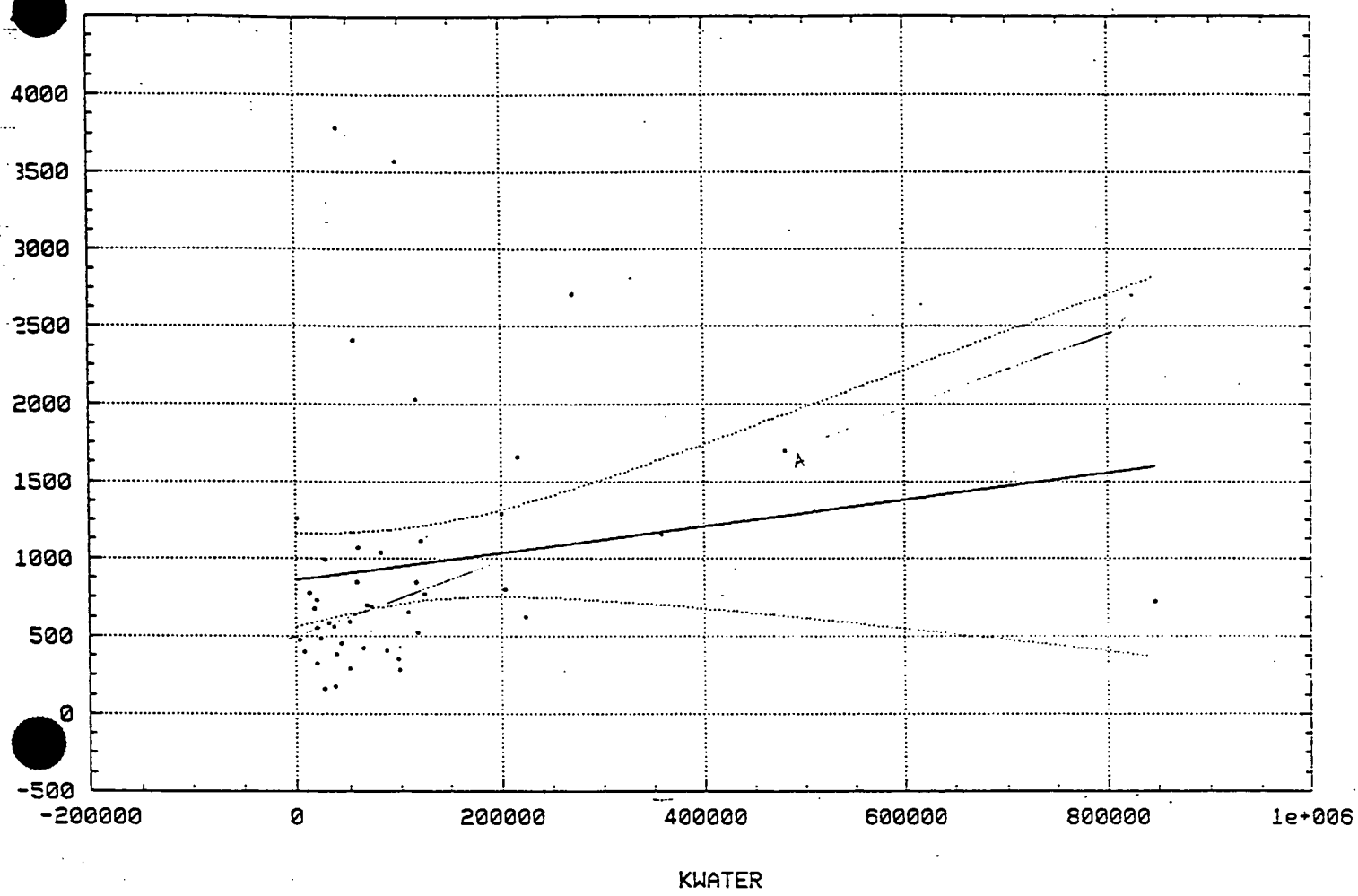
000167

007360

KWATER vs. KSOIL

KSOIL = 859.21 + .00087 * KWATER

Correlation: r = .15964



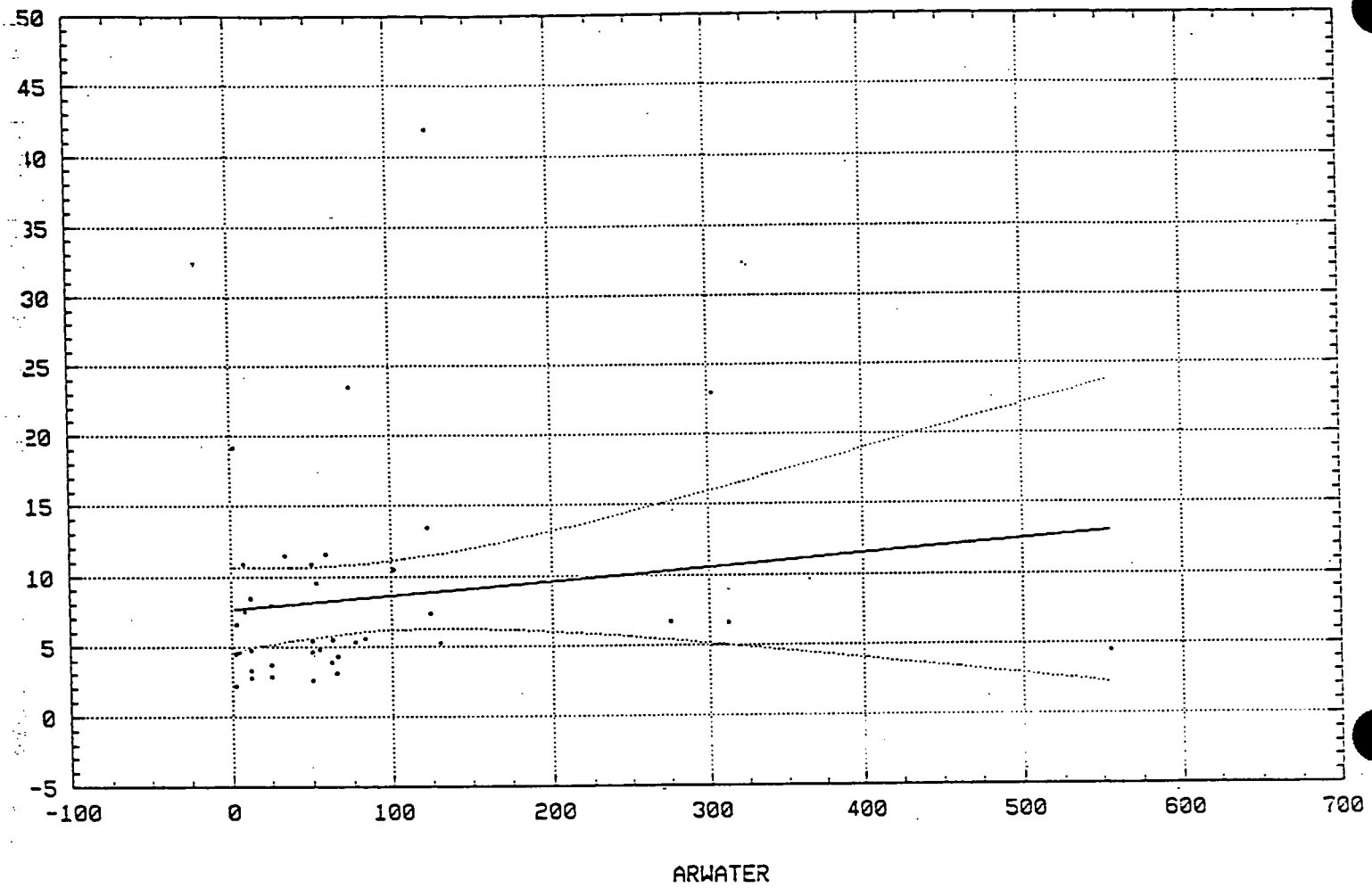

Thru A KD = 400/20,000

000368

ARWATER vs. ARSOIL

ARSOIL = 7.6434 + .00968 * ARWATER

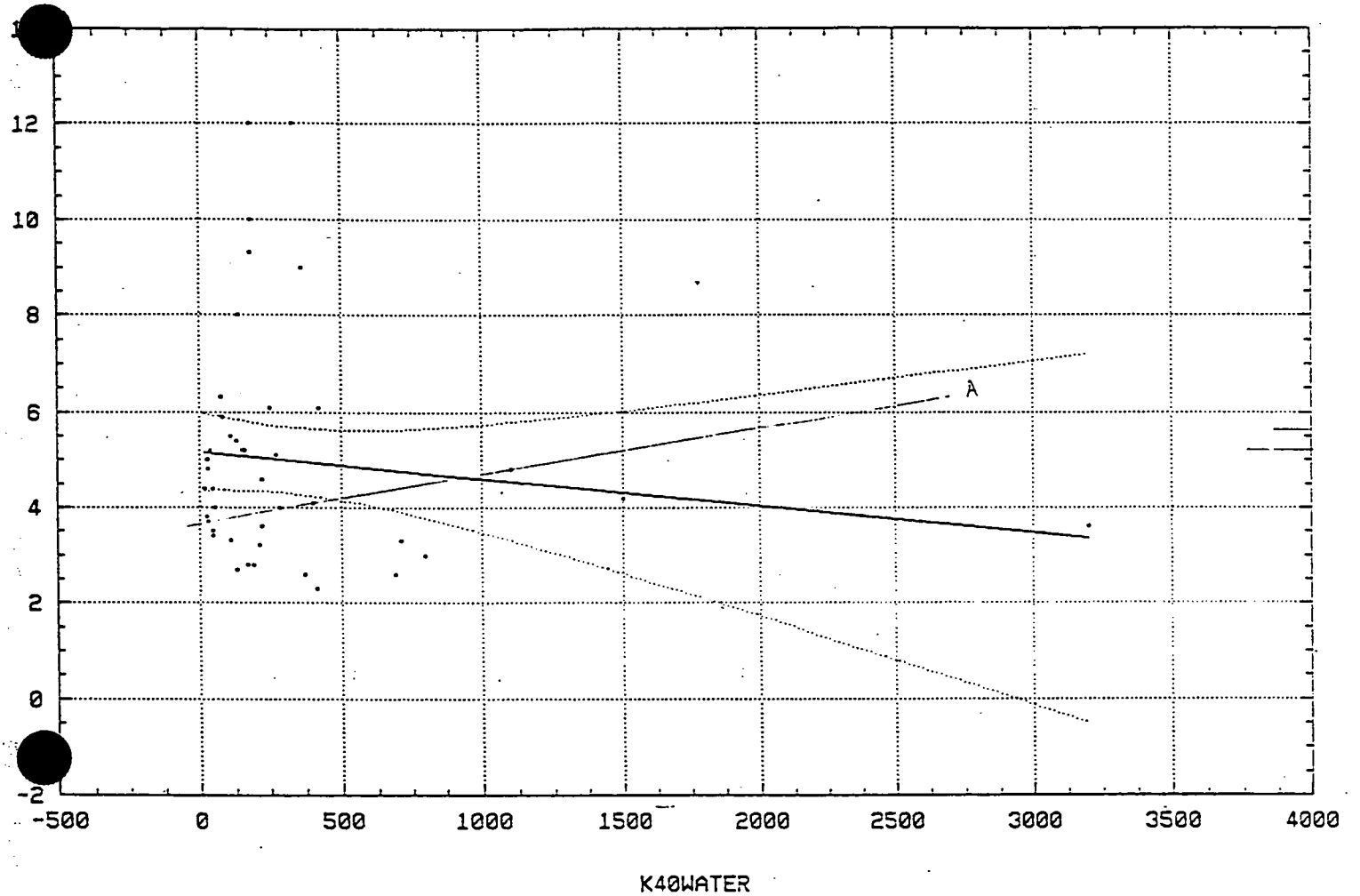
Correlation: r = .14095




000369

K40WATER vs. K40SOIL
K40SOIL = 5.1664 - .00066 * K40WATER
Correlation: r = -.1291

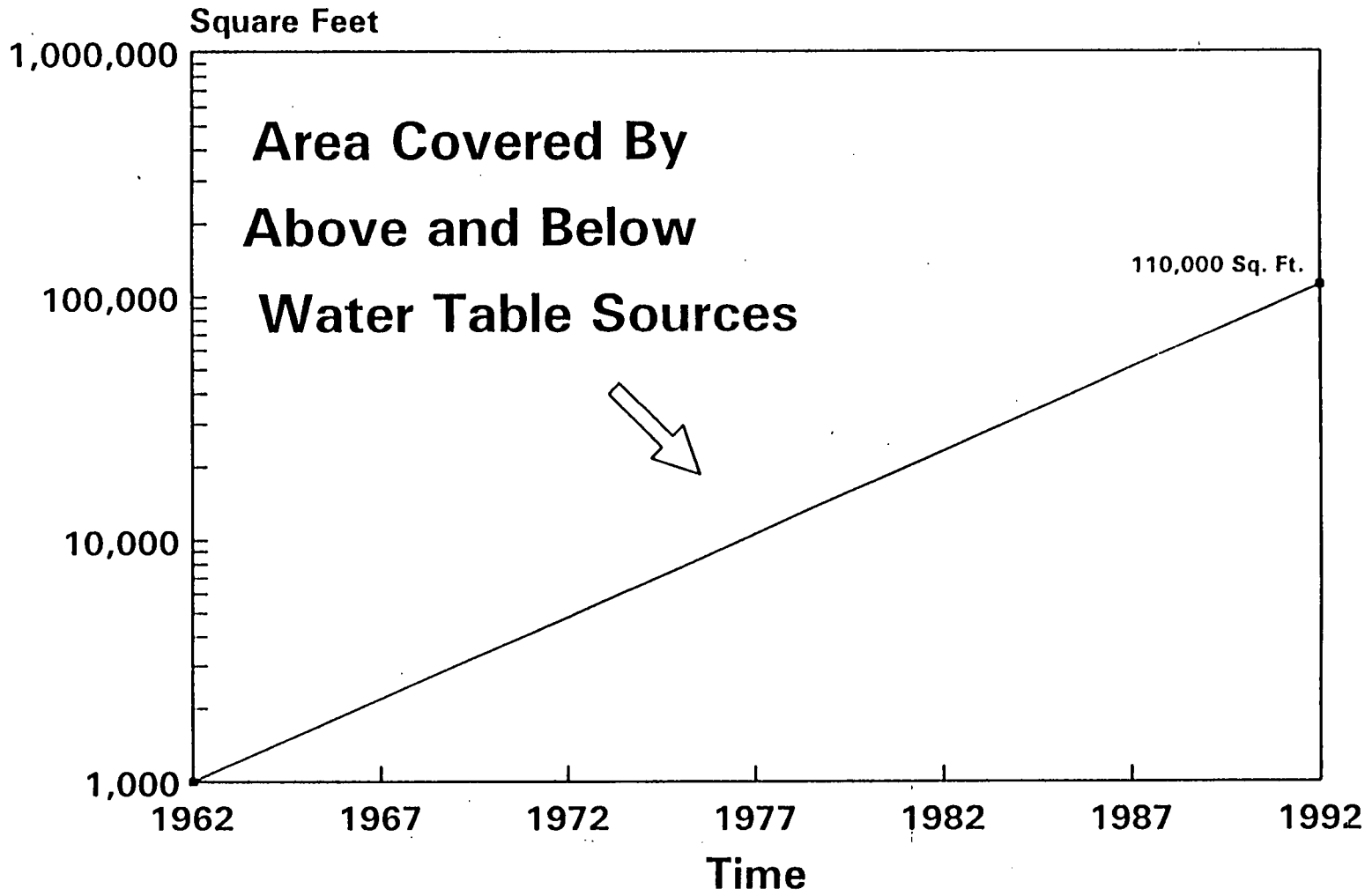
007360



*Appendix F*

*Estimation of Source Area Growth Up to 1991*

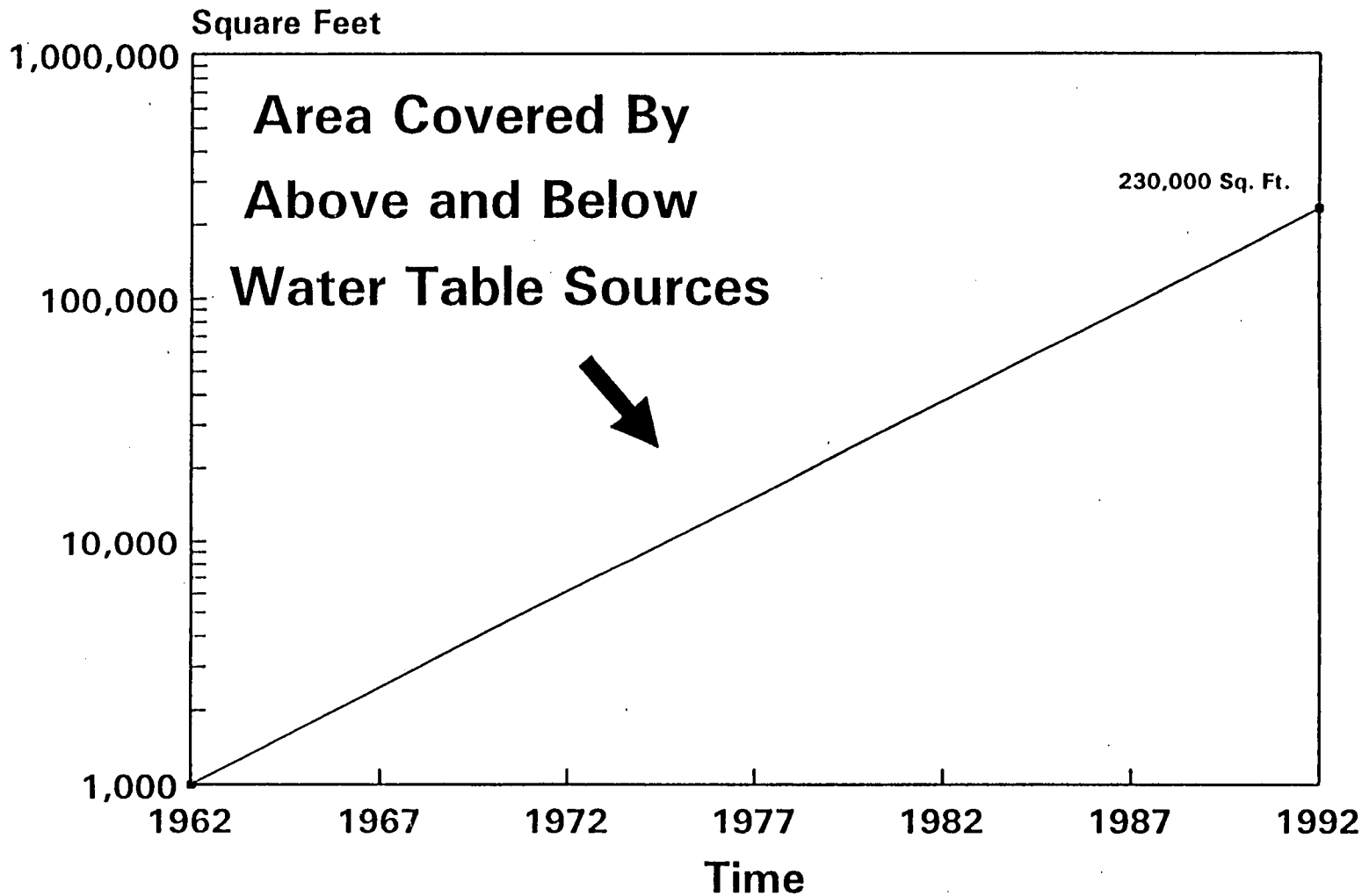
## Estimated Sodium Source Area Growth Prior to 1992 (RN Chem. Co. Property)




003372

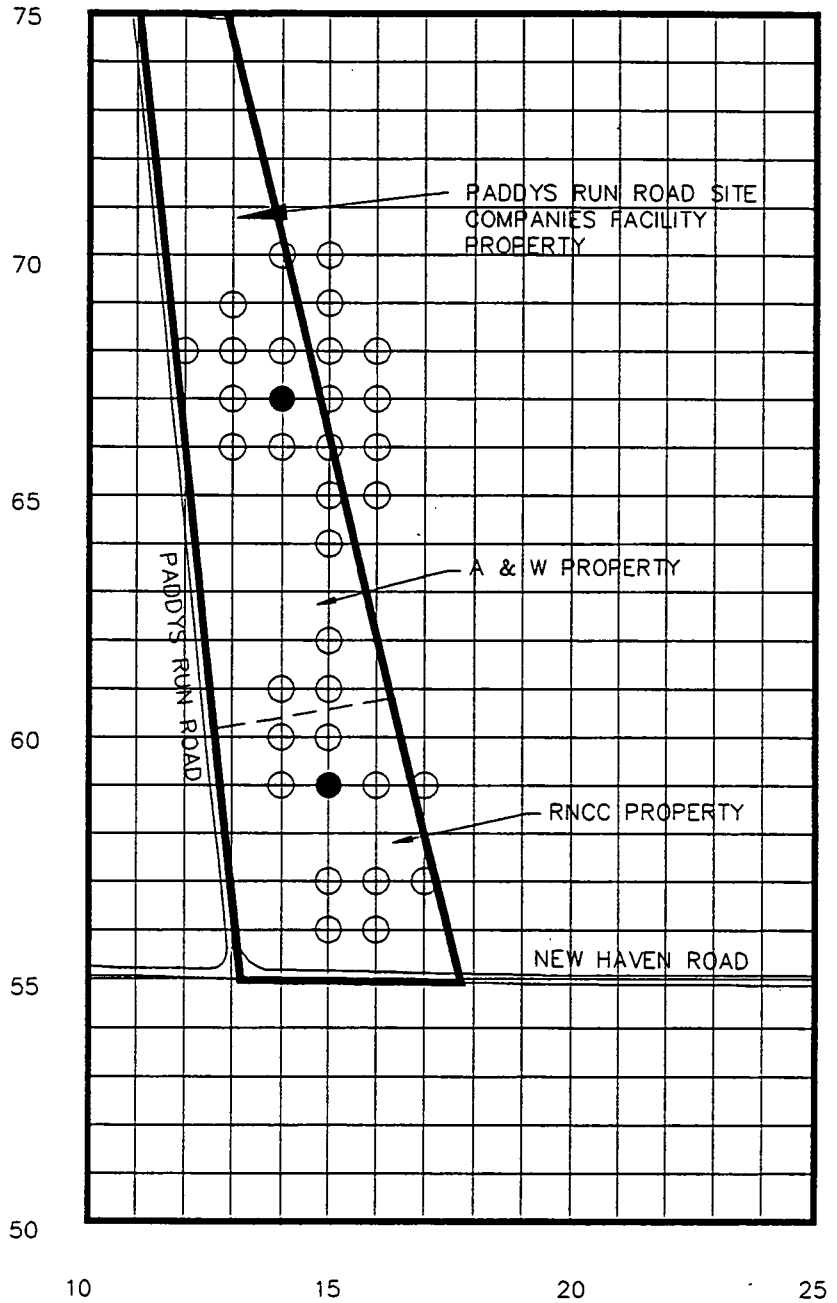
007360

## Estimated Sodium Source Area Growth Prior to 1992 (A&W Property)




000223

# Period 1
## Sodium Model Source Nodes
### Paddys Run Road Site
### Hamilton County, Ohio




LEGEND

○ NO MASS INTRODUCED THROUGH NODE

● MASS INTRODUCED THROUGH NODE

N

0 400
FEET

NOTE: COORDINATES REFER TO LOCAL GRID SYSTEM



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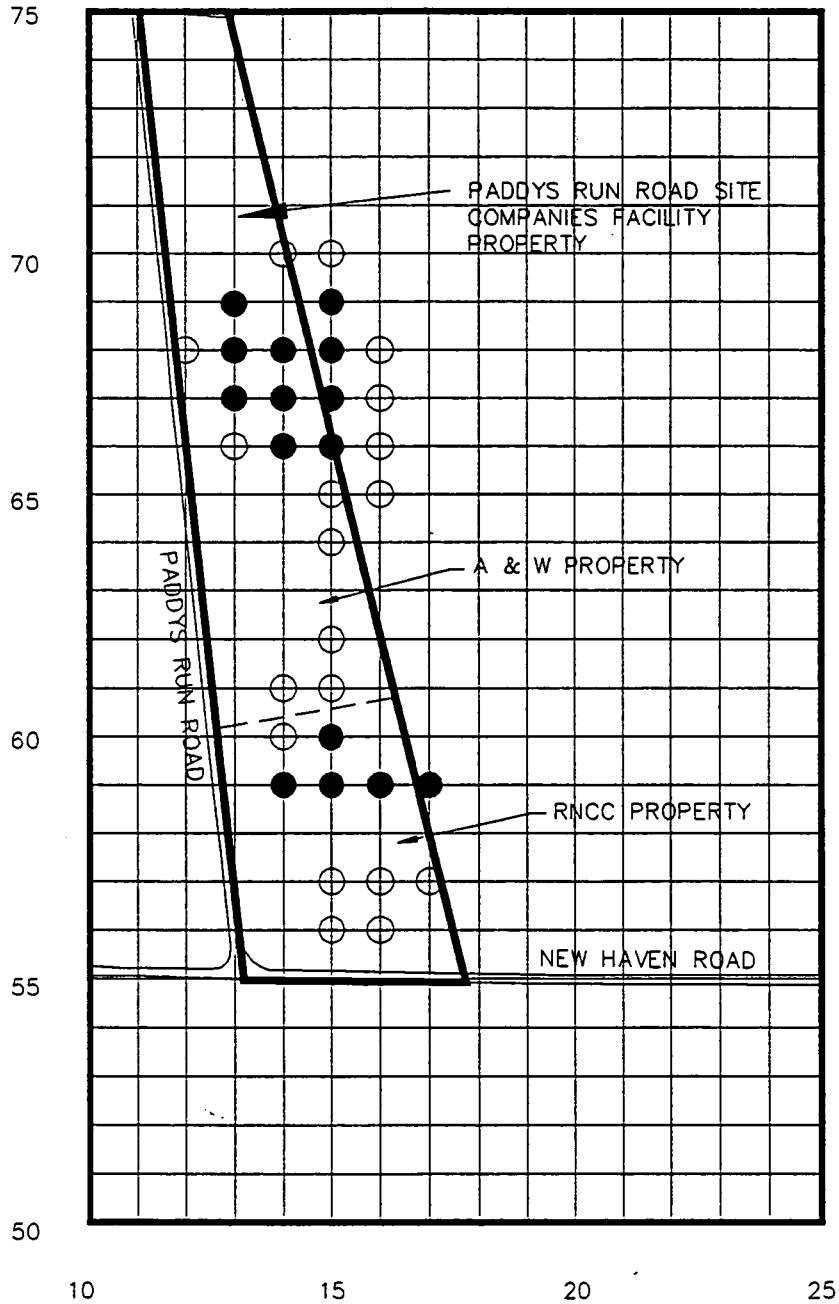
11102.07/11007PD1/090492-1

# Period 3
# Sodium Model Source Nodes
## Paddys Run Road Site
## Hamilton County, Ohio




LEGEND

○ NO MASS INTRODUCED THROUGH NODE

● MASS INTRODUCED THROUGH NODE

N

NOTE: COORDINATES REFER TO LOCAL GRID SYSTEM

0 400
FEET

000275

11102.07/11007PD3/090492-1

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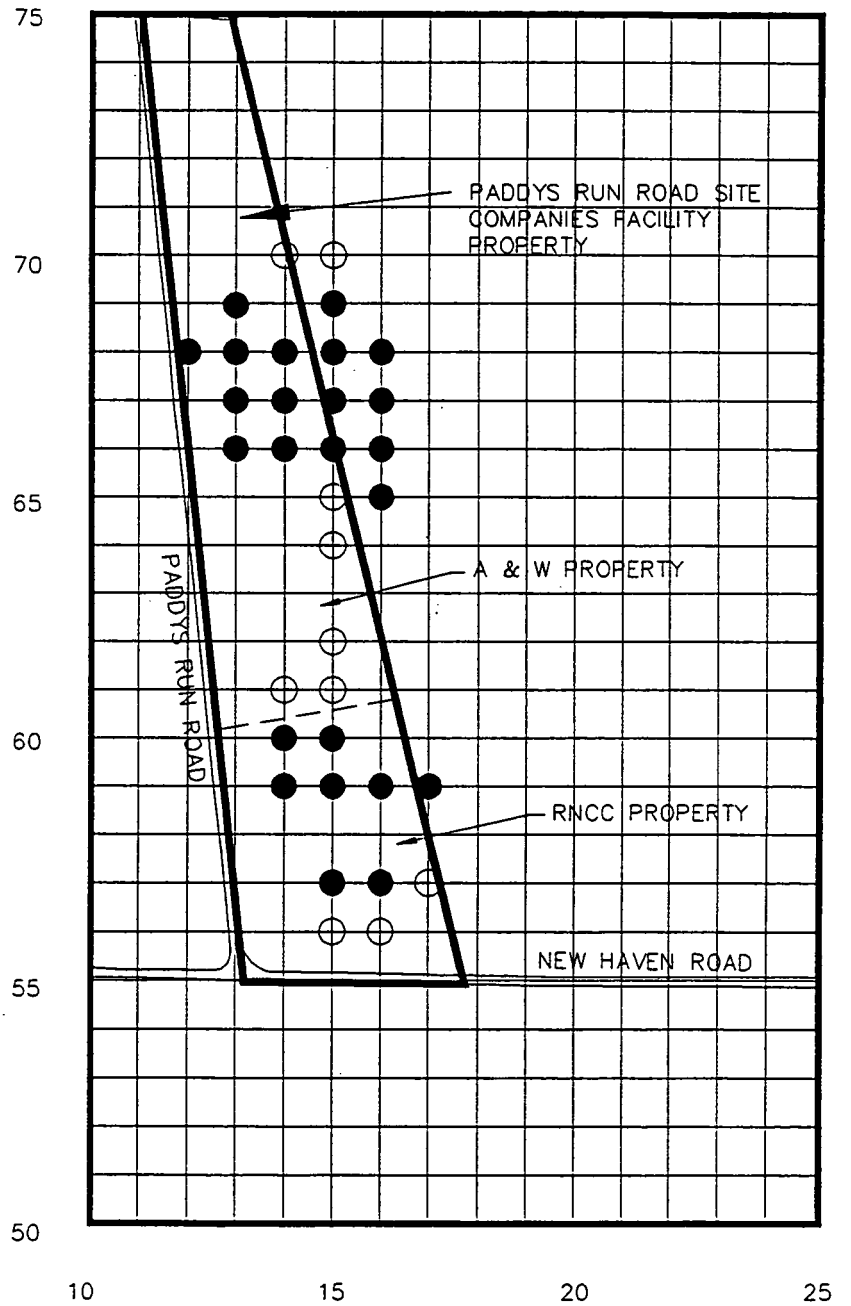
# Period 4
## Sodium Model Source Nodes
### Paddys Run Road Site
### Hamilton County, Ohio




LEGEND

- ○ NO MASS INTRODUCED THROUGH NODE
- ● MASS INTRODUCED THROUGH NODE

N

0 400
FEET

NOTE: COORDINATES REFER TO LOCAL GRID SYSTEM



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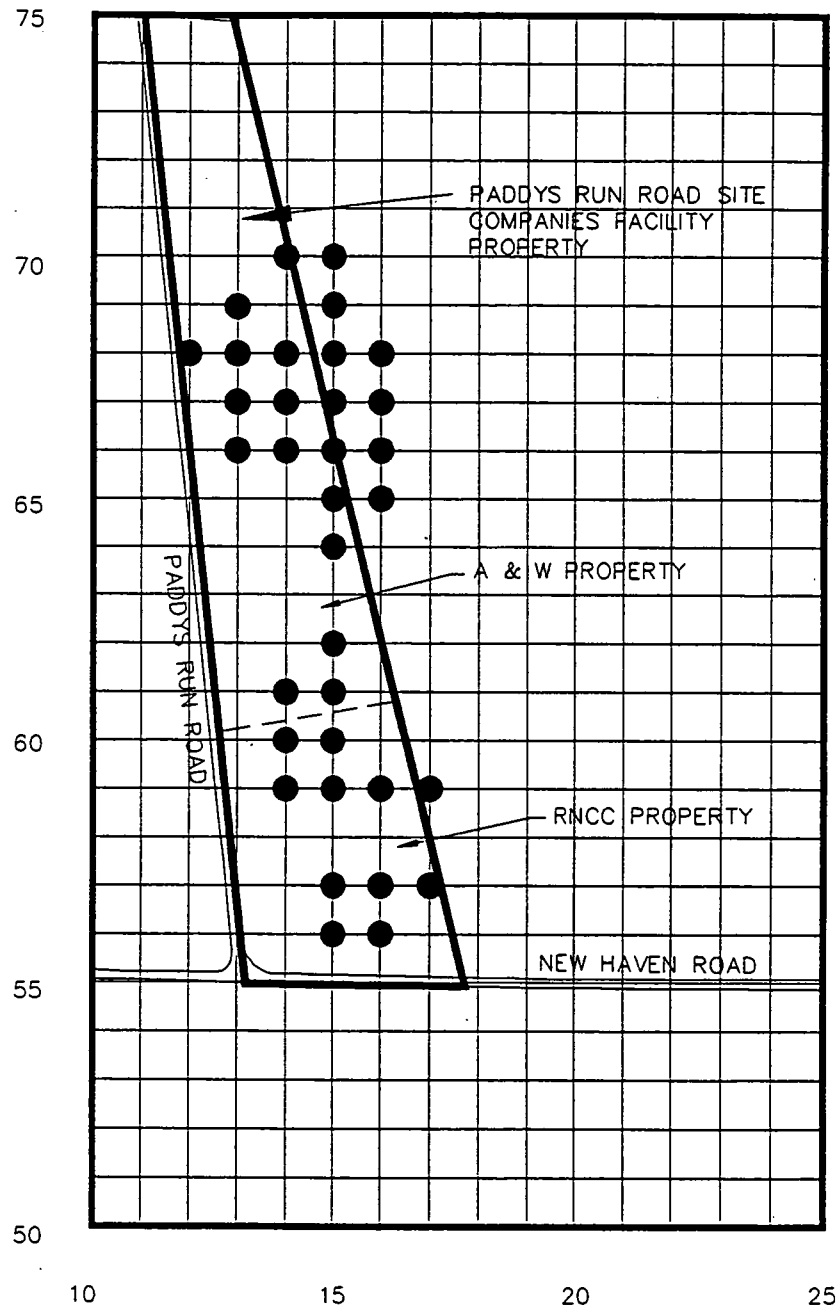
11102.07/11007PD4/090492-1

# Period 5
# Sodium Model Source Nodes
## Paddys Run Road Site
## Hamilton County, Ohio




LEGEND

○ NO MASS INTRODUCED THROUGH NODE

● MASS INTRODUCED THROUGH NODE

N

0 400
FEET

NOTE: COORDINATES REFER TO LOCAL GRID SYSTEM

000377

11102.07/11007PD5/090492-1

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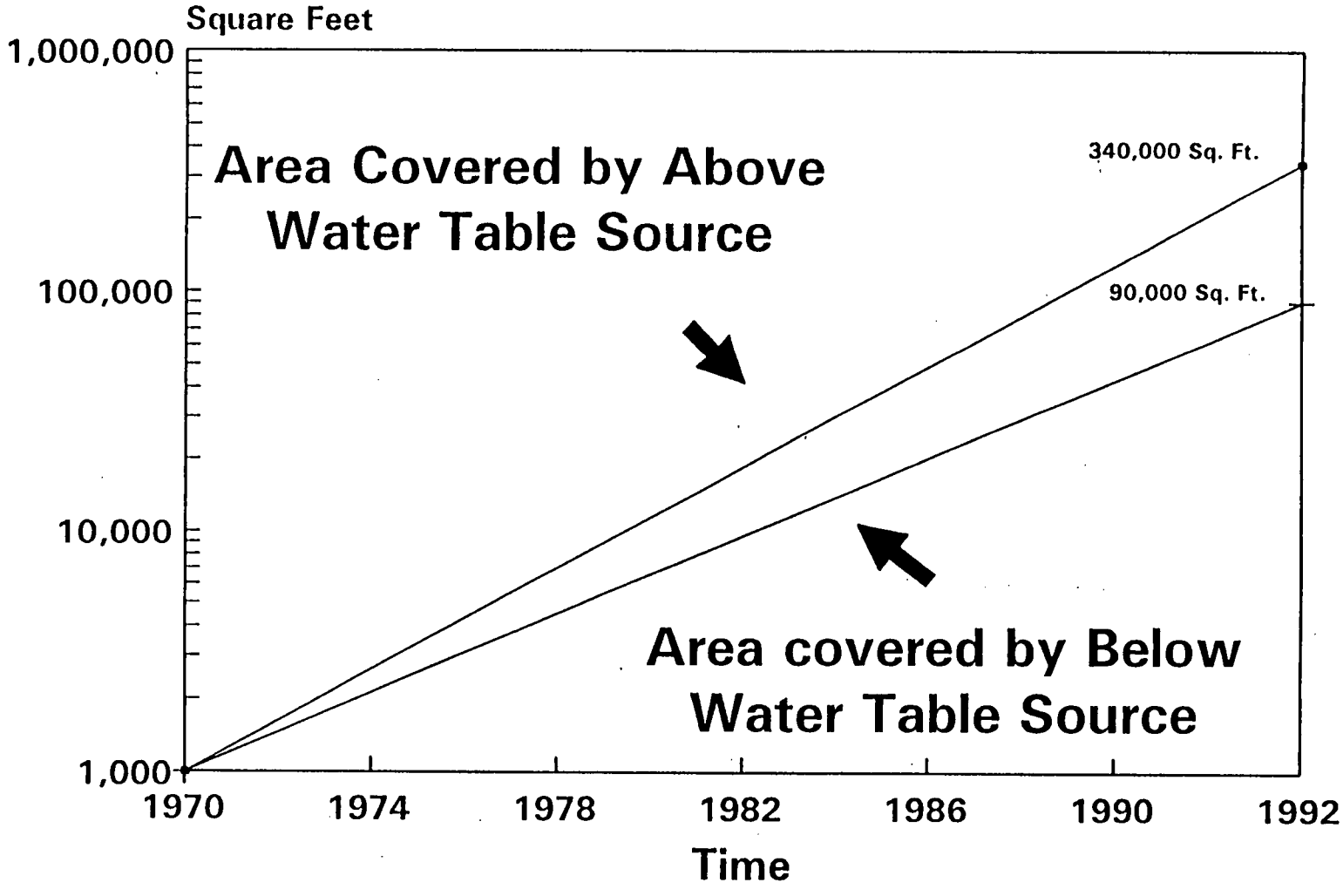
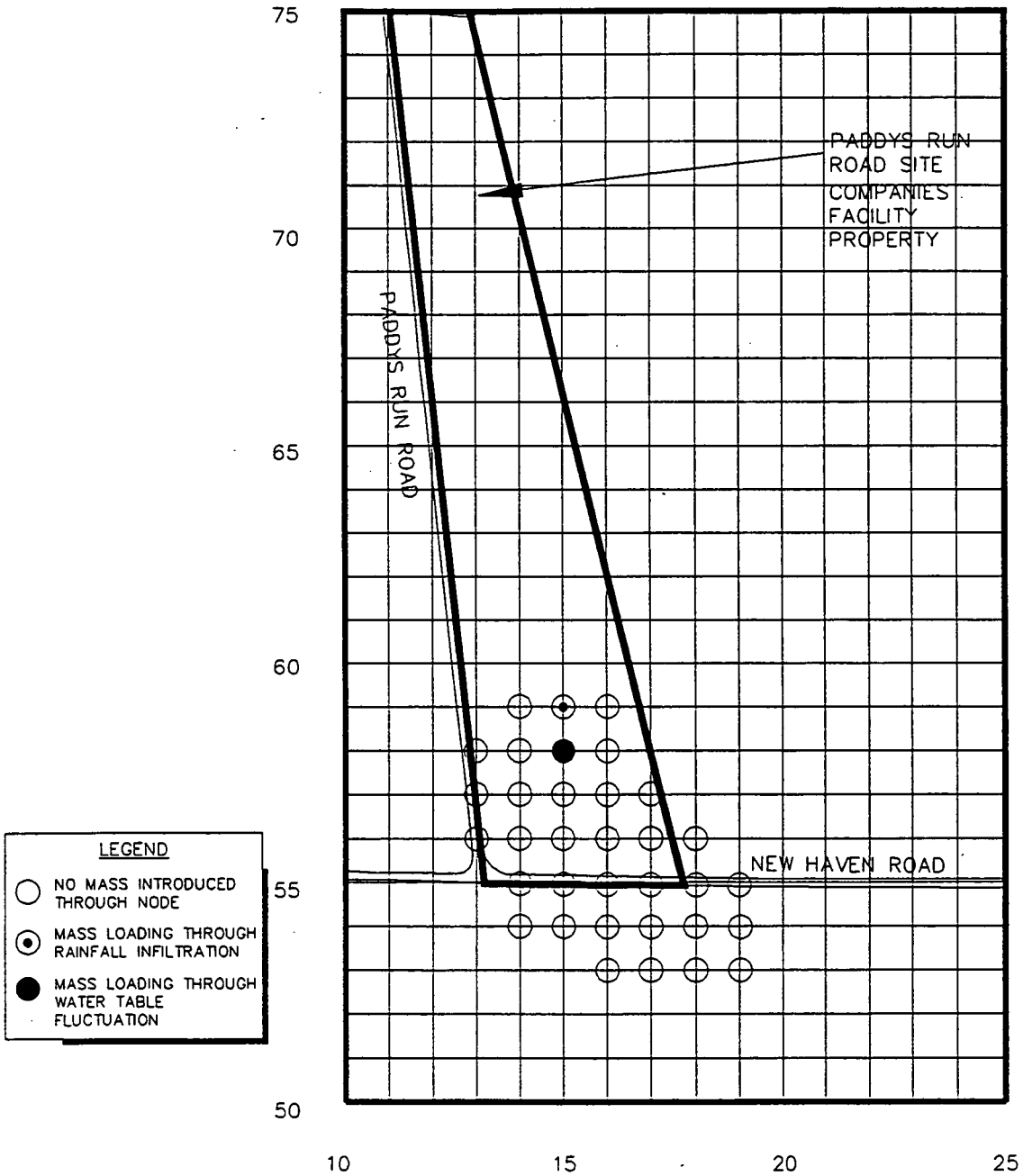
## Estimated Ethylbenzene Source Area Growth Prior to 1992




007360

000378

# Period 1
# Ethylbenzene Model Source Nodes
## Paddys Run Road Site
## Hamilton County, Ohio




NOTE: COORDINATES REFER TO LOCAL GRID SYSTEM

0 400
FEET

000279

11102.07/11007P1/090492-1

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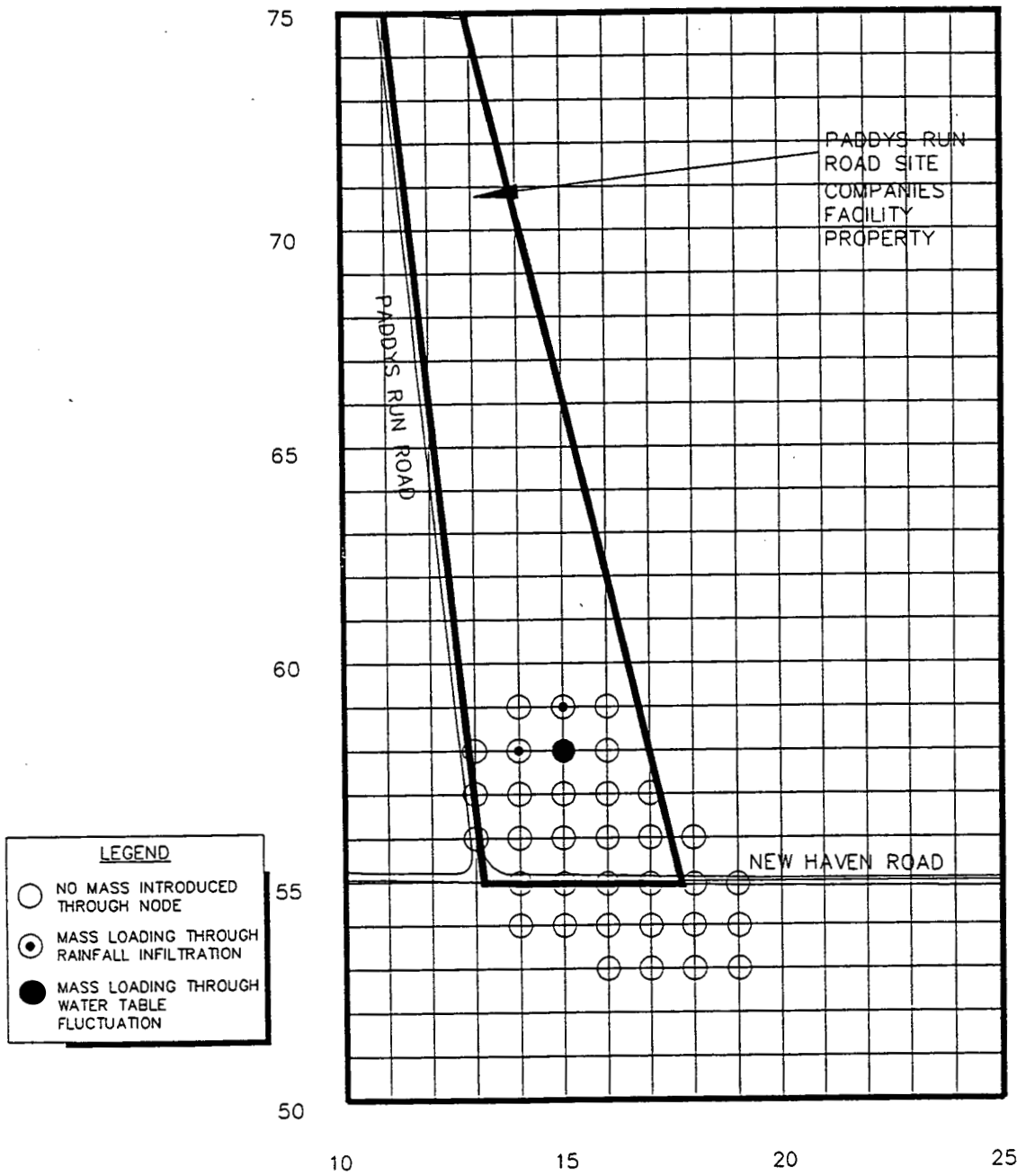
# Period 2
## Ethylbenzene Model Source Nodes
### Paddys Run Road Site
### Hamilton County, Ohio




N

0 400
FEET

NOTE: COORDINATES REFER TO LOCAL GRID SYSTEM



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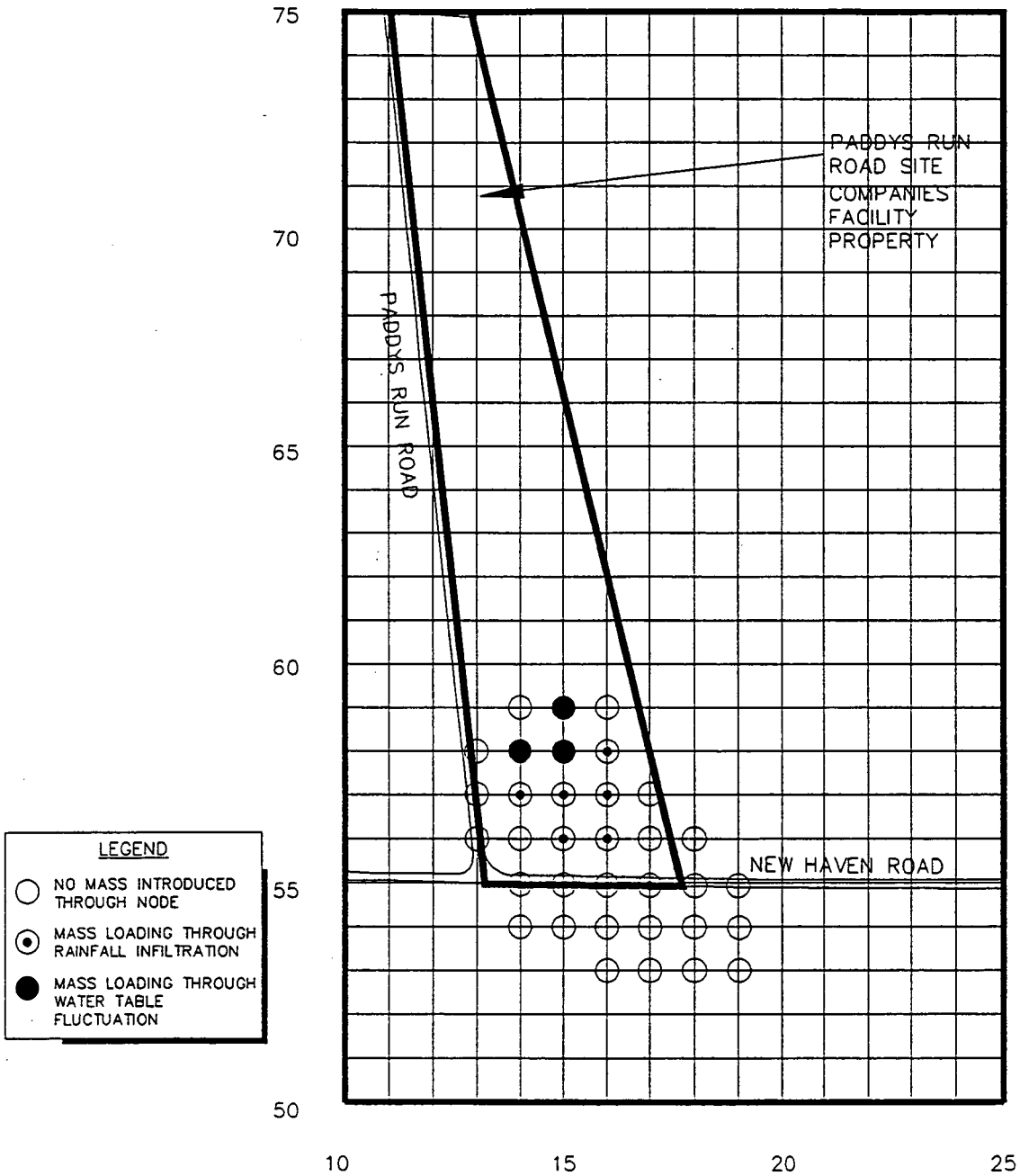
11102.07/11007P2/090492-1

# Period 3
# Ethylbenzene Model Source Nodes
## Paddys Run Road Site
## Hamilton County, Ohio




NOTE: COORDINATES REFER TO LOCAL GRID SYSTEM

0 400
FEET

000181

11102.07/11007P3/090492-1

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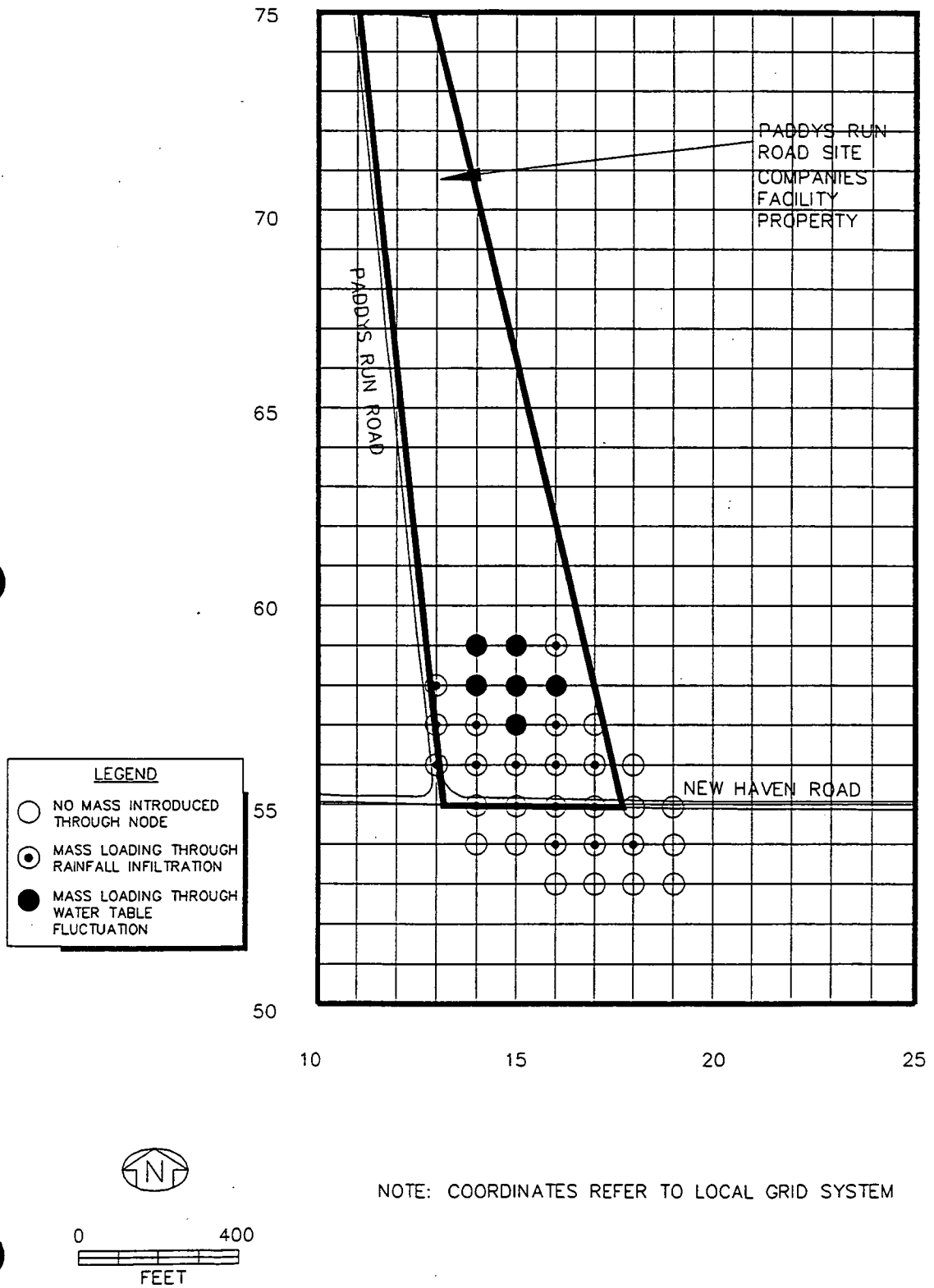
# Period 4
# Ethylbenzene Model Source Nodes
## Paddys Run Road Site
## Hamilton County, Ohio




NOTE: COORDINATES REFER TO LOCAL GRID SYSTEM



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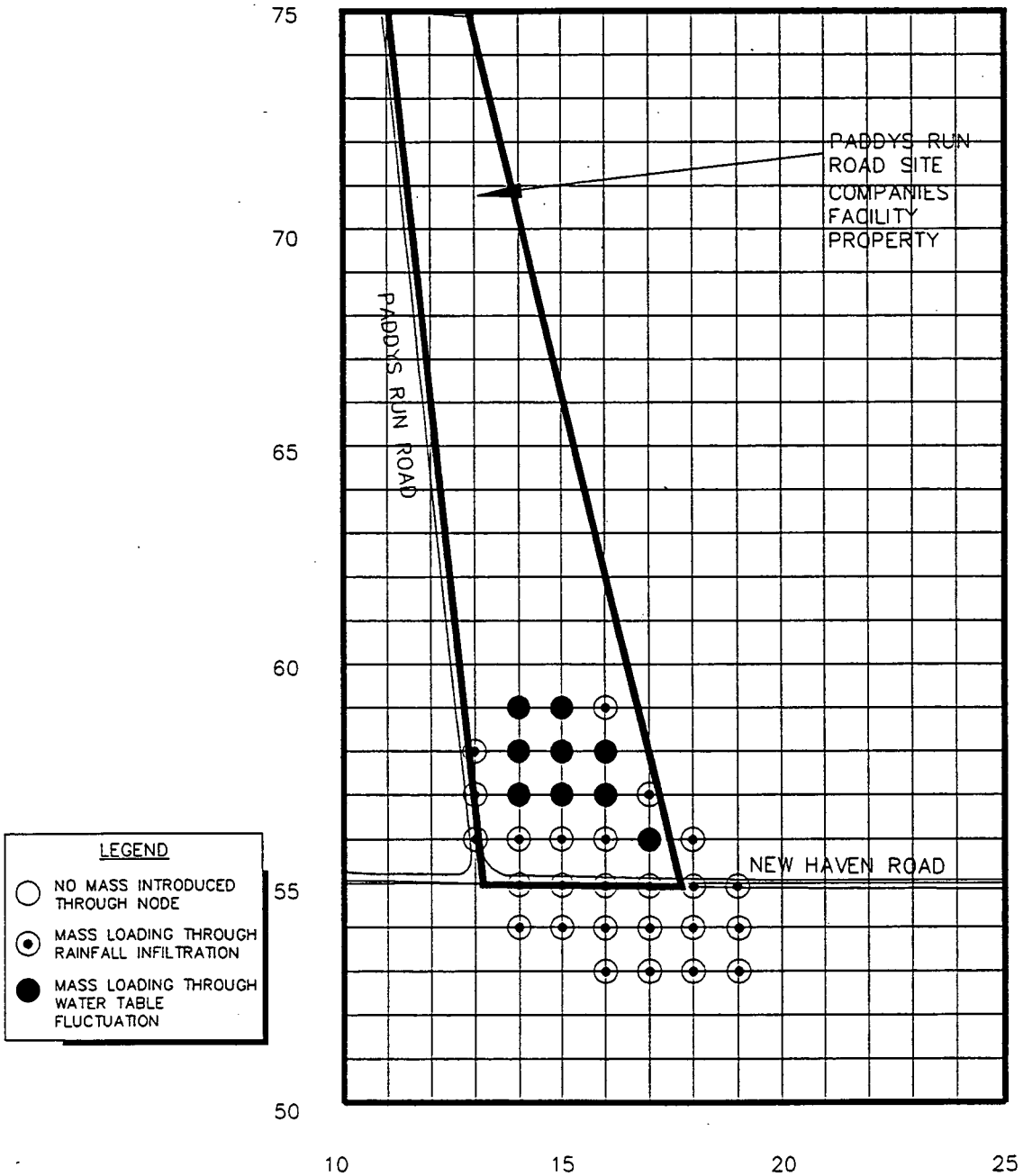
11102.07/11007P4/090492-1

# Period 5
# Ethylbenzene Model Source Nodes
## Paddys Run Road Site
## Hamilton County, Ohio




NOTE: COORDINATES REFER TO LOCAL GRID SYSTEM

0 400
FEET

000183

11102.07/11007ESN/090492-1

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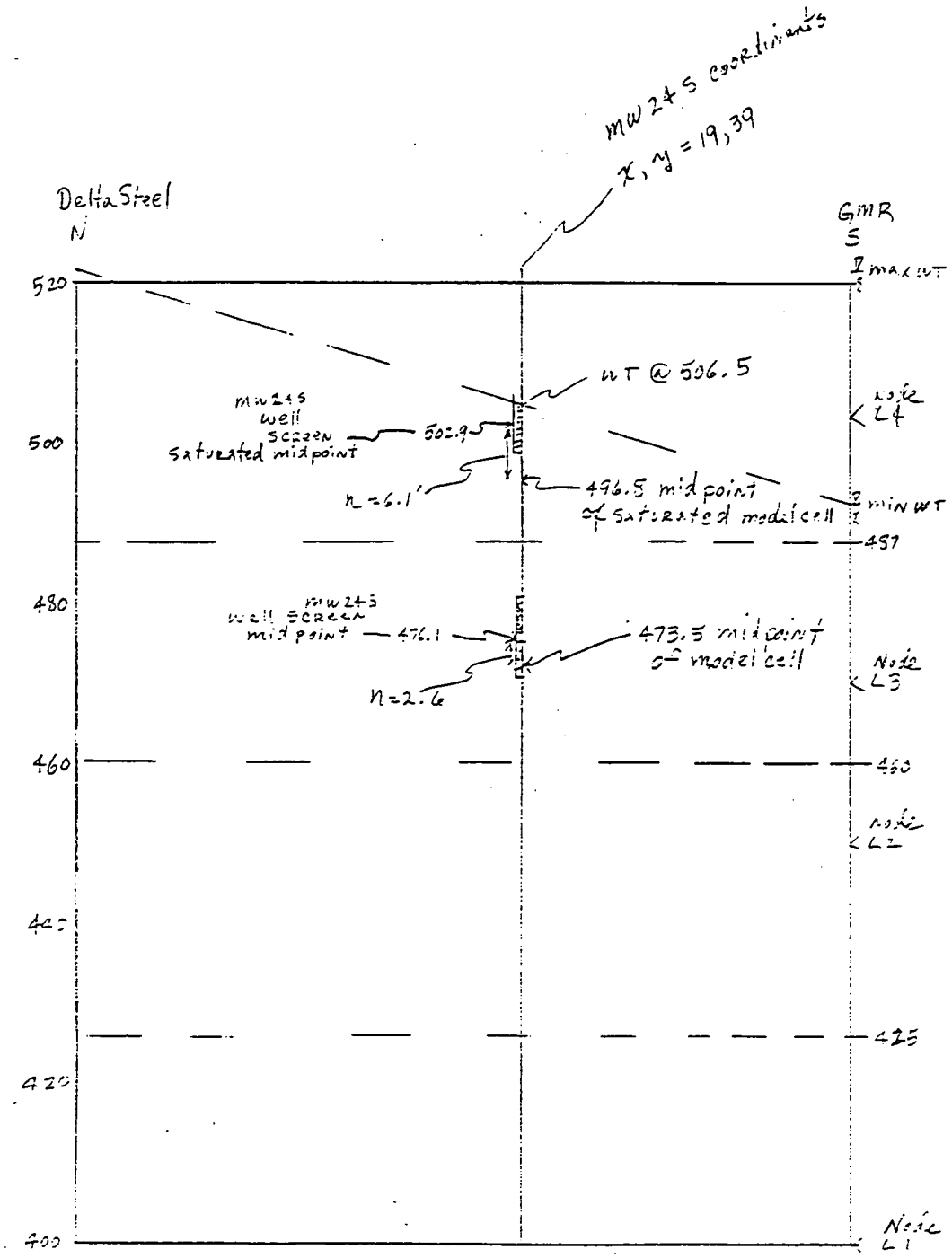
*Appendix G*

*Evaluation of Vertical Concentration Gradients*

**ERM-South, Inc.**
Environmental Resources Management

Project: PRRS — W.O. No. 11102.07 — Sheet 1 of 4
Subject: Standardizing concentrations — By: JLB — Date: 4/16/92
Chkd by: — Date:



**ERM-South, Inc.**
Environmental Resources Management

Project _____ W.O. No. 11102.07 Sheet 2 of 4
Subject _____ By JCH Date 4/16/92
Chkd by _____ Date _____

Backged

observed avg Na conc. in MW24S = 74800 − 20650 = 54150 ug/l

" " " " " " I = 17150 − " = −3500 ug/l

Standardizing equation for Na : $C_{x-n} = C_x K^{-n}$
where K = 1.030

Standardizing observed avg Na conc for 19, 34, 4 = 43642 ug/l (n=6.1')

" " " " " " 19, 34, 3 = Below Background
∴ = ∅

observed avg EB conc. in MW24S = 125 ug/l

" " " " " " I = 9.5 ug/l

Standardizing equation for EB : $C_{x-n} = C_x K^{-n}$
where K = 1.129

Standardizing observed avg EB conc for 19, 34, 4 = 59 ug/l (n=6.1')

" " " " " " 19, 34, 3 = 6.9 ug/l (n=26')

Governing Equations:

$$S = \frac{\log(Y_2/Y_1)}{x_2 - x_1}$$

$$K = 10^S$$

$$C_{x-n} = C_x K^{-n}$$

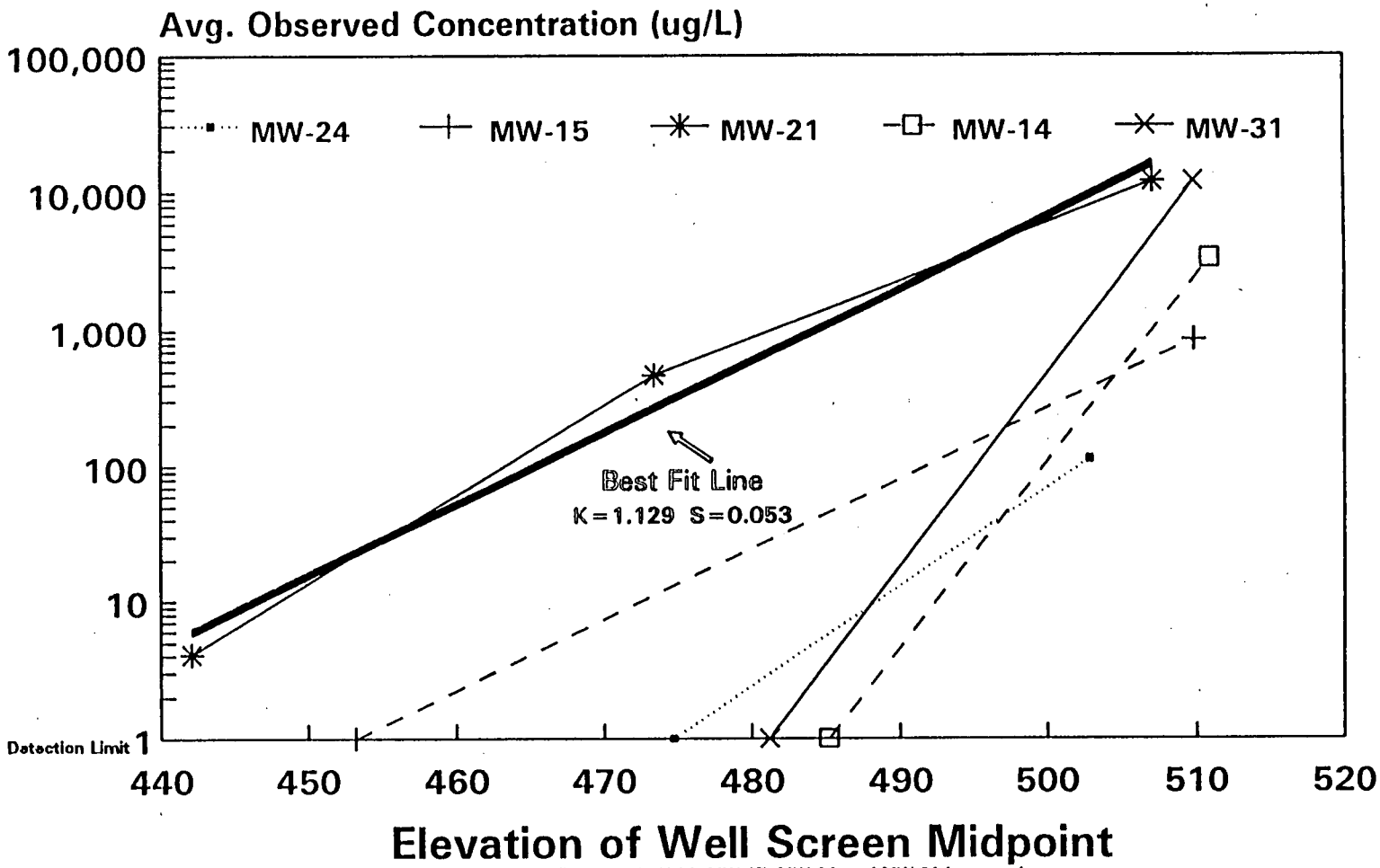
n = distance between midpoint of saturated cell and well screen

$C_x$ = concentration in well

$C_{x-n}$ = standardized concentration

000 [illegible]

# Vertical Ethylbenzene Conc. Gradients
# Paddys Run Road Site
# Hamilton County, Ohio




(1) Vertical gradients could not reasonably be estimated for well clusters MW-14, MW-15, MW-24, and MW-31 because the deeper well in each cluster had no detectable ethylbenzene.
(2) Round 4 data was not included (See ERM, September 1992)

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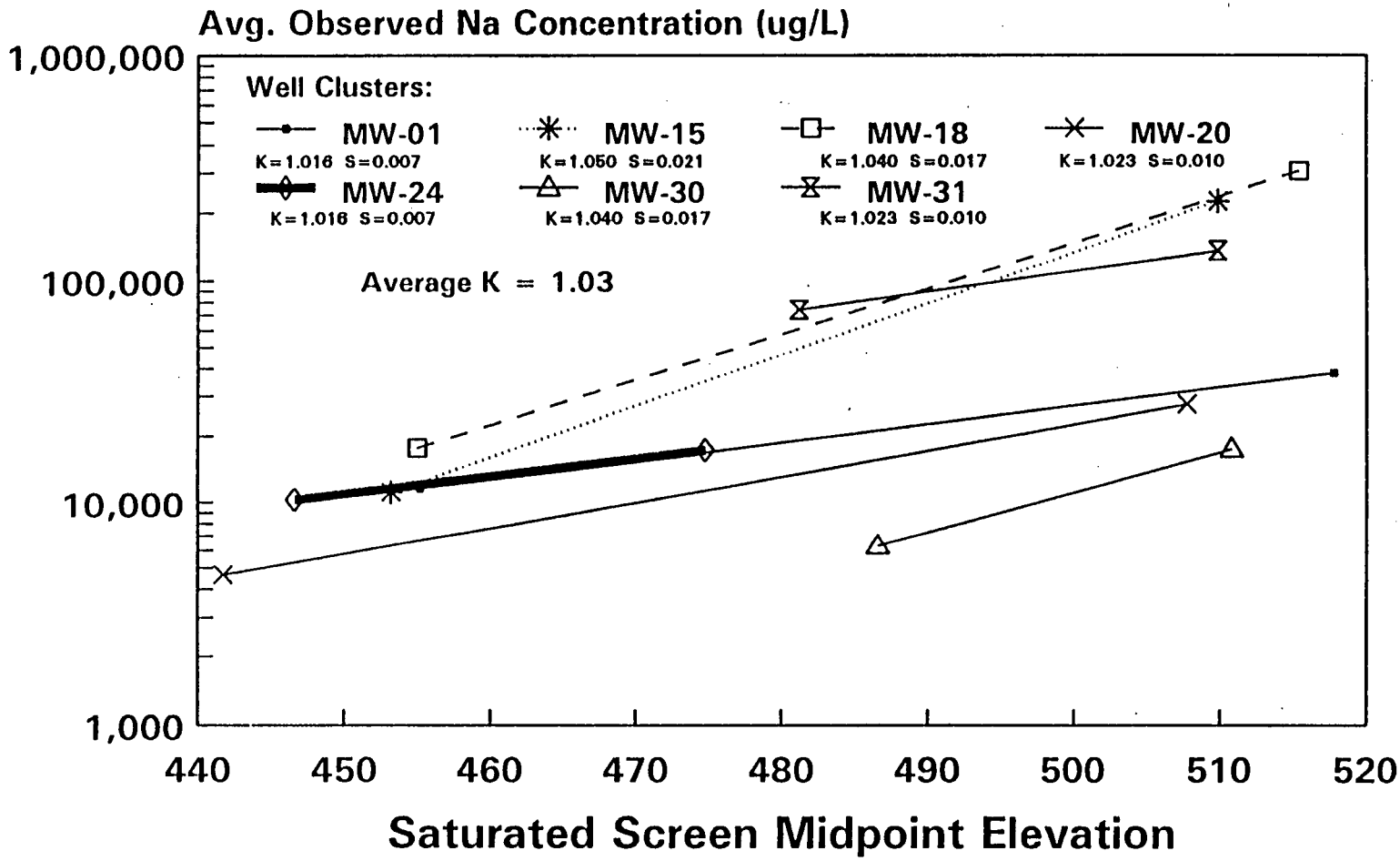
# Vertical Sodium Concentration Gradients
# Paddys Run Road Site
# Hamilton County, Ohio

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*Appendix H*

*Sample Transport Model Input/Output Files*

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 ETHYL114.DAT   PRRS LOCAL ETHYLBENZENE TRANSPORT MODEL (1/79-1/92)    5-19-92
KH/KV=100@AQCELLS;MAXTIMESTEP=75D,DBKD=1.0,SCMF=0.0002,DL=50,DT=3;DPTAS=0.0005
C DECLAM=5.0E-10; 1.0 lb/day INTO QSFX; W/CONST HEADS IN ALL LAYERS @ BDRIES
C 20000 LB EB INPUT, NEW LOADING
C (NEW PR KRBC&HRBC AND SP. HEADS) - LOG PLUME GROWTH (4-27-92)
C...START OF DATA FILE
C...
C...(1.3) RESTRT(T/F),  TIMSTRT
             F          0.00
C...
C...(1.4) HEAT, SOLUTE, EEUNIT, CYLIND, SCALMF; ALL (T/F)
           F     T       T       F        T
C...
C...(1.5)  NX,   NY,   NZ,  NCHN
          40    81     4    0
C...
C...(1.6) NPTCBC, NFBC, NAIFC, NLBC, NHCBC, NWEL
          268    2941     0   213     0      3
C...
C...(1.7) NPMZ  (NUMBER OF POROUS MEDIA ZONES)
          114
C...
C...(1.8) SLMETH(1=D4,2=SOR), LCROSD(T/F)
           2                   T
C...
C...(1.9) IBC (INDEX OF EXCLUDED CELLS = -1)
C...
  0 /
C...
C...(1.10) RDECHO (T=WRITE TO ECHO FILE)
            T
C...
C...STATIC DATA - READ2
C...(2.1) PRTRE(T=PRINTOUT OF READ-ECHO INPUT)
           T
C...
C...(2.2A.1) UNIGRX, UNIGRY, UNIGRZ - (T=UNIFORM GRID SPACING)
              T       F       F
C...
C...(2.2A.2B) X(I), X(NX); FOR UNIFORM GRID (IF UNIGRX=T)
             0.00  3900.0
C...
C...(2.2A.3A) Y(J), J=1 TO NY FOR NONUNIFORM GRID (IF UNIGRY=F)
    0.0   100.0   200.0   300.0   400.0   500.0   600.0   700.0   800.0   900.0
 1000.0  1100.0  1200.0  1300.0  1400.0  1500.0  1600.0  1700.0  1800.0  1900.0
 2000.0  2100.0  2200.0  2300.0  2400.0  2500.0  2600.0  2700.0  2800.0  2900.0
 3000.0  3100.0  3200.0  3300.0  3400.0  3500.0  3600.0  3700.0  3800.0  3900.0
 4000.0  4100.0  4200.0  4300.0  4400.0  4500.0  4600.0  4700.0  4800.0  4900.0
 5000.0  5100.0  5200.0  5300.0  5400.0  5500.0  5600.0  5700.0  5800.0  5900.0
 6000.0  6100.0  6200.0  6300.0  6400.0  6500.0  6600.0  6700.0  6800.0  6900.0
 7000.0  7100.0  7200.0  7300.0  7400.0  7500.0  7600.0  7700.0  7800.0  7900.0
 8000.0
C...
C...(2.2A.4B) Z(K), K=1 TO NZ FOR NONUNIFORM GRID (IF UNIGRZ=F)
         400.0    450.0    470.0    504.0
C...
C...(2.3.1) TILT (T/F TRUE TO TILT Z-AXIS)
            F
C...
C...FLUID PROPERTIES
C...(2.4.1) COMPRESSIBILITY OF FLUID
             3.03E-06
C...
C...(2.4.2) PRDEN, TRDEN(REF.TEMP.), WO(MASS FRAC.),  DENFO(FLD. DENSITY)
             0.00       60.0              0.0               62.40
C...(2.4.3) W1,DENF1;(O) - SOLUTE (1.4)
     .0002  62.400001
C...
C...FLUID VISCOSITY DATA
C...2.5.2 NOTV1,TVF1(I),VISTF1(I),I=1 TO NOTV1;(O) -  SOLUTE (1.4) AND
C2.5.3
             2    60.    0.   1.138     1.  1.138001
C...
C...REFERENCE CONDITION INFORMATION
C...(2.6.1) PAATM (ATM. ABS.-PRESS.; 0=STAND. PRESS OF 1.0132E+5 Pa)
            0.00
C...
C...(2.6.2) POH(PRESS.), TOH (REF TEMP.; CONST. T FOR ISOTHERMAL SIMS.)
            0.0          60.0
C...SOLUTE INFORMATION
C...(2.8) DM,DECLAM;(O) - SOLUTE (1.4)
    9.30E-05    5.0E-10
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C...
C...THESE VARIABLES DEFINE THE RANGE OF POROUS MEDIA ZONES
C...(2.9.1) IPMZ,I1Z(IPMZ),I2Z(IPMZ),J1Z(IPMZ),J2Z(IPMZ),K1Z(IPMZ),K2Z(IPMZ)
      1     1     4    42    49     3     4
      2     4     9    42    49     3     4
      3     1    14    35    42     3     4
      4     1    16    30    35     3     4
      5     1    14    24    30     3     4
      6     1    13    22    24     3     4
      7     1    13    19    22     3     4
C...
      8     1    11    16    19     3     4
      9     1     5    12    16     3     4
     10     5     9    12    16     3     4
     11     1     4    10    12     3     4
     12    38    40    79    81     3     4
     13    35    40    65    79     3     4
     14    38    40    59    65     3     4
     15    32    40     4     5     3     4
     16    27    40     1     4     3     4
     17     1     8    52    55     2     3
     18     1    12    49    52     2     3
     19     1    15    35    49     2     3
     20     1    17    25    35     2     3
     21     1    16    21    25     2     3
     22     1    14    18    21     2     3
     23     1    12    15    18     2     3
     24     1    10    12    15     2     3
     25     1     7     9    12     2     3
     26     1     4     5     9     2     3
     27    36    40    78    81     2     3
     28    34    40    63    78     2     3
     29    36    40    59    63     2     3
     30    38    40    55    59     2     3
     31    31    40     5     6     2     3
     32    26    40     3     5     2     3
     33    23    40     1     3     2     3
     34     1    12    59    62     1     2
     35     1    17    55    59     1     2
     36     1    19    48    55     1     2
     37     1    17    45    48     1     2
     38     1    16    37    45     1     2
     39     1    18    27    37     1     2
     40     1    17    23    27     1     2
     41     1    16    20    23     1     2
     42     1    13    15    20     1     2
     43     1    10    12    15     1     2
     44     1     8    10    12     1     2
     45     1     6     7    10     1     2
     46     1     4     4     7     1     2
     47    34    40    78    81     1     2
     48    32    40    72    78     1     2
     49    31    40    63    72     1     2
     50    32    40    61    63     1     2
     51    34    40    56    61     1     2
     52    37    40    53    56     1     2
     53    27    40     5     7     1     2
     54    24    40     3     5     1     2
     55    20    40     1     3     1     2
     56     1    38    79    81     3     4
     57     1    35    65    79     3     4
     58     1    38    59    65     3     4
     59     1    40    54    59     3     4
     60     1    40    49    54     3     4
     61     9    40    42    49     3     4
     62    14    40    35    42     3     4
     63    16    40    30    35     3     4
     64    14    40    24    30     3     4
     65    13    40    22    24     3     4
     66    13    40    19    22     3     4
C...
     67    11    40    16    19     3     4
     68     9    40    12    16     3     4
     69     4    40    10    12     3     4
     70     1    40     7    10     3     4
     71     1    40     5     7     3     4
     72     1    32     4     5     3     4
     73     1    27     1     4     3     4
     74    20    36    78    81     2     3
     75    20    34    63    78     2     3
     76     1    20    55    81     2     3
     77    20    36    59    63     2     3
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          78        20    38       55    59        2     3
          79         8    40       52    55        2     3
          80        12    40       49    52        2     3
          81        15    40       35    49        2     3
          82        17    40       25    35        2     3
          83        16    40       21    25        2     3
          84        14    40       18    21        2     3
          85        12    40       15    18        2     3
          86        10    40       12    15        2     3
          87         7    40        9    12        2     3
          88         4    40        6     9        2     3
          89         4    31        5     6        2     3
          90         1    26        3     5        2     3
          91         1    23        1     3        2     3
          92        19    34       78    81        1     2
          93        19    32       72    78        1     2
          94         1    19       62    81        1     2
          95        19    31       63    72        1     2
          96        19    32       61    63        1     2
          97        12    19       59    62        1     2
          98        19    34       56    61        1     2
          99        17    19       55    59        1     2
         100        19    37       48    56        1     2
         101        37    40       48    53        1     2
         102        17    40       45    48        1     2
         103        16    40       37    45        1     2
         104        18    40       27    37        1     2
         105        17    40       23    27        1     2
         106        16    40       20    23        1     2
         107        13    40       15    20        1     2
         108        10    40       12    15        1     2
         109         8    40       10    12        1     2
         110         6    40        7    10        1     2
         111         4    20        4     7        1     2
         112        20    27        5     7        1     2
         113        20    24        3     5        1     2
         114         1    20        1     4        1     2
 0 /
C...
C...POROUS-MEDIA PROPERTIES
C...PERMEABILITIES IN THE X,Y,Z DIRECTIONS
C...(2.10.1) KXX(IPMZ), KYY(IPMZ), KZZ(IPMZ); IPMZ=1 TO NPMZ
C...                                           IPMZ= 1-55 (K=0.67 fpd, BEDROCK)
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
   2.96E-12  2.96E-12  2.96E-12
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   2.96E-12   2.96E-12   2.96E-12
   2.96E-12   2.96E-12   2.96E-12
   2.96E-12   2.96E-12   2.96E-12
   2.96E-12   2.96E-12   2.96E-12
   2.96E-12   2.96E-12   2.96E-12
   2.96E-12   2.96E-12   2.96E-12
   2.96E-12   2.96E-12   2.96E-12
   2.96E-12   2.96E-12   2.96E-12
   2.96E-12   2.96E-12   2.96E-12
   2.96E-12   2.96E-12   2.96E-12
   2.96E-12   2.96E-12   2.96E-12
   2.96E-12   2.96E-12   2.96E-12
   2.96E-12   2.96E-12   2.96E-12
   2.96E-12   2.96E-12   2.96E-12
   2.96E-12   2.96E-12   2.96E-12
   2.96E-12   2.96E-12   2.96E-12
C...                                   IPMZ= 56-73 ZONE 3-4 (K=350 & 35 fpd)
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
C...                                   IPMZ= 74-91, ZONE 2-3 (K=350 & 35 fpd)
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
   1.54E-09   1.54E-09   1.54E-11
C...                                   IPMZ= 92-114, ZONE 1-2 (K=450 & 45 fpd)
   1.99E-09   1.99E-09   1.99E-11
   1.99E-09   1.99E-09   1.99E-11
   1.99E-09   1.99E-09   1.99E-11
   1.99E-09   1.99E-09   1.99E-11
   1.99E-09   1.99E-09   1.99E-11
   1.99E-09   1.99E-09   1.99E-11
   1.99E-09   1.99E-09   1.99E-11
   1.99E-09   1.99E-09   1.99E-11
   1.99E-09   1.99E-09   1.99E-11
   1.99E-09   1.99E-09   1.99E-11
   1.99E-09   1.99E-09   1.99E-11
   1.99E-09   1.99E-09   1.99E-11
   1.99E-09   1.99E-09   1.99E-11
   1.99E-09   1.99E-09   1.99E-11
   1.99E-09   1.99E-09   1.99E-11
   1.99E-09   1.99E-09   1.99E-11
   1.99E-09   1.99E-09   1.99E-11
   1.99E-09   1.99E-09   1.99E-11
   1.99E-09   1.99E-09   1.99E-11
   1.99E-09   1.99E-09   1.99E-11
   1.99E-09   1.99E-09   1.99E-11
   1.99E-09   1.99E-09   1.99E-11
   1.99E-09   1.99E-09   1.99E-11
C...POROSITY FOR MEDIUM IN ZONE IPMZ(i)
C...2.10.2 POROS(IPMZ), IPMZ=1 TO NPMZ
      114*0.225
C...
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C...2.10.3 BULK VERTICAL COMPRESSIBILITY
C...  ABPM(IPMZ), IPMZ=1 TO NPMZ
      114*0.000015
C...(2.12) ALPHL(IPMZ),ALPHT(IPMZ),IPMZ=1 TO NPMZ (1.7);(0) - SOLUTE (1.4)
      50. 3.
      50. 3.
      50. 3.
      50. 3.
      50. 3.
      50. 3.
      50. 3.
      50. 3.
      50. 3.
      50. 3.
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      50. 3.
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C...
C.....POROUS MEDIA SOLUTE PROPERTY INFORMATION
C.2.13 .. DBKD(IPMZ),IPMZ=1 TO NPMZ (1.7);(0) - SOLUTE (1.4)
      114*1.0
C...
C...WELL-MODEL INFORMATION (IF NWEL>0)
C...(2.14.1) RDWDEF (T=READ WELL DEFINITION DATA)
  T
C...(2.14.2) IMPQW (T=SEMI-IMPLICIT CALCS.)
  F
C...(2.14.3)IWEL,  IW,  JW, LCBOTW, LCTOPW, WBOD, WQMETH
C...(2.14.4) WCF (WELL COMPLETION FACTORS IN EA. LEVEL; 1.0=OPENED)
C...WELL #1= A&W #1, #2= A&W #2, #3= RNCC
  1   12  78      1   2     1.0       10
      1.0         1.0       1.0   1.0
  2   12  75      1   2     1.0       10
      1.0         1.0       1.0   1.0
  3   15  60      1   2     1.0       10
      1.0         1.0       1.0   1.0
  0 /
C...
C...BOUNDARY-CONDITIONS INFORMATION
C...SPECIFIED VALUE
C...(2.15) IBC(i,j,k), MOD.CODE: INDEX OF B.C. TYPE (PRESS,TEMP,MASS-FRAC)
   1   40   81  81    1  4
   100
    1   1    1   8    1  4
   100
    2  20  1   1  1  4
   100
  0 /
C...SPECIFIED FLUX VALUE
C...(2.16) IBC(i,j,k) INDEX OF B.C. INDEX (3=z, n4=FLOW EQ.)
C...              i     i       j     j         k     k
C...          ----------------------------------------------------
C...                                                   (BEDROCK) FLUX=6"/yr
                  1     9       43    49        4     4
               300200
                  1    13       19    42        4     4
               300200
                 14    14       24    42        4     4
               300200
                 15    16       30    35        4     4
               300200
                  1    11       16    18        4     4
               300200
```

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```
          1    9   12   15    4    4
300200
          1    4   10   11    4    4
300200
         38   40   80   80    4    4
300200
         35   40   65   79    4    4
300200
         38   40   59   64    4    4
300200
         32   40    5    5    4    4
300200
         27   40    1    4    4    4
300200
C...                                                    FLUX = 6 "/yr
          1    2   50   54    4    4
300200
          1    7   73   80    4    4
300200
          1    2   55   72    4    4
300200
         19   37   80   80    4    4
300200
         22   34   74   79    4    4
300200
         29   34   65   73    4    4
300200
C...                                                    FLUX = 10 "/yr
          9   18   80   80    4    4
300200
          9   21   74   79    4    4
300200
          4    8   65   71    4    4
300200
          9   28   65   73    4    4
300200
          4   13   59   64    4    4
300200
         14   15   59   59    4    4
300002
         14   15   60   64    4    4
300200
         16   37   59   64    4    4
300200
          4   13   55   58    4    4
300200
         14   16   57   58    4    4
300002
         14   16   55   56    4    4
300200
         17   17   56   56    4    4
300002
         17   17   55   55    4    4
300200
         17   17   57   58    4    4
300200
         18   40   55   58    4    4
300200
C...
          6   40   53   54    4    4
300200
         11   40   49   52    4    4
300200
         11   40   44   48    4    4
300200
         15   15   37   42    4    4
300200
         17   40   38   43    4    4
300200
          4    5   51   54    4    4
300200
          6   10   51   52    4    4
300200
         17   17   27   28    4    4
300200
         17   17   30   35    4    4
300200
C...                                                    FLUX = 14 "/yr
         15   17   36   36    4    4
300200
         19   40   29   37    4    4
300200
```

```
          18    40    27    28     4    4
        300200
          17    39    12    26     4    4
        300200
          40    40    15    26     4    4
        300200
          16    16    22    28     4    4
        300200
          15    15    19    20     4    4
        300200
          14    14    19    23     4    4
        300200
          10    11    12    15     4    4
        300200
          12    15    12    18     4    4
        300200
           4     5     5     6     4    4
        300200
           8    39     6     8     4    4
        300200
          40    40     6     7     4    4
        300200
           6    28     5     5     4    4
        300200
           2    26     2     4     4    4
        300200
           2     3     5     6     4    4
        300200
 0 /
C... AQUIFER LEAKAGE
C...(2.17.1) IBC(i,j,k) IBC INDEX (n1=3 FOR Z-DIRECTION)
C...GREAT MIAMI RIVER
          2     2     9     9     4    4
        300300
          2     2     8     8     4    4
        300300
          2     2     7     7     4    4
        300300
          3     3     9     9     4    4
        300300
          3     3     8     8     4    4
        300300
          3     3     7     7     4    4
        300300
          4     4     9     9     4    4
        300300
          4     4     8     8     4    4
        300300
          4     4     7     7     4    4
        300300
          5     5     9     9     4    4
        300300
          5     5     8     8     4    4
        300300
          5     5     7     7     4    4
        300300
          5     5    10    10     4    4
        300300
          5     5    11    11     4    4
        300300
          6     6     7     7     4    4
        300300
          6     6     8     8     4    4
        300300
          6     6     9     9     4    4
        300300
          6     6    10    10     4    4
        300300
          6     6    11    11     4    4
        300300
          7     7     7     7     4    4
        300300
          7     7     8     8     4    4
        300300
          7     7     9     9     4    4
        300300
          7     7    10    10     4    4
        300300
          7     7    11    11     4    4
        300300
          8     8    11    11     4    4
        300300
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|---|---|---|---|---|---|---|
| 8 | 8 | 10 | 10 | 4 | 4 | 300300 |
| 8 | 8 | 9 | 9 | 4 | 4 | 300300 |
| 9 | 9 | 11 | 11 | 4 | 4 | 300300 |
| 9 | 9 | 10 | 10 | 4 | 4 | 300300 |
| 9 | 9 | 9 | 9 | 4 | 4 | 300300 |
| 10 | 10 | 11 | 11 | 4 | 4 | 300300 |
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| 10 | 10 | 9 | 9 | 4 | 4 | 300300 |
| 11 | 11 | 11 | 11 | 4 | 4 | 300300 |
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| 11 | 11 | 9 | 9 | 4 | 4 | 300300 |
| 12 | 12 | 11 | 11 | 4 | 4 | 300300 |
| 12 | 12 | 10 | 10 | 4 | 4 | 300300 |
| 12 | 12 | 9 | 9 | 4 | 4 | 300300 |
| 13 | 13 | 11 | 11 | 4 | 4 | 300300 |
| 13 | 13 | 10 | 10 | 4 | 4 | 300300 |
| 13 | 13 | 9 | 9 | 4 | 4 | 300300 |
| 14 | 14 | 11 | 11 | 4 | 4 | 300300 |
| 14 | 14 | 10 | 10 | 4 | 4 | 300300 |
| 14 | 14 | 9 | 9 | 4 | 4 | 300300 |
| 15 | 15 | 11 | 11 | 4 | 4 | 300300 |
| 15 | 15 | 10 | 10 | 4 | 4 | 300300 |
| 15 | 15 | 9 | 9 | 4 | 4 | 300300 |
| 16 | 16 | 11 | 11 | 4 | 4 | 300300 |
| 16 | 16 | 10 | 10 | 4 | 4 | 300300 |
| 16 | 16 | 9 | 9 | 4 | 4 | 300300 |
| 17 | 17 | 11 | 11 | 4 | 4 | 300300 |
| 17 | 17 | 10 | 10 | 4 | 4 | 300300 |
| 17 | 17 | 9 | 9 | 4 | 4 | 300300 |
| 18 | 18 | 11 | 11 | 4 | 4 | 300300 |
| 18 | 18 | 10 | 10 | 4 | 4 | 300300 |
| 18 | 18 | 9 | 9 | 4 | 4 | 300300 |
| 19 | 19 | 11 | 11 | 4 | 4 | 300300 |
| 19 | 19 | 10 | 10 | 4 | 4 | 300300 |
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| 20 | 20 | 11 | 11 | 4 | 4 | 300300 |
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| 21 | 21 | 11 | 11 | 4 | 4 | 300300 |
| 21 | 21 | 10 | 10 | 4 | 4 | 300300 |
| 21 | 21 | 9 | 9 | 4 | 4 | 300300 |

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|---|---|---|---|---|---|---|
| 22 | 22 | 11 | 11 | 4 | 4 | 300300 |
| 22 | 22 | 10 | 10 | 4 | 4 | 300300 |
| 22 | 22 | 9 | 9 | 4 | 4 | 300300 |
| 23 | 23 | 11 | 11 | 4 | 4 | 300300 |
| 23 | 23 | 10 | 10 | 4 | 4 | 300300 |
| 23 | 23 | 9 | 9 | 4 | 4 | 300300 |
| 24 | 24 | 11 | 11 | 4 | 4 | 300300 |
| 24 | 24 | 10 | 10 | 4 | 4 | 300300 |
| 24 | 24 | 9 | 9 | 4 | 4 | 300300 |
| 25 | 25 | 11 | 11 | 4 | 4 | 300300 |
| 25 | 25 | 10 | 10 | 4 | 4 | 300300 |
| 25 | 25 | 9 | 9 | 4 | 4 | 300300 |
| 26 | 26 | 11 | 11 | 4 | 4 | 300300 |
| 26 | 26 | 10 | 10 | 4 | 4 | 300300 |
| 26 | 26 | 9 | 9 | 4 | 4 | 300300 |
| 27 | 27 | 11 | 11 | 4 | 4 | 300300 |
| 27 | 27 | 10 | 10 | 4 | 4 | 300300 |
| 27 | 27 | 9 | 9 | 4 | 4 | 300300 |
| 28 | 28 | 11 | 11 | 4 | 4 | 300300 |
| 28 | 28 | 10 | 10 | 4 | 4 | 300300 |
| 28 | 28 | 9 | 9 | 4 | 4 | 300300 |
| 29 | 29 | 11 | 11 | 4 | 4 | 300300 |
| 29 | 29 | 10 | 10 | 4 | 4 | 300300 |
| 29 | 29 | 9 | 9 | 4 | 4 | 300300 |
| 30 | 30 | 11 | 11 | 4 | 4 | 300300 |
| 30 | 30 | 10 | 10 | 4 | 4 | 300300 |
| 30 | 30 | 9 | 9 | 4 | 4 | 300300 |
| 31 | 31 | 11 | 11 | 4 | 4 | 300300 |
| 31 | 31 | 10 | 10 | 4 | 4 | 300300 |
| 31 | 31 | 9 | 9 | 4 | 4 | 300300 |
| 32 | 32 | 11 | 11 | 4 | 4 | 300300 |
| 32 | 32 | 10 | 10 | 4 | 4 | 300300 |
| 32 | 32 | 9 | 9 | 4 | 4 | 300300 |
| 33 | 33 | 11 | 11 | 4 | 4 | 300300 |
| 33 | 33 | 10 | 10 | 4 | 4 | 300300 |
| 33 | 33 | 9 | 9 | 4 | 4 | 300300 |
| 34 | 34 | 11 | 11 | 4 | 4 | 300300 |
| 34 | 34 | 10 | 10 | 4 | 4 | 300300 |
| 34 | 34 | 9 | 9 | 4 | 4 | 300300 |
| 35 | 35 | 11 | 11 | 4 | 4 | 300300 |
| 35 | 35 | 10 | 10 | 4 | 4 | 300300 |

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      35      35       9       9     4     4
    300300
      36      36      11      11     4     4
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      36      36      10      10     4     4
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      36      36       9       9     4     4
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      37      37      11      11     4     4
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      37      37      10      10     4     4
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      37      37       9       9     4     4
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      38      38      11      11     4     4
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      38      38      10      10     4     4
    300300
      38      38       9       9     4     4
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      39      39      11      11     4     4
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      39      39      10      10     4     4
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      39      39       9       9     4     4
    300300
C...PADDY'S RUN
      16      16      12      12     4     4
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      16      16      13      13     4     4
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      16      16      14      14     4     4
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      16      16      15      15     4     4
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      16      16      16      16     4     4
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      16      16      17      17     4     4
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      16      16      18      18     4     4
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      16      16      19      19     4     4
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      16      16      20      20     4     4
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      16      16      21      21     4     4
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      15      15      21      21     4     4
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      15      15      22      22     4     4
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      15      15      23      23     4     4
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      15      15      24      24     4     4
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      15      15      25      25     4     4
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      15      15      26      26     4     4
    300300
      15      15      27      27     4     4
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      15      15      28      28     4     4
    300300
      15      15      29      29     4     4
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      16      16      29      29     4     4
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      17      17      29      29     4     4
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      18      18      29      29     4     4
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      18      18      30      30     4     4
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      18      18      31      31     4     4
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      18      18      32      32     4     4
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      18      18      33      33     4     4
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      18      18      34      34     4     4
    300300
      18      18      35      35     4     4
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|---|---|---|---|---|---|
| 300300 | | | | | |
| 18 | 18 | 36 | 36 | 4 | 4 |
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| 18 | 18 | 37 | 37 | 4 | 4 |
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| 17 | 17 | 37 | 37 | 4 | 4 |
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| 16 | 16 | 37 | 37 | 4 | 4 |
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| 16 | 16 | 38 | 38 | 4 | 4 |
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| 16 | 16 | 39 | 39 | 4 | 4 |
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| 16 | 16 | 40 | 40 | 4 | 4 |
| 300300 | | | | | |
| 16 | 16 | 41 | 41 | 4 | 4 |
| 300300 | | | | | |
| 16 | 16 | 42 | 42 | 4 | 4 |
| 300300 | | | | | |
| 10 | 10 | 43 | 43 | 4 | 4 |
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| 11 | 11 | 43 | 43 | 4 | 4 |
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| 12 | 12 | 43 | 43 | 4 | 4 |
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| 13 | 13 | 43 | 43 | 4 | 4 |
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| 14 | 14 | 43 | 43 | 4 | 4 |
| 300300 | | | | | |
| 15 | 15 | 43 | 43 | 4 | 4 |
| 300300 | | | | | |
| 16 | 16 | 43 | 43 | 4 | 4 |
| 300300 | | | | | |
| 10 | 10 | 44 | 44 | 4 | 4 |
| 300300 | | | | | |
| 10 | 10 | 45 | 45 | 4 | 4 |
| 300300 | | | | | |
| 10 | 10 | 46 | 46 | 4 | 4 |
| 300300 | | | | | |
| 10 | 10 | 47 | 47 | 4 | 4 |
| 300300 | | | | | |
| 10 | 10 | 48 | 48 | 4 | 4 |
| 300300 | | | | | |
| 10 | 10 | 49 | 49 | 4 | 4 |
| 300300 | | | | | |
| 3 | 3 | 50 | 50 | 4 | 4 |
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| 4 | 4 | 50 | 50 | 4 | 4 |
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| 5 | 5 | 50 | 50 | 4 | 4 |
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| 6 | 6 | 50 | 50 | 4 | 4 |
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| 7 | 7 | 50 | 50 | 4 | 4 |
| 300300 | | | | | |
| 8 | 8 | 50 | 50 | 4 | 4 |
| 300300 | | | | | |
| 9 | 9 | 50 | 50 | 4 | 4 |
| 300300 | | | | | |
| 10 | 10 | 50 | 50 | 4 | 4 |
| 300300 | | | | | |
| 3 | 3 | 51 | 51 | 4 | 4 |
| 300300 | | | | | |
| 3 | 3 | 52 | 52 | 4 | 4 |
| 300300 | | | | | |
| 3 | 3 | 53 | 53 | 4 | 4 |
| 300300 | | | | | |
| 3 | 3 | 54 | 54 | 4 | 4 |
| 300300 | | | | | |
| 3 | 3 | 55 | 55 | 4 | 4 |
| 300300 | | | | | |
| 3 | 3 | 56 | 56 | 4 | 4 |
| 300300 | | | | | |
| 3 | 3 | 57 | 57 | 4 | 4 |
| 300300 | | | | | |
| 3 | 3 | 58 | 58 | 4 | 4 |
| 300300 | | | | | |
| 3 | 3 | 59 | 59 | 4 | 4 |
| 300300 | | | | | |
| 3 | 3 | 60 | 60 | 4 | 4 |
| 300300 | | | | | |
| 3 | 3 | 61 | 61 | 4 | 4 |

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300300
     3        3        62       62       4        4
300300
     3        3        63       63       4        4
300300
     3        3        64       64       4        4
300300
     3        3        65       65       4        4
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     3        3        66       66       4        4
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     3        3        67       67       4        4
300300
     3        3        68       68       4        4
300300
     3        3        69       69       4        4
300300
     3        3        70       70       4        4
300300
     3        3        71       71       4        4
300300
     3        3        72       72       4        4
300300
     4        4        72       72       4        4
300300
     5        5        72       72       4        4
300300
     6        6        72       72       4        4
300300
     7        7        72       72       4        4
300300
     8        8        72       72       4        4
300300
     8        8        73       73       4        4
300300
     8        8        74       74       4        4
300300
     8        8        75       75       4        4
300300
     8        8        76       76       4        4
300300
     8        8        77       77       4        4
300300
     8        8        78       78       4        4
300300
     8        8        79       79       4        4
300300
     8        8        80       80       4        4
300300
  0 /
C 2.17.2
  0 /
C...RIVER LEAKAGE
C...(k=1.71E-12 fpd; GMR WIDTH=250'; PR WIDTH=20'; BED THICK.=1.0')
C...(2.17.3) I1, I2,   J1, J2,   KRBC,    BBRBC,     ZERBC
C...GREAT MIAMI RIVER:
     2    2    9    9    1.8E-12        1
    488.1
     2    2    8    8    1.8E-12        1
    488.1
     2    2    7    7    1.8E-12        1
    488.1
     3    3    9    9    1.8E-12        1
    488.2
     3    3    8    8    1.8E-12        1
    488.2
     3    3    7    7    1.8E-12        1
    488.2
     4    4    9    9    1.8E-12        1
    488.3
     4    4    8    8    1.8E-12        1
    488.3
     4    4    7    7    1.8E-12        1
    488.3
     5    5    9    9    1.8E-12        1
    488.4
     5    5    8    8    1.8E-12        1
    488.4
     5    5    7    7    1.8E-12        1
    488.4
     5    5   10   10    1.8E-12        1
    488.5
```

5 5 11 11 1.8E-12 1
488.5
6 6 7 7 1.8E-12 1
488.7
6 6 8 8 1.8E-12 1
488.7
6 6 9 9 1.8E-12 1
488.7
6 6 10 10 1.8E-12 1
488.7
6 6 11 11 1.8E-12 1
488.7
7 7 7 7 1.8E-12 1
488.7
7 7 8 8 1.8E-12 1
488.7
7 7 9 9 1.8E-12 1
488.7
7 7 10 10 1.8E-12 1
488.7
7 7 11 11 1.8E-12 1
488.7
8 8 11 11 1.8E-12 1
488.8
8 8 10 10 1.8E-12 1
488.8
8 8 9 9 1.8E-12 1
488.8
9 9 11 11 1.8E-12 1
488.9
9 9 10 10 1.8E-12 1
488.9
9 9 9 9 1.8E-12 1
488.9
10 10 11 11 1.8E-12 1
489
10 10 10 10 1.8E-12 1
489
10 10 9 9 1.8E-12 1
489
11 11 11 11 1.8E-12 1
489.1
11 11 10 10 1.8E-12 1
489.1
11 11 9 9 1.8E-12 1
489.1
12 12 11 11 1.8E-12 1
489.1
12 12 10 10 1.8E-12 1
489.1
12 12 9 9 1.8E-12 1
489.1
13 13 11 11 1.8E-12 1
489.2
13 13 10 10 1.8E-12 1
489.2
13 13 9 9 1.8E-12 1
489.2
14 14 11 11 1.8E-12 1
489.3
14 14 10 10 1.8E-12 1
489.3
14 14 9 9 1.8E-12 1
489.3
15 15 11 11 1.8E-12 1
489.4
15 15 10 10 1.8E-12 1
489.4
15 15 9 9 1.8E-12 1
489.4
16 16 11 11 1.8E-12 1
489.5
16 16 10 10 1.8E-12 1
489.5
16 16 9 9 1.8E-12 1
489.5
17 17 11 11 1.8E-12 1
489.5
17 17 10 10 1.8E-12 1
489.5
17 17 9 9 1.8E-12 1
489.5

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|---|---|---|---|---|---|---|
| 18 | 18 | 11 | 11 | 1.8E-12 | 1 | 489.5 |
| 18 | 18 | 10 | 10 | 1.8E-12 | 1 | 489.5 |
| 18 | 18 | 9 | 9 | 1.8E-12 | 1 | 489.5 |
| 19 | 19 | 11 | 11 | 1.8E-12 | 1 | 489.6 |
| 19 | 19 | 10 | 10 | 1.8E-12 | 1 | 489.6 |
| 19 | 19 | 9 | 9 | 1.8E-12 | 1 | 489.6 |
| 20 | 20 | 11 | 11 | 1.8E-12 | 1 | 489.6 |
| 20 | 20 | 10 | 10 | 1.8E-12 | 1 | 489.6 |
| 20 | 20 | 9 | 9 | 1.8E-12 | 1 | 489.6 |
| 21 | 21 | 11 | 11 | 1.8E-12 | 1 | 489.6 |
| 21 | 21 | 10 | 10 | 1.8E-12 | 1 | 489.6 |
| 21 | 21 | 9 | 9 | 1.8E-12 | 1 | 489.6 |
| 22 | 22 | 11 | 11 | 1.8E-12 | 1 | 489.7 |
| 22 | 22 | 10 | 10 | 1.8E-12 | 1 | 489.7 |
| 22 | 22 | 9 | 9 | 1.8E-12 | 1 | 489.7 |
| 23 | 23 | 11 | 11 | 1.8E-12 | 1 | 489.7 |
| 23 | 23 | 10 | 10 | 1.8E-12 | 1 | 489.7 |
| 23 | 23 | 9 | 9 | 1.8E-12 | 1 | 489.7 |
| 24 | 24 | 11 | 11 | 1.8E-12 | 1 | 489.7 |
| 24 | 24 | 10 | 10 | 1.8E-12 | 1 | 489.7 |
| 24 | 24 | 9 | 9 | 1.8E-12 | 1 | 489.7 |
| 25 | 25 | 11 | 11 | 1.8E-12 | 1 | 489.7 |
| 25 | 25 | 10 | 10 | 1.8E-12 | 1 | 489.7 |
| 25 | 25 | 9 | 9 | 1.8E-12 | 1 | 489.7 |
| 26 | 26 | 11 | 11 | 1.8E-12 | 1 | 489.8 |
| 26 | 26 | 10 | 10 | 1.8E-12 | 1 | 489.8 |
| 26 | 26 | 9 | 9 | 1.8E-12 | 1 | 489.8 |
| 27 | 27 | 11 | 11 | 1.8E-12 | 1 | 489.85 |
| 27 | 27 | 10 | 10 | 1.8E-12 | 1 | 489.85 |
| 27 | 27 | 9 | 9 | 1.8E-12 | 1 | 489.85 |
| 28 | 28 | 11 | 11 | 1.8E-12 | 1 | 489.885 |
| 28 | 28 | 10 | 10 | 1.8E-12 | 1 | 489.885 |
| 28 | 28 | 9 | 9 | 1.8E-12 | 1 | 489.885 |
| 29 | 29 | 11 | 11 | 1.8E-12 | 1 | 489.92 |
| 29 | 29 | 10 | 10 | 1.8E-12 | 1 | 489.92 |
| 29 | 29 | 9 | 9 | 1.8E-12 | 1 | 489.92 |
| 30 | 30 | 11 | 11 | 1.8E-12 | 1 | 489.955 |
| 30 | 30 | 10 | 10 | 1.8E-12 | 1 | 489.955 |
| 30 | 30 | 9 | 9 | 1.8E-12 | 1 | 489.955 |
| 31 | 31 | 11 | 11 | 1.8E-12 | 1 | 489.99 |
| 31 | 31 | 10 | 10 | 1.8E-12 | 1 | 489.99 |

```
      31   31    9    9   1.8E-12        1
      489.99
      32   32   11   11  1.8E-12        1
      490.025
      32   32   10   10  1.8E-12        1
      490.025
      32   32    9    9  1.8E-12        1
      490.025
      33   33   11   11   1.8E-12        1
      490.06
      33   33   10   10   1.8E-12        1
      490.06
      33   33    9    9   1.8E-12        1
      490.06
      34   34   11   11  1.8E-12        1
      490.095
      34   34   10   10  1.8E-12        1
      490.095
      34   34    9    9  1.8E-12        1
      490.095
      35   35   11   11   1.8E-12        1
      490.13
      35   35   10   10   1.8E-12        1
      490.13
      35   35    9    9   1.8E-12        1
      490.13
      36   36   11   11  1.8E-12        1
      490.165
      36   36   10   10  1.8E-12        1
      490.165
      36   36    9    9  1.8E-12        1
      490.165
      37   37   11   11    1.8E-12        1
      490.2
      37   37   10   10    1.8E-12        1
      490.2
      37   37    9    9    1.8E-12        1
      490.2
      38   38   11   11  1.8E-12        1
      490.235
      38   38   10   10  1.8E-12        1
      490.235
      38   38    9    9  1.8E-12        1
      490.235
      39   39   11   11   1.8E-12        1
      490.27
      39   39   10   10   1.8E-12        1
      490.27
      39   39    9    9   1.8E-12        1
      490.27
C...PADDY'S RUN
       16       16        12        12  4.4E-13        1
      493.50
       16       16        13        13  4.4E-13        1
      493.92
       16       16        14        14  4.4E-13        1
      494.33
       16       16        15        15  4.4E-13        1
      494.75
       16       16        16        16  4.4E-13        1
      495.17
       16       16        17        17  4.4E-13        1
      495.58
       16       16        18        18  4.4E-13        1
      496.00
       16       16        19        19  4.4E-13        1
      496.42
       16       16        20        20  4.4E-13        1
      496.83
       16       16        21        21  4.4E-13        1
      497.25
       15       15        21        21  4.4E-13        1
      497.67
       15       15        22        22  4.4E-13        1
      498.08
       15       15        23        23  4.4E-13        1
      498.50
       15       15        24        24  4.4E-13        1
      498.93
       15       15        25        25  4.4E-13        1
      499.36
       15       15        26        26  4.4E-13        1
```

000402

| | | | | | |
|---|---|---|---|---|---|
| 499.79 | | | | | |
| 15 | 15 | 27 | 27 | 4.4E-13 | 1 |
| 500.21 | | | | | |
| 15 | 15 | 28 | 28 | 4.4E-13 | 1 |
| 500.64 | | | | | |
| 15 | 15 | 29 | 29 | 4.4E-13 | 1 |
| 501.07 | | | | | |
| 16 | 16 | 29 | 29 | 4.4E-13 | 1 |
| 501.50 | | | | | |
| 17 | 17 | 29 | 29 | 4.4E-13 | 1 |
| 501.93 | | | | | |
| 18 | 18 | 29 | 29 | 4.4E-13 | 1 |
| 502.36 | | | | | |
| 18 | 18 | 30 | 30 | 4.4E-13 | 1 |
| 502.79 | | | | | |
| 18 | 18 | 31 | 31 | 4.4E-13 | 1 |
| 503.21 | | | | | |
| 18 | 18 | 32 | 32 | 4.4E-13 | 1 |
| 503.64 | | | | | |
| 18 | 18 | 33 | 33 | 4.4E-13 | 1 |
| 504.07 | | | | | |
| 18 | 18 | 34 | 34 | 4.4E-13 | 1 |
| 504.50 | | | | | |
| 18 | 18 | 35 | 35 | 4.4E-13 | 1 |
| 504.93 | | | | | |
| 18 | 18 | 37 | 37 | 4.4E-13 | 1 |
| 505.36 | | | | | |
| 18 | 18 | 36 | 36 | 4.4E-13 | 1 |
| 505.79 | | | | | |
| 17 | 17 | 37 | 37 | 4.4E-13 | 1 |
| 506.21 | | | | | |
| 16 | 16 | 37 | 37 | 4.4E-13 | 1 |
| 506.64 | | | | | |
| 16 | 16 | 38 | 38 | 4.4E-13 | 1 |
| 507.07 | | | | | |
| 16 | 16 | 39 | 39 | 4.4E-13 | 1 |
| 507.50 | | | | | |
| 16 | 16 | 40 | 40 | 4.4E-13 | 1 |
| 507.72 | | | | | |
| 16 | 16 | 41 | 41 | 4.4E-13 | 1 |
| 507.95 | | | | | |
| 16 | 16 | 42 | 42 | 4.4E-13 | 1 |
| 508.17 | | | | | |
| 10 | 10 | 43 | 43 | 4.4E-13 | 1 |
| 508.40 | | | | | |
| 11 | 11 | 43 | 43 | 4.4E-13 | 1 |
| 508.62 | | | | | |
| 12 | 12 | 43 | 43 | 4.4E-13 | 1 |
| 508.84 | | | | | |
| 13 | 13 | 43 | 43 | 4.4E-13 | 1 |
| 509.07 | | | | | |
| 14 | 14 | 43 | 43 | 4.4E-13 | 1 |
| 509.29 | | | | | |
| 15 | 15 | 43 | 43 | 4.4E-13 | 1 |
| 509.52 | | | | | |
| 16 | 16 | 43 | 43 | 4.4E-13 | 1 |
| 509.74 | | | | | |
| 10 | 10 | 44 | 44 | 4.4E-13 | 1 |
| 509.97 | | | | | |
| 10 | 10 | 45 | 45 | 4.4E-13 | 1 |
| 510.19 | | | | | |
| 10 | 10 | 46 | 46 | 4.4E-13 | 1 |
| 510.41 | | | | | |
| 10 | 10 | 47 | 47 | 4.4E-13 | 1 |
| 510.64 | | | | | |
| 10 | 10 | 48 | 48 | 4.4E-13 | 1 |
| 510.86 | | | | | |
| 10 | 10 | 49 | 49 | 4.4E-13 | 1 |
| 511.09 | | | | | |
| 3 | 3 | 50 | 50 | 4.4E-13 | 1 |
| 511.31 | | | | | |
| 4 | 4 | 50 | 50 | 4.4E-13 | 1 |
| 511.53 | | | | | |
| 5 | 5 | 50 | 50 | 4.4E-13 | 1 |
| 511.76 | | | | | |
| 6 | 6 | 50 | 50 | 4.4E-13 | 1 |
| 511.98 | | | | | |
| 7 | 7 | 50 | 50 | 4.4E-13 | 1 |
| 512.21 | | | | | |
| 8 | 8 | 50 | 50 | 4.4E-13 | 1 |
| 512.43 | | | | | |
| 9 | 9 | 50 | 50 | 4.4E-13 | 1 |

```
      512.66
       10       10       50       50  4.4E-13       1
      512.88
        3        3       51       51  4.4E-13       1
      513.10
        3        3       52       52  4.4E-13       1
      513.33
        3        3       53       53  4.4E-13       1
      513.55
        3        3       54       54  4.4E-13       1
      513.78
        3        3       55       55  4.4E-13       1
      514.00
        3        3       56       56  4.4E-13       1
      514.22
        3        3       57       57  4.4E-13       1
      514.43
        3        3       58       58  4.4E-13       1
      514.65
        3        3       59       59  4.4E-13       1
      514.87
        3        3       60       60  4.4E-13       1
      515.08
        3        3       61       61  4.4E-13       1
      515.30
        3        3       62       62  4.4E-13       1
      515.52
        3        3       63       63  4.4E-13       1
      515.73
        3        3       64       64  4.4E-13       1
      515.95
        3        3       65       65  4.4E-13       1
      516.17
        3        3       66       66  4.4E-13       1
      516.38
        3        3       67       67  4.4E-13       1
      516.60
        3        3       68       68  4.4E-13       1
      516.82
        3        3       69       69  4.4E-13       1
      517.03
        3        3       70       70  4.4E-13       1
      517.25
        3        3       71       71  4.4E-13       1
      517.47
        3        3       72       72  4.4E-13       1
      517.68
        4        4       72       72  4.4E-13       1
      517.90
        5        5       72       72  4.4E-13       1
      518.12
        6        6       72       72  4.4E-13       1
      518.33
        7        7       72       72  4.4E-13       1
      518.55
        8        8       72       72  4.4E-13       1
      518.77
        8        8       73       73  4.4E-13       1
      518.98
        8        8       74       74  4.4E-13       1
      519.20
        8        8       75       75  4.4E-13       1
      519.42
        8        8       76       76  4.4E-13       1
      519.63
        8        8       77       77  4.4E-13       1
      519.85
        8        8       78       78  4.4E-13       1
      520.07
        8        8       79       79  4.4E-13       1
      520.28
        8        8       80       80  4.4E-13       1
      520.50
  0 /
C...
C...FREE SURFACE B.C.
C...(2.20) FRESUR(T=UNCONFINED), PRTCCM(T=PRINT MESSAGE)
  T T
C...
C...INITIAL CONDITIONS
C...(2.21.1) ICHYDP, ICT, ICC: (T=HYDROSTATIC P, T, MASS-FRAC TO BE SPECIFIED)
  F F F
```

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```
C...
C...(2.21.2) ICHWT (T=INITIAL WT ELEV. TO BE INPUT)
  T
C...
C...(2.21.3C) HWT: WT ELEV. BY i,j,k RANGE
  1  1  1  1  4  4
    494.75  1
  2  2  1  1  4  4
    494.76  1
      ***

*** NOTE: DUE TO THE EXTENSIVE SIZE OF THE INITIAL HEAD ARRAY, ONLY THE BEGINNING AND END OF THE ARRAY
          HAVE BEEN PRINTED.
     ***
 39 39 81 81  4  4
    518.70  1
 40 40 81 81  4  4
    518.70  1
 0 /
C...
C...CALCULATION INFORMATION   [DEFAULT VALUES]
C...(2.22.1) FDSMTH(FACTOR FOR SPATIAL-DISCRTZ), FDTMTH(FACTOR FOR TEMPORAL
C...         DISCRTZ.): 0.0=UPSTREAM DIFFERENCING, 1.0=BACKWARD-IN-TIME
               0.       1.0
C...
C...(2.22.2) TOLDEN(TOLERANCE), MAXITN(MAXIMUM ITERATIONS)
              0.001             10
C...
C...(2.22.3) NTSORT  (# TIMESTEPS FOR OVERRELAXATION PARAMETER[5]),
C...         EPSSOR  (TOLERANCE FOR SOR...[1.0E-5]),
C...         EPSOMG  (TOLERANCE ON FRAC. CHANGE[0.2]),
C...         MAXITN1 (MAX. ITERATION FOR OVERRELAX. PARAMETER[50]),
C...         MAXITN2 (MAX. ITERATION FOR THE SOLUTION OF MATRIX EQ.[100]).
C...
C...               5   1.0E-03   0.50    250      250
                   5   1.0E-03   0.50    500      500
C...
C...OUTPUT OF STATIC DATA
C...(2.23.1) PRTPMP (PMZ PROP.),     PRTFP (FLD.PROP.),   PRTIC (INIT. COND.),
C...         PRTBC (BOUNDARY COND.), PRTSLM (SOL'N METH.),
C...         PRTWELL (STATIC WELLBORE)
  F F F F F F
C...
C...(2.23.2) IPRTTC (INDEX FOR IC PRINTOUT), PRTDV (T=PRT. OF DENSITY & VISC.)
C...200  T
C...
C...(2.23.3) ORENPR (INDEX FOR ORIENT. OF ARRAY PRT.)
  12
C...
C...(2.23.4) PLTZON (T=PRT. PMZ PROPERTIES)
C...  F
C...
C...(2.23.5) OCPLOT (T= PLOTS OF OBSERVED & CALCULATED VALUES)
  F
C...
C... TRANSIENT DATA (PERIOD 1: 1970-1980)
C...(3.1) THRU (T=SIMULATION IS THROUGH)
  F
C...
C... WELL INFORMATION
C... RDWFLO(T=READ WELL-FLOW-RATE), RDWHD (T=READ WELL-HEAD)
  T F
C...
C...(3.2.2) IWELL,    QWV,    PWSUR,    PWKT,    TWSRKT,    CWKT
              1   -2.17E+04   0.0       0.0      60.0
  0.00
              2   -2.17E+04   0.0       0.0      60.0
  0.00
              3   -4.81E+02   0.0       0.0      60.0
  0.00
  0 /
C...
C...BOUNDARY CONDITIONS INFORMATION
C...SPECIFIED VALUES
C...(3.3.1) RDSPBC,RDSTBC,RDSCBC (READ SPECIFIED-PRESSURE,TEMP.,MASS-FRAC. DATA)
  T F F
C...
C...(3.3.2) PNP: PRESSURE AT SPECIFIED PRESSURE B.C. NODES BY i,j,k.
                                 2     2     1     1     4     4
                     -4.58183            1
                                 3     3     1     1     4     4
                     -4.39483            1
```

| | | | | | | |
|---|---|---|---|---|---|---|
| | 4 | 4 | 1 | 1 | 4 | 4 |
| -4.20783 | | 1 | | | | |
| | 5 | 5 | 1 | 1 | 4 | 4 |
| -4.02083 | | 1 | | | | |
| | 6 | 6 | 1 | 1 | 4 | 4 |
| -3.83383 | | 1 | | | | |
| | 7 | 7 | 1 | 1 | 4 | 4 |
| -3.64683 | | 1 | | | | |
| | 8 | 8 | 1 | 1 | 4 | 4 |
| -3.45983 | | 1 | | | | |
| | 9 | 9 | 1 | 1 | 4 | 4 |
| -3.27283 | | 1 | | | | |
| | 10 | 10 | 1 | 1 | 4 | 4 |
| -3.08583 | | 1 | | | | |
| | 11 | 11 | 1 | 1 | 4 | 4 |
| -2.89883 | | 1 | | | | |
| | 12 | 12 | 1 | 1 | 4 | 4 |
| -2.71183 | | 1 | | | | |
| | 13 | 13 | 1 | 1 | 4 | 4 |
| -2.52483 | | 1 | | | | |
| | 14 | 14 | 1 | 1 | 4 | 4 |
| -2.33783 | | 1 | | | | |
| | 15 | 15 | 1 | 1 | 4 | 4 |
| -2.15083 | | 1 | | | | |
| | 16 | 16 | 1 | 1 | 4 | 4 |
| -1.96383 | | 1 | | | | |
| | 17 | 17 | 1 | 1 | 4 | 4 |
| -1.77683 | | 1 | | | | |
| | 18 | 18 | 1 | 1 | 4 | 4 |
| -1.58983 | | 1 | | | | |
| | 19 | 19 | 1 | 1 | 4 | 4 |
| -1.40283 | | 1 | | | | |
| | 20 | 20 | 1 | 1 | 4 | 4 |
| -1.21583 | | 1 | | | | |
| | 2 | 2 | 1 | 1 | 3 | 3 |
| 10.15819 | | 1 | | | | |
| | 3 | 3 | 1 | 1 | 3 | 3 |
| 10.34519 | | 1 | | | | |
| | 4 | 4 | 1 | 1 | 3 | 3 |
| 10.53219 | | 1 | | | | |
| | 5 | 5 | 1 | 1 | 3 | 3 |
| 10.71919 | | 1 | | | | |
| | 6 | 6 | 1 | 1 | 3 | 3 |
| 10.90619 | | 1 | | | | |
| | 7 | 7 | 1 | 1 | 3 | 3 |
| 11.09319 | | 1 | | | | |
| | 8 | 8 | 1 | 1 | 3 | 3 |
| 11.28019 | | 1 | | | | |
| | 9 | 9 | 1 | 1 | 3 | 3 |
| 11.46719 | | 1 | | | | |
| | 10 | 10 | 1 | 1 | 3 | 3 |
| 11.65419 | | 1 | | | | |
| | 11 | 11 | 1 | 1 | 3 | 3 |
| 11.84119 | | 1 | | | | |
| | 12 | 12 | 1 | 1 | 3 | 3 |
| 12.02819 | | 1 | | | | |
| | 13 | 13 | 1 | 1 | 3 | 3 |
| 12.21519 | | 1 | | | | |
| | 14 | 14 | 1 | 1 | 3 | 3 |
| 12.40219 | | 1 | | | | |
| | 15 | 15 | 1 | 1 | 3 | 3 |
| 12.58919 | | 1 | | | | |
| | 16 | 16 | 1 | 1 | 3 | 3 |
| 12.77619 | | 1 | | | | |
| | 17 | 17 | 1 | 1 | 3 | 3 |
| 12.96319 | | 1 | | | | |
| | 18 | 18 | 1 | 1 | 3 | 3 |
| 13.15019 | | 1 | | | | |
| | 19 | 19 | 1 | 1 | 3 | 3 |
| 13.33719 | | 1 | | | | |
| | 20 | 20 | 1 | 1 | 3 | 3 |
| 13.52419 | | 1 | | | | |
| | 2 | 2 | 1 | 1 | 2 | 2 |
| 18.82879 | | 1 | | | | |
| | 3 | 3 | 1 | 1 | 2 | 2 |
| 19.01579 | | 1 | | | | |
| | 4 | 4 | 1 | 1 | 2 | 2 |
| 19.20279 | | 1 | | | | |
| | 5 | 5 | 1 | 1 | 2 | 2 |
| 19.38979 | | 1 | | | | |
| | 6 | 6 | 1 | 1 | 2 | 2 |
| 19.57679 | | 1 | | | | |

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| | | | | | | |
|---|---|---|---|---|---|---|
| 19.76379 | 7 | 7 | 1 | 1 | 2 | 2 |
| 19.95079 | 8 | 8 | 1 | 1 | 2 | 2 |
| 20.13779 | 9 | 9 | 1 | 1 | 2 | 2 |
| 20.32479 | 10 | 10 | 1 | 1 | 2 | 2 |
| 20.51179 | 11 | 11 | 1 | 1 | 2 | 2 |
| 20.69879 | 12 | 12 | 1 | 1 | 2 | 2 |
| 20.88579 | 13 | 13 | 1 | 1 | 2 | 2 |
| 21.07279 | 14 | 14 | 1 | 1 | 2 | 2 |
| 21.25979 | 15 | 15 | 1 | 1 | 2 | 2 |
| 21.44679 | 16 | 16 | 1 | 1 | 2 | 2 |
| 21.63379 | 17 | 17 | 1 | 1 | 2 | 2 |
| 21.82079 | 18 | 18 | 1 | 1 | 2 | 2 |
| 22.00779 | 19 | 19 | 1 | 1 | 2 | 2 |
| 22.19479 | 20 | 20 | 1 | 1 | 2 | 2 |
| 40.50529 | 2 | 2 | 1 | 1 | 1 | 1 |
| 40.69229 | 3 | 3 | 1 | 1 | 1 | 1 |
| 40.87929 | 4 | 4 | 1 | 1 | 1 | 1 |
| 41.06629 | 5 | 5 | 1 | 1 | 1 | 1 |
| 41.25329 | 6 | 6 | 1 | 1 | 1 | 1 |
| 41.44029 | 7 | 7 | 1 | 1 | 1 | 1 |
| 41.62729 | 8 | 8 | 1 | 1 | 1 | 1 |
| 41.81429 | 9 | 9 | 1 | 1 | 1 | 1 |
| 42.00129 | 10 | 10 | 1 | 1 | 1 | 1 |
| 42.18829 | 11 | 11 | 1 | 1 | 1 | 1 |
| 42.37529 | 12 | 12 | 1 | 1 | 1 | 1 |
| 42.56229 | 13 | 13 | 1 | 1 | 1 | 1 |
| 42.74929 | 14 | 14 | 1 | 1 | 1 | 1 |
| 42.93629 | 15 | 15 | 1 | 1 | 1 | 1 |
| 43.12329 | 16 | 16 | 1 | 1 | 1 | 1 |
| 43.31029 | 17 | 17 | 1 | 1 | 1 | 1 |
| 43.49729 | 18 | 18 | 1 | 1 | 1 | 1 |
| 43.68429 | 19 | 19 | 1 | 1 | 1 | 1 |
| 43.87129 | 20 | 20 | 1 | 1 | 1 | 1 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 81 | 81 | 4 | 4 |
| 7.36 | 1 | | | | |
| 2 | 2 | 81 | 81 | 4 | 4 |
| 7.33 | 1 | | | | |
| 3 | 3 | 81 | 81 | 4 | 4 |
| 7.29 | 1 | | | | |
| 4 | 4 | 81 | 81 | 4 | 4 |
| 7.26 | 1 | | | | |
| 5 | 5 | 81 | 81 | 4 | 4 |
| 7.23 | 1 | | | | |
| 6 | 6 | 81 | 81 | 4 | 4 |
| 7.19 | 1 | | | | |
| 7 | 7 | 81 | 81 | 4 | 4 |
| 7.16 | 1 | | | | |
| 8 | 8 | 81 | 81 | 4 | 4 |

7.12 1
9 9 81 81 4 4
7.09 1
10 10 81 81 4 4
7.05 1
11 11 81 81 4 4
7.02 1
12 12 81 81 4 4
6.99 1
13 13 81 81 4 4
6.96 1
14 14 81 81 4 4
6.93 1
15 15 81 81 4 4
6.90 1
16 16 81 81 4 4
6.87 1
17 17 81 81 4 4
6.83 1
18 18 81 81 4 4
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19 19 81 81 4 4
6.76 1
20 20 81 81 4 4
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21 21 81 81 4 4
6.73 1
22 22 81 81 4 4
6.71 1
23 23 81 81 4 4
6.69 1
24 24 81 81 4 4
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6.66 1
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5 5 81 81 3 3
21.97 1
6 6 81 81 3 3
21.93 1
7 7 81 81 3 3
21.90 1
8 8 81 81 3 3
21.86 1
9 9 81 81 3 3

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| | | | | | |
|---|---|---|---|---|---|
| 21.83 | 1 | | | | |
| 10 | 10 | 81 | 81 | 3 | 3 |
| 21.79 | 1 | | | | |
| 11 | 11 | 81 | 81 | 3 | 3 |
| 21.76 | 1 | | | | |
| 12 | 12 | 81 | 81 | 3 | 3 |
| 21.73 | 1 | | | | |
| 13 | 13 | 81 | 81 | 3 | 3 |
| 21.70 | 1 | | | | |
| 14 | 14 | 81 | 81 | 3 | 3 |
| 21.67 | 1 | | | | |
| 15 | 15 | 81 | 81 | 3 | 3 |
| 21.64 | 1 | | | | |
| 16 | 16 | 81 | 81 | 3 | 3 |
| 21.61 | 1 | | | | |
| 17 | 17 | 81 | 81 | 3 | 3 |
| 21.57 | 1 | | | | |
| 18 | 18 | 81 | 81 | 3 | 3 |
| 21.54 | 1 | | | | |
| 19 | 19 | 81 | 81 | 3 | 3 |
| 21.50 | 1 | | | | |
| 20 | 20 | 81 | 81 | 3 | 3 |
| 21.48 | 1 | | | | |
| 21 | 21 | 81 | 81 | 3 | 3 |
| 21.47 | 1 | | | | |
| 22 | 22 | 81 | 81 | 3 | 3 |
| 21.45 | 1 | | | | |
| 23 | 23 | 81 | 81 | 3 | 3 |
| 21.43 | 1 | | | | |
| 24 | 24 | 81 | 81 | 3 | 3 |
| 21.42 | 1 | | | | |
| 25 | 25 | 81 | 81 | 3 | 3 |
| 21.40 | 1 | | | | |
| 26 | 26 | 81 | 81 | 3 | 3 |
| 21.37 | 1 | | | | |
| 27 | 27 | 81 | 81 | 3 | 3 |
| 21.35 | 1 | | | | |
| 28 | 28 | 81 | 81 | 3 | 3 |
| 21.33 | 1 | | | | |
| 29 | 29 | 81 | 81 | 3 | 3 |
| 21.32 | 1 | | | | |
| 30 | 30 | 81 | 81 | 3 | 3 |
| 21.30 | 1 | | | | |
| 31 | 31 | 81 | 81 | 3 | 3 |
| 21.28 | 1 | | | | |
| 32 | 32 | 81 | 81 | 3 | 3 |
| 21.27 | 1 | | | | |
| 33 | 33 | 81 | 81 | 3 | 3 |
| 21.26 | 1 | | | | |
| 34 | 34 | 81 | 81 | 3 | 3 |
| 21.25 | 1 | | | | |
| 35 | 35 | 81 | 81 | 3 | 3 |
| 21.24 | 1 | | | | |
| 36 | 36 | 81 | 81 | 3 | 3 |
| 21.23 | 1 | | | | |
| 37 | 37 | 81 | 81 | 3 | 3 |
| 21.21 | 1 | | | | |
| 38 | 38 | 81 | 81 | 3 | 3 |
| 21.19 | 1 | | | | |
| 39 | 39 | 81 | 81 | 3 | 3 |
| 21.18 | 1 | | | | |
| 40 | 40 | 81 | 81 | 3 | 3 |
| 21.16 | 1 | | | | |
| 1 | 1 | 81 | 81 | 2 | 2 |
| 30.77 | 1 | | | | |
| 2 | 2 | 81 | 81 | 2 | 2 |
| 30.74 | 1 | | | | |
| 3 | 3 | 81 | 81 | 2 | 2 |
| 30.70 | 1 | | | | |
| 4 | 4 | 81 | 81 | 2 | 2 |
| 30.67 | 1 | | | | |
| 5 | 5 | 81 | 81 | 2 | 2 |
| 30.64 | 1 | | | | |
| 6 | 6 | 81 | 81 | 2 | 2 |
| 30.60 | 1 | | | | |
| 7 | 7 | 81 | 81 | 2 | 2 |
| 30.57 | 1 | | | | |
| 8 | 8 | 81 | 81 | 2 | 2 |
| 30.53 | 1 | | | | |
| 9 | 9 | 81 | 81 | 2 | 2 |
| 30.50 | 1 | | | | |
| 10 | 10 | 81 | 81 | 2 | 2 |

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| | | | | | |
|---|---|---|---|---|---|
| 30.46 | 1 | | | | |
| 11 | 11 | 81 | 81 | 2 | 2 |
| 30.43 | 1 | | | | |
| 12 | 12 | 81 | 81 | 2 | 2 |
| 30.40 | 1 | | | | |
| 13 | 13 | 81 | 81 | 2 | 2 |
| 30.37 | 1 | | | | |
| 14 | 14 | 81 | 81 | 2 | 2 |
| 30.34 | 1 | | | | |
| 15 | 15 | 81 | 81 | 2 | 2 |
| 30.31 | 1 | | | | |
| 16 | 16 | 81 | 81 | 2 | 2 |
| 30.28 | 1 | | | | |
| 17 | 17 | 81 | 81 | 2 | 2 |
| 30.24 | 1 | | | | |
| 18 | 18 | 81 | 81 | 2 | 2 |
| 30.21 | 1 | | | | |
| 19 | 19 | 81 | 81 | 2 | 2 |
| 30.17 | 1 | | | | |
| 20 | 20 | 81 | 81 | 2 | 2 |
| 30.15 | 1 | | | | |
| 21 | 21 | 81 | 81 | 2 | 2 |
| 30.14 | 1 | | | | |
| 22 | 22 | 81 | 81 | 2 | 2 |
| 30.12 | 1 | | | | |
| 23 | 23 | 81 | 81 | 2 | 2 |
| 30.10 | 1 | | | | |
| 24 | 24 | 81 | 81 | 2 | 2 |
| 30.09 | 1 | | | | |
| 25 | 25 | 81 | 81 | 2 | 2 |
| 30.07 | 1 | | | | |
| 26 | 26 | 81 | 81 | 2 | 2 |
| 30.04 | 1 | | | | |
| 27 | 27 | 81 | 81 | 2 | 2 |
| 30.02 | 1 | | | | |
| 28 | 28 | 81 | 81 | 2 | 2 |
| 30.00 | 1 | | | | |
| 29 | 29 | 81 | 81 | 2 | 2 |
| 29.99 | 1 | | | | |
| 30 | 30 | 81 | 81 | 2 | 2 |
| 29.97 | 1 | | | | |
| 31 | 31 | 81 | 81 | 2 | 2 |
| 29.95 | 1 | | | | |
| 32 | 32 | 81 | 81 | 2 | 2 |
| 29.94 | 1 | | | | |
| 33 | 33 | 81 | 81 | 2 | 2 |
| 29.93 | 1 | | | | |
| 34 | 34 | 81 | 81 | 2 | 2 |
| 29.92 | 1 | | | | |
| 35 | 35 | 81 | 81 | 2 | 2 |
| 29.91 | 1 | | | | |
| 36 | 36 | 81 | 81 | 2 | 2 |
| 29.90 | 1 | | | | |
| 37 | 37 | 81 | 81 | 2 | 2 |
| 29.88 | 1 | | | | |
| 38 | 38 | 81 | 81 | 2 | 2 |
| 29.86 | 1 | | | | |
| 39 | 39 | 81 | 81 | 2 | 2 |
| 29.85 | 1 | | | | |
| 40 | 40 | 81 | 81 | 2 | 2 |
| 29.83 | 1 | | | | |
| 1 | 1 | 81 | 81 | 1 | 1 |
| 52.44 | 1 | | | | |
| 2 | 2 | 81 | 81 | 1 | 1 |
| 52.41 | 1 | | | | |
| 3 | 3 | 81 | 81 | 1 | 1 |
| 52.37 | 1 | | | | |
| 4 | 4 | 81 | 81 | 1 | 1 |
| 52.34 | 1 | | | | |
| 5 | 5 | 81 | 81 | 1 | 1 |
| 52.31 | 1 | | | | |
| 6 | 6 | 81 | 81 | 1 | 1 |
| 52.27 | 1 | | | | |
| 7 | 7 | 81 | 81 | 1 | 1 |
| 52.24 | 1 | | | | |
| 8 | 8 | 81 | 81 | 1 | 1 |
| 52.20 | 1 | | | | |
| 9 | 9 | 81 | 81 | 1 | 1 |
| 52.17 | 1 | | | | |
| 10 | 10 | 81 | 81 | 1 | 1 |
| 52.13 | 1 | | | | |
| 11 | 11 | 81 | 81 | 1 | 1 |

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| | | | | | |
|---|---|---|---|---|---|
| 52.10 | 1 | | | | |
| 12 | 12 | 81 | 81 | 1 | 1 |
| 52.07 | 1 | | | | |
| 13 | 13 | 81 | 81 | 1 | 1 |
| 52.04 | 1 | | | | |
| 14 | 14 | 81 | 81 | 1 | 1 |
| 52.01 | 1 | | | | |
| 15 | 15 | 81 | 81 | 1 | 1 |
| 51.98 | 1 | | | | |
| 16 | 16 | 81 | 81 | 1 | 1 |
| 51.95 | 1 | | | | |
| 17 | 17 | 81 | 81 | 1 | 1 |
| 51.91 | 1 | | | | |
| 18 | 18 | 81 | 81 | 1 | 1 |
| 51.88 | 1 | | | | |
| 19 | 19 | 81 | 81 | 1 | 1 |
| 51.84 | 1 | | | | |
| 20 | 20 | 81 | 81 | 1 | 1 |
| 51.82 | 1 | | | | |
| 21 | 21 | 81 | 81 | 1 | 1 |
| 51.81 | 1 | | | | |
| 22 | 22 | 81 | 81 | 1 | 1 |
| 51.79 | 1 | | | | |
| 23 | 23 | 81 | 81 | 1 | 1 |
| 51.77 | 1 | | | | |
| 24 | 24 | 81 | 81 | 1 | 1 |
| 51.76 | 1 | | | | |
| 25 | 25 | 81 | 81 | 1 | 1 |
| 51.74 | 1 | | | | |
| 26 | 26 | 81 | 81 | 1 | 1 |
| 51.71 | 1 | | | | |
| 27 | 27 | 81 | 81 | 1 | 1 |
| 51.69 | 1 | | | | |
| 28 | 28 | 81 | 81 | 1 | 1 |
| 51.67 | 1 | | | | |
| 29 | 29 | 81 | 81 | 1 | 1 |
| 51.66 | 1 | | | | |
| 30 | 30 | 81 | 81 | 1 | 1 |
| 51.64 | 1 | | | | |
| 31 | 31 | 81 | 81 | 1 | 1 |
| 51.62 | 1 | | | | |
| 32 | 32 | 81 | 81 | 1 | 1 |
| 51.61 | 1 | | | | |
| 33 | 33 | 81 | 81 | 1 | 1 |
| 51.60 | 1 | | | | |
| 34 | 34 | 81 | 81 | 1 | 1 |
| 51.59 | 1 | | | | |
| 35 | 35 | 81 | 81 | 1 | 1 |
| 51.58 | 1 | | | | |
| 36 | 36 | 81 | 81 | 1 | 1 |
| 51.57 | 1 | | | | |
| 37 | 37 | 81 | 81 | 1 | 1 |
| 51.55 | 1 | | | | |
| 38 | 38 | 81 | 81 | 1 | 1 |
| 51.53 | 1 | | | | |
| 39 | 39 | 81 | 81 | 1 | 1 |
| 51.52 | 1 | | | | |
| 40 | 40 | 81 | 81 | 1 | 1 |
| 51.50 | 1 | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 4 | 4 |
| -4.57 | | 1 | | | |
| 1 | 1 | 2 | 2 | 4 | 4 |
| -4.55 | | 1 | | | |
| 1 | 1 | 3 | 3 | 4 | 4 |
| -4.53 | | 1 | | | |
| 1 | 1 | 4 | 4 | 4 | 4 |
| -4.51 | | 1 | | | |
| 1 | 1 | 5 | 5 | 4 | 4 |
| -4.50 | | 1 | | | |
| 1 | 1 | 6 | 6 | 4 | 4 |
| -4.48 | | 1 | | | |
| 1 | 1 | 7 | 7 | 4 | 4 |
| -4.30 | | 1 | | | |
| 1 | 1 | 8 | 8 | 4 | 4 |
| -4.24 | | 1 | | | |
| 1 | 1 | 1 | 1 | 3 | 3 |
| 10.17 | | 1 | | | |
| 1 | 1 | 2 | 2 | 3 | 3 |
| 10.19 | | 1 | | | |
| 1 | 1 | 3 | 3 | 3 | 3 |
| 10.21 | | 1 | | | |
| 1 | 1 | 4 | 4 | 3 | 3 |

```
              10.23          1
               1    1      5    5      3    3
              10.24          1
               1    1      6    6      3    3
              10.26          1
               1    1      7    7      3    3
              10.44          1
               1    1      8    8      3    3
              10.50          1
               1    1      1    1      2    2
              18.84          1
               1    1      2    2      2    2
              18.86          1
               1    1      3    3      2    2
              18.88          1
               1    1      4    4      2    2
              18.90          1
               1    1      5    5      2    2
              18.91          1
               1    1      6    6      2    2
              18.93          1
               1    1      7    7      2    2
              19.11          1
               1    1      8    8      2    2
              19.18          1
               1    1      1    1      1    1
              40.52          1
               1    1      2    2      1    1
              40.54          1
               1    1      3    3      1    1
              40.55          1
               1    1      4    4      1    1
              40.57          1
               1    1      5    5      1    1
              40.59          1
               1    1      6    6      1    1
              40.61          1
               1    1      7    7      1    1
              40.79          1
               1    1      8    8      1    1
              40.85          1
   0 /
C...
C...(3.3.4) CSBC BY I,J,K RANGE (0.1-0.3); (0) - RDSPBC (3.3.1) AND
   1 40   1 81    4  4
   0.0    1
  0 /
C...
C... SPECIFIED FLUX
C...3.4.1 RDFLXQ(FLUID), RDFLXH(HEAT), RDFLXS(SOLUTE)
       T              F              T
C...
C...(3.4.2) QFFX, QFFY, QFFZ, (BY i,j,k)
C...NORTH OF THE GMR (14 in/yr)
C...                                                    (BEDROCK) FLUX=6"/yr
                    1     9       43    49        4     4
                    0.    1        0.    1      -0.0014 1
                    1    13       19    42        4     4
                    0.    1        0.    1      -0.0014 1
                   14    14       24    42        4     4
                    0.    1        0.    1      -0.0014 1
                   15    16       30    35        4     4
                    0.    1        0.    1      -0.0014 1
                    1    11       16    18        4     4
                    0.    1        0.    1      -0.0014 1
                    1     9       12    15        4     4
                    0.    1        0.    1      -0.0014 1
                    1     4       10    11        4     4
                    0.    1        0.    1      -0.0014 1
                   38    40       80    80        4     4
                    0.    1        0.    1      -0.0014 1
                   35    40       65    79        4     4
                    0.    1        0.    1      -0.0014 1
                   38    40       59    64        4     4
                    0.    1        0.    1      -0.0014 1
                   32    40        5     5        4     4
                    0.    1        0.    1      -0.0014 1
                   27    40        1     4        4     4
                    0.    1        0.    1      -0.0014 1
C...                                                          FLUX = 6 "/yr
                    1     2       50    54        4     4
                    0.    1        0.    1      -0.0014 1
```

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```
                 1     7       73    80        4     4
                 0.    1        0.    1      -0.0014 1
                 1     2       55    72        4     4
                 0.    1        0.    1      -0.0014 1
                19    37       80    80        4     4
                 0.    1        0.    1      -0.0014 1
                22    34       74    79        4     4
                 0.    1        0.    1      -0.0014 1
                29    34       65    73        4     4
                 0.    1        0.    1      -0.0014 1
C...                                                        FLUX = 10 "/yr
                 9    18       80    80        4     4
                 0.    1        0.    1      -0.0023 1
                 9    21       74    79        4     4
                 0.    1        0.    1      -0.0023 1
                 4     8       65    71        4     4
                 0.    1        0.    1      -0.0023 1
                 4     5       51    54        4     4
                 0.    1        0.    1      -0.0023 1
                 6    10       51    52        4     4
                 0.    1        0.    1      -0.0023 1
                 9    28       65    73        4     4
                 0.    1        0.    1      -0.0023 1
C...                          FUTURE PAVED AREA (RUETGERS-NEASE) @ 2"/yr
                13    16       59    60        4     4
                 0.    1        0.    1      -0.0023 1
                13    15       58    58        4     4
                 0.    1        0.    1      -0.0023 1
C...
                 4    12       59    64        4     4
                 0.    1        0.    1      -0.0023 1
                13    16       61    64        4     4
                 0.    1        0.    1      -0.0023 1
                17    37       59    64        4     4
                 0.    1        0.    1      -0.0023 1
                 4    12       55    58        4     4
                 0.    1        0.    1      -0.0023 1
                13    15       55    57        4     4
                 0.    1        0.    1      -0.0023 1
                16    40       55    58        4     4
                 0.    1        0.    1      -0.0023 1
C...
                 6    40       53    54        4     4
                 0.    1        0.    1      -0.0023 1
                11    40       49    52        4     4
                 0.    1        0.    1      -0.0023 1
                11    40       44    48        4     4
                 0.    1        0.    1      -0.0023 1
                15    15       37    42        4     4
                 0.    1        0.    1      -0.0023 1
                17    40       38    43        4     4
                 0.    1        0.    1      -0.0023 1
                17    17       30    35        4     4
                 0.    1        0.    1      -0.0023 1
C...                                                        FLUX = 14 "/yr
                15    17       36    36        4     4
                 0.    1        0.    1      -0.0032 1
                19    40       29    37        4     4
                 0.    1        0.    1      -0.0032 1
                17    40       27    28        4     4
                 0.    1        0.    1      -0.0032 1
C...                17    40       12    26        4     4
C...                 0.    1        0.    1      -0.0032 1
                17    39       12    26        4     4
                 0.    1        0.    1      -0.0032 1
                40    40       15    26        4     4
                 0.    1        0.    1      -0.0032 1
                16    16       22    28        4     4
                 0.    1        0.    1      -0.0032 1
                15    15       19    20        4     4
                 0.    1        0.    1      -0.0032 1
                14    14       19    23        4     4
                 0.    1        0.    1      -0.0032 1
                10    11       12    15        4     4
                 0.    1        0.    1      -0.0032 1
                12    15       12    18        4     4
                 0.    1        0.    1      -0.0032 1
                 4     5        5     8        4     4
                 0.    1        0.    1      -0.0032 1
C...                 6    40        6    10        4     4
C...                 0.    1        0.    1      -0.0032 1
                 6    39        6    10        4     4
```

```
                    0.    1        0.    1      -0.0032 1
                    40   40        6     7        4     4
                    0.    1        0.    1      -0.0032 1
                    6    31        5     5        4     4
                    0.    1        0.    1      -0.0032 1
C...                    2    26        1     4        4     4
C...                    0.    1        0.    1      -0.0032 1
                    2    26        2     4        4     4
                    0.    1        0.    1      -0.0032 1
                    2     3        5     8        4     4
                    0.    1        0.    1      -0.0032 1
  0 /
C...
C...(3.4.3) UDENBC - DENSITY ASSOCIATED WITH SPECIFIED-FLUX (BY i,j,k)
C...                                                    (BEDROCK) FLUX=6"/yr
                    1    40        1    80        4     4
                    62.4  1
  0 /
C...(3.4.5) CFLX B.C. BY I,J,K RANGE
                      1    40       60    80        4     4
                    0.0     1
                      1    14       58    59        4     4
                    0.0     1
                     16    40       58    59        4     4
                    0.0     1
                      1    40        1    57        4     4
                    0.0     1
C...SOLUTE LOADING @ RUETGERS-NEASE
                     15    15       59    59        4     4
                    0.01   1
  0 /
C...(3.4.7) QSFX, QSFY, QSFZ (BY i,j,k) - (1970-1979)
                    15    15       58    58        4     4
                    0.    1        0.    1    -2.86E-05 1
  0 /
C...
C...(3.5.1) RDLBC
  T
  0 /
C...
C...(3.5.4) CLBC - SOLUTE MASS FRACTION ON THE OTHER SIDE OF THE AQUITARD
   1  40   1  81   3 3
   0.0     1
  0 /
C...
C...(3.5.5) RIVER LEAKAGE
C...I1,I2,J1,J2,HRBC,DENRBC,VISRBC,TRBC,CRBC
C...GREAT MIAMI RIVER
       2    2    9    9    493.1     62.4    1.138   60   0
       2    2    8    8    493.1     62.4    1.138   60   0
       2    2    7    7    493.1     62.4    1.138   60   0
       3    3    9    9    493.2     62.4    1.138   60   0
       3    3    8    8    493.2     62.4    1.138   60   0
       3    3    7    7    493.2     62.4    1.138   60   0
       4    4    9    9    493.3     62.4    1.138   60   0
       4    4    8    8    493.3     62.4    1.138   60   0
       4    4    7    7    493.3     62.4    1.138   60   0
       5    5    9    9    493.4     62.4    1.138   60   0
       5    5    8    8    493.4     62.4    1.138   60   0
       5    5    7    7    493.4     62.4    1.138   60   0
       5    5   10   10    493.5     62.4    1.138   60   0
       5    5   11   11    493.5     62.4    1.138   60   0
       6    6    7    7    493.7     62.4    1.138   60   0
       6    6    8    8    493.7     62.4    1.138   60   0
       6    6    9    9    493.7     62.4    1.138   60   0
       6    6   10   10    493.7     62.4    1.138   60   0
       6    6   11   11    493.7     62.4    1.138   60   0
       7    7    7    7    493.7     62.4    1.138   60   0
       7    7    8    8    493.7     62.4    1.138   60   0
       7    7    9    9    493.7     62.4    1.138   60   0
       7    7   10   10    493.7     62.4    1.138   60   0
       7    7   11   11    493.8     62.4    1.138   60   0
       8    8   11   11    493.8     62.4    1.138   60   0
       8    8   10   10    493.8     62.4    1.138   60   0
       8    8    9    9    493.9     62.4    1.138   60   0
       9    9   11   11    493.9     62.4    1.138   60   0
       9    9   10   10    493.9     62.4    1.138   60   0
       9    9    9    9      494     62.4    1.138   60   0
      10   10   11   11      494     62.4    1.138   60   0
      10   10   10   10      494     62.4    1.138   60   0
      10   10    9    9    494.1     62.4    1.138   60   0
      11   11   11   11    494.1     62.4    1.138   60   0
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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11 | 11 | 10 | 10 | 494.1 | 62.4 | 1.138 | 60 | 0 |
| 11 | 11 | 9 | 9 | 494.1 | 62.4 | 1.138 | 60 | 0 |
| 12 | 12 | 11 | 11 | 494.1 | 62.4 | 1.138 | 60 | 0 |
| 12 | 12 | 10 | 10 | 494.1 | 62.4 | 1.138 | 60 | 0 |
| 12 | 12 | 9 | 9 | 494.2 | 62.4 | 1.138 | 60 | 0 |
| 13 | 13 | 11 | 11 | 494.2 | 62.4 | 1.138 | 60 | 0 |
| 13 | 13 | 10 | 10 | 494.2 | 62.4 | 1.138 | 60 | 0 |
| 13 | 13 | 9 | 9 | 494.3 | 62.4 | 1.138 | 60 | 0 |
| 14 | 14 | 11 | 11 | 494.3 | 62.4 | 1.138 | 60 | 0 |
| 14 | 14 | 10 | 10 | 494.3 | 62.4 | 1.138 | 60 | 0 |
| 14 | 14 | 9 | 9 | 494.4 | 62.4 | 1.138 | 60 | 0 |
| 15 | 15 | 11 | 11 | 494.4 | 62.4 | 1.138 | 60 | 0 |
| 15 | 15 | 10 | 10 | 494.4 | 62.4 | 1.138 | 60 | 0 |
| 15 | 15 | 9 | 9 | 494.5 | 62.4 | 1.138 | 60 | 0 |
| 16 | 16 | 11 | 11 | 494.5 | 62.4 | 1.138 | 60 | 0 |
| 16 | 16 | 10 | 10 | 494.5 | 62.4 | 1.138 | 60 | 0 |
| 16 | 16 | 9 | 9 | 494.5 | 62.4 | 1.138 | 60 | 0 |
| 17 | 17 | 11 | 11 | 494.5 | 62.4 | 1.138 | 60 | 0 |
| 17 | 17 | 10 | 10 | 494.5 | 62.4 | 1.138 | 60 | 0 |
| 17 | 17 | 9 | 9 | 494.5 | 62.4 | 1.138 | 60 | 0 |
| 18 | 18 | 11 | 11 | 494.5 | 62.4 | 1.138 | 60 | 0 |
| 18 | 18 | 10 | 10 | 494.5 | 62.4 | 1.138 | 60 | 0 |
| 18 | 18 | 9 | 9 | 494.6 | 62.4 | 1.138 | 60 | 0 |
| 19 | 19 | 11 | 11 | 494.6 | 62.4 | 1.138 | 60 | 0 |
| 19 | 19 | 10 | 10 | 494.6 | 62.4 | 1.138 | 60 | 0 |
| 19 | 19 | 9 | 9 | 494.6 | 62.4 | 1.138 | 60 | 0 |
| 20 | 20 | 11 | 11 | 494.6 | 62.4 | 1.138 | 60 | 0 |
| 20 | 20 | 10 | 10 | 494.6 | 62.4 | 1.138 | 60 | 0 |
| 20 | 20 | 9 | 9 | 494.6 | 62.4 | 1.138 | 60 | 0 |
| 21 | 21 | 11 | 11 | 494.6 | 62.4 | 1.138 | 60 | 0 |
| 21 | 21 | 10 | 10 | 494.6 | 62.4 | 1.138 | 60 | 0 |
| 21 | 21 | 9 | 9 | 494.7 | 62.4 | 1.138 | 60 | 0 |
| 22 | 22 | 11 | 11 | 494.7 | 62.4 | 1.138 | 60 | 0 |
| 22 | 22 | 10 | 10 | 494.7 | 62.4 | 1.138 | 60 | 0 |
| 22 | 22 | 9 | 9 | 494.7 | 62.4 | 1.138 | 60 | 0 |
| 23 | 23 | 11 | 11 | 494.7 | 62.4 | 1.138 | 60 | 0 |
| 23 | 23 | 10 | 10 | 494.7 | 62.4 | 1.138 | 60 | 0 |
| 23 | 23 | 9 | 9 | 494.7 | 62.4 | 1.138 | 60 | 0 |
| 24 | 24 | 11 | 11 | 494.7 | 62.4 | 1.138 | 60 | 0 |
| 24 | 24 | 10 | 10 | 494.7 | 62.4 | 1.138 | 60 | 0 |
| 24 | 24 | 9 | 9 | 494.7 | 62.4 | 1.138 | 60 | 0 |
| 25 | 25 | 11 | 11 | 494.7 | 62.4 | 1.138 | 60 | 0 |
| 25 | 25 | 10 | 10 | 494.7 | 62.4 | 1.138 | 60 | 0 |
| 25 | 25 | 9 | 9 | 494.8 | 62.4 | 1.138 | 60 | 0 |
| 26 | 26 | 11 | 11 | 494.8 | 62.4 | 1.138 | 60 | 0 |
| 26 | 26 | 10 | 10 | 494.8 | 62.4 | 1.138 | 60 | 0 |
| 26 | 26 | 9 | 9 | 494.85 | 62.4 | 1.138 | 60 | 0 |
| 27 | 27 | 11 | 11 | 494.85 | 62.4 | 1.138 | 60 | 0 |
| 27 | 27 | 10 | 10 | 494.85 | 62.4 | 1.138 | 60 | 0 |
| 27 | 27 | 9 | 9 | 494.885 | 62.4 | 1.138 | 60 | 0 |
| 28 | 28 | 11 | 11 | 494.885 | 62.4 | 1.138 | 60 | 0 |
| 28 | 28 | 10 | 10 | 494.885 | 62.4 | 1.138 | 60 | 0 |
| 28 | 28 | 9 | 9 | 494.92 | 62.4 | 1.138 | 60 | 0 |
| 29 | 29 | 11 | 11 | 494.92 | 62.4 | 1.138 | 60 | 0 |
| 29 | 29 | 10 | 10 | 494.92 | 62.4 | 1.138 | 60 | 0 |
| 29 | 29 | 9 | 9 | 494.955 | 62.4 | 1.138 | 60 | 0 |
| 30 | 30 | 11 | 11 | 494.955 | 62.4 | 1.138 | 60 | 0 |
| 30 | 30 | 10 | 10 | 494.955 | 62.4 | 1.138 | 60 | 0 |
| 30 | 30 | 9 | 9 | 494.99 | 62.4 | 1.138 | 60 | 0 |
| 31 | 31 | 11 | 11 | 494.99 | 62.4 | 1.138 | 60 | 0 |
| 31 | 31 | 10 | 10 | 494.99 | 62.4 | 1.138 | 60 | 0 |
| 31 | 31 | 9 | 9 | 495.025 | 62.4 | 1.138 | 60 | 0 |
| 32 | 32 | 11 | 11 | 495.025 | 62.4 | 1.138 | 60 | 0 |
| 32 | 32 | 10 | 10 | 495.025 | 62.4 | 1.138 | 60 | 0 |
| 32 | 32 | 9 | 9 | 495.06 | 62.4 | 1.138 | 60 | 0 |
| 33 | 33 | 11 | 11 | 495.06 | 62.4 | 1.138 | 60 | 0 |
| 33 | 33 | 10 | 10 | 495.06 | 62.4 | 1.138 | 60 | 0 |
| 33 | 33 | 9 | 9 | 495.095 | 62.4 | 1.138 | 60 | 0 |
| 34 | 34 | 11 | 11 | 495.095 | 62.4 | 1.138 | 60 | 0 |
| 34 | 34 | 10 | 10 | 495.095 | 62.4 | 1.138 | 60 | 0 |
| 34 | 34 | 9 | 9 | 495.13 | 62.4 | 1.138 | 60 | 0 |
| 35 | 35 | 11 | 11 | 495.13 | 62.4 | 1.138 | 60 | 0 |
| 35 | 35 | 10 | 10 | 495.13 | 62.4 | 1.138 | 60 | 0 |
| 35 | 35 | 9 | 9 | 495.165 | 62.4 | 1.138 | 60 | 0 |
| 36 | 36 | 11 | 11 | 495.165 | 62.4 | 1.138 | 60 | 0 |
| 36 | 36 | 10 | 10 | 495.165 | 62.4 | 1.138 | 60 | 0 |
| 36 | 36 | 9 | 9 | 495.2 | 62.4 | 1.138 | 60 | 0 |
| 37 | 37 | 11 | 11 | 495.2 | 62.4 | 1.138 | 60 | 0 |
| 37 | 37 | 10 | 10 | 495.2 | 62.4 | 1.138 | 60 | 0 |
| 37 | 37 | 9 | 9 | 495.235 | 62.4 | 1.138 | 60 | 0 |
| 38 | 38 | 11 | 11 | 495.235 | 62.4 | 1.138 | 60 | 0 |
| 38 | 38 | 10 | 10 | 495.235 | 62.4 | 1.138 | 60 | 0 |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 38 | 38 | 9 | 9 | 495.27 | 62.4 | 1.138 | 60 | 0 |
| 39 | 39 | 11 | 11 | 495.27 | 62.4 | 1.138 | 60 | 0 |
| 39 | 39 | 10 | 10 | 495.27 | 62.4 | 1.138 | 60 | 0 |
| 39 | 39 | 9 | 9 | 495.27 | 62.4 | 1.138 | 60 | 0 |

C...PADDY'S RUN

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 16 | 16 | 12 | 12 | 494.00 | 62.4 | 1.138 | 60 | 0 |
| 16 | 16 | 13 | 13 | 494.42 | 62.4 | 1.138 | 60 | 0 |
| 16 | 16 | 14 | 14 | 494.83 | 62.4 | 1.138 | 60 | 0 |
| 16 | 16 | 15 | 15 | 495.25 | 62.4 | 1.138 | 60 | 0 |
| 16 | 16 | 16 | 16 | 495.67 | 62.4 | 1.138 | 60 | 0 |
| 16 | 16 | 17 | 17 | 496.08 | 62.4 | 1.138 | 60 | 0 |
| 16 | 16 | 18 | 18 | 496.50 | 62.4 | 1.138 | 60 | 0 |
| 16 | 16 | 19 | 19 | 496.92 | 62.4 | 1.138 | 60 | 0 |
| 16 | 16 | 20 | 20 | 497.33 | 62.4 | 1.138 | 60 | 0 |
| 16 | 16 | 21 | 21 | 497.75 | 62.4 | 1.138 | 60 | 0 |
| 15 | 15 | 21 | 21 | 498.17 | 62.4 | 1.138 | 60 | 0 |
| 15 | 15 | 22 | 22 | 498.58 | 62.4 | 1.138 | 60 | 0 |
| 15 | 15 | 23 | 23 | 499.00 | 62.4 | 1.138 | 60 | 0 |
| 15 | 15 | 24 | 24 | 499.43 | 62.4 | 1.138 | 60 | 0 |
| 15 | 15 | 25 | 25 | 499.86 | 62.4 | 1.138 | 60 | 0 |
| 15 | 15 | 26 | 26 | 500.29 | 62.4 | 1.138 | 60 | 0 |
| 15 | 15 | 27 | 27 | 500.71 | 62.4 | 1.138 | 60 | 0 |
| 15 | 15 | 28 | 28 | 501.14 | 62.4 | 1.138 | 60 | 0 |
| 15 | 15 | 29 | 29 | 501.57 | 62.4 | 1.138 | 60 | 0 |
| 16 | 16 | 29 | 29 | 502.00 | 62.4 | 1.138 | 60 | 0 |
| 17 | 17 | 29 | 29 | 502.43 | 62.4 | 1.138 | 60 | 0 |
| 18 | 18 | 29 | 29 | 502.86 | 62.4 | 1.138 | 60 | 0 |
| 18 | 18 | 30 | 30 | 503.29 | 62.4 | 1.138 | 60 | 0 |
| 18 | 18 | 31 | 31 | 503.71 | 62.4 | 1.138 | 60 | 0 |
| 18 | 18 | 32 | 32 | 504.14 | 62.4 | 1.138 | 60 | 0 |
| 18 | 18 | 33 | 33 | 504.57 | 62.4 | 1.138 | 60 | 0 |
| 18 | 18 | 34 | 34 | 505.00 | 62.4 | 1.138 | 60 | 0 |
| 18 | 18 | 35 | 35 | 505.43 | 62.4 | 1.138 | 60 | 0 |
| 18 | 18 | 36 | 36 | 505.86 | 62.4 | 1.138 | 60 | 0 |
| 18 | 18 | 37 | 37 | 506.29 | 62.4 | 1.138 | 60 | 0 |
| 17 | 17 | 37 | 37 | 506.71 | 62.4 | 1.138 | 60 | 0 |
| 16 | 16 | 37 | 37 | 507.14 | 62.4 | 1.138 | 60 | 0 |
| 16 | 16 | 38 | 38 | 507.57 | 62.4 | 1.138 | 60 | 0 |
| 16 | 16 | 39 | 39 | 508.00 | 62.4 | 1.138 | 60 | 0 |
| 16 | 16 | 40 | 40 | 508.22 | 62.4 | 1.138 | 60 | 0 |
| 16 | 16 | 41 | 41 | 508.45 | 62.4 | 1.138 | 60 | 0 |
| 16 | 16 | 42 | 42 | 508.67 | 62.4 | 1.138 | 60 | 0 |
| 10 | 10 | 43 | 43 | 508.90 | 62.4 | 1.138 | 60 | 0 |
| 11 | 11 | 43 | 43 | 509.12 | 62.4 | 1.138 | 60 | 0 |
| 12 | 12 | 43 | 43 | 509.34 | 62.4 | 1.138 | 60 | 0 |
| 13 | 13 | 43 | 43 | 509.57 | 62.4 | 1.138 | 60 | 0 |
| 14 | 14 | 43 | 43 | 509.79 | 62.4 | 1.138 | 60 | 0 |
| 15 | 15 | 43 | 43 | 510.02 | 62.4 | 1.138 | 60 | 0 |
| 16 | 16 | 43 | 43 | 510.24 | 62.4 | 1.138 | 60 | 0 |
| 10 | 10 | 44 | 44 | 510.47 | 62.4 | 1.138 | 60 | 0 |
| 10 | 10 | 45 | 45 | 510.69 | 62.4 | 1.138 | 60 | 0 |
| 10 | 10 | 46 | 46 | 510.91 | 62.4 | 1.138 | 60 | 0 |
| 10 | 10 | 47 | 47 | 511.14 | 62.4 | 1.138 | 60 | 0 |
| 10 | 10 | 48 | 48 | 511.36 | 62.4 | 1.138 | 60 | 0 |
| 10 | 10 | 49 | 49 | 511.59 | 62.4 | 1.138 | 60 | 0 |
| 3 | 3 | 50 | 50 | 511.81 | 62.4 | 1.138 | 60 | 0 |
| 4 | 4 | 50 | 50 | 512.03 | 62.4 | 1.138 | 60 | 0 |
| 5 | 5 | 50 | 50 | 512.26 | 62.4 | 1.138 | 60 | 0 |
| 6 | 6 | 50 | 50 | 512.48 | 62.4 | 1.138 | 60 | 0 |
| 7 | 7 | 50 | 50 | 512.71 | 62.4 | 1.138 | 60 | 0 |
| 8 | 8 | 50 | 50 | 512.93 | 62.4 | 1.138 | 60 | 0 |
| 9 | 9 | 50 | 50 | 513.16 | 62.4 | 1.138 | 60 | 0 |
| 10 | 10 | 50 | 50 | 513.38 | 62.4 | 1.138 | 60 | 0 |
| 3 | 3 | 51 | 51 | 513.60 | 62.4 | 1.138 | 60 | 0 |
| 3 | 3 | 52 | 52 | 513.83 | 62.4 | 1.138 | 60 | 0 |
| 3 | 3 | 53 | 53 | 514.05 | 62.4 | 1.138 | 60 | 0 |
| 3 | 3 | 54 | 54 | 514.28 | 62.4 | 1.138 | 60 | 0 |
| 3 | 3 | 55 | 55 | 514.50 | 62.4 | 1.138 | 60 | 0 |
| 3 | 3 | 56 | 56 | 514.72 | 62.4 | 1.138 | 60 | 0 |
| 3 | 3 | 57 | 57 | 514.93 | 62.4 | 1.138 | 60 | 0 |
| 3 | 3 | 58 | 58 | 515.15 | 62.4 | 1.138 | 60 | 0 |
| 3 | 3 | 59 | 59 | 515.37 | 62.4 | 1.138 | 60 | 0 |
| 3 | 3 | 60 | 60 | 515.58 | 62.4 | 1.138 | 60 | 0 |
| 3 | 3 | 61 | 61 | 515.80 | 62.4 | 1.138 | 60 | 0 |
| 3 | 3 | 62 | 62 | 516.02 | 62.4 | 1.138 | 60 | 0 |
| 3 | 3 | 63 | 63 | 516.23 | 62.4 | 1.138 | 60 | 0 |
| 3 | 3 | 64 | 64 | 516.45 | 62.4 | 1.138 | 60 | 0 |
| 3 | 3 | 65 | 65 | 516.67 | 62.4 | 1.138 | 60 | 0 |
| 3 | 3 | 66 | 66 | 516.88 | 62.4 | 1.138 | 60 | 0 |
| 3 | 3 | 67 | 67 | 517.10 | 62.4 | 1.138 | 60 | 0 |
| 3 | 3 | 68 | 68 | 517.32 | 62.4 | 1.138 | 60 | 0 |
| 3 | 3 | 69 | 69 | 517.53 | 62.4 | 1.138 | 60 | 0 |

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```
     3     3     70    70      517.75     62.4    1.138      60     0
     3     3     71    71      517.97     62.4    1.138      60     0
     3     3     72    72      518.18     62.4    1.138      60     0
     4     4     72    72      518.40     62.4    1.138      60     0
     5     5     72    72      518.62     62.4    1.138      60     0
     6     6     72    72      518.83     62.4    1.138      60     0
     7     7     72    72      519.05     62.4    1.138      60     0
     8     8     72    72      519.27     62.4    1.138      60     0
     8     8     73    73      519.48     62.4    1.138      60     0
     8     8     74    74      519.70     62.4    1.138      60     0
     8     8     75    75      519.92     62.4    1.138      60     0
     8     8     76    76      520.13     62.4    1.138      60     0
     8     8     77    77      520.35     62.4    1.138      60     0
     8     8     78    78      520.57     62.4    1.138      60     0
     8     8     79    79      520.78     62.4    1.138      60     0
     8     8     80    80      521.00     62.4    1.138      60     0
 0 /
C...
C... CALCULATION INFORMATION
C...(3.7.1) RDCALC (T= READ CALCULATION INFO. AT THIS TIME)
  T
C...
C...(3.7.2) AUTOTS (T=AUTOMATIC TIMESTEP ADJUSTMENT IS DESIRED)
  T
C...
C...(3.7.3B) DPTAS,DTTAS,DCTAS(MAX. CHANGE IN PRESSURE[5.0E+4 Pa], TEMP.[5 C],
C...                          MASS-FRAC.[0.25] ALLOWED), DTIMMN (MIN. TIMESTEP
C...                          REQ.[1.0E+4s]), DTIMMX (MAX. TIMESTEP [1.0E+7s])
C...  7.2519         5       0.25      0.118      118.0
      0.3            1.0     0.0005    0.0001      75.0
C...
C...(3.7.4) TIMCHG (TIME NEW TRANSIENT DATA WILL BE READ OR TERMINATION)
      3650.
C...   .0001
C...
C...PRINTOUT INTERVALS FOR: VELOCITY,FLD. DENSITY, SOLUTION METH., COND. AND
C.. DISPERSION, P-T-C, LFLOW-BALANCE, WELL, B.C. (0=NONE, n=nTH TIMESTEP,
C...-1=ONLY AT NEW DATA READ AND END OF SIMULATION)
C...(3.8.1) PRIVEL, PRIDV, PRISLM, PRIKD, PRIPTC, PRIGFB, PRIWEL, PRIBCF
              0       0      0      0       0       0       0       0
C...
C...(3.8.2) IPRPTC (INDEX FOR PRESSURE, TEMP., AND MASS-FRAC. ARRAYS; n1n2n3)
C...  001
C...
C...(3.8.3) CHKPTD(T=CHKPT. DUMPS), NTSCHK(# OF TIMESTEPS BETWEEN SOR CHKPT.
C...                DUMPS), SAVLDO(T=SAVE LAST CHKPT. DUMP)
  F  0  F
C...
C...(3.9.1) RDMPDT, PRTMPD (T=READ & WRITE CONTROL DATA FOR MAP GENERATION)
  F  F
C...
C... TRANSIENT DATA (PERIOD 2: 1980-1985)
C...(3.1) THRU (T=SIMULATION IS THROUGH)
  F
C...
C... WELL INFORMATION
C... RDWFLO(T=READ WELL-FLOW-RATE), RDWHD (T=READ WELL-HEAD)
  T F
C...
C...(3.2.2) IWELL,    QWV,    PWSUR,    PWKT,    TWSRKT,    CWKT
              1   -2.17E+04   0.0       0.0      60.0
  0.00
              2   -2.17E+04   0.0       0.0      60.0
  0.00
              3   -4.81E+02   0.0       0.0      60.0
  0.00
  0 /
C...
C...BOUNDARY CONDITIONS INFORMATION
C...SPECIFIED VALUES
C...(3.3.1) RDSPBC,RDSTBC,RDSCBC (READ SPECIFIED-PRESSURE,TEMP.,MASS-FRAC. DATA)
  F F F
C...
C...(3.3.2) PNP PRESSURE AT SPECIFIED PRESSURE B.C. NODES BY i,j,k.
C...0 /
C...
C... SPECIFIED FLUX
C... RDFLXQ(FLUID), RDFLXH(HEAT), RDFLXS(SOLUTE)
      T              F              T
C...
C...(3.4.2) QFFX, QFFY, QFFZ, (BY i,j,k)
C...NORTH OF THE GMR (14 in/yr)
```

```
C...                                                    (BEDROCK) FLUX=6"/yr
      1     9    43    49     4     4
     0.     1     0.    1   -0.0014 1
      1    13    19    42     4     4
     0.     1     0.    1   -0.0014 1
     14    14    24    42     4     4
     0.     1     0.    1   -0.0014 1
     15    16    30    35     4     4
     0.     1     0.    1   -0.0014 1
      1    11    16    18     4     4
     0.     1     0.    1   -0.0014 1
      1     9    12    15     4     4
     0.     1     0.    1   -0.0014 1
      1     4    10    11     4     4
     0.     1     0.    1   -0.0014 1
     38    40    80    80     4     4
     0.     1     0.    1   -0.0014 1
     35    40    65    79     4     4
     0.     1     0.    1   -0.0014 1
     38    40    59    64     4     4
     0.     1     0.    1   -0.0014 1
     32    40     5     5     4     4
     0.     1     0.    1   -0.0014 1
     27    40     1     4     4     4
     0.     1     0.    1   -0.0014 1
C...                                                    FLUX = 6 "/yr
      1     2    50    54     4     4
     0.     1     0.    1   -0.0014 1
      1     7    73    80     4     4
     0.     1     0.    1   -0.0014 1
      1     2    55    72     4     4
     0.     1     0.    1   -0.0014 1
     19    37    80    80     4     4
     0.     1     0.    1   -0.0014 1
     22    34    74    79     4     4
     0.     1     0.    1   -0.0014 1
     29    34    65    73     4     4
     0.     1     0.    1   -0.0014 1
C...                                                    FLUX = 10 "/yr
      9    18    80    80     4     4
     0.     1     0.    1   -0.0023 1
      9    21    74    79     4     4
     0.     1     0.    1   -0.0023 1
      4     8    65    71     4     4
     0.     1     0.    1   -0.0023 1
      9    28    65    73     4     4
     0.     1     0.    1   -0.0023 1
C...                        BEGIN PAVED AREA (RUETGERS-NEASE)  2"/yr
     13    16    59    60     4     4
     0.     1     0.    1   -4.57E-04  1
     13    15    58    58     4     4
     0.     1     0.    1   -4.57E-04  1
C...                        END PAVED AREA (RUETGERS-NEASE)  2"/yr
      4    12    59    64     4     4
     0.     1     0.    1   -0.0023 1
     13    16    61    64     4     4
     0.     1     0.    1   -0.0023 1
     17    37    59    64     4     4
     0.     1     0.    1   -0.0023 1
      4    12    55    58     4     4
     0.     1     0.    1   -0.0023 1
     13    15    55    57     4     4
     0.     1     0.    1   -0.0023 1
     16    40    55    58     4     4
     0.     1     0.    1   -0.0023 1
C...
      6    40    53    54     4     4
     0.     1     0.    1   -0.0023 1
     11    40    49    52     4     4
     0.     1     0.    1   -0.0023 1
     15    40    44    48     4     4
     0.     1     0.    1   -0.0023 1
     15    15    37    42     4     4
     0.     1     0.    1   -0.0023 1
     17    40    38    43     4     4
     0.     1     0.    1   -0.0023 1
C...                                                    FLUX = 14 "/yr
     15    17    36    36     4     4
     0.     1     0.    1   -0.0032 1
     19    40    29    37     4     4
     0.     1     0.    1   -0.0032 1
     17    40    27    28     4     4
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```
                    0.    1        0.    1       -0.0032 1
C...                   17    40       12    26        4     4
C...                    0.    1        0.    1      -0.0032 1
                   17    39       12    26        4     4
                    0.    1        0.    1       -0.0032 1
                   40    40       15    26        4     4
                    0.    1        0.    1       -0.0032 1
                   16    16       22    28        4     4
                    0.    1        0.    1       -0.0032 1
                   15    15       19    20        4     4
                    0.    1        0.    1       -0.0032 1
                   14    14       19    23        4     4
                    0.    1        0.    1       -0.0032 1
                   10    11       12    15        4     4
                    0.    1        0.    1       -0.0032 1
                   12    15       12    18        4     4
                    0.    1        0.    1       -0.0032 1
                    4     5        5     8        4     4
                    0.    1        0.    1       -0.0032 1
C...                    6    40        6    10        4     4
C...                    0.    1        0.    1      -0.0032 1
                    6    39        6    10        4     4
                    0.    1        0.    1       -0.0032 1
                   40    40        6     7        4     4
                    0.    1        0.    1       -0.0032 1
                    6    31        5     5        4     4
                    0.    1        0.    1       -0.0032 1
C...                    2    26        1     4        4     4
C...                    0.    1        0.    1      -0.0032 1
                    2    26        2     4        4     4
                    0.    1        0.    1       -0.0032 1
                    2     3        5     8        4     4
                    0.    1        0.    1       -0.0032 1
  0 /
C...
C...(3.4.3) UDENBC - DENSITY ASSOCIATED WITH SPECIFIED-FLUX (BY i,j,k)
                    1    40        1    80        4     4
                   62.4  1
  0 /
C...(3.4.5) CFLX B.C. BY I,J,K RANGE
                    1    40       60    80        4     4
                   0.00  1
                    1    14       59    59        4     4
                   0.00  1
                   16    40       58    59        4     4
                   0.00  1
                    1    13       58    58        4     4
                   0.00  1
                    1    40        1    57        4     4
                   0.00  1
  0 /
C...(3.4.7) QSFX, QSFY, QSFZ (BY i,j,k) - (1974-1979)
                   15    15       59    59        4     4
                    0.    1        0.    1   -4.33E-06  1
                   14    14       58    58        4     4
                    0.    1        0.    1   -4.33E-06  1
                   15    15       58    58        4     4
                    0.    1        0.    1   -1.08E-04  1
  0 /
C...
C...(3.5.1) RDLBC
  F
C...  0 /
C...
C...(3.5.4) CLBC - SOLUTE MASS FRACTION ON THE OTHER SIDE OF THE AQUITARD
C...
C...(3.5.5) RIVER LEAKAGE
C...I1,I2,J1,J2,HRBC,DENRBC,VISRBC,TRBC,CRBC
C...GREAT MIAMI RIVER
C...
C... CALCULATION INFORMATION
C...(3.7.1) RDCALC (T= READ CALCULATION INFO. AT THIS TIME)
  T
C...
C...(3.7.2) AUTOTS (T=AUTOMATIC TIMESTEP ADJUSTMENT IS DESIRED)
  T
C...
C...(3.7.3B) DPTAS,DTTAS,DCTAS(MAX. CHANGE IN PRESSURE[5.0E+4 Pa], TEMP.[5 C],
C...                          MASS-FRAC.[0.25] ALLOWED), DTIMMN (MIN. TIMESTEP
C...                          REQ.[1.0E+4s]), DTIMMX (MAX. TIMESTEP [1.0E+7s])
     0.3            1.0     0.0005    0.0001      75.0
C...
```

```
C...(3.7.4) TIMCHG (TIME NEW TRANSIENT DATA WILL BE READ OR TERMINATION)
     5475.
C...   .0002
C...
C...PRINTOUT INTERVALS FOR: VELOCITY,FLD. DENSITY, SOLUTION METH., COND. AND
C.. DISPERSION, P-T-C, LFLOW-BALANCE, WELL, B.C. (0=NONE, n=nTH TIMESTEP,
C...-1=ONLY AT NEW DATA READ AND END OF SIMULATION)
C...(3.8.1) PRIVEL, PRIDV, PRISLM, PRIKD, PRIPTC, PRIGFB, PRIWEL, PRIBCF
                 0     0       0     0     0        0     0      0
C...
C...(3.8.2) IPRPTC (INDEX FOR PRESSURE, TEMP., AND MASS-FRAC. ARRAYS; n1n2n3)
C...  001
C...
C...(3.8.3) CHKPTD(T=CHKPT. DUMPS), NTSCHK(# OF TIMESTEPS BETWEEN SOR CHKPT.
C...                DUMPS), SAVLDO(T=SAVE LAST CHKPT. DUMP)
C  T  -1   T
   F   0   F
C...
C...(3.9.1) RDMPDT, PRTMPD (T=READ & WRITE CONTROL DATA FOR MAP GENERATION)
  F  F
C... TRANSIENT DATA (PERIOD 3: 1985-1989)
C...(3.1) THRU (T=SIMULATION IS THROUGH)
  F
C...
C... WELL INFORMATION
C... RDWFLO(T=READ WELL-FLOW-RATE), RDWHD (T=READ WELL-HEAD)
  F F
C...
C...(3.2.2) IWELL,    QWV,    PWSUR,    PWKT,    TWSRKT,    CWKT
C...  0 /
C...
C...BOUNDARY CONDITIONS INFORMATION
C...SPECIFIED VALUES
C...(3.3.1) RDSPBC,RDSTBC,RDSCBC (READ SPECIFIED-PRESSURE,TEMP.,MASS-FRAC. DATA)
  F F F
C...
C...(3.3.2) PNP PRESSURE AT SPECIFIED PRESSURE B.C. NODES BY i,j,k.
C...   0 /
C...
C...(3.3.4) CSBC BY I,J,K RANGE (0.1-0.3); (0) - RDSPBC (3.3.1) AND
C...  0 /
C...
C... SPECIFIED FLUX
C... RDFLXQ(FLUID), RDFLXH(HEAT), RDFLXS(SOLUTE)
      T              F              T
C...
C...(3.4.2) QFFX, QFFY, QFFZ, (BY i,j,k)
C...NORTH OF THE GMR (14 in/yr)
C...                                                  (BEDROCK) FLUX=6"/yr
                  1     9       43    49        4     4
                  0.    1        0.    1     -0.0014 1
                  1    13       19    42        4     4
                  0.    1        0.    1     -0.0014 1
                 14    14       24    42        4     4
                  0.    1        0.    1     -0.0014 1
                 15    16       30    35        4     4
                  0.    1        0.    1     -0.0014 1
                  1    11       16    18        4     4
                  0.    1        0.    1     -0.0014 1
                  1     9       12    15        4     4
                  0.    1        0.    1     -0.0014 1
                  1     4       10    11        4     4
                  0.    1        0.    1     -0.0014 1
                 38    40       80    80        4     4
                  0.    1        0.    1     -0.0014 1
                 35    40       65    79        4     4
                  0.    1        0.    1     -0.0014 1
                 38    40       59    64        4     4
                  0.    1        0.    1     -0.0014 1
                 32    40        5     5        4     4
                  0.    1        0.    1     -0.0014 1
                 27    40        1     4        4     4
                  0.    1        0.    1     -0.0014 1
C...                                                        FLUX = 6 "/yr
                  1     2       50    54        4     4
                  0.    1        0.    1     -0.0014 1
                  1     7       73    80        4     4
                  0.    1        0.    1     -0.0014 1
                  1     2       55    72        4     4
                  0.    1        0.    1     -0.0014 1
                 19    37       80    80        4     4
                  0.    1        0.    1     -0.0014 1
```

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```
                22    34        74    79        4     4
                 0.    1         0.    1      -0.0014 1
                29    34        65    73        4     4
                 0.    1         0.    1      -0.0014 1
C...                                                        FLUX = 10 "/yr
                 9    18        80    80        4     4
                 0.    1         0.    1      -0.0023 1
                 9    21        74    79        4     4
                 0.    1         0.    1      -0.0023 1
                 4     8        65    71        4     4
                 0.    1         0.    1      -0.0023 1
                 9    28        65    73        4     4
                 0.    1         0.    1      -0.0023 1
C...                          BEGIN PAVED AREA (RUETGERS-NEASE)  2"/yr
                13    16        59    60        4     4
                 0.    1         0.    1   -4.57E-04  1
                13    15        58    58        4     4
                 0.    1         0.    1   -4.57E-04  1
C...                          END PAVED AREA (RUETGERS-NEASE)  2"/yr
                 4    12        59    64        4     4
                 0.    1         0.    1      -0.0023 1
                13    16        61    64        4     4
                 0.    1         0.    1      -0.0023 1
                17    37        59    64        4     4
                 0.    1         0.    1      -0.0023 1
                 4    12        55    58        4     4
                 0.    1         0.    1      -0.0023 1
                13    15        55    57        4     4
                 0.    1         0.    1      -0.0023 1
                16    40        55    58        4     4
                 0.    1         0.    1      -0.0023 1
C...
                 6    40        53    54        4     4
                 0.    1         0.    1      -0.0023 1
                11    40        49    52        4     4
                 0.    1         0.    1      -0.0023 1
                15    40        44    48        4     4
                 0.    1         0.    1      -0.0023 1
                15    15        37    42        4     4
                 0.    1         0.    1      -0.0023 1
                17    40        38    43        4     4
                 0.    1         0.    1      -0.0023 1
C...                                                        FLUX = 14 "/yr
                15    17        36    36        4     4
                 0.    1         0.    1      -0.0032 1
                19    40        29    37        4     4
                 0.    1         0.    1      -0.0032 1
                17    40        27    28        4     4
                 0.    1         0.    1      -0.0032 1
C...                17    40        12    26        4     4
C...                 0.    1         0.    1      -0.0032 1
                17    39        12    26        4     4
                 0.    1         0.    1      -0.0032 1
                40    40        15    26        4     4
                 0.    1         0.    1      -0.0032 1
                16    16        22    28        4     4
                 0.    1         0.    1      -0.0032 1
                15    15        19    20        4     4
                 0.    1         0.    1      -0.0032 1
                14    14        19    23        4     4
                 0.    1         0.    1      -0.0032 1
                10    11        12    15        4     4
                 0.    1         0.    1      -0.0032 1
                12    15        12    18        4     4
                 0.    1         0.    1      -0.0032 1
                 4     5         5     8        4     4
                 0.    1         0.    1      -0.0032 1
C...                 6    40        6    10        4     4
C...                 0.    1         0.    1      -0.0032 1
                 6    39         6    10        4     4
                 0.    1         0.    1      -0.0032 1
                40    40         6     7        4     4
                 0.    1         0.    1      -0.0032 1
                 6    31         5     5        4     4
                 0.    1         0.    1      -0.0032 1
C...                 2    26         1     4        4     4
C...                 0.    1         0.    1      -0.0032 1
                 2    26         2     4        4     4
                 0.    1         0.    1      -0.0032 1
                 2     3         5     8        4     4
                 0.    1         0.    1      -0.0032 1
 0 /
```

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```
C...
C...(3.4.3) UDENBC - DENSITY ASSOCIATED WITH SPECIFIED-FLUX (BY i,j,k)
                    1    40        1    80        4     4
                   62.4  1
  0 /
C...(3.4.5) CFLX B.C. BY I,J,K RANGE
                    1    40       60    80        4     4
                 0.00     1
                    1    14       59    59        4     4
                 0.00     1
                   16    40       59    59        4     4
                 0.00     1
                    1    13       57    58        4     4
                 0.00     1
                   17    40       56    58        4     4
                 0.00     1
                    1    14       56    56        4     4
                 0.00     1
                    1    17       55    55        4     4
                 0.00     1
                   18    40       55    55        4     4
                 0.00     1
                    1    40        1    54        4     4
                 0.00     1
C...SOLUTE LOADING @ RUETGERS-NEASE  10 CELLS
                   15    16       56    56        4     4
                 0.76     1
                   17    17       55    55        4     4
                 0.76     1
  0 /
C...(3.4.7) QSFX, QSFY, QSFZ (BY i,j,k) - (1984-1988) 3.5 CELLS SPRD OVER 3
                   16    16       58    58        4     4
                   0.     1        0.    1   -2.17E-05  1
                   14    16       57    57        4     4
                   0.     1        0.    1   -2.17E-05  1
                   15    15       59    59        4     4
                   0.     1        0.    1   -0.907E-04 1
                   14    15       58    58        4     4
                   0.     1        0.    1   -0.907E-04 1
  0 /
C...
C...(3.5.1) RDLBC
  F
C...  0 /
C...
C...(3.5.4) CLBC - SOLUTE MASS FRACTION ON THE OTHER SIDE OF THE AQUITARD
C...
C...(3.5.5) RIVER LEAKAGE
C...I1,I2,J1,J2,HRBC,DENRBC,VISRBC,TRBC,CRBC
C...
C... CALCULATION INFORMATION
C...(3.7.1) RDCALC (T= READ CALCULATION INFO. AT THIS TIME)
  T
C...
C...(3.7.2) AUTOTS (T=AUTOMATIC TIMESTEP ADJUSTMENT IS DESIRED)
  T
C...
C...(3.7.3B) DPTAS,DTTAS,DCTAS(MAX. CHANGE IN PRESSURE[5.0E+4 Pa], TEMP.[5 C],
C...                          MASS-FRAC.[0.25] ALLOWED), DTIMMN (MIN. TIMESTEP
C...                          REQ.[1.0E+4s]), DTIMMX (MAX. TIMESTEP [1.0E+7s])
C...  7.2519        5       0.25      0.118      118.0
      0.3           1.0     0.0005    0.0001      75.0
C...
C...(3.7.4) TIMCHG (TIME NEW TRANSIENT DATA WILL BE READ OR TERMINATION)
   6935.
C...   0.0003
C...
C...PRINTOUT INTERVALS FOR: VELOCITY,FLD. DENSITY, SOLUTION METH., COND. AND
C.. DISPERSION, P-T-C, LFLOW-BALANCE, WELL, B.C. (0=NONE, n=nTH TIMESTEP,
C...-1=ONLY AT NEW DATA READ AND END OF SIMULATION)
C...(3.8.1) PRIVEL, PRIDV, PRISLM, PRIKD, PRIPTC, PRIGFB, PRIWEL, PRIBCF
                0     0       0     0      0        0      0       0
C...
C...(3.8.2) IPRPTC (INDEX FOR PRESSURE, TEMP., AND MASS-FRAC. ARRAYS; n1n2n3)
C...  001
C...
C...(3.8.3) CHKPTD(T=CHKPT. DUMPS), NTSCHK(# OF TIMESTEPS BETWEEN SOR CHKPT.
C...                DUMPS), SAVLDO(T=SAVE LAST CHKPT. DUMP)
C  T  -1   T
   F   0   F
C...
C...(3.9.4) RDMPDT, PRTMPD (T=READ & WRITE CONTROL DATA FOR MAP GENERATION)
```

```
  F  F
C... TRANSIENT DATA (PERIOD 4  1989-1991)
C...(3.1) THRU (T=SIMULATION IS THROUGH)
  F
C... WELL INFORMATION
C... RDWFLO(T=READ WELL-FLOW-RATE), RDWHD (T=READ WELL-HEAD)
  F F
C...
C...(3.2.2) IWELL,    QWV,    PWSUR,    PWKT,    TWSRKT,    CWKT
C...  0 /
C...C...
C...BOUNDARY CONDITIONS INFORMATION
C...SPECIFIED VALUES
C...(3.3.1) RDSPBC,RDSTBC,RDSCBC (READ SPECIFIED-PRESSURE,TEMP.,MASS-FRAC. DATA)
  F F F
C...
C...(3.3.2) PNP: PRESSURE AT SPECIFIED PRESSURE B.C. NODES BY i,j,k.
C... 0 /
C...
C...(3.3.4) CSBC BY I,J,K RANGE (0.1-0.3); (0) - RDSPBC (3.3.1) AND
C...  0 /
C...
C... SPECIFIED FLUX
C... RDFLXQ(FLUID), RDFLXH(HEAT), RDFLXS(SOLUTE)
      T              F             T
C...
C...(3.4.2) QFFX, QFFY, QFFZ, (BY i,j,k)
C...NORTH OF THE GMR (14 in/yr)
C...                                                    (BEDROCK) FLUX=6"/yr
                    1     9       43    49        4     4
                    0.    1        0.    1      -0.0014 1
                    1    13       19    42        4     4
                    0.    1        0.    1      -0.0014 1
                   14    14       24    42        4     4
                    0.    1        0.    1      -0.0014 1
                   15    16       30    35        4     4
                    0.    1        0.    1      -0.0014 1
                    1    11       16    18        4     4
                    0.    1        0.    1      -0.0014 1
                    1     9       12    15        4     4
                    0.    1        0.    1      -0.0014 1
                    1     4       10    11        4     4
                    0.    1        0.    1      -0.0014 1
                   38    40       80    80        4     4
                    0.    1        0.    1      -0.0014 1
                   35    40       65    79        4     4
                    0.    1        0.    1      -0.0014 1
                   38    40       59    64        4     4
                    0.    1        0.    1      -0.0014 1
                   32    40        5     5        4     4
                    0.    1        0.    1      -0.0014 1
                   27    40        1     4        4     4
                    0.    1        0.    1      -0.0014 1
C...                                                        FLUX = 6 "/yr
                    1     2       50    54        4     4
                    0.    1        0.    1      -0.0014 1
                    1     7       73    80        4     4
                    0.    1        0.    1      -0.0014 1
                    1     2       55    72        4     4
                    0.    1        0.    1      -0.0014 1
                   19    37       80    80        4     4
                    0.    1        0.    1      -0.0014 1
                   22    34       74    79        4     4
                    0.    1        0.    1      -0.0014 1
                   29    34       65    73        4     4
                    0.    1        0.    1      -0.0014 1
C...                                                        FLUX = 10 "/yr
                    9    18       80    80        4     4
                    0.    1        0.    1      -0.0023 1
                    9    21       74    79        4     4
                    0.    1        0.    1      -0.0023 1
                    4     8       65    71        4     4
                    0.    1        0.    1      -0.0023 1
C...                    9    28       65    73        4     4
C...                    0.    1        0.    1      -0.0023 1
                    9    11       65    73        4     4
                    0.    1        0.    1      -0.0023 1
                   12    14       69    73        4     4
                    0.    1        0.    1      -0.0023 1
                   15    28       65    73        4     4
                    0.    1        0.    1      -0.0023 1
                   12    12       65    65        4     4
```

```
                0.    1        0.    1       -0.0023 1
               12   12       68   68          4     4
                0.    1        0.    1       -0.0023 1
               14   14       68   68          4     4
                0.    1        0.    1       -0.0023 1
C...                                          BEGIN PAVED AREA (A&W) @ 2"/yr
               13   13       68   68          4     4
                0.    1        0.    1    -4.57E-04  1
               12   14       66   67          4     4
                0.    1        0.    1    -4.57E-04  1
               13   14       65   65          4     4
                0.    1        0.    1    -4.57E-04  1
C...
               13   15       64   64          4     4
                0.    1        0.    1    -4.57E-04  1
               13   14       63   63          4     4
                0.    1        0.    1    -4.57E-04  1
C...                                          END PAVED AREA (A&W) @ 2"/yr
C...                4    37       59   64          4     4
C...                0.    1        0.    1       -0.0023 1
C...                          BEGIN PAVED AREA (RUETGERS-NEASE) @ 2"/yr
               13   16       59   60          4     4
                0.    1        0.    1    -4.57E-04  1
               13   15       58   58          4     4
                0.    1        0.    1    -4.57E-04  1
C...                          END PAVED AREA (RUETGERS-NEASE) @ 2"/yr
                4   12       59   64          4     4
                0.    1        0.    1       -0.0023 1
               13   16       61   64          4     4
                0.    1        0.    1       -0.0023 1
               17   37       59   64          4     4
                0.    1        0.    1       -0.0023 1
                4   12       55   58          4     4
                0.    1        0.    1       -0.0023 1
               13   15       55   57          4     4
                0.    1        0.    1       -0.0023 1
               16   40       55   58          4     4
                0.    1        0.    1       -0.0023 1
C...
                6   40       53   54          4     4
                0.    1        0.    1       -0.0023 1
               11   40       49   52          4     4
                0.    1        0.    1       -0.0023 1
               15   40       44   48          4     4
                0.    1        0.    1       -0.0023 1
               15   15       37   42          4     4
                0.    1        0.    1       -0.0023 1
               17   40       38   43          4     4
                0.    1        0.    1       -0.0023 1
C...                                                                FLUX = 14 "/yr
               15   17       36   36          4     4
                0.    1        0.    1       -0.0032 1
               19   40       29   37          4     4
                0.    1        0.    1       -0.0032 1
               17   40       27   28          4     4
                0.    1        0.    1       -0.0032 1
C...                17    40       12   26          4     4
C...                0.    1        0.    1       -0.0032 1
               17   39       12   26          4     4
                0.    1        0.    1       -0.0032 1
               40   40       15   26          4     4
                0.    1        0.    1       -0.0032 1
               16   16       22   28          4     4
                0.    1        0.    1       -0.0032 1
               15   15       19   20          4     4
                0.    1        0.    1       -0.0032 1
               14   14       19   23          4     4
                0.    1        0.    1       -0.0032 1
               10   11       12   15          4     4
                0.    1        0.    1       -0.0032 1
               12   15       12   18          4     4
                0.    1        0.    1       -0.0032 1
                4    5        5    8          4     4
                0.    1        0.    1       -0.0032 1
C...                6    40        6   10          4     4
C...                0.    1        0.    1       -0.0032 1
                6   39        6   10          4     4
                0.    1        0.    1       -0.0032 1
               40   40        6    7          4     4
                0.    1        0.    1       -0.0032 1
                6   31        5    5          4     4
                0.    1        0.    1       -0.0032 1
```

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C...                    2    26        1     4        4     4
C...                    0.    1        0.    1      -0.0032 1
                    2    26        2     4        4     4
                    0.    1        0.    1      -0.0032 1
                    2     3        5     8        4     4
                    0.    1        0.    1      -0.0032 1
  0 /
C...
C...(3.4.3) UDENBC - DENSITY ASSOCIATED WITH SPECIFIED-FLUX (BY i,j,k)
                    1    40        1    80        4     4
                    62.4  1
  0 /
C...(3.4.5) CFLX B.C. BY I,J,K RANGE
                    1    40       60    80        4     4
                    0.0   1
                    1    13       59    59        4     4
                    0.0   1
                   17    40       57    59        4     4
                    0.0   1
                    1    12       56    58        4     4
                    0.0   1
                    1    13       55    55        4     4
                    0.0   1
                   18    40       55    56        4     4
                    0.0   1
                    1    15       54    54        4     4
                    0.0   1
                   19    40       54    54        4     4
                    0.0   1
                    1    40        1    53        4     4
                    0.0   1
C... 23 CELLS
                   16    16       59    59        4     4
                  0.76      1
                   13    13       58    58        4     4
                  0.76      1
                   13    13       57    57        4     4
                  0.76      1
                   13    16       56    56        4     4
                  0.76      1
                   14    17       55    55        4     4
                  0.76      1
                   16    18       54    54        4     4
                  0.76      1
  0 /
C...(3.4.7) QSFX, QSFY, QSFZ (BY i,j,k) - (1988-1990) 6.5 CELLS SPRD OVER 6
                   14    15       59    59        4     4
                    0.    1        0.    1   -0.846E-04 1
                   14    15       58    58        4     4
                    0.    1        0.    1   -0.846E-04  1
                   16    16       58    58        4     4
                    0.    1        0.    1   -1.02E-04  1
                   15    15       57    57        4     4
                    0.    1        0.    1   -1.020E-04  1
                   14    14       57    57        4     4
                    0.    1        0.    1   -2.17E-05   1
                   16    16       57    57        4     4
                    0.    1        0.    1   -2.17E-05   1
                   17    17       56    56        4     4
                    0.    1        0.    1   -2.17E-05   1
  0 /
C...
C...(3.5.1) RDLBC
  F
C...  0 /
C...
C...(3.5.4) CLBC - SOLUTE MASS FRACTION ON THE OTHER SIDE OF THE AQUITARD
C...
C...(3.5.5) RIVER LEAKAGE
C...I1,I2,J1,J2,HRBC,DENRBC,VISRBC,TRBC,CRBC
C...
C... CALCULATION INFORMATION
C...(3.7.1) RDCALC (T= READ CALCULATION INFO. AT THIS TIME)
  T
C...
C...(3.7.2) AUTOTS (T=AUTOMATIC TIMESTEP ADJUSTMENT IS DESIRED)
  T
C...
C...(3.7.3B) DPTAS,DTTAS,DCTAS(MAX. CHANGE IN PRESSURE[5.0E+4 Pa], TEMP.[5 C],
C...                           MASS-FRAC.[0.25] ALLOWED), DTIMMN (MIN. TIMESTEP
C...                           REQ.[1.0E+4s]), DTIMMX (MAX. TIMESTEP [1.0E+7s])
C...  7.2519          5       0.25       0.118       118.0
```

```
     0.3            1.0     0.0005    0.0001      75.0
C...
C...(3.7.4) TIMCHG (TIME NEW TRANSIENT DATA WILL BE READ OR TERMINATION)
    7665.
C...   0.0004
C...
C...PRINTOUT INTERVALS FOR: VELOCITY,FLD. DENSITY, SOLUTION METH., COND. AND
C.. DISPERSION, P-T-C, LFLOW-BALANCE, WELL, B.C. (0=NONE, n=nTH TIMESTEP,
C...-1=ONLY AT NEW DATA READ AND END OF SIMULATION)
C...(3.8.1) PRIVEL, PRIDV, PRISLM, PRIKD, PRIPTC, PRIGFB, PRIWEL, PRIBCF
                0     0      0     0       0       0       0      0
C...
C...(3.8.2) IPRPTC (INDEX FOR PRESSURE, TEMP., AND MASS-FRAC. ARRAYS; n1n2n3)
C...  001
C...
C...(3.8.3) CHKPTD(T=CHKPT. DUMPS), NTSCHK(# OF TIMESTEPS BETWEEN SOR CHKPT.
C...                DUMPS), SAVLDO(T=SAVE LAST CHKPT. DUMP)
   F   0   F
C...
C...(3.9.1) RDMPDT, PRTMPD (T=READ & WRITE CONTROL DATA FOR MAP GENERATION)
  F  F
C... TRANSIENT DATA (PERIOD 5: 1991-1992)
C...(3.1) THRU (T=SIMULATION IS THROUGH)
  F
C... WELL INFORMATION
C... RDWFLO(T=READ WELL-FLOW-RATE), RDWHD (T=READ WELL-HEAD)
  F F
C...
C...(3.2.2) IWELL,    QWV,    PWSUR,    PWKT,    TWSRKT,    CWKT
C...
C...BOUNDARY CONDITIONS INFORMATION
C...SPECIFIED VALUES
C...(3.3.1) RDSPBC,RDSTBC,RDSCBC (READ SPECIFIED-PRESSURE,TEMP.,MASS-FRAC. DATA)
  F F F
C...
C...(3.3.2) PNP: PRESSURE AT SPECIFIED PRESSURE B.C. NODES BY i,j,k.
C...
C...(3.3.4) CSBC BY I,J,K RANGE (0.1-0.3); (0) - RDSPBC (3.3.1) AND
C...
C... SPECIFIED FLUX
C... RDFLXQ(FLUID), RDFLXH(HEAT), RDFLXS(SOLUTE)
      T              F             T
C...
C...(3.4.2) QFFX, QFFY, QFFZ, (BY i,j,k)
C...NORTH OF THE GMR (14 in/yr)
C...                                                    (BEDROCK) FLUX=6"/yr
                    1    9      43    49       4     4
                    0.   1       0.    1     -0.0014 1
                    1   13      19    42       4     4
                    0.   1       0.    1     -0.0014 1
                   14   14      24    42       4     4
                    0.   1       0.    1     -0.0014 1
                   15   16      30    35       4     4
                    0.   1       0.    1     -0.0014 1
                    1   11      16    18       4     4
                    0.   1       0.    1     -0.0014 1
                    1    9      12    15       4     4
                    0.   1       0.    1     -0.0014 1
                    1    4      10    11       4     4
                    0.   1       0.    1     -0.0014 1
                   38   40      80    80       4     4
                    0.   1       0.    1     -0.0014 1
                   35   40      65    79       4     4
                    0.   1       0.    1     -0.0014 1
                   38   40      59    64       4     4
                    0.   1       0.    1     -0.0014 1
                   32   40       5     5       4     4
                    0.   1       0.    1     -0.0014 1
                   27   40       1     4       4     4
                    0.   1       0.    1     -0.0014 1
C...                                                          FLUX = 6 "/yr
                    1    2      50    54       4     4
                    0.   1       0.    1     -0.0014 1
                    1    7      73    80       4     4
                    0.   1       0.    1     -0.0014 1
                    1    2      55    72       4     4
                    0.   1       0.    1     -0.0014 1
                   19   37      80    80       4     4
                    0.   1       0.    1     -0.0014 1
                   22   34      74    79       4     4
                    0.   1       0.    1     -0.0014 1
                   29   34      65    73       4     4
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                0.    1        0.    1      -0.0014 1
C...                                                          FLUX = 10 "/yr
                9    18       80    80        4     4
                0.    1        0.    1      -0.0023 1
                9    21       74    79        4     4
                0.    1        0.    1      -0.0023 1
                4     8       65    71        4     4
                0.    1        0.    1      -0.0023 1
C...                9    28       65    73        4     4
C...                0.    1        0.    1      -0.0023 1
                9    11       65    73        4     4
                0.    1        0.    1      -0.0023 1
               12    14       69    73        4     4
                0.    1        0.    1      -0.0023 1
               15    28       65    73        4     4
                0.    1        0.    1      -0.0023 1
               12    12       65    65        4     4
                0.    1        0.    1      -0.0023 1
               12    12       68    68        4     4
                0.    1        0.    1      -0.0023 1
               14    14       68    68        4     4
                0.    1        0.    1      -0.0023 1
C...                                        BEGIN PAVED AREA (A&W) @ 2"/yr
               13    13       68    68        4     4
                0.    1        0.    1   -4.57E-04  1
               12    14       66    67        4     4
                0.    1        0.    1   -4.57E-04  1
               13    14       65    65        4     4
                0.    1        0.    1   -4.57E-04  1
C...
               13    15       64    64        4     4
                0.    1        0.    1  -4.57E-04   1
               13    14       63    63        4     4
                0.    1        0.    1  -4.57E-04   1
C...                                          END PAVED AREA (A&W) @ 2"/yr
C...                4    37       59    64        4     4
C...                0.    1        0.    1      -0.0023 1
C...                                BEGIN PAVED AREA (RUETGERS-NEASE) @ 2"/yr
               13    16       59    60        4     4
                0.    1        0.    1   -4.57E-04  1
               13    15       58    58        4     4
                0.    1        0.    1   -4.57E-04  1
C...                                   END PAVED AREA (RUETGERS-NEASE) @ 2"/yr
                4    12       59    64        4     4
                0.    1        0.    1      -0.0023 1
               13    16       61    64        4     4
                0.    1        0.    1      -0.0023 1
               17    37       59    64        4     4
                0.    1        0.    1      -0.0023 1
                4    12       55    58        4     4
                0.    1        0.    1      -0.0023 1
               13    15       55    57        4     4
                0.    1        0.    1      -0.0023 1
               16    40       55    58        4     4
                0.    1        0.    1      -0.0023 1
C...
                6    40       53    54        4     4
                0.    1        0.    1      -0.0023 1
               11    40       49    52        4     4
                0.    1        0.    1      -0.0023 1
               15    40       44    48        4     4
                0.    1        0.    1      -0.0023 1
               15    15       37    42        4     4
                0.    1        0.    1      -0.0023 1
               17    40       38    43        4     4
                0.    1        0.    1      -0.0023 1
C...                                                          FLUX = 14 "/yr
               15    17       36    36        4     4
                0.    1        0.    1      -0.0032 1
               19    40       29    37        4     4
                0.    1        0.    1      -0.0032 1
               17    40       27    28        4     4
                0.    1        0.    1      -0.0032 1
C...                17    40       12    26        4     4
C...                0.    1        0.    1      -0.0032 1
               17    39       12    26        4     4
                0.    1        0.    1      -0.0032 1
               40    40       15    26        4     4
                0.    1        0.    1      -0.0032 1
               16    16       22    28        4     4
                0.    1        0.    1      -0.0032 1
               15    15       19    20        4     4
```

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                    0.    1        0.    1       -0.0032 1
                   14    14       19    23        4     4
                    0.    1        0.    1       -0.0032 1
                   10    11       12    15        4     4
                    0.    1        0.    1       -0.0032 1
                   12    15       12    18        4     4
                    0.    1        0.    1       -0.0032 1
                    4     5        5     8        4     4
                    0.    1        0.    1       -0.0032 1
C...                    6    40        6    10        4     4
C...                    0.    1        0.    1       -0.0032 1
                    6    39        6    10        4     4
                    0.    1        0.    1       -0.0032 1
                   40    40        6     7        4     4
                    0.    1        0.    1       -0.0032 1
                    6    31        5     5        4     4
                    0.    1        0.    1       -0.0032 1
                    2    26        1     4        4     4
                    0.    1        0.    1       -0.0032 1
                    2     3        5     8        4     4
                    0.    1        0.    1       -0.0032 1
  0 /
C...
C...(3.4.3) UDENBC - DENSITY ASSOCIATED WITH SPECIFIED-FLUX (BY i,j,k)
C...                                                    (BEDROCK) FLUX=6"/yr
                    1    40        1    80        4     4
                   62.4  1
  0 /
C...(3.4.5) CFLX B.C. BY I,J,K RANGE
                    1    40       60    80        4     4
                 0.00      1
                    1    13       59    59        4     4
                 0.00      1
                   17    40       58    59        4     4
                 0.00      1
                    1    12       56    58        4     4
                 0.00      1
                   18    40       57    57        4     4
                 0.00      1
                   19    40       56    56        4     4
                 0.00      1
                   20    40       53    55        4     4
                 0.00      1
                    1    13       54    55        4     4
                 0.00      1
                    1    15       53    53        4     4
                 0.00      1
                    1    40        1    52        4     4
                 0.00      1
C... 34 CELLS
                   16    16       59    59        4     4
                 0.76      1
                   13    13       58    58        4     4
                 0.76      1
                   13    13       57    57        4     4
                 0.76      1
                   17    17       57    57        4     4
                 0.76      1
                   13    16       56    56        4     4
                 0.76      1
                   18    18       56    56        4     4
                 0.76      1
                   14    19       54    55        4     4
                 0.76      1
                   16    19       53    53        4     4
                 0.76      1
  0 /
C...(3.4.7) QSFX, QSFY, QSFZ (BY i,j,k) - (1990-1991) 9 CELLS
                   14    15       59    59        4     4
                    0.    1        0.    1   -0.784E-04 1
                   14    15       58    58        4     4
                    0.    1        0.    1   -0.784E-04 1
                   16    16       58    58        4     4
                    0.    1        0.    1   -0.958E-04 1
                   14    16       57    57        4     4
                    0.    1        0.    1   -0.958E-04 1
                   17    17       56    56        4     4
                    0.    1        0.    1   -0.958E-04 1
  0 /
C...
C...(3.5.1) RDLBC
  F
```

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```
C...  0 /
C...
C...(3.5.4) CLBC - SOLUTE MASS FRACTION ON THE OTHER SIDE OF THE AQUITARD
C...
C...(3.5.5) RIVER LEAKAGE
C...I1,I2,J1,J2,HRBC,DENRBC,VISRBC,TRBC,CRBC
C...
C... CALCULATION INFORMATION
C...(3.7.1) RDCALC (T= READ CALCULATION INFO. AT THIS TIME)
  T
C...
C...(3.7.2) AUTOTS (T=AUTOMATIC TIMESTEP ADJUSTMENT IS DESIRED)
  T
C...
C...(3.7.3B) DPTAS,DTTAS,DCTAS(MAX. CHANGE IN PRESSURE[5.0E+4 Pa], TEMP.[5 C],
C...                          MASS-FRAC.[0.25] ALLOWED), DTIMMN (MIN. TIMESTEP
C...                          REQ.[1.0E+4s]), DTIMMX (MAX. TIMESTEP [1.0E+7s])
     0.3            1.0     0.0005    0.0001      75.0
C...
C...(3.7.4) TIMCHG (TIME NEW TRANSIENT DATA WILL BE READ OR TERMINATION)
   8030.
C...     0.0005
C...
C...PRINTOUT INTERVALS FOR: VELOCITY,FLD. DENSITY, SOLUTION METH., COND. AND
C.. DISPERSION, P-T-C, LFLOW-BALANCE, WELL, B.C. (0=NONE, n=nTH TIMESTEP,
C...-1=ONLY AT NEW DATA READ AND END OF SIMULATION)
C...(3.8.1) PRIVEL, PRIDV, PRISLM, PRIKD, PRIPTC, PRIGFB, PRIWEL, PRIBCF
                0     0     -1     0     -1        -1      0       0
C...
C...(3.8.2) IPRPTC (INDEX FOR PRESSURE, TEMP., AND MASS-FRAC. ARRAYS; n1n2n3)
  001
C...
C...(3.8.3) CHKPTD(T=CHKPT. DUMPS), NTSCHK(# OF TIMESTEPS BETWEEN SOR CHKPT.
C...               DUMPS), SAVLDO(T=SAVE LAST CHKPT. DUMP)
   F   0   F
C...
C...(3.9.1) RDMPDT, PRTMPD (T=READ & WRITE CONTROL DATA FOR MAP GENERATION)
  F  F
C...(3.99.1) THRU (T= SIGNIFIES END OF SIMULATION)
  T
C...(3.99.2) PLOTWP, PLOTWT, PLOTWC (T=PLOT OBSERVED AND/OR CALCULATED PRESS.,
C...                                 TEMP., MASS-FRAC.)
  F  F  F
```

```
*************************************************
*                                               *
*    THREE DIMENSIONAL FLOW, HEAT AND SOLUTE    *
*  TRANSPORT SIMULATOR - (HST3D):RELEASE - 1.1  *
*                                               *
*************************************************
```

```
 ETHYL114.DAT   PRRS LOCAL ETHYLBENZENE TRANSPORT MODEL (1/79-1/92)    5-19-92
KH/KV=100@AQCELLS;MAXTIMESTEP=75D,DBKD=1.0,SCMF=0.0002,DL=50,DT=3;DPTAS=0.0005

            *** FUNDAMENTAL INFORMATION ***
   CARTESIAN COORDINATES
   ISOTHERMAL SIMULATION
   SOLUTE TRANSPORT SIMULATION
   WELLBORE MODEL MAY INCLUDE : FLUID PRESSURE DROP
   INPUT DATA IS EXPECTED IN  ENGLISH UNITS
   SOLUTE CONCENTRATION IS EXPRESSED AS SCALED MASS FRACTION WITH RANGE (0-1)

            *** PROBLEM DIMENSIONING INFORMATION ***
   NUMBER OF NODES IN X-DIRECTION ............................................ NX ...   40
   NUMBER OF NODES IN Y-DIRECTION ............................................ NY ...   81
   NUMBER OF NODES IN Z-DIRECTION ............................................ NZ ...    4
   NUMBER OF POROUS MEDIA ZONES .............................................. NPMZ .  114
   NUMBER OF SPECIFIED PRESSURE, TEMPERATURE OR MASS FRACTION B.C. ........... NPTCBC  268
   NUMBER OF SPECIFIED FLUX B.C. CELLS (FLOW, HEAT OR SOLUTE)................ NFBC . 2941
   NUMBER OF HEAT CONDUCTION B.C. CELLS ...................................... NHCBC     0
   NUMBER OF NODES OUTSIDE REGION FOR EACH HEAT CONDUCTION B.C. CELL ......... NHCN      0
   NUMBER OF AQUIFER INFLUENCE FUNCTION CELLS ................................ NAIFC     0
   NUMBER OF LEAKAGE CELLS ................................................... NLBC .  213
   NUMBER OF WELLS ........................................................... NWEL .    3

   ITERATIVE TWO-LINE-SUCCESSIVE-OVER-RELAXATION SOLVER IS SELECTED
   ABBREVIATED DIAGONAL CROSS-DISPERSIVITY COEFFICIENT STORAGE ALLOCATED
   TOTAL LENGTH OF LABELED COMMON BLOCKS ......................................    6681  BYTES
                                                                   REQUIRED          COMPILED
   LENGTH OF VARIABLE LENGTH REAL ARRAY  (VPA ARRAY) ..........  599994  ELEMENTS  900000  ELEMENTS
   LENGTH OF VARIABLE LENGTH INTEGER ARRAY (IVPA ARRAY) .......   30042  ELEMENTS   50000  ELEMENTS

                          ** SPECIFIED VALUE B.C. NODES ** (READ ECHO)
       REGION                B.C. CODE
  I1  I2  J1  J2  K1  K2
.......................................................................................
   1  40  81  81   1   4        100
   1   1   1   8   1   4        100
   2  20   1   1   1   4        100

                          ** FLUX B.C. CELLS ** (READ ECHO)
       REGION                B.C. CODE
  I1  I2  J1  J2  K1  K2
.......................................................................................
   1   9  43  49   4   4     300200
   1  13  19  42   4   4     300200
```



000423

| | | | | | | |
|---|---|---|---|---|---|---|
| 14 | 14 | 24 | 42 | 4 | 4 | 300200 |
| 15 | 16 | 30 | 35 | 4 | 4 | 300200 |
| 1 | 11 | 16 | 18 | 4 | 4 | 300200 |
| 1 | 9 | 12 | 15 | 4 | 4 | 300200 |
| 1 | 4 | 10 | 11 | 4 | 4 | 300200 |
| 38 | 40 | 80 | 80 | 4 | 4 | 300200 |
| 35 | 40 | 65 | 79 | 4 | 4 | 300200 |
| 38 | 40 | 59 | 64 | 4 | 4 | 300200 |
| 32 | 40 | 5 | 5 | 4 | 4 | 300200 |
| 27 | 40 | 1 | 4 | 4 | 4 | 300200 |
| 1 | 2 | 50 | 54 | 4 | 4 | 300200 |
| 1 | 7 | 73 | 80 | 4 | 4 | 300200 |
| 1 | 2 | 55 | 72 | 4 | 4 | 300200 |
| 19 | 37 | 80 | 80 | 4 | 4 | 300200 |
| 22 | 34 | 74 | 79 | 4 | 4 | 300200 |
| 29 | 34 | 65 | 73 | 4 | 4 | 300200 |
| 9 | 18 | 80 | 80 | 4 | 4 | 300200 |
| 9 | 21 | 74 | 79 | 4 | 4 | 300200 |
| 4 | 8 | 65 | 71 | 4 | 4 | 300200 |
| 9 | 28 | 65 | 73 | 4 | 4 | 300200 |
| 4 | 13 | 59 | 64 | 4 | 4 | 300200 |
| 14 | 15 | 59 | 59 | 4 | 4 | 300002 |
| 14 | 15 | 60 | 64 | 4 | 4 | 300200 |
| 16 | 37 | 59 | 64 | 4 | 4 | 300200 |
| 4 | 13 | 55 | 58 | 4 | 4 | 300200 |
| 14 | 16 | 57 | 58 | 4 | 4 | 300002 |
| 14 | 16 | 55 | 56 | 4 | 4 | 300200 |
| 17 | 17 | 56 | 56 | 4 | 4 | 300002 |
| 17 | 17 | 55 | 55 | 4 | 4 | 300200 |
| 17 | 17 | 57 | 58 | 4 | 4 | 300200 |
| 18 | 40 | 55 | 58 | 4 | 4 | 300200 |
| 6 | 40 | 53 | 54 | 4 | 4 | 300200 |
| 11 | 40 | 49 | 52 | 4 | 4 | 300200 |
| 11 | 40 | 44 | 48 | 4 | 4 | 300200 |
| 15 | 15 | 37 | 42 | 4 | 4 | 300200 |
| 17 | 40 | 38 | 43 | 4 | 4 | 300200 |
| 4 | 5 | 51 | 54 | 4 | 4 | 300200 |
| 6 | 10 | 51 | 52 | 4 | 4 | 300200 |
| 17 | 17 | 27 | 28 | 4 | 4 | 300200 |
| 17 | 17 | 30 | 35 | 4 | 4 | 300200 |
| 15 | 17 | 36 | 36 | 4 | 4 | 300200 |
| 19 | 40 | 29 | 37 | 4 | 4 | 300200 |
| 18 | 40 | 27 | 28 | 4 | 4 | 300200 |
| 17 | 39 | 12 | 26 | 4 | 4 | 300200 |
| 40 | 40 | 15 | 26 | 4 | 4 | 300200 |
| 16 | 16 | 22 | 28 | 4 | 4 | 300200 |
| 15 | 15 | 19 | 20 | 4 | 4 | 300200 |
| 14 | 14 | 19 | 23 | 4 | 4 | 300200 |
| 10 | 11 | 12 | 15 | 4 | 4 | 300200 |
| 12 | 15 | 12 | 18 | 4 | 4 | 300200 |
| 4 | 5 | 5 | 6 | 4 | 4 | 300200 |
| 8 | 39 | 6 | 8 | 4 | 4 | 300200 |
| 40 | 40 | 6 | 7 | 4 | 4 | 300200 |
| 6 | 28 | 5 | 5 | 4 | 4 | 300200 |
| 2 | 26 | 2 | 4 | 4 | 4 | 300200 |
| 2 | 3 | 5 | 6 | 4 | 4 | 300200 |

0004434

002360

** AQUIFER AND RIVER LEAKAGE B.C. NODES ** (READ ECHO)

| REGION | | | | | | B.C. CODE |
|---|---|---|---|---|---|---|
| I1 | I2 | J1 | J2 | K1 | K2 | |
| 2 | 2 | 9 | 9 | 4 | 4 | 300300 |
| 2 | 2 | 8 | 8 | 4 | 4 | 300300 |
| 2 | 2 | 7 | 7 | 4 | 4 | 300300 |
| 3 | 3 | 9 | 9 | 4 | 4 | 300300 |
| 3 | 3 | 8 | 8 | 4 | 4 | 300300 |
| 3 | 3 | 7 | 7 | 4 | 4 | 300300 |
| 4 | 4 | 9 | 9 | 4 | 4 | 300300 |
| 4 | 4 | 8 | 8 | 4 | 4 | 300300 |
| 4 | 4 | 7 | 7 | 4 | 4 | 300300 |
| 5 | 5 | 9 | 9 | 4 | 4 | 300300 |
| 5 | 5 | 8 | 8 | 4 | 4 | 300300 |
| 5 | 5 | 7 | 7 | 4 | 4 | 300300 |
| 5 | 5 | 10 | 10 | 4 | 4 | 300300 |
| 5 | 5 | 11 | 11 | 4 | 4 | 300300 |
| 6 | 6 | 7 | 7 | 4 | 4 | 300300 |
| 6 | 6 | 8 | 8 | 4 | 4 | 300300 |
| 6 | 6 | 9 | 9 | 4 | 4 | 300300 |
| 6 | 6 | 10 | 10 | 4 | 4 | 300300 |
| 6 | 6 | 11 | 11 | 4 | 4 | 300300 |
| 7 | 7 | 7 | 7 | 4 | 4 | 300300 |
| 7 | 7 | 8 | 8 | 4 | 4 | 300300 |
| 7 | 7 | 9 | 9 | 4 | 4 | 300300 |
| 7 | 7 | 10 | 10 | 4 | 4 | 300300 |
| 7 | 7 | 11 | 11 | 4 | 4 | 300300 |
| 8 | 8 | 11 | 11 | 4 | 4 | 300300 |
| 8 | 8 | 10 | 10 | 4 | 4 | 300300 |
| 8 | 8 | 9 | 9 | 4 | 4 | 300300 |
| 9 | 9 | 11 | 11 | 4 | 4 | 300300 |
| 9 | 9 | 10 | 10 | 4 | 4 | 300300 |
| 9 | 9 | 9 | 9 | 4 | 4 | 300300 |
| 10 | 10 | 11 | 11 | 4 | 4 | 300300 |
| 10 | 10 | 10 | 10 | 4 | 4 | 300300 |
| 10 | 10 | 9 | 9 | 4 | 4 | 300300 |
| 11 | 11 | 11 | 11 | 4 | 4 | 300300 |
| 11 | 11 | 10 | 10 | 4 | 4 | 300300 |
| 11 | 11 | 9 | 9 | 4 | 4 | 300300 |
| 12 | 12 | 11 | 11 | 4 | 4 | 300300 |
| 12 | 12 | 10 | 10 | 4 | 4 | 300300 |
| 12 | 12 | 9 | 9 | 4 | 4 | 300300 |
| 13 | 13 | 11 | 11 | 4 | 4 | 300300 |
| 13 | 13 | 10 | 10 | 4 | 4 | 300300 |
| 13 | 13 | 9 | 9 | 4 | 4 | 300300 |
| 14 | 14 | 11 | 11 | 4 | 4 | 300300 |
| 14 | 14 | 10 | 10 | 4 | 4 | 300300 |
| 14 | 14 | 9 | 9 | 4 | 4 | 300300 |
| 15 | 15 | 11 | 11 | 4 | 4 | 300300 |
| 15 | 15 | 10 | 10 | 4 | 4 | 300300 |
| 15 | 15 | 9 | 9 | 4 | 4 | 300300 |
| 16 | 16 | 11 | 11 | 4 | 4 | 300300 |
| 16 | 16 | 10 | 10 | 4 | 4 | 300300 |
| 16 | 16 | 9 | 9 | 4 | 4 | 300300 |
| 17 | 17 | 11 | 11 | 4 | 4 | 300300 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 17 | 17 | 10 | 10 | 4 | 4 | 300300 |
| 17 | 17 | 9 | 9 | 4 | 4 | 300300 |
| 18 | 18 | 11 | 11 | 4 | 4 | 300300 |
| 18 | 18 | 10 | 10 | 4 | 4 | 300300 |
| 18 | 18 | 9 | 9 | 4 | 4 | 300300 |
| 19 | 19 | 11 | 11 | 4 | 4 | 300300 |
| 19 | 19 | 10 | 10 | 4 | 4 | 300300 |
| 19 | 19 | 9 | 9 | 4 | 4 | 300300 |
| 20 | 20 | 11 | 11 | 4 | 4 | 300300 |
| 20 | 20 | 10 | 10 | 4 | 4 | 300300 |
| 20 | 20 | 9 | 9 | 4 | 4 | 300300 |
| 21 | 21 | 11 | 11 | 4 | 4 | 300300 |
| 21 | 21 | 10 | 10 | 4 | 4 | 300300 |
| 21 | 21 | 9 | 9 | 4 | 4 | 300300 |
| 22 | 22 | 11 | 11 | 4 | 4 | 300300 |
| 22 | 22 | 10 | 10 | 4 | 4 | 300300 |
| 22 | 22 | 9 | 9 | 4 | 4 | 300300 |
| 23 | 23 | 11 | 11 | 4 | 4 | 300300 |
| 23 | 23 | 10 | 10 | 4 | 4 | 300300 |
| 23 | 23 | 9 | 9 | 4 | 4 | 300300 |
| 24 | 24 | 11 | 11 | 4 | 4 | 300300 |
| 24 | 24 | 10 | 10 | 4 | 4 | 300300 |
| 24 | 24 | 9 | 9 | 4 | 4 | 300300 |
| 25 | 25 | 11 | 11 | 4 | 4 | 300300 |
| 25 | 25 | 10 | 10 | 4 | 4 | 300300 |
| 25 | 25 | 9 | 9 | 4 | 4 | 300300 |
| 26 | 26 | 11 | 11 | 4 | 4 | 300300 |
| 26 | 26 | 10 | 10 | 4 | 4 | 300300 |
| 26 | 26 | 9 | 9 | 4 | 4 | 300300 |
| 27 | 27 | 11 | 11 | 4 | 4 | 300300 |
| 27 | 27 | 10 | 10 | 4 | 4 | 300300 |
| 27 | 27 | 9 | 9 | 4 | 4 | 300300 |
| 28 | 28 | 11 | 11 | 4 | 4 | 300300 |
| 28 | 28 | 10 | 10 | 4 | 4 | 300300 |
| 28 | 28 | 9 | 9 | 4 | 4 | 300300 |
| 29 | 29 | 11 | 11 | 4 | 4 | 300300 |
| 29 | 29 | 10 | 10 | 4 | 4 | 300300 |
| 29 | 29 | 9 | 9 | 4 | 4 | 300300 |
| 30 | 30 | 11 | 11 | 4 | 4 | 300300 |
| 30 | 30 | 10 | 10 | 4 | 4 | 300300 |
| 30 | 30 | 9 | 9 | 4 | 4 | 300300 |
| 31 | 31 | 11 | 11 | 4 | 4 | 300300 |
| 31 | 31 | 10 | 10 | 4 | 4 | 300300 |
| 31 | 31 | 9 | 9 | 4 | 4 | 300300 |
| 32 | 32 | 11 | 11 | 4 | 4 | 300300 |
| 32 | 32 | 10 | 10 | 4 | 4 | 300300 |
| 32 | 32 | 9 | 9 | 4 | 4 | 300300 |
| 33 | 33 | 11 | 11 | 4 | 4 | 300300 |
| 33 | 33 | 10 | 10 | 4 | 4 | 300300 |
| 33 | 33 | 9 | 9 | 4 | 4 | 300300 |
| 34 | 34 | 11 | 11 | 4 | 4 | 300300 |
| 34 | 34 | 10 | 10 | 4 | 4 | 300300 |
| 34 | 34 | 9 | 9 | 4 | 4 | 300300 |
| 35 | 35 | 11 | 11 | 4 | 4 | 300300 |
| 35 | 35 | 10 | 10 | 4 | 4 | 300300 |
| 35 | 35 | 9 | 9 | 4 | 4 | 300300 |



0023360

0004336

| | | | | | | |
|---|---|---|---|---|---|---|
| 36 | 36 | 11 | 11 | 4 | 4 | 300300 |
| 36 | 36 | 10 | 10 | 4 | 4 | 300300 |
| 36 | 36 | 9 | 9 | 4 | 4 | 300300 |
| 37 | 37 | 11 | 11 | 4 | 4 | 300300 |
| 37 | 37 | 10 | 10 | 4 | 4 | 300300 |
| 37 | 37 | 9 | 9 | 4 | 4 | 300300 |
| 38 | 38 | 11 | 11 | 4 | 4 | 300300 |
| 38 | 38 | 10 | 10 | 4 | 4 | 300300 |
| 38 | 38 | 9 | 9 | 4 | 4 | 300300 |
| 39 | 39 | 11 | 11 | 4 | 4 | 300300 |
| 39 | 39 | 10 | 10 | 4 | 4 | 300300 |
| 39 | 39 | 9 | 9 | 4 | 4 | 300300 |
| 16 | 16 | 12 | 12 | 4 | 4 | 300300 |
| 16 | 16 | 13 | 13 | 4 | 4 | 300300 |
| 16 | 16 | 14 | 14 | 4 | 4 | 300300 |
| 16 | 16 | 15 | 15 | 4 | 4 | 300300 |
| 16 | 16 | 16 | 16 | 4 | 4 | 300300 |
| 16 | 16 | 17 | 17 | 4 | 4 | 300300 |
| 16 | 16 | 18 | 18 | 4 | 4 | 300300 |
| 16 | 16 | 19 | 19 | 4 | 4 | 300300 |
| 16 | 16 | 20 | 20 | 4 | 4 | 300300 |
| 16 | 16 | 21 | 21 | 4 | 4 | 300300 |
| 15 | 15 | 21 | 21 | 4 | 4 | 300300 |
| 15 | 15 | 22 | 22 | 4 | 4 | 300300 |
| 15 | 15 | 23 | 23 | 4 | 4 | 300300 |
| 15 | 15 | 24 | 24 | 4 | 4 | 300300 |
| 15 | 15 | 25 | 25 | 4 | 4 | 300300 |
| 15 | 15 | 26 | 26 | 4 | 4 | 300300 |
| 15 | 15 | 27 | 27 | 4 | 4 | 300300 |
| 15 | 15 | 28 | 28 | 4 | 4 | 300300 |
| 15 | 15 | 29 | 29 | 4 | 4 | 300300 |
| 16 | 16 | 29 | 29 | 4 | 4 | 300300 |
| 17 | 17 | 29 | 29 | 4 | 4 | 300300 |
| 18 | 18 | 29 | 29 | 4 | 4 | 300300 |
| 18 | 18 | 30 | 30 | 4 | 4 | 300300 |
| 18 | 18 | 31 | 31 | 4 | 4 | 300300 |
| 18 | 18 | 32 | 32 | 4 | 4 | 300300 |
| 18 | 18 | 33 | 33 | 4 | 4 | 300300 |
| 18 | 18 | 34 | 34 | 4 | 4 | 300300 |
| 18 | 18 | 35 | 35 | 4 | 4 | 300300 |
| 18 | 18 | 36 | 36 | 4 | 4 | 300300 |
| 18 | 18 | 37 | 37 | 4 | 4 | 300300 |
| 17 | 17 | 37 | 37 | 4 | 4 | 300300 |
| 16 | 16 | 37 | 37 | 4 | 4 | 300300 |
| 16 | 16 | 38 | 38 | 4 | 4 | 300300 |
| 16 | 16 | 39 | 39 | 4 | 4 | 300300 |
| 16 | 16 | 40 | 40 | 4 | 4 | 300300 |
| 16 | 16 | 41 | 41 | 4 | 4 | 300300 |
| 16 | 16 | 42 | 42 | 4 | 4 | 300300 |
| 10 | 10 | 43 | 43 | 4 | 4 | 300300 |
| 11 | 11 | 43 | 43 | 4 | 4 | 300300 |
| 12 | 12 | 43 | 43 | 4 | 4 | 300300 |
| 13 | 13 | 43 | 43 | 4 | 4 | 300300 |
| 14 | 14 | 43 | 43 | 4 | 4 | 300300 |
| 15 | 15 | 43 | 43 | 4 | 4 | 300300 |
| 16 | 16 | 43 | 43 | 4 | 4 | 300300 |



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| | | | | | | |
|---|---|---|---|---|---|---|
| 10 | 10 | 44 | 44 | 4 | 4 | 300300 |
| 10 | 10 | 45 | 45 | 4 | 4 | 300300 |
| 10 | 10 | 46 | 46 | 4 | 4 | 300300 |
| 10 | 10 | 47 | 47 | 4 | 4 | 300300 |
| 10 | 10 | 48 | 48 | 4 | 4 | 300300 |
| 10 | 10 | 49 | 49 | 4 | 4 | 300300 |
| 3 | 3 | 50 | 50 | 4 | 4 | 300300 |
| 4 | 4 | 50 | 50 | 4 | 4 | 300300 |
| 5 | 5 | 50 | 50 | 4 | 4 | 300300 |
| 6 | 6 | 50 | 50 | 4 | 4 | 300300 |
| 7 | 7 | 50 | 50 | 4 | 4 | 300300 |
| 8 | 8 | 50 | 50 | 4 | 4 | 300300 |
| 9 | 9 | 50 | 50 | 4 | 4 | 300300 |
| 10 | 10 | 50 | 50 | 4 | 4 | 300300 |
| 3 | 3 | 51 | 51 | 4 | 4 | 300300 |
| 3 | 3 | 52 | 52 | 4 | 4 | 300300 |
| 3 | 3 | 53 | 53 | 4 | 4 | 300300 |
| 3 | 3 | 54 | 54 | 4 | 4 | 300300 |
| 3 | 3 | 55 | 55 | 4 | 4 | 300300 |
| 3 | 3 | 56 | 56 | 4 | 4 | 300300 |
| 3 | 3 | 57 | 57 | 4 | 4 | 300300 |
| 3 | 3 | 58 | 58 | 4 | 4 | 300300 |
| 3 | 3 | 59 | 59 | 4 | 4 | 300300 |
| 3 | 3 | 60 | 60 | 4 | 4 | 300300 |
| 3 | 3 | 61 | 61 | 4 | 4 | 300300 |
| 3 | 3 | 62 | 62 | 4 | 4 | 300300 |
| 3 | 3 | 63 | 63 | 4 | 4 | 300300 |
| 3 | 3 | 64 | 64 | 4 | 4 | 300300 |
| 3 | 3 | 65 | 65 | 4 | 4 | 300300 |
| 3 | 3 | 66 | 66 | 4 | 4 | 300300 |
| 3 | 3 | 67 | 67 | 4 | 4 | 300300 |
| 3 | 3 | 68 | 68 | 4 | 4 | 300300 |
| 3 | 3 | 69 | 69 | 4 | 4 | 300300 |
| 3 | 3 | 70 | 70 | 4 | 4 | 300300 |
| 3 | 3 | 71 | 71 | 4 | 4 | 300300 |
| 3 | 3 | 72 | 72 | 4 | 4 | 300300 |
| 4 | 4 | 72 | 72 | 4 | 4 | 300300 |
| 5 | 5 | 72 | 72 | 4 | 4 | 300300 |
| 6 | 6 | 72 | 72 | 4 | 4 | 300300 |
| 7 | 7 | 72 | 72 | 4 | 4 | 300300 |
| 8 | 8 | 72 | 72 | 4 | 4 | 300300 |
| 8 | 8 | 73 | 73 | 4 | 4 | 300300 |
| 8 | 8 | 74 | 74 | 4 | 4 | 300300 |
| 8 | 8 | 75 | 75 | 4 | 4 | 300300 |
| 8 | 8 | 76 | 76 | 4 | 4 | 300300 |
| 8 | 8 | 77 | 77 | 4 | 4 | 300300 |
| 8 | 8 | 78 | 78 | 4 | 4 | 300300 |
| 8 | 8 | 79 | 79 | 4 | 4 | 300300 |
| 8 | 8 | 80 | 80 | 4 | 4 | 300300 |

** AQUIFER LEAKAGE PARAMETERS ** (READ ECHO)

| REGION | | | | | | AQUITARD PERMEABILITY | | ELEVATION OF OUTER BOUNDARY | | THICKNESS OF AQUITARD | | M.C.=MODIFICATION CODE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I1 | I2 | J1 | J2 | K1 | K2 | (FT**2) | M.C. | (FT) | M.C. | (FT) | M.C. | |



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*** TIME INVARIANT OR STATIC DATA ***

X-DIRECTION NODE COORDINATES (FT)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 0.00 | 100.00 | 200.00 | 300.00 | 400.00 | 500.00 | 600.00 | 700.00 | 800.00 | 900.00 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 1000.00 | 1100.00 | 1200.00 | 1300.00 | 1400.00 | 1500.00 | 1600.00 | 1700.00 | 1800.00 | 1900.00 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 2000.00 | 2100.00 | 2200.00 | 2300.00 | 2400.00 | 2500.00 | 2600.00 | 2700.00 | 2800.00 | 2900.00 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 3000.00 | 3100.00 | 3200.00 | 3300.00 | 3400.00 | 3500.00 | 3600.00 | 3700.00 | 3800.00 | 3900.00 |

Y-DIRECTION NODE COORDINATES (FT)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 0.00 | 100.00 | 200.00 | 300.00 | 400.00 | 500.00 | 600.00 | 700.00 | 800.00 | 900.00 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 1000.00 | 1100.00 | 1200.00 | 1300.00 | 1400.00 | 1500.00 | 1600.00 | 1700.00 | 1800.00 | 1900.00 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 2000.00 | 2100.00 | 2200.00 | 2300.00 | 2400.00 | 2500.00 | 2600.00 | 2700.00 | 2800.00 | 2900.00 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 3000.00 | 3100.00 | 3200.00 | 3300.00 | 3400.00 | 3500.00 | 3600.00 | 3700.00 | 3800.00 | 3900.00 |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 4000.00 | 4100.00 | 4200.00 | 4300.00 | 4400.00 | 4500.00 | 4600.00 | 4700.00 | 4800.00 | 4900.00 |
| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| 5000.00 | 5100.00 | 5200.00 | 5300.00 | 5400.00 | 5500.00 | 5600.00 | 5700.00 | 5800.00 | 5900.00 |

| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
|---|---|---|---|---|---|---|---|---|---|
| 6000.00 | 6100.00 | 6200.00 | 6300.00 | 6400.00 | 6500.00 | 6600.00 | 6700.00 | 6800.00 | 6900.00 |

| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
|---|---|---|---|---|---|---|---|---|---|
| 7000.00 | 7100.00 | 7200.00 | 7300.00 | 7400.00 | 7500.00 | 7600.00 | 7700.00 | 7800.00 | 7900.00 |

| 81 |
|---|
| 8000.00 |

Z-DIRECTION NODE COORDINATES (FT)

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| 400.00 | 450.00 | 470.00 | 504.00 |

Z-AXIS IS POSITIVE VERTICALLY UPWARD

A FREE-SURFACE WATER TABLE IN UPPERMOST LAYER OF CELLS IS SPECIFIED FOR THIS SIMULATON

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** SPECIFIED PRESSURE B.C. ** (READ ECHO)

| REGION I1 | I2 | J1 | J2 | K1 | K2 | PRESSURE | MODIFICATION CODE |
|---|---|---|---|---|---|---|---|
| 2 | 2 | 1 | 1 | 4 | 4 | -4.582 | 1 |
| 3 | 3 | 1 | 1 | 4 | 4 | -4.395 | 1 |
| 4 | 4 | 1 | 1 | 4 | 4 | -4.208 | 1 |
| 5 | 5 | 1 | 1 | 4 | 4 | -4.021 | 1 |
| 6 | 6 | 1 | 1 | 4 | 4 | -3.834 | 1 |
| 7 | 7 | 1 | 1 | 4 | 4 | -3.647 | 1 |
| 8 | 8 | 1 | 1 | 4 | 4 | -3.460 | 1 |
| 9 | 9 | 1 | 1 | 4 | 4 | -3.273 | 1 |
| 10 | 10 | 1 | 1 | 4 | 4 | -3.086 | 1 |
| 11 | 11 | 1 | 1 | 4 | 4 | -2.899 | 1 |
| 12 | 12 | 1 | 1 | 4 | 4 | -2.712 | 1 |
| 13 | 13 | 1 | 1 | 4 | 4 | -2.525 | 1 |
| 14 | 14 | 1 | 1 | 4 | 4 | -2.338 | 1 |
| 15 | 15 | 1 | 1 | 4 | 4 | -2.151 | 1 |
| 16 | 16 | 1 | 1 | 4 | 4 | -1.964 | 1 |
| 17 | 17 | 1 | 1 | 4 | 4 | -1.777 | 1 |
| 18 | 18 | 1 | 1 | 4 | 4 | -1.590 | 1 |
| 19 | 19 | 1 | 1 | 4 | 4 | -1.403 | 1 |
| 20 | 20 | 1 | 1 | 4 | 4 | -1.216 | 1 |
| 2 | 2 | 1 | 1 | 3 | 3 | 10.16 | 1 |
| 3 | 3 | 1 | 1 | 3 | 3 | 10.35 | 1 |



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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4 | 4 | 1 | 1 | 3 | 3 | 10.53 | 1 |
| 5 | 5 | 1 | 1 | 3 | 3 | 10.72 | 1 |
| 6 | 6 | 1 | 1 | 3 | 3 | 10.91 | 1 |
| 7 | 7 | 1 | 1 | 3 | 3 | 11.09 | 1 |
| 8 | 8 | 1 | 1 | 3 | 3 | 11.28 | 1 |
| 9 | 9 | 1 | 1 | 3 | 3 | 11.47 | 1 |
| 10 | 10 | 1 | 1 | 3 | 3 | 11.65 | 1 |
| 11 | 11 | 1 | 1 | 3 | 3 | 11.84 | 1 |
| 12 | 12 | 1 | 1 | 3 | 3 | 12.03 | 1 |
| 13 | 13 | 1 | 1 | 3 | 3 | 12.22 | 1 |
| 14 | 14 | 1 | 1 | 3 | 3 | 12.40 | 1 |
| 15 | 15 | 1 | 1 | 3 | 3 | 12.59 | 1 |
| 16 | 16 | 1 | 1 | 3 | 3 | 12.78 | 1 |
| 17 | 17 | 1 | 1 | 3 | 3 | 12.96 | 1 |
| 18 | 18 | 1 | 1 | 3 | 3 | 13.15 | 1 |
| 19 | 19 | 1 | 1 | 3 | 3 | 13.34 | 1 |
| 20 | 20 | 1 | 1 | 3 | 3 | 13.52 | 1 |
| 2 | 2 | 1 | 1 | 2 | 2 | 18.83 | 1 |
| 3 | 3 | 1 | 1 | 2 | 2 | 19.02 | 1 |
| 4 | 4 | 1 | 1 | 2 | 2 | 19.20 | 1 |
| 5 | 5 | 1 | 1 | 2 | 2 | 19.39 | 1 |
| 6 | 6 | 1 | 1 | 2 | 2 | 19.58 | 1 |
| 7 | 7 | 1 | 1 | 2 | 2 | 19.76 | 1 |
| 8 | 8 | 1 | 1 | 2 | 2 | 19.95 | 1 |
| 9 | 9 | 1 | 1 | 2 | 2 | 20.14 | 1 |
| 10 | 10 | 1 | 1 | 2 | 2 | 20.32 | 1 |
| 11 | 11 | 1 | 1 | 2 | 2 | 20.51 | 1 |
| 12 | 12 | 1 | 1 | 2 | 2 | 20.70 | 1 |
| 13 | 13 | 1 | 1 | 2 | 2 | 20.89 | 1 |
| 14 | 14 | 1 | 1 | 2 | 2 | 21.07 | 1 |
| 15 | 15 | 1 | 1 | 2 | 2 | 21.26 | 1 |
| 16 | 16 | 1 | 1 | 2 | 2 | 21.45 | 1 |
| 17 | 17 | 1 | 1 | 2 | 2 | 21.63 | 1 |
| 18 | 18 | 1 | 1 | 2 | 2 | 21.82 | 1 |
| 19 | 19 | 1 | 1 | 2 | 2 | 22.01 | 1 |
| 20 | 20 | 1 | 1 | 2 | 2 | 22.19 | 1 |
| 2 | 2 | 1 | 1 | 1 | 1 | 40.51 | 1 |
| 3 | 3 | 1 | 1 | 1 | 1 | 40.69 | 1 |
| 4 | 4 | 1 | 1 | 1 | 1 | 40.88 | 1 |
| 5 | 5 | 1 | 1 | 1 | 1 | 41.07 | 1 |
| 6 | 6 | 1 | 1 | 1 | 1 | 41.25 | 1 |
| 7 | 7 | 1 | 1 | 1 | 1 | 41.44 | 1 |
| 8 | 8 | 1 | 1 | 1 | 1 | 41.63 | 1 |
| 9 | 9 | 1 | 1 | 1 | 1 | 41.81 | 1 |
| 10 | 10 | 1 | 1 | 1 | 1 | 42.00 | 1 |
| 11 | 11 | 1 | 1 | 1 | 1 | 42.19 | 1 |
| 12 | 12 | 1 | 1 | 1 | 1 | 42.38 | 1 |
| 13 | 13 | 1 | 1 | 1 | 1 | 42.56 | 1 |
| 14 | 14 | 1 | 1 | 1 | 1 | 42.75 | 1 |
| 15 | 15 | 1 | 1 | 1 | 1 | 42.94 | 1 |
| 16 | 16 | 1 | 1 | 1 | 1 | 43.12 | 1 |
| 17 | 17 | 1 | 1 | 1 | 1 | 43.31 | 1 |
| 18 | 18 | 1 | 1 | 1 | 1 | 43.50 | 1 |
| 19 | 19 | 1 | 1 | 1 | 1 | 43.68 | 1 |
| 20 | 20 | 1 | 1 | 1 | 1 | 43.87 | 1 |
| 1 | 1 | 81 | 81 | 4 | 4 | 7.360 | 1 |



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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2 | 2 | 81 | 81 | 4 | 4 | 7.330 | 1 |
| 3 | 3 | 81 | 81 | 4 | 4 | 7.290 | 1 |
| 4 | 4 | 81 | 81 | 4 | 4 | 7.260 | 1 |
| 5 | 5 | 81 | 81 | 4 | 4 | 7.230 | 1 |
| 6 | 6 | 81 | 81 | 4 | 4 | 7.190 | 1 |
| 7 | 7 | 81 | 81 | 4 | 4 | 7.160 | 1 |
| 8 | 8 | 81 | 81 | 4 | 4 | 7.120 | 1 |
| 9 | 9 | 81 | 81 | 4 | 4 | 7.090 | 1 |
| 10 | 10 | 81 | 81 | 4 | 4 | 7.050 | 1 |
| 11 | 11 | 81 | 81 | 4 | 4 | 7.020 | 1 |
| 12 | 12 | 81 | 81 | 4 | 4 | 6.990 | 1 |
| 13 | 13 | 81 | 81 | 4 | 4 | 6.960 | 1 |
| 14 | 14 | 81 | 81 | 4 | 4 | 6.930 | 1 |
| 15 | 15 | 81 | 81 | 4 | 4 | 6.900 | 1 |
| 16 | 16 | 81 | 81 | 4 | 4 | 6.870 | 1 |
| 17 | 17 | 81 | 81 | 4 | 4 | 6.830 | 1 |
| 18 | 18 | 81 | 81 | 4 | 4 | 6.800 | 1 |
| 19 | 19 | 81 | 81 | 4 | 4 | 6.760 | 1 |
| 20 | 20 | 81 | 81 | 4 | 4 | 6.740 | 1 |
| 21 | 21 | 81 | 81 | 4 | 4 | 6.730 | 1 |
| 22 | 22 | 81 | 81 | 4 | 4 | 6.710 | 1 |
| 23 | 23 | 81 | 81 | 4 | 4 | 6.690 | 1 |
| 24 | 24 | 81 | 81 | 4 | 4 | 6.680 | 1 |
| 25 | 25 | 81 | 81 | 4 | 4 | 6.660 | 1 |
| 26 | 26 | 81 | 81 | 4 | 4 | 6.630 | 1 |
| 27 | 27 | 81 | 81 | 4 | 4 | 6.610 | 1 |
| 28 | 28 | 81 | 81 | 4 | 4 | 6.590 | 1 |
| 29 | 29 | 81 | 81 | 4 | 4 | 6.580 | 1 |
| 30 | 30 | 81 | 81 | 4 | 4 | 6.560 | 1 |
| 31 | 31 | 81 | 81 | 4 | 4 | 6.540 | 1 |
| 32 | 32 | 81 | 81 | 4 | 4 | 6.530 | 1 |
| 33 | 33 | 81 | 81 | 4 | 4 | 6.520 | 1 |
| 34 | 34 | 81 | 81 | 4 | 4 | 6.510 | 1 |
| 35 | 35 | 81 | 81 | 4 | 4 | 6.500 | 1 |
| 36 | 36 | 81 | 81 | 4 | 4 | 6.490 | 1 |
| 37 | 37 | 81 | 81 | 4 | 4 | 6.470 | 1 |
| 38 | 38 | 81 | 81 | 4 | 4 | 6.450 | 1 |
| 39 | 39 | 81 | 81 | 4 | 4 | 6.440 | 1 |
| 40 | 40 | 81 | 81 | 4 | 4 | 6.420 | 1 |
| 1 | 1 | 81 | 81 | 3 | 3 | 22.10 | 1 |
| 2 | 2 | 81 | 81 | 3 | 3 | 22.07 | 1 |
| 3 | 3 | 81 | 81 | 3 | 3 | 22.03 | 1 |
| 4 | 4 | 81 | 81 | 3 | 3 | 22.00 | 1 |
| 5 | 5 | 81 | 81 | 3 | 3 | 21.97 | 1 |
| 6 | 6 | 81 | 81 | 3 | 3 | 21.93 | 1 |
| 7 | 7 | 81 | 81 | 3 | 3 | 21.90 | 1 |
| 8 | 8 | 81 | 81 | 3 | 3 | 21.86 | 1 |
| 9 | 9 | 81 | 81 | 3 | 3 | 21.83 | 1 |
| 10 | 10 | 81 | 81 | 3 | 3 | 21.79 | 1 |
| 11 | 11 | 81 | 81 | 3 | 3 | 21.76 | 1 |
| 12 | 12 | 81 | 81 | 3 | 3 | 21.73 | 1 |
| 13 | 13 | 81 | 81 | 3 | 3 | 21.70 | 1 |
| 14 | 14 | 81 | 81 | 3 | 3 | 21.67 | 1 |
| 15 | 15 | 81 | 81 | 3 | 3 | 21.64 | 1 |
| 16 | 16 | 81 | 81 | 3 | 3 | 21.61 | 1 |
| 17 | 17 | 81 | 81 | 3 | 3 | 21.57 | 1 |



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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 18 | 18 | 81 | 81 | 3 | 3 | 21.54 | 1 |
| 19 | 19 | 81 | 81 | 3 | 3 | 21.50 | 1 |
| 20 | 20 | 81 | 81 | 3 | 3 | 21.48 | 1 |
| 21 | 21 | 81 | 81 | 3 | 3 | 21.47 | 1 |
| 22 | 22 | 81 | 81 | 3 | 3 | 21.45 | 1 |
| 23 | 23 | 81 | 81 | 3 | 3 | 21.43 | 1 |
| 24 | 24 | 81 | 81 | 3 | 3 | 21.42 | 1 |
| 25 | 25 | 81 | 81 | 3 | 3 | 21.40 | 1 |
| 26 | 26 | 81 | 81 | 3 | 3 | 21.37 | 1 |
| 27 | 27 | 81 | 81 | 3 | 3 | 21.35 | 1 |
| 28 | 28 | 81 | 81 | 3 | 3 | 21.33 | 1 |
| 29 | 29 | 81 | 81 | 3 | 3 | 21.32 | 1 |
| 30 | 30 | 81 | 81 | 3 | 3 | 21.30 | 1 |
| 31 | 31 | 81 | 81 | 3 | 3 | 21.28 | 1 |
| 32 | 32 | 81 | 81 | 3 | 3 | 21.27 | 1 |
| 33 | 33 | 81 | 81 | 3 | 3 | 21.26 | 1 |
| 34 | 34 | 81 | 81 | 3 | 3 | 21.25 | 1 |
| 35 | 35 | 81 | 81 | 3 | 3 | 21.24 | 1 |
| 36 | 36 | 81 | 81 | 3 | 3 | 21.23 | 1 |
| 37 | 37 | 81 | 81 | 3 | 3 | 21.21 | 1 |
| 38 | 38 | 81 | 81 | 3 | 3 | 21.19 | 1 |
| 39 | 39 | 81 | 81 | 3 | 3 | 21.18 | 1 |
| 40 | 40 | 81 | 81 | 3 | 3 | 21.16 | 1 |
| 1 | 1 | 81 | 81 | 2 | 2 | 30.77 | 1 |
| 2 | 2 | 81 | 81 | 2 | 2 | 30.74 | 1 |
| 3 | 3 | 81 | 81 | 2 | 2 | 30.70 | 1 |
| 4 | 4 | 81 | 81 | 2 | 2 | 30.67 | 1 |
| 5 | 5 | 81 | 81 | 2 | 2 | 30.64 | 1 |
| 6 | 6 | 81 | 81 | 2 | 2 | 30.60 | 1 |
| 7 | 7 | 81 | 81 | 2 | 2 | 30.57 | 1 |
| 8 | 8 | 81 | 81 | 2 | 2 | 30.53 | 1 |
| 9 | 9 | 81 | 81 | 2 | 2 | 30.50 | 1 |
| 10 | 10 | 81 | 81 | 2 | 2 | 30.46 | 1 |
| 11 | 11 | 81 | 81 | 2 | 2 | 30.43 | 1 |
| 12 | 12 | 81 | 81 | 2 | 2 | 30.40 | 1 |
| 13 | 13 | 81 | 81 | 2 | 2 | 30.37 | 1 |
| 14 | 14 | 81 | 81 | 2 | 2 | 30.34 | 1 |
| 15 | 15 | 81 | 81 | 2 | 2 | 30.31 | 1 |
| 16 | 16 | 81 | 81 | 2 | 2 | 30.28 | 1 |
| 17 | 17 | 81 | 81 | 2 | 2 | 30.24 | 1 |
| 18 | 18 | 81 | 81 | 2 | 2 | 30.21 | 1 |
| 19 | 19 | 81 | 81 | 2 | 2 | 30.17 | 1 |
| 20 | 20 | 81 | 81 | 2 | 2 | 30.15 | 1 |
| 21 | 21 | 81 | 81 | 2 | 2 | 30.14 | 1 |
| 22 | 22 | 81 | 81 | 2 | 2 | 30.12 | 1 |
| 23 | 23 | 81 | 81 | 2 | 2 | 30.10 | 1 |
| 24 | 24 | 81 | 81 | 2 | 2 | 30.09 | 1 |
| 25 | 25 | 81 | 81 | 2 | 2 | 30.07 | 1 |
| 26 | 26 | 81 | 81 | 2 | 2 | 30.04 | 1 |
| 27 | 27 | 81 | 81 | 2 | 2 | 30.02 | 1 |
| 28 | 28 | 81 | 81 | 2 | 2 | 30.00 | 1 |
| 29 | 29 | 81 | 81 | 2 | 2 | 29.99 | 1 |
| 30 | 30 | 81 | 81 | 2 | 2 | 29.97 | 1 |
| 31 | 31 | 81 | 81 | 2 | 2 | 29.95 | 1 |
| 32 | 32 | 81 | 81 | 2 | 2 | 29.94 | 1 |
| 33 | 33 | 81 | 81 | 2 | 2 | 29.93 | 1 |



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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 34 | 34 | 81 | 81 | 2 | 2 | 29.92 | 1 |
| 35 | 35 | 81 | 81 | 2 | 2 | 29.91 | 1 |
| 36 | 36 | 81 | 81 | 2 | 2 | 29.90 | 1 |
| 37 | 37 | 81 | 81 | 2 | 2 | 29.88 | 1 |
| 38 | 38 | 81 | 81 | 2 | 2 | 29.86 | 1 |
| 39 | 39 | 81 | 81 | 2 | 2 | 29.85 | 1 |
| 40 | 40 | 81 | 81 | 2 | 2 | 29.83 | 1 |
| 1 | 1 | 81 | 81 | 1 | 1 | 52.44 | 1 |
| 2 | 2 | 81 | 81 | 1 | 1 | 52.41 | 1 |
| 3 | 3 | 81 | 81 | 1 | 1 | 52.37 | 1 |
| 4 | 4 | 81 | 81 | 1 | 1 | 52.34 | 1 |
| 5 | 5 | 81 | 81 | 1 | 1 | 52.31 | 1 |
| 6 | 6 | 81 | 81 | 1 | 1 | 52.27 | 1 |
| 7 | 7 | 81 | 81 | 1 | 1 | 52.24 | 1 |
| 8 | 8 | 81 | 81 | 1 | 1 | 52.20 | 1 |
| 9 | 9 | 81 | 81 | 1 | 1 | 52.17 | 1 |
| 10 | 10 | 81 | 81 | 1 | 1 | 52.13 | 1 |
| 11 | 11 | 81 | 81 | 1 | 1 | 52.10 | 1 |
| 12 | 12 | 81 | 81 | 1 | 1 | 52.07 | 1 |
| 13 | 13 | 81 | 81 | 1 | 1 | 52.04 | 1 |
| 14 | 14 | 81 | 81 | 1 | 1 | 52.01 | 1 |
| 15 | 15 | 81 | 81 | 1 | 1 | 51.98 | 1 |
| 16 | 16 | 81 | 81 | 1 | 1 | 51.95 | 1 |
| 17 | 17 | 81 | 81 | 1 | 1 | 51.91 | 1 |
| 18 | 18 | 81 | 81 | 1 | 1 | 51.88 | 1 |
| 19 | 19 | 81 | 81 | 1 | 1 | 51.84 | 1 |
| 20 | 20 | 81 | 81 | 1 | 1 | 51.82 | 1 |
| 21 | 21 | 81 | 81 | 1 | 1 | 51.81 | 1 |
| 22 | 22 | 81 | 81 | 1 | 1 | 51.79 | 1 |
| 23 | 23 | 81 | 81 | 1 | 1 | 51.77 | 1 |
| 24 | 24 | 81 | 81 | 1 | 1 | 51.76 | 1 |
| 25 | 25 | 81 | 81 | 1 | 1 | 51.74 | 1 |
| 26 | 26 | 81 | 81 | 1 | 1 | 51.71 | 1 |
| 27 | 27 | 81 | 81 | 1 | 1 | 51.69 | 1 |
| 28 | 28 | 81 | 81 | 1 | 1 | 51.67 | 1 |
| 29 | 29 | 81 | 81 | 1 | 1 | 51.66 | 1 |
| 30 | 30 | 81 | 81 | 1 | 1 | 51.64 | 1 |
| 31 | 31 | 81 | 81 | 1 | 1 | 51.62 | 1 |
| 32 | 32 | 81 | 81 | 1 | 1 | 51.61 | 1 |
| 33 | 33 | 81 | 81 | 1 | 1 | 51.60 | 1 |
| 34 | 34 | 81 | 81 | 1 | 1 | 51.59 | 1 |
| 35 | 35 | 81 | 81 | 1 | 1 | 51.58 | 1 |
| 36 | 36 | 81 | 81 | 1 | 1 | 51.57 | 1 |
| 37 | 37 | 81 | 81 | 1 | 1 | 51.55 | 1 |
| 38 | 38 | 81 | 81 | 1 | 1 | 51.53 | 1 |
| 39 | 39 | 81 | 81 | 1 | 1 | 51.52 | 1 |
| 40 | 40 | 81 | 81 | 1 | 1 | 51.50 | 1 |
| 1 | 1 | 1 | 1 | 4 | 4 | -4.570 | 1 |
| 1 | 1 | 2 | 2 | 4 | 4 | -4.550 | 1 |
| 1 | 1 | 3 | 3 | 4 | 4 | -4.530 | 1 |
| 1 | 1 | 4 | 4 | 4 | 4 | -4.510 | 1 |
| 1 | 1 | 5 | 5 | 4 | 4 | -4.500 | 1 |
| 1 | 1 | 6 | 6 | 4 | 4 | -4.480 | 1 |
| 1 | 1 | 7 | 7 | 4 | 4 | -4.300 | 1 |
| 1 | 1 | 8 | 8 | 4 | 4 | -4.240 | 1 |
| 1 | 1 | 1 | 1 | 3 | 3 | 10.17 | 1 |



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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 2 | 2 | 3 | 3 | 10.19 | 1 |
| 1 | 1 | 3 | 3 | 3 | 3 | 10.21 | 1 |
| 1 | 1 | 4 | 4 | 3 | 3 | 10.23 | 1 |
| 1 | 1 | 5 | 5 | 3 | 3 | 10.24 | 1 |
| 1 | 1 | 6 | 6 | 3 | 3 | 10.26 | 1 |
| 1 | 1 | 7 | 7 | 3 | 3 | 10.44 | 1 |
| 1 | 1 | 8 | 8 | 3 | 3 | 10.50 | 1 |
| 1 | 1 | 1 | 1 | 2 | 2 | 18.84 | 1 |
| 1 | 1 | 2 | 2 | 2 | 2 | 18.86 | 1 |
| 1 | 1 | 3 | 3 | 2 | 2 | 18.88 | 1 |
| 1 | 1 | 4 | 4 | 2 | 2 | 18.90 | 1 |
| 1 | 1 | 5 | 5 | 2 | 2 | 18.91 | 1 |
| 1 | 1 | 6 | 6 | 2 | 2 | 18.93 | 1 |
| 1 | 1 | 7 | 7 | 2 | 2 | 19.11 | 1 |
| 1 | 1 | 8 | 8 | 2 | 2 | 19.18 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 40.52 | 1 |
| 1 | 1 | 2 | 2 | 1 | 1 | 40.54 | 1 |
| 1 | 1 | 3 | 3 | 1 | 1 | 40.55 | 1 |
| 1 | 1 | 4 | 4 | 1 | 1 | 40.57 | 1 |
| 1 | 1 | 5 | 5 | 1 | 1 | 40.59 | 1 |
| 1 | 1 | 6 | 6 | 1 | 1 | 40.61 | 1 |
| 1 | 1 | 7 | 7 | 1 | 1 | 40.79 | 1 |
| 1 | 1 | 8 | 8 | 1 | 1 | 40.85 | 1 |

** MASS FRACTION FOR INFLOW AT SPECIFIED PRESSURE B.C. ** (READ ECHO)

| REGION I1 | I2 | J1 | J2 | K1 | K2 | MASS FRACTION | MODIFICATION CODE |
|---|---|---|---|---|---|---|---|
| 1 | 40 | 1 | 81 | 4 | 4 | 0.0000 | 1 |

** SPECIFIED FLUX B.C. ** FLOW

| REGION I1 | I2 | J1 | J2 | K1 | K2 | (AMT/FT**2-D) QFX | M.C.=MODIFICATION CODE M.C. | QFY | M.C. | QFZ | M.C. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 9 | 43 | 49 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 1 | 13 | 19 | 42 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 14 | 14 | 24 | 42 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 15 | 16 | 30 | 35 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 1 | 11 | 16 | 18 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 1 | 9 | 12 | 15 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 1 | 4 | 10 | 11 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 38 | 40 | 80 | 80 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 35 | 40 | 65 | 79 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 38 | 40 | 59 | 64 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 32 | 40 | 5 | 5 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 27 | 40 | 1 | 4 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 1 | 2 | 50 | 54 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 1 | 7 | 73 | 80 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 1 | 2 | 55 | 72 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 19 | 37 | 80 | 80 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 22 | 34 | 74 | 79 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 29 | 34 | 65 | 73 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.4000E-03 | 1 |
| 9 | 18 | 80 | 80 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -2.3000E-03 | 1 |
| 9 | 21 | 74 | 79 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -2.3000E-03 | 1 |
| 4 | 8 | 65 | 71 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -2.3000E-03 | 1 |
| 4 | 5 | 51 | 54 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -2.3000E-03 | 1 |



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| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 10 | 51 | 52 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -2.3000E-03 | 1 |
| 9 | 28 | 65 | 73 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -2.3000E-03 | 1 |
| 13 | 16 | 59 | 60 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -2.3000E-03 | 1 |
| 13 | 15 | 58 | 58 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -2.3000E-03 | 1 |
| 4 | 12 | 59 | 64 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -2.3000E-03 | 1 |
| 13 | 16 | 61 | 64 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -2.3000E-03 | 1 |
| 17 | 37 | 59 | 64 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -2.3000E-03 | 1 |
| 4 | 12 | 55 | 58 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -2.3000E-03 | 1 |
| 13 | 15 | 55 | 57 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -2.3000E-03 | 1 |
| 16 | 40 | 55 | 58 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -2.3000E-03 | 1 |
| 6 | 40 | 53 | 54 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -2.3000E-03 | 1 |
| 11 | 40 | 49 | 52 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -2.3000E-03 | 1 |
| 11 | 40 | 44 | 48 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -2.3000E-03 | 1 |
| 15 | 15 | 37 | 42 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -2.3000E-03 | 1 |
| 17 | 40 | 38 | 43 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -2.3000E-03 | 1 |
| 17 | 17 | 30 | 35 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -2.3000E-03 | 1 |
| 15 | 17 | 36 | 36 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 19 | 40 | 29 | 37 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 17 | 40 | 27 | 28 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 17 | 39 | 12 | 26 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 40 | 40 | 15 | 26 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 16 | 16 | 22 | 28 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 15 | 15 | 19 | 20 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 14 | 14 | 19 | 23 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 10 | 11 | 12 | 15 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 12 | 15 | 12 | 18 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 4 | 5 | 5 | 8 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 6 | 39 | 6 | 10 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 40 | 40 | 6 | 7 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 6 | 31 | 5 | 5 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 2 | 26 | 2 | 4 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |
| 2 | 3 | 5 | 8 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -3.2000E-03 | 1 |

** DENSITY FOR INFLOW AT SPECIFIED FLUID FLUX B.C. ** (READ ECHO)
M.C.=MODIFICATION CODE

| REGION I1 | I2 | J1 | J2 | K1 | K2 | DENSITY | M.C. |
|---|---|---|---|---|---|---|---|
| 1 | 40 | 1 | 80 | 4 | 4 | 62.40 | 1 |

** MASS FRACTION FOR INFLOW AT SPECIFIED FLUID FLUX B.C. ** (READ ECHO)
M.C.=MODIFICATION CODE

| REGION I1 | I2 | J1 | J2 | K1 | K2 | MASS FRACTION | M.C. |
|---|---|---|---|---|---|---|---|
| 1 | 40 | 60 | 80 | 4 | 4 | 0.0000 | 1 |
| 1 | 14 | 58 | 59 | 4 | 4 | 0.0000 | 1 |
| 16 | 40 | 58 | 59 | 4 | 4 | 0.0000 | 1 |
| 1 | 40 | 1 | 57 | 4 | 4 | 0.0000 | 1 |
| 15 | 15 | 59 | 59 | 4 | 4 | 1.0000E-02 | 1 |

** SPECIFIED FLUX B.C. ** SOLUTE
(AMT/FT**2-D) M.C.=MODIFICATION CODE

| REGION I1 | I2 | J1 | J2 | K1 | K2 | QFX | M.C. | QFY | M.C. | QFZ | M.C. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 15 | 58 | 58 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -2.8600E-05 | 1 |

** AQUIFER LEAKAGE PARAMETERS ** (READ ECHO)



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0072366

| REGION I1 | I2 | J1 | J2 | K1 | K2 | POTENTIAL (FT-LBF/LBM) | M.C. | DENSITY (LB/FT**3) | M.C. | VISCOSITY (CP ) | M.C. |
|---|---|---|---|---|---|---|---|---|---|---|---|

M.C.=MODIFICATION CODE

** AQUIFER LEAKAGE PARAMETERS ** (READ ECHO)

| REGION I1 | I2 | J1 | J2 | K1 | K2 | MASS FRACTION | MODIFICATION CODE |
|---|---|---|---|---|---|---|---|
| 1 | 40 | 1 | 81 | 3 | 3 | 0.0000 | 1 |

*** TRANSIENT WELL DATA ***

| WELL NO. | FLOW RATE (FT**3/D) | SURFACE PRESSURE (PSI) | WELL DATUM PRESSURE (PSI) | PRESSURE LIMITED? | INJECTION TEMPERATURE (DEG.F) | INJECTION SCALED MASS FRACTION (-) |
|---|---|---|---|---|---|---|
| 1 | -2.1700E+04 | | | NO | | |
| 2 | -2.1700E+04 | | | NO | | |
| 3 | -481.0 | | | NO | | |

*** CALCULATION INFORMATION ***

AUTOMATIC TIME STEP CONTROL PARAMETERS

| | | | |
|---|---|---|---|
| MAXIMUM PRESSURE CHANGE ALLOWED PER TIME STEP..... | DPTAS | 0.30 | (PSI) |
| MAXIMUM TEMPERATURE CHANGE ALLOWED PER TIME STEP ..... | DTTAS | 1.0 | (DEG.F) |
| MAXIMUM SCALED MASS FRACTION CHANGE ALLOWED PER TIME STEP .. | DCTAS | 5.00E-04 | (-) |
| MINIMUM TIME STEP REQUIRED ..... | DTIMMN | 1.00E-04 | (D) |
| MAXIMUM TIME STEP ALLOWED ..... | DTIMMX | 75. | (D) |

TIME AT WHICH NEXT SET OF TIME VARYING PARAMETERS WILL BE READ ..... TIMCHG 3.154E+08 (S); 3.650E+03 (D)

** MASS FRACTION FOR INFLOW AT SPECIFIED FLUID FLUX B.C. ** (READ ECHO)

M.C.=MODIFICATION CODE

| REGION I1 | I2 | J1 | J2 | K1 | K2 | MASS FRACTION | M.C. |
|---|---|---|---|---|---|---|---|
| 1 | 40 | 60 | 80 | 4 | 4 | 0.0000 | 1 |
| 1 | 14 | 59 | 59 | 4 | 4 | 0.0000 | 1 |
| 16 | 40 | 58 | 59 | 4 | 4 | 0.0000 | 1 |
| 1 | 13 | 58 | 58 | 4 | 4 | 0.0000 | 1 |
| 1 | 40 | 1 | 57 | 4 | 4 | 0.0000 | 1 |

** SPECIFIED FLUX B.C. ** SOLUTE

(AMT/FT**2-D) M.C.=MODIFICATION CODE

| REGION I1 | I2 | J1 | J2 | K1 | K2 | QFX | M.C. | QFY | M.C. | QFZ | M.C. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 15 | 59 | 59 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -4.3300E-06 | 1 |
| 14 | 14 | 58 | 58 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -4.3300E-06 | 1 |
| 15 | 15 | 58 | 58 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.0800E-04 | 1 |



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                    *** CALCULATION INFORMATION ***

                         AUTOMATIC TIME STEP CONTROL PARAMETERS
          MAXIMUM PRESSURE CHANGE ALLOWED PER TIME STEP............... DPTAS   0.30      (PSI)
          MAXIMUM TEMPERATURE CHANGE ALLOWED PER TIME STEP ........... DTTAS    1.0      (DEG.F)
          MAXIMUM SCALED MASS FRACTION CHANGE ALLOWED PER TIME STEP .. DCTAS   5.00E-04  (-)
          MINIMUM TIME STEP REQUIRED ................................ DTIMMN   1.00E-04  (D)
          MAXIMUM TIME STEP ALLOWED ................................. DTIMMX    75.      (D)
 TIME AT WHICH NEXT SET OF TIME VARYING
     PARAMETERS WILL BE READ ............................... TIMCHG  4.730E+08  (S);  5.475E+03  (D)
-----------------------------------------------------------------------------------------------------------

                         ** MASS FRACTION FOR INFLOW AT SPECIFIED FLUID FLUX B.C. **  (READ ECHO)
      REGION                                   M.C.=MODIFICATION CODE
 I1  I2  J1  J2  K1  K2      MASS FRACTION  M.C.
..........................................................................................
  1  40  60  80   4   4        0.0000          1
  1  14  59  59   4   4        0.0000          1
 16  40  59  59   4   4        0.0000          1
  1  13  57  58   4   4        0.0000          1
 17  40  56  58   4   4        0.0000          1
  1  14  56  56   4   4        0.0000          1
  1  17  55  55   4   4        0.0000          1
 18  40  55  55   4   4        0.0000          1
  1  40   1  54   4   4        0.0000          1
 15  16  56  56   4   4        0.7600          1
 17  17  55  55   4   4        0.7600          1

                         ** SPECIFIED FLUX B.C.  **   SOLUTE
      REGION            (AMT/FT**2-D)      M.C.=MODIFICATION CODE
 I1  I2  J1  J2  K1  K2        QFX     M.C.      QFY     M.C.      QFZ     M.C.
..........................................................................................
 16  16  58  58   4   4       0.0000        1       0.0000        1      -2.1700E-05     1
 14  16  57  57   4   4       0.0000        1       0.0000        1      -2.1700E-05     1
 15  15  59  59   4   4       0.0000        1       0.0000        1      -9.0700E-05     1
 14  15  58  58   4   4       0.0000        1       0.0000        1      -9.0700E-05     1
-----------------------------------------------------------------------------------------------------------

                    *** CALCULATION INFORMATION ***

                         AUTOMATIC TIME STEP CONTROL PARAMETERS
          MAXIMUM PRESSURE CHANGE ALLOWED PER TIME STEP............... DPTAS   0.30      (PSI)
          MAXIMUM TEMPERATURE CHANGE ALLOWED PER TIME STEP ........... DTTAS    1.0      (DEG.F)
          MAXIMUM SCALED MASS FRACTION CHANGE ALLOWED PER TIME STEP .. DCTAS   5.00E-04  (-)
          MINIMUM TIME STEP REQUIRED ................................ DTIMMN   1.00E-04  (D)
          MAXIMUM TIME STEP ALLOWED ................................. DTIMMX    75.      (D)
 TIME AT WHICH NEXT SET OF TIME VARYING
     PARAMETERS WILL BE READ ............................... TIMCHG  5.992E+08  (S);  6.935E+03  (D)
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8 4 0 0 0

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** MASS FRACTION FOR INFLOW AT SPECIFIED FLUID FLUX B.C. ** (READ ECHO)
M.C.=MODIFICATION CODE

| REGION I1 | I2 | J1 | J2 | K1 | K2 | MASS FRACTION | M.C. |
|---|---|---|---|---|---|---|---|
| 1 | 40 | 60 | 80 | 4 | 4 | 0.0000 | 1 |
| 1 | 13 | 59 | 59 | 4 | 4 | 0.0000 | 1 |
| 17 | 40 | 57 | 59 | 4 | 4 | 0.0000 | 1 |
| 1 | 12 | 56 | 58 | 4 | 4 | 0.0000 | 1 |
| 1 | 13 | 55 | 55 | 4 | 4 | 0.0000 | 1 |
| 18 | 40 | 55 | 56 | 4 | 4 | 0.0000 | 1 |
| 1 | 15 | 54 | 54 | 4 | 4 | 0.0000 | 1 |
| 19 | 40 | 54 | 54 | 4 | 4 | 0.0000 | 1 |
| 1 | 40 | 1 | 53 | 4 | 4 | 0.0000 | 1 |
| 16 | 16 | 59 | 59 | 4 | 4 | 0.7600 | 1 |
| 13 | 13 | 58 | 58 | 4 | 4 | 0.7600 | 1 |
| 13 | 13 | 57 | 57 | 4 | 4 | 0.7600 | 1 |
| 13 | 16 | 56 | 56 | 4 | 4 | 0.7600 | 1 |
| 14 | 17 | 55 | 55 | 4 | 4 | 0.7600 | 1 |
| 16 | 18 | 54 | 54 | 4 | 4 | 0.7600 | 1 |

** SPECIFIED FLUX B.C. ** SOLUTE
(AMT/FT**2-D) M.C.=MODIFICATION CODE

| REGION I1 | I2 | J1 | J2 | K1 | K2 | QFX | M.C. | QFY | M.C. | QFZ | M.C. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | 15 | 59 | 59 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -8.4600E-05 | 1 |
| 14 | 15 | 58 | 58 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -8.4600E-05 | 1 |
| 16 | 16 | 58 | 58 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.0200E-04 | 1 |
| 15 | 15 | 57 | 57 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -1.0200E-04 | 1 |
| 14 | 14 | 57 | 57 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -2.1700E-05 | 1 |
| 16 | 16 | 57 | 57 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -2.1700E-05 | 1 |
| 17 | 17 | 56 | 56 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -2.1700E-05 | 1 |

*** CALCULATION INFORMATION ***

AUTOMATIC TIME STEP CONTROL PARAMETERS

| | | | |
|---|---|---|---|
| MAXIMUM PRESSURE CHANGE ALLOWED PER TIME STEP..... | DPTAS | 0.30 | (PSI) |
| MAXIMUM TEMPERATURE CHANGE ALLOWED PER TIME STEP ..... | DTTAS | 1.0 | (DEG.F) |
| MAXIMUM SCALED MASS FRACTION CHANGE ALLOWED PER TIME STEP .. | DCTAS | 5.00E-04 | (-) |
| MINIMUM TIME STEP REQUIRED ..... | DTIMMN | 1.00E-04 | (D) |
| MAXIMUM TIME STEP ALLOWED ..... | DTIMMX | 75. | (D) |
| TIME AT WHICH NEXT SET OF TIME VARYING PARAMETERS WILL BE READ ..... | TIMCHG | 6.623E+08 (S); | 7.665E+03 (D) |

** MASS FRACTION FOR INFLOW AT SPECIFIED FLUID FLUX B.C. ** (READ ECHO)
M.C.=MODIFICATION CODE

| REGION I1 | I2 | J1 | J2 | K1 | K2 | MASS FRACTION | M.C. |
|---|---|---|---|---|---|---|---|
| 1 | 40 | 60 | 80 | 4 | 4 | 0.0000 | 1 |
| 1 | 13 | 59 | 59 | 4 | 4 | 0.0000 | 1 |
| 17 | 40 | 58 | 59 | 4 | 4 | 0.0000 | 1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 12 | 56 | 58 | 4 | 4 | 0.0000 | 1 |
| 18 | 40 | 57 | 57 | 4 | 4 | 0.0000 | 1 |
| 19 | 40 | 56 | 56 | 4 | 4 | 0.0000 | 1 |
| 20 | 40 | 53 | 55 | 4 | 4 | 0.0000 | 1 |
| 1 | 13 | 54 | 55 | 4 | 4 | 0.0000 | 1 |
| 1 | 15 | 53 | 53 | 4 | 4 | 0.0000 | 1 |
| 1 | 40 | 1 | 52 | 4 | 4 | 0.0000 | 1 |
| 16 | 16 | 59 | 59 | 4 | 4 | 0.7600 | 1 |
| 13 | 13 | 58 | 58 | 4 | 4 | 0.7600 | 1 |
| 13 | 13 | 57 | 57 | 4 | 4 | 0.7600 | 1 |
| 17 | 17 | 57 | 57 | 4 | 4 | 0.7600 | 1 |
| 13 | 16 | 56 | 56 | 4 | 4 | 0.7600 | 1 |
| 18 | 18 | 56 | 56 | 4 | 4 | 0.7600 | 1 |
| 14 | 19 | 54 | 55 | 4 | 4 | 0.7600 | 1 |
| 16 | 19 | 53 | 53 | 4 | 4 | 0.7600 | 1 |

** SPECIFIED FLUX B.C. ** SOLUTE

| REGION | | | | | | (AMT/FT**2-D) | M.C.=MODIFICATION CODE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| I1 | I2 | J1 | J2 | K1 | K2 | QFX | M.C. | QFY | M.C. | QFZ | M.C. |
| 14 | 15 | 59 | 59 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -7.8400E-05 | 1 |
| 14 | 15 | 58 | 58 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -7.8400E-05 | 1 |
| 16 | 16 | 58 | 58 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -9.5800E-05 | 1 |
| 14 | 16 | 57 | 57 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -9.5800E-05 | 1 |
| 17 | 17 | 56 | 56 | 4 | 4 | 0.0000 | 1 | 0.0000 | 1 | -9.5800E-05 | 1 |

*** CALCULATION INFORMATION ***

AUTOMATIC TIME STEP CONTROL PARAMETERS

MAXIMUM PRESSURE CHANGE ALLOWED PER TIME STEP..... DPTAS 0.30 (PSI)
MAXIMUM TEMPERATURE CHANGE ALLOWED PER TIME STEP ..... DTTAS 1.0 (DEG.F)
MAXIMUM SCALED MASS FRACTION CHANGE ALLOWED PER TIME STEP .. DCTAS 5.00E-04 (-)
MINIMUM TIME STEP REQUIRED ..... DTIMMN 1.00E-04 (D)
MAXIMUM TIME STEP ALLOWED ..... DTIMMX 75. (D)
TIME AT WHICH NEXT SET OF TIME VARYING
PARAMETERS WILL BE READ ..... TIMCHG 6.938E+08 (S); 8.030E+03 (D)

*** OUTPUT AT END OF TIME STEP NO. 387 ***

TIME ..... 6.938E+08 (S); 8.030E+03 (D)

CURRENT TIME STEP LENGTH ..... 2.221E+06 (S); 25.7 (D)

NO. OF P,T,C LOOP ITERATIONS USED ..... 1
NO. OF TWO-LINE SOR ITERATIONS USED
PRESSURE EQUATION (Z-DIRECTION) ..... 10
SOLUTE EQUATION (X-DIRECTION) ..... 5
MAXIMUM CHANGE IN PRESSURE ..... 8.0171E-05 (PSI) AT LOCATION ( 1,29, 4)
MAXIMUM CHANGE IN SCALED MASS FRACTION ..... 5.1016E-04 (-) AT LOCATION (18,53, 4)



00 4 5 0

0 0 7 3 6 0

SOLUTE SCALED MASS FRACTION (-)

AREAL LAYERS

K = 1

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 81 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 80 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 79 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 78 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 77 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 76 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 75 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 74 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 73 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 72 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 71 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 70 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 69 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 68 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 67 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 66 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 65 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 64 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 63 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 62 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 61 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 60 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 59 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 58 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 57 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 56 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 55 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 54 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 53 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 52 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 51 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 50 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 49 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 48 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 47 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 46 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 45 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 44 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 43 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 42 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 41 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 40 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 39 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 38 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 37 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 36 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 35 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 34 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 33 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |



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|---|---|---|---|---|---|---|---|---|---|---|
| 32 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 31 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 30 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 29 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 28 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 27 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 26 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 25 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 24 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 23 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 22 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 21 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 20 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 19 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 18 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 17 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 16 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 15 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00017 |
| 14 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00002 | 0.00018 |
| 13 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00004 | 0.00019 |
| 12 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00002 | 0.00014 | 0.00017 | 0.00019 |
| 11 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00005 | 0.00015 | 0.00017 | 0.00018 |
| 10 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00002 | 0.00011 | 0.00013 | 0.00015 | 0.00016 | 0.00017 |
| 9 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00004 | 0.00011 | 0.00013 | 0.00013 | 0.00014 | 0.00015 |
| 8 | 0.00000 | 0.00000 | 0.00000 | 0.00002 | 0.00005 | 0.00010 | 0.00011 | 0.00012 | 0.00012 | 0.00012 |
| 7 | 0.00000 | 0.00000 | 0.00001 | 0.00007 | 0.00008 | 0.00009 | 0.00009 | 0.00009 | 0.00008 | 0.00008 |
| 6 | 0.00000 | 0.00000 | 0.00001 | 0.00006 | 0.00007 | 0.00007 | 0.00007 | 0.00006 | 0.00005 | 0.00004 |
| 5 | 0.00000 | 0.00001 | 0.00002 | 0.00005 | 0.00006 | 0.00005 | 0.00005 | 0.00004 | 0.00003 | 0.00002 |
| 4 | 0.00003 | 0.00004 | 0.00004 | 0.00004 | 0.00004 | 0.00004 | 0.00003 | 0.00002 | 0.00001 | 0.00001 |
| 3 | 0.00003 | 0.00003 | 0.00003 | 0.00003 | 0.00003 | 0.00002 | 0.00002 | 0.00001 | 0.00001 | 0.00000 |
| 2 | 0.00002 | 0.00002 | 0.00002 | 0.00002 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 1 | 0.00002 | 0.00002 | 0.00002 | 0.00002 | 0.00001 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |

| | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| 81 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 80 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 79 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 78 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 77 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 76 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 75 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 74 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 73 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 72 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 71 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 70 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 69 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 68 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 67 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 66 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 65 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 64 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 63 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 62 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00000 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 61 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00001 | 0.00002 | 0.00002 | 0.00002 | 0.00001 |
| 60 | 0.00000 | 0.00000 | 0.00000 | 0.00002 | 0.00004 | 0.00006 | 0.00007 | 0.00007 | 0.00006 | 0.00004 |
| 59 | 0.00000 | 0.00001 | 0.00004 | 0.00016 | 0.00028 | 0.00030 | 0.00026 | 0.00021 | 0.00015 | 0.00009 |
| 58 | 0.00000 | 0.00000 | -0.00002 | 0.00061 | 0.00172 | 0.00170 | 0.00065 | 0.00046 | 0.00032 | 0.00019 |
| 57 | 0.00000 | 0.00000 | -0.00002 | 0.00088 | 0.00291 | 0.00315 | 0.00133 | 0.00083 | 0.00056 | 0.00035 |
| 56 | 0.00000 | 0.00000 | 0.00001 | 0.00091 | 0.00333 | 0.00398 | 0.00199 | 0.00135 | 0.00085 | 0.00059 |
| 55 | 0.00000 | 0.00001 | 0.00005 | 0.00044 | 0.00145 | 0.00168 | 0.00181 | 0.00172 | 0.00143 | 0.00102 |
| 54 | 0.00000 | 0.00001 | 0.00007 | 0.00070 | 0.00252 | 0.00395 | 0.00381 | 0.00273 | 0.00195 | 0.00134 |
| 53 | 0.00000 | 0.00000 | 0.00004 | 0.00052 | 0.00212 | 0.00377 | 0.00413 | 0.00338 | 0.00261 | 0.00166 |
| 52 | 0.00000 | 0.00001 | 0.00007 | 0.00044 | 0.00155 | 0.00288 | 0.00347 | 0.00315 | 0.00320 | 0.00197 |
| 51 | 0.00000 | 0.00000 | 0.00004 | 0.00029 | 0.00119 | 0.00255 | 0.00350 | 0.00359 | 0.00380 | 0.00232 |
| 50 | 0.00000 | 0.00000 | 0.00002 | 0.00017 | 0.00084 | 0.00211 | 0.00328 | 0.00364 | 0.00420 | 0.00261 |
| 49 | 0.00000 | 0.00000 | 0.00002 | 0.00012 | 0.00060 | 0.00159 | 0.00281 | 0.00328 | 0.00419 | 0.00278 |
| 48 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00018 | 0.00094 | 0.00400 | 0.00439 | 0.00394 | 0.00282 |
| 47 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00021 | 0.00109 | 0.00407 | 0.00459 | 0.00411 | 0.00298 |
| 46 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00013 | 0.00098 | 0.00384 | 0.00455 | 0.00416 | 0.00306 |
| 45 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00009 | 0.00232 | 0.00358 | 0.00431 | 0.00404 | 0.00298 |
| 44 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00009 | 0.00185 | 0.00324 | 0.00412 | 0.00403 | 0.00309 |
| 43 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00008 | 0.00142 | 0.00287 | 0.00387 | 0.00394 | 0.00313 |
| 42 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00007 | 0.00110 | 0.00251 | 0.00357 | 0.00379 | 0.00314 |
| 41 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00005 | 0.00086 | 0.00218 | 0.00323 | 0.00359 | 0.00311 |
| 40 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00004 | 0.00066 | 0.00186 | 0.00287 | 0.00334 | 0.00304 |
| 39 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00003 | 0.00050 | 0.00156 | 0.00247 | 0.00304 | 0.00293 |
| 38 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00037 | 0.00126 | 0.00199 | 0.00266 | 0.00276 |
| 37 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00041 | 0.00108 | 0.00163 | 0.00222 | 0.00251 |
| 36 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00004 | 0.00035 | 0.00147 | 0.00207 | 0.00237 |
| 35 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00002 | 0.00024 | 0.00130 | 0.00194 | 0.00224 |
| 34 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00018 | 0.00115 | 0.00182 | 0.00211 |
| 33 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00016 | 0.00104 | 0.00171 | 0.00198 |
| 32 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00015 | 0.00095 | 0.00161 | 0.00185 |
| 31 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00016 | 0.00089 | 0.00151 | 0.00172 |
| 30 | 0.00000 | 0.00000 | 0.00000 | -0.00001 | 0.00000 | 0.00000 | 0.00017 | 0.00085 | 0.00142 | 0.00158 |
| 29 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00019 | 0.00084 | 0.00132 | 0.00145 |
| 28 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00024 | 0.00087 | 0.00123 | 0.00132 |
| 27 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00076 | 0.00091 | 0.00114 | 0.00120 |
| 26 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00008 | 0.00071 | 0.00088 | 0.00105 | 0.00107 |
| 25 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00012 | 0.00068 | 0.00084 | 0.00096 | 0.00096 |
| 24 | 0.00000 | 0.00000 | -0.00001 | 0.00000 | 0.00000 | 0.00019 | 0.00066 | 0.00079 | 0.00088 | 0.00085 |
| 23 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00055 | 0.00065 | 0.00075 | 0.00080 | 0.00076 |
| 22 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00007 | 0.00053 | 0.00062 | 0.00069 | 0.00072 | 0.00067 |
| 21 | 0.00000 | 0.00000 | 0.00001 | 0.00004 | 0.00017 | 0.00051 | 0.00059 | 0.00064 | 0.00064 | 0.00059 |
| 20 | 0.00000 | 0.00001 | 0.00025 | 0.00037 | 0.00045 | 0.00050 | 0.00056 | 0.00058 | 0.00058 | 0.00052 |
| 19 | -0.00001 | 0.00002 | 0.00028 | 0.00037 | 0.00043 | 0.00048 | 0.00051 | 0.00053 | 0.00051 | 0.00045 |
| 18 | 0.00000 | 0.00004 | 0.00028 | 0.00036 | 0.00041 | 0.00044 | 0.00047 | 0.00047 | 0.00045 | 0.00039 |
| 17 | 0.00000 | 0.00007 | 0.00028 | 0.00034 | 0.00038 | 0.00041 | 0.00042 | 0.00042 | 0.00039 | 0.00034 |
| 16 | 0.00002 | 0.00010 | 0.00028 | 0.00033 | 0.00036 | 0.00038 | 0.00038 | 0.00037 | 0.00034 | 0.00029 |
| 15 | 0.00022 | 0.00025 | 0.00028 | 0.00031 | 0.00033 | 0.00034 | 0.00034 | 0.00033 | 0.00030 | 0.00025 |
| 14 | 0.00022 | 0.00025 | 0.00027 | 0.00029 | 0.00030 | 0.00031 | 0.00030 | 0.00028 | 0.00025 | 0.00021 |
| 13 | 0.00022 | 0.00024 | 0.00025 | 0.00027 | 0.00027 | 0.00027 | 0.00026 | 0.00024 | 0.00021 | 0.00018 |
| 12 | 0.00021 | 0.00022 | 0.00023 | 0.00024 | 0.00024 | 0.00024 | 0.00022 | 0.00020 | 0.00018 | 0.00015 |
| 11 | 0.00019 | 0.00020 | 0.00021 | 0.00021 | 0.00021 | 0.00020 | 0.00018 | 0.00017 | 0.00015 | 0.00012 |
| 10 | 0.00017 | 0.00018 | 0.00018 | 0.00018 | 0.00017 | 0.00016 | 0.00015 | 0.00013 | 0.00011 | 0.00010 |
| 9 | 0.00015 | 0.00015 | 0.00014 | 0.00014 | 0.00013 | 0.00012 | 0.00011 | 0.00010 | 0.00008 | 0.00007 |
| 8 | 0.00011 | 0.00011 | 0.00010 | 0.00009 | 0.00008 | 0.00007 | 0.00006 | 0.00006 | 0.00005 | 0.00004 |
| 7 | 0.00006 | 0.00005 | 0.00004 | 0.00003 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00001 | 0.00001 |
| 6 | 0.00003 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |



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|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 4 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 3 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 2 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 1 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

| | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
|---|---|---|---|---|---|---|---|---|---|---|
| 81 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 80 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 79 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 78 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 77 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 76 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 75 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 74 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 73 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 72 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 71 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 70 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 69 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 68 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 67 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 66 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 65 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 64 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 63 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 62 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 61 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 60 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 59 | 0.00005 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 58 | 0.00010 | 0.00005 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 57 | 0.00020 | 0.00010 | 0.00005 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 56 | 0.00034 | 0.00018 | 0.00008 | 0.00004 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 55 | 0.00055 | 0.00027 | 0.00013 | 0.00006 | 0.00003 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 54 | 0.00074 | 0.00038 | 0.00018 | 0.00008 | 0.00004 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 53 | 0.00093 | 0.00048 | 0.00023 | 0.00011 | 0.00005 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 52 | 0.00111 | 0.00058 | 0.00029 | 0.00014 | 0.00006 | 0.00003 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 51 | 0.00129 | 0.00068 | 0.00034 | 0.00017 | 0.00008 | 0.00004 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 50 | 0.00146 | 0.00077 | 0.00040 | 0.00020 | 0.00009 | 0.00004 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 49 | 0.00157 | 0.00083 | 0.00044 | 0.00022 | 0.00011 | 0.00005 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 48 | 0.00163 | 0.00084 | 0.00045 | 0.00024 | 0.00012 | 0.00006 | 0.00003 | 0.00001 | 0.00001 | 0.00000 |
| 47 | 0.00179 | 0.00094 | 0.00051 | 0.00027 | 0.00014 | 0.00007 | 0.00003 | 0.00001 | 0.00001 | 0.00000 |
| 46 | 0.00189 | 0.00102 | 0.00056 | 0.00030 | 0.00015 | 0.00008 | 0.00004 | 0.00002 | 0.00001 | 0.00000 |
| 45 | 0.00186 | 0.00103 | 0.00058 | 0.00032 | 0.00017 | 0.00008 | 0.00004 | 0.00002 | 0.00001 | 0.00000 |
| 44 | 0.00199 | 0.00115 | 0.00065 | 0.00035 | 0.00018 | 0.00009 | 0.00004 | 0.00002 | 0.00001 | 0.00000 |
| 43 | 0.00210 | 0.00124 | 0.00071 | 0.00038 | 0.00020 | 0.00010 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 42 | 0.00217 | 0.00133 | 0.00076 | 0.00041 | 0.00021 | 0.00010 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 41 | 0.00223 | 0.00140 | 0.00081 | 0.00044 | 0.00022 | 0.00011 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 40 | 0.00227 | 0.00145 | 0.00085 | 0.00046 | 0.00023 | 0.00011 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 39 | 0.00227 | 0.00149 | 0.00088 | 0.00047 | 0.00024 | 0.00012 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 38 | 0.00225 | 0.00151 | 0.00090 | 0.00049 | 0.00025 | 0.00012 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 37 | 0.00217 | 0.00151 | 0.00090 | 0.00049 | 0.00025 | 0.00012 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 36 | 0.00209 | 0.00148 | 0.00090 | 0.00049 | 0.00025 | 0.00012 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 35 | 0.00200 | 0.00143 | 0.00087 | 0.00047 | 0.00024 | 0.00011 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |



0004554

002860

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 34 | 0.00189 | 0.00136 | 0.00083 | 0.00046 | 0.00023 | 0.00011 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 33 | 0.00178 | 0.00128 | 0.00079 | 0.00043 | 0.00022 | 0.00010 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 32 | 0.00166 | 0.00120 | 0.00074 | 0.00041 | 0.00021 | 0.00010 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 31 | 0.00153 | 0.00111 | 0.00068 | 0.00038 | 0.00019 | 0.00009 | 0.00004 | 0.00002 | 0.00001 | 0.00000 |
| 30 | 0.00140 | 0.00101 | 0.00063 | 0.00035 | 0.00018 | 0.00009 | 0.00004 | 0.00002 | 0.00001 | 0.00000 |
| 29 | 0.00127 | 0.00092 | 0.00058 | 0.00032 | 0.00017 | 0.00008 | 0.00004 | 0.00002 | 0.00001 | 0.00000 |
| 28 | 0.00115 | 0.00083 | 0.00053 | 0.00030 | 0.00016 | 0.00008 | 0.00004 | 0.00002 | 0.00001 | 0.00000 |
| 27 | 0.00103 | 0.00075 | 0.00048 | 0.00027 | 0.00014 | 0.00007 | 0.00003 | 0.00002 | 0.00001 | 0.00000 |
| 26 | 0.00092 | 0.00067 | 0.00043 | 0.00025 | 0.00013 | 0.00007 | 0.00003 | 0.00001 | 0.00001 | 0.00000 |
| 25 | 0.00081 | 0.00060 | 0.00038 | 0.00022 | 0.00012 | 0.00006 | 0.00003 | 0.00001 | 0.00001 | 0.00000 |
| 24 | 0.00072 | 0.00053 | 0.00034 | 0.00020 | 0.00011 | 0.00006 | 0.00003 | 0.00001 | 0.00001 | 0.00000 |
| 23 | 0.00063 | 0.00047 | 0.00030 | 0.00018 | 0.00010 | 0.00005 | 0.00002 | 0.00001 | 0.00001 | 0.00000 |
| 22 | 0.00055 | 0.00041 | 0.00027 | 0.00016 | 0.00009 | 0.00005 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 21 | 0.00048 | 0.00036 | 0.00024 | 0.00014 | 0.00008 | 0.00004 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 20 | 0.00042 | 0.00031 | 0.00021 | 0.00013 | 0.00007 | 0.00004 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 19 | 0.00037 | 0.00027 | 0.00018 | 0.00011 | 0.00006 | 0.00003 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 18 | 0.00032 | 0.00024 | 0.00016 | 0.00010 | 0.00006 | 0.00003 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 17 | 0.00027 | 0.00020 | 0.00014 | 0.00009 | 0.00005 | 0.00003 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 16 | 0.00024 | 0.00017 | 0.00012 | 0.00008 | 0.00005 | 0.00003 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 15 | 0.00020 | 0.00015 | 0.00010 | 0.00007 | 0.00004 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 14 | 0.00017 | 0.00013 | 0.00009 | 0.00006 | 0.00003 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 13 | 0.00014 | 0.00011 | 0.00008 | 0.00005 | 0.00003 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 12 | 0.00012 | 0.00009 | 0.00006 | 0.00004 | 0.00003 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 11 | 0.00010 | 0.00007 | 0.00005 | 0.00003 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 10 | 0.00008 | 0.00006 | 0.00004 | 0.00003 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 9 | 0.00006 | 0.00004 | 0.00003 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 8 | 0.00004 | 0.00003 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | -0.00001 | -0.00001 |
| 7 | 0.00001 | 0.00002 | 0.00001 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | -0.00001 | -0.00001 |
| 6 | 0.00000 | 0.00000 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 5 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 4 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 3 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 2 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 1 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

| | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
|---|---|---|---|---|---|---|---|---|---|---|
| 81 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 80 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 79 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 78 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 77 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 76 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 75 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 74 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 73 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 72 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 71 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 70 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 69 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 68 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 67 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 66 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 65 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 64 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 63 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 62 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 61 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 60 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 59 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 58 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 57 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 56 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 55 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 54 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 53 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 52 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 51 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 50 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 49 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 48 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 47 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 46 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 45 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 44 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 43 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 42 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 41 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 40 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 39 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 38 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 37 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 36 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 35 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 34 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 33 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 32 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 31 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 30 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 29 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 28 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 27 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 26 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 25 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 24 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 23 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 22 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 21 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 20 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 19 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 18 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 17 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 16 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 15 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 14 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 13 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 12 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 11 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 10 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 9 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 8 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |



00436
00736

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 7 | -0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 6 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 5 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 4 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 3 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 2 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 1 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

K = 2

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 81 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 80 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 79 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 78 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 77 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 76 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 75 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 74 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 73 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 72 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 71 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 70 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 69 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 68 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 67 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 66 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 65 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 64 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 63 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 62 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 61 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 60 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 59 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 58 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 57 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 56 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 55 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 54 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 53 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 52 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 51 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 50 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 49 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 48 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 47 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 46 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 45 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 44 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 43 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 42 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 41 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 40 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 39 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 38 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 37 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 36 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 35 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 34 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 33 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 32 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 31 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 30 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 29 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 28 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 27 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 26 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 25 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 24 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 23 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 22 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 21 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 20 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 19 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 18 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 17 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 16 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | -0.00008 | 0.00002 |
| 15 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | -0.00002 | 0.00016 |
| 14 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00006 | 0.00017 |
| 13 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00001 | 0.00009 | 0.00018 |
| 12 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | -0.00001 | 0.00003 | 0.00011 | 0.00015 | 0.00017 | 0.00018 |
| 11 | 0.00000 | 0.00000 | 0.00000 | 0.00002 | 0.00006 | 0.00008 | 0.00013 | 0.00016 | 0.00017 | 0.00018 |
| 10 | -0.00001 | 0.00000 | 0.00003 | 0.00005 | 0.00007 | 0.00012 | 0.00014 | 0.00015 | 0.00016 | 0.00017 |
| 9 | 0.00001 | 0.00004 | 0.00006 | 0.00009 | 0.00010 | 0.00012 | 0.00013 | 0.00014 | 0.00014 | 0.00015 |
| 8 | 0.00003 | 0.00004 | 0.00005 | 0.00009 | 0.00011 | 0.00012 | 0.00011 | 0.00011 | 0.00011 | 0.00011 |
| 7 | 0.00003 | 0.00004 | 0.00004 | 0.00008 | 0.00009 | 0.00009 | 0.00009 | 0.00008 | 0.00007 | 0.00006 |
| 6 | 0.00003 | 0.00003 | 0.00003 | 0.00006 | 0.00006 | 0.00006 | 0.00005 | 0.00004 | 0.00003 | 0.00002 |
| 5 | 0.00003 | 0.00003 | 0.00004 | 0.00005 | 0.00005 | 0.00004 | 0.00003 | 0.00002 | 0.00001 | 0.00001 |
| 4 | 0.00003 | 0.00003 | 0.00003 | 0.00003 | 0.00003 | 0.00002 | 0.00002 | 0.00001 | 0.00001 | 0.00000 |
| 3 | 0.00002 | 0.00002 | 0.00002 | 0.00002 | 0.00002 | 0.00001 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 2 | 0.00002 | 0.00002 | 0.00002 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 1 | 0.00002 | 0.00002 | 0.00002 | 0.00001 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

| | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| 81 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 80 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 79 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 78 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 77 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 76 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 75 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 74 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 73 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 72 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 71 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 70 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 69 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 68 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 67 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 66 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |



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|---|---|---|---|---|---|---|---|---|---|---|
| 65 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 64 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 63 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 62 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00001 | 0.00002 | 0.00002 | 0.00001 | 0.00001 | 0.00001 |
| 61 | 0.00000 | 0.00000 | 0.00000 | 0.00003 | 0.00006 | 0.00007 | 0.00006 | 0.00005 | 0.00004 | 0.00003 |
| 60 | 0.00000 | 0.00000 | 0.00000 | 0.00015 | 0.00026 | 0.00028 | 0.00025 | 0.00018 | 0.00014 | 0.00007 |
| 59 | 0.00000 | 0.00000 | 0.00006 | 0.00056 | 0.00095 | 0.00098 | 0.00095 | 0.00060 | 0.00038 | 0.00016 |
| 58 | 0.00000 | 0.00000 | 0.00003 | 0.00181 | 0.00346 | 0.00422 | 0.00238 | 0.00125 | 0.00071 | 0.00034 |
| 57 | 0.00000 | -0.00002 | 0.00011 | 0.00319 | 0.00652 | 0.00838 | 0.00488 | 0.00237 | 0.00132 | 0.00065 |
| 56 | 0.00001 | -0.00004 | 0.00031 | 0.00380 | 0.00845 | 0.01137 | 0.00767 | 0.00400 | 0.00230 | 0.00125 |
| 55 | 0.00001 | 0.00005 | 0.00067 | 0.00349 | 0.00777 | 0.01080 | 0.00887 | 0.00545 | 0.00354 | 0.00188 |
| 54 | 0.00001 | 0.00002 | 0.00051 | 0.00308 | 0.00760 | 0.01143 | 0.01093 | 0.00783 | 0.00465 | 0.00245 |
| 53 | 0.00000 | 0.00001 | 0.00036 | 0.00245 | 0.00665 | 0.01102 | 0.01200 | 0.00992 | 0.00599 | 0.00306 |
| 52 | 0.00001 | 0.00006 | 0.00040 | 0.00191 | 0.00497 | 0.00848 | 0.01001 | 0.00893 | 0.00630 | 0.00331 |
| 51 | 0.00000 | 0.00003 | 0.00027 | 0.00140 | 0.00393 | 0.00753 | 0.01005 | 0.01019 | 0.00741 | 0.00401 |
| 50 | 0.00000 | 0.00002 | 0.00018 | 0.00094 | 0.00273 | 0.00596 | 0.00885 | 0.00980 | 0.00762 | 0.00434 |
| 49 | 0.00000 | 0.00002 | 0.00020 | 0.00082 | 0.00192 | 0.00405 | 0.00633 | 0.00749 | 0.00679 | 0.00413 |
| 48 | 0.00000 | 0.00001 | 0.00007 | 0.00041 | 0.00169 | 0.00365 | 0.00597 | 0.00726 | 0.00673 | 0.00437 |
| 47 | 0.00000 | 0.00000 | 0.00004 | 0.00023 | 0.00125 | 0.00289 | 0.00516 | 0.00662 | 0.00637 | 0.00439 |
| 46 | 0.00000 | 0.00000 | 0.00002 | 0.00012 | 0.00083 | 0.00218 | 0.00439 | 0.00600 | 0.00597 | 0.00435 |
| 45 | 0.00000 | 0.00000 | 0.00001 | 0.00006 | 0.00051 | 0.00169 | 0.00368 | 0.00551 | 0.00560 | 0.00434 |
| 44 | 0.00000 | 0.00000 | 0.00000 | 0.00003 | 0.00027 | 0.00129 | 0.00310 | 0.00484 | 0.00514 | 0.00415 |
| 43 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00013 | 0.00096 | 0.00260 | 0.00422 | 0.00471 | 0.00397 |
| 42 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00006 | 0.00072 | 0.00218 | 0.00369 | 0.00429 | 0.00377 |
| 41 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00004 | 0.00056 | 0.00185 | 0.00322 | 0.00390 | 0.00357 |
| 40 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00002 | 0.00044 | 0.00157 | 0.00280 | 0.00353 | 0.00336 |
| 39 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00002 | 0.00034 | 0.00132 | 0.00240 | 0.00316 | 0.00315 |
| 38 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00027 | 0.00109 | 0.00198 | 0.00276 | 0.00292 |
| 37 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00002 | 0.00025 | 0.00096 | 0.00162 | 0.00233 | 0.00266 |
| 36 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00015 | 0.00059 | 0.00137 | 0.00211 | 0.00246 |
| 35 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00002 | 0.00014 | 0.00044 | 0.00111 | 0.00193 | 0.00229 |
| 34 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00006 | 0.00034 | 0.00100 | 0.00178 | 0.00213 |
| 33 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00004 | 0.00029 | 0.00093 | 0.00166 | 0.00198 |
| 32 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00006 | 0.00029 | 0.00089 | 0.00156 | 0.00184 |
| 31 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00010 | 0.00033 | 0.00088 | 0.00147 | 0.00169 |
| 30 | 0.00000 | 0.00000 | -0.00001 | -0.00013 | 0.00004 | 0.00018 | 0.00039 | 0.00087 | 0.00138 | 0.00155 |
| 29 | 0.00000 | 0.00000 | 0.00000 | -0.00001 | 0.00013 | 0.00022 | 0.00043 | 0.00086 | 0.00128 | 0.00141 |
| 28 | 0.00000 | 0.00000 | 0.00000 | 0.00003 | 0.00016 | 0.00024 | 0.00050 | 0.00087 | 0.00119 | 0.00127 |
| 27 | 0.00000 | 0.00000 | 0.00000 | 0.00004 | 0.00017 | 0.00026 | 0.00062 | 0.00087 | 0.00110 | 0.00114 |
| 26 | 0.00000 | 0.00000 | 0.00000 | 0.00005 | 0.00018 | 0.00029 | 0.00064 | 0.00084 | 0.00101 | 0.00102 |
| 25 | 0.00000 | 0.00000 | 0.00000 | -0.00001 | 0.00008 | 0.00041 | 0.00064 | 0.00081 | 0.00092 | 0.00092 |
| 24 | 0.00000 | 0.00000 | -0.00013 | 0.00011 | 0.00021 | 0.00043 | 0.00063 | 0.00076 | 0.00084 | 0.00081 |
| 23 | 0.00000 | 0.00000 | 0.00002 | 0.00013 | 0.00022 | 0.00048 | 0.00061 | 0.00071 | 0.00076 | 0.00072 |
| 22 | 0.00000 | 0.00000 | 0.00005 | 0.00015 | 0.00025 | 0.00049 | 0.00059 | 0.00066 | 0.00068 | 0.00064 |
| 21 | 0.00000 | 0.00000 | 0.00003 | 0.00023 | 0.00037 | 0.00049 | 0.00056 | 0.00061 | 0.00061 | 0.00056 |
| 20 | 0.00000 | 0.00001 | 0.00020 | 0.00030 | 0.00040 | 0.00047 | 0.00053 | 0.00056 | 0.00055 | 0.00049 |
| 19 | -0.00011 | 0.00004 | 0.00024 | 0.00033 | 0.00040 | 0.00045 | 0.00049 | 0.00050 | 0.00049 | 0.00043 |
| 18 | -0.00002 | 0.00018 | 0.00026 | 0.00033 | 0.00038 | 0.00042 | 0.00045 | 0.00045 | 0.00043 | 0.00038 |
| 17 | 0.00008 | 0.00019 | 0.00027 | 0.00032 | 0.00036 | 0.00039 | 0.00041 | 0.00041 | 0.00038 | 0.00033 |
| 16 | 0.00012 | 0.00020 | 0.00027 | 0.00031 | 0.00034 | 0.00036 | 0.00037 | 0.00036 | 0.00033 | 0.00029 |
| 15 | 0.00020 | 0.00023 | 0.00027 | 0.00030 | 0.00032 | 0.00033 | 0.00033 | 0.00032 | 0.00029 | 0.00025 |
| 14 | 0.00021 | 0.00023 | 0.00026 | 0.00028 | 0.00030 | 0.00030 | 0.00030 | 0.00028 | 0.00025 | 0.00021 |
| 13 | 0.00021 | 0.00023 | 0.00024 | 0.00026 | 0.00027 | 0.00027 | 0.00026 | 0.00024 | 0.00022 | 0.00018 |
| 12 | 0.00020 | 0.00022 | 0.00023 | 0.00024 | 0.00024 | 0.00024 | 0.00023 | 0.00021 | 0.00018 | 0.00015 |
| 11 | 0.00019 | 0.00020 | 0.00021 | 0.00021 | 0.00021 | 0.00020 | 0.00019 | 0.00017 | 0.00015 | 0.00013 |
| 10 | 0.00017 | 0.00018 | 0.00018 | 0.00018 | 0.00018 | 0.00017 | 0.00016 | 0.00014 | 0.00012 | 0.00010 |



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|---|---|---|---|---|---|---|---|---|---|---|
| 9 | 0.00015 | 0.00015 | 0.00015 | 0.00015 | 0.00014 | 0.00014 | 0.00013 | 0.00012 | 0.00011 | 0.00010 |
| 8 | 0.00010 | 0.00009 | 0.00009 | 0.00007 | 0.00006 | 0.00005 | 0.00004 | 0.00003 | 0.00003 | 0.00003 |
| 7 | 0.00005 | 0.00003 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 6 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 5 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 4 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 3 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 2 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 1 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

| | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
|---|---|---|---|---|---|---|---|---|---|---|
| 81 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 80 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 79 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 78 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 77 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 76 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 75 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 74 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 73 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 72 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 71 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 70 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 69 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 68 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 67 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 66 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 65 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 64 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 63 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 62 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 61 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 60 | 0.00003 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 59 | 0.00007 | 0.00003 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 58 | 0.00015 | 0.00007 | 0.00003 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 57 | 0.00031 | 0.00014 | 0.00006 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 56 | 0.00060 | 0.00027 | 0.00012 | 0.00005 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 55 | 0.00087 | 0.00039 | 0.00017 | 0.00007 | 0.00003 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 54 | 0.00118 | 0.00054 | 0.00024 | 0.00010 | 0.00004 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 53 | 0.00149 | 0.00069 | 0.00031 | 0.00014 | 0.00006 | 0.00003 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 52 | 0.00168 | 0.00081 | 0.00038 | 0.00017 | 0.00008 | 0.00003 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 51 | 0.00205 | 0.00100 | 0.00047 | 0.00022 | 0.00010 | 0.00004 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 50 | 0.00229 | 0.00115 | 0.00055 | 0.00026 | 0.00012 | 0.00005 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 49 | 0.00229 | 0.00120 | 0.00060 | 0.00029 | 0.00014 | 0.00006 | 0.00003 | 0.00001 | 0.00001 | 0.00000 |
| 48 | 0.00253 | 0.00139 | 0.00072 | 0.00036 | 0.00017 | 0.00008 | 0.00003 | 0.00002 | 0.00001 | 0.00000 |
| 47 | 0.00264 | 0.00147 | 0.00077 | 0.00039 | 0.00019 | 0.00009 | 0.00004 | 0.00002 | 0.00001 | 0.00000 |
| 46 | 0.00272 | 0.00155 | 0.00083 | 0.00042 | 0.00020 | 0.00010 | 0.00004 | 0.00002 | 0.00001 | 0.00000 |
| 45 | 0.00283 | 0.00166 | 0.00091 | 0.00047 | 0.00023 | 0.00011 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 44 | 0.00280 | 0.00168 | 0.00093 | 0.00048 | 0.00024 | 0.00011 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 43 | 0.00276 | 0.00169 | 0.00095 | 0.00050 | 0.00025 | 0.00012 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 42 | 0.00271 | 0.00170 | 0.00096 | 0.00051 | 0.00025 | 0.00012 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 41 | 0.00265 | 0.00170 | 0.00098 | 0.00052 | 0.00026 | 0.00012 | 0.00006 | 0.00002 | 0.00001 | 0.00000 |
| 40 | 0.00259 | 0.00170 | 0.00099 | 0.00053 | 0.00026 | 0.00012 | 0.00006 | 0.00002 | 0.00001 | 0.00000 |
| 39 | 0.00251 | 0.00168 | 0.00099 | 0.00053 | 0.00027 | 0.00013 | 0.00006 | 0.00003 | 0.00001 | 0.00000 |



00440

00360

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 38 | 0.00242 | 0.00166 | 0.00099 | 0.00053 | 0.00027 | 0.00013 | 0.00006 | 0.00002 | 0.00001 | 0.00000 |
| 37 | 0.00231 | 0.00163 | 0.00098 | 0.00053 | 0.00027 | 0.00013 | 0.00006 | 0.00002 | 0.00001 | 0.00000 |
| 36 | 0.00219 | 0.00156 | 0.00095 | 0.00051 | 0.00026 | 0.00012 | 0.00006 | 0.00002 | 0.00001 | 0.00000 |
| 35 | 0.00206 | 0.00148 | 0.00091 | 0.00049 | 0.00025 | 0.00012 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 34 | 0.00193 | 0.00139 | 0.00085 | 0.00047 | 0.00023 | 0.00011 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 33 | 0.00179 | 0.00130 | 0.00080 | 0.00044 | 0.00022 | 0.00010 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 32 | 0.00165 | 0.00120 | 0.00074 | 0.00040 | 0.00020 | 0.00010 | 0.00004 | 0.00002 | 0.00001 | 0.00000 |
| 31 | 0.00151 | 0.00110 | 0.00068 | 0.00037 | 0.00019 | 0.00009 | 0.00004 | 0.00002 | 0.00001 | 0.00000 |
| 30 | 0.00137 | 0.00100 | 0.00062 | 0.00035 | 0.00018 | 0.00009 | 0.00004 | 0.00002 | 0.00001 | 0.00000 |
| 29 | 0.00124 | 0.00090 | 0.00057 | 0.00032 | 0.00016 | 0.00008 | 0.00004 | 0.00002 | 0.00001 | 0.00000 |
| 28 | 0.00111 | 0.00081 | 0.00051 | 0.00029 | 0.00015 | 0.00007 | 0.00003 | 0.00002 | 0.00001 | 0.00000 |
| 27 | 0.00099 | 0.00072 | 0.00046 | 0.00026 | 0.00014 | 0.00007 | 0.00003 | 0.00001 | 0.00001 | 0.00000 |
| 26 | 0.00088 | 0.00064 | 0.00041 | 0.00024 | 0.00013 | 0.00006 | 0.00003 | 0.00001 | 0.00001 | 0.00000 |
| 25 | 0.00078 | 0.00057 | 0.00037 | 0.00022 | 0.00012 | 0.00006 | 0.00003 | 0.00001 | 0.00001 | 0.00000 |
| 24 | 0.00069 | 0.00050 | 0.00033 | 0.00019 | 0.00011 | 0.00005 | 0.00003 | 0.00001 | 0.00001 | 0.00000 |
| 23 | 0.00060 | 0.00044 | 0.00029 | 0.00017 | 0.00010 | 0.00005 | 0.00002 | 0.00001 | 0.00001 | 0.00000 |
| 22 | 0.00053 | 0.00039 | 0.00026 | 0.00016 | 0.00009 | 0.00004 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 21 | 0.00046 | 0.00034 | 0.00023 | 0.00014 | 0.00008 | 0.00004 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 20 | 0.00040 | 0.00030 | 0.00020 | 0.00012 | 0.00007 | 0.00004 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 19 | 0.00035 | 0.00026 | 0.00018 | 0.00011 | 0.00006 | 0.00003 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 18 | 0.00031 | 0.00023 | 0.00015 | 0.00010 | 0.00006 | 0.00003 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 17 | 0.00027 | 0.00020 | 0.00014 | 0.00009 | 0.00005 | 0.00003 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 16 | 0.00023 | 0.00017 | 0.00012 | 0.00007 | 0.00004 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 15 | 0.00020 | 0.00015 | 0.00010 | 0.00007 | 0.00004 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 14 | 0.00017 | 0.00013 | 0.00009 | 0.00006 | 0.00003 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 13 | 0.00015 | 0.00011 | 0.00008 | 0.00005 | 0.00003 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 12 | 0.00012 | 0.00009 | 0.00006 | 0.00004 | 0.00003 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 11 | 0.00010 | 0.00008 | 0.00005 | 0.00004 | 0.00002 | 0.00001 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 10 | 0.00008 | 0.00006 | 0.00005 | 0.00003 | 0.00002 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00000 |
| 9 | 0.00008 | 0.00006 | 0.00004 | 0.00003 | 0.00002 | 0.00002 | 0.00002 | 0.00001 | 0.00001 | 0.00001 |
| 8 | 0.00003 | 0.00003 | 0.00003 | 0.00003 | 0.00003 | 0.00003 | 0.00004 | 0.00004 | 0.00004 | 0.00003 |
| 7 | 0.00000 | 0.00000 | 0.00001 | 0.00001 | 0.00002 | 0.00002 | 0.00003 | 0.00004 | 0.00006 | 0.00006 |
| 6 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00001 | 0.00001 | 0.00002 | 0.00002 | 0.00002 |
| 5 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 |
| 4 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 3 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 2 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 1 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

| | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
|---|---|---|---|---|---|---|---|---|---|---|
| 81 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 80 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 79 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 78 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 77 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 76 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 75 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 74 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 73 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 72 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 71 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 70 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 69 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 68 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 67 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 66 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 65 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 64 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 63 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 62 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 61 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 60 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 59 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 58 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 57 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 56 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 55 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 54 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 53 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 52 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 51 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 50 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 49 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 48 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 47 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 46 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 45 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 44 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 43 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 42 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 41 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 40 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 39 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 38 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 37 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 36 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 35 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 34 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 33 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 32 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 31 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 30 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 29 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 28 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 27 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 26 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 25 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 24 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 23 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 22 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 21 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 20 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 19 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 18 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 17 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 16 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 15 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 14 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 13 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 12 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

0004402

00736 0

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 11 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 10 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 9 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 8 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 7 | 0.00004 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 6 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 5 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 4 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 3 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 2 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 1 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

K = 3

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 81 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 80 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 79 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 78 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 77 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 76 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 75 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 74 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 73 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 72 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 71 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 70 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 69 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 68 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 67 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 66 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 65 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 64 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 63 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 62 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 61 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 60 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 59 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 58 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 57 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 56 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 55 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 54 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 53 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 52 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 51 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 50 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 49 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 48 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 47 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 46 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 45 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 44 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 43 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 42 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 41 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |



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|---|---|---|---|---|---|---|---|---|---|---|
| 40 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 39 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 38 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 37 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 36 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 35 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 34 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 33 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 32 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 31 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 30 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 29 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 28 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 27 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 26 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 25 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 24 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 23 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 22 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 21 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 20 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 19 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 18 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 |
| 17 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00002 |
| 16 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00010 | 0.00014 |
| 15 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00011 | 0.00015 |
| 14 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00012 | 0.00016 |
| 13 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00001 | 0.00002 | 0.00003 | 0.00013 | 0.00016 |
| 12 | 0.00000 | 0.00000 | 0.00000 | 0.00005 | 0.00008 | 0.00010 | 0.00012 | 0.00014 | 0.00015 | 0.00017 |
| 11 | 0.00000 | 0.00000 | 0.00001 | 0.00008 | 0.00011 | 0.00012 | 0.00014 | 0.00015 | 0.00015 | 0.00017 |
| 10 | 0.00005 | 0.00007 | 0.00008 | 0.00009 | 0.00011 | 0.00013 | 0.00013 | 0.00014 | 0.00015 | 0.00016 |
| 9 | 0.00007 | 0.00008 | 0.00009 | 0.00010 | 0.00011 | 0.00011 | 0.00012 | 0.00012 | 0.00013 | 0.00013 |
| 8 | 0.00006 | 0.00007 | 0.00007 | 0.00007 | 0.00007 | 0.00007 | 0.00008 | 0.00008 | 0.00007 | 0.00006 |
| 7 | 0.00005 | 0.00005 | 0.00005 | 0.00005 | 0.00005 | 0.00005 | 0.00005 | 0.00004 | 0.00004 | 0.00003 |
| 6 | 0.00004 | 0.00004 | 0.00004 | 0.00004 | 0.00004 | 0.00004 | 0.00003 | 0.00002 | 0.00002 | 0.00001 |
| 5 | 0.00003 | 0.00003 | 0.00003 | 0.00003 | 0.00003 | 0.00002 | 0.00002 | 0.00001 | 0.00001 | 0.00000 |
| 4 | 0.00003 | 0.00003 | 0.00003 | 0.00002 | 0.00002 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 3 | 0.00002 | 0.00002 | 0.00002 | 0.00002 | 0.00001 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 2 | 0.00002 | 0.00002 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 1 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

| | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| 81 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 80 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 79 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 78 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 77 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 76 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 75 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 74 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 73 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 72 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 71 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 70 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |



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|---|---|---|---|---|---|---|---|---|---|---|
| 69 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 68 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 67 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 66 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 65 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 64 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 63 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 62 | 0.00000 | 0.00000 | 0.00000 | 0.00002 | 0.00004 | 0.00004 | 0.00003 | 0.00002 | 0.00001 | 0.00001 |
| 61 | 0.00000 | 0.00000 | 0.00000 | 0.00011 | 0.00020 | 0.00019 | 0.00014 | 0.00008 | 0.00005 | 0.00003 |
| 60 | 0.00000 | 0.00000 | 0.00001 | 0.00056 | 0.00095 | 0.00081 | 0.00052 | 0.00029 | 0.00016 | 0.00009 |
| 59 | 0.00000 | 0.00001 | 0.00008 | 0.00211 | 0.00329 | 0.00273 | 0.00163 | 0.00084 | 0.00042 | 0.00021 |
| 58 | 0.00000 | 0.00000 | 0.00011 | 0.00517 | 0.00835 | 0.00894 | 0.00473 | 0.00215 | 0.00098 | 0.00045 |
| 57 | 0.00001 | -0.00004 | 0.00043 | 0.00767 | 0.01302 | 0.01533 | 0.00943 | 0.00438 | 0.00196 | 0.00089 |
| 56 | 0.00001 | -0.00009 | 0.00085 | 0.00787 | 0.01460 | 0.01841 | 0.01491 | 0.00782 | 0.00362 | 0.00164 |
| 55 | 0.00001 | 0.00007 | 0.00141 | 0.00747 | 0.01437 | 0.01884 | 0.01737 | 0.01108 | 0.00635 | 0.00289 |
| 54 | 0.00001 | 0.00003 | 0.00090 | 0.00541 | 0.01167 | 0.01671 | 0.01687 | 0.01225 | 0.00736 | 0.00352 |
| 53 | 0.00001 | 0.00002 | 0.00062 | 0.00418 | 0.00992 | 0.01587 | 0.01768 | 0.01460 | 0.00971 | 0.00473 |
| 52 | 0.00001 | 0.00008 | 0.00068 | 0.00335 | 0.00806 | 0.01357 | 0.01646 | 0.01524 | 0.01152 | 0.00628 |
| 51 | 0.00001 | 0.00004 | 0.00038 | 0.00219 | 0.00580 | 0.01076 | 0.01421 | 0.01416 | 0.01092 | 0.00614 |
| 50 | 0.00000 | 0.00002 | 0.00023 | 0.00140 | 0.00398 | 0.00815 | 0.01176 | 0.01267 | 0.01022 | 0.00606 |
| 49 | 0.00000 | 0.00003 | 0.00026 | 0.00112 | 0.00296 | 0.00604 | 0.00936 | 0.01093 | 0.00963 | 0.00631 |
| 48 | 0.00000 | 0.00002 | 0.00015 | 0.00070 | 0.00212 | 0.00458 | 0.00742 | 0.00910 | 0.00844 | 0.00580 |
| 47 | 0.00000 | 0.00001 | 0.00008 | 0.00041 | 0.00145 | 0.00342 | 0.00591 | 0.00769 | 0.00752 | 0.00543 |
| 46 | 0.00000 | 0.00000 | 0.00004 | 0.00023 | 0.00093 | 0.00247 | 0.00471 | 0.00656 | 0.00674 | 0.00513 |
| 45 | 0.00000 | 0.00000 | 0.00002 | 0.00012 | 0.00057 | 0.00176 | 0.00375 | 0.00565 | 0.00607 | 0.00486 |
| 44 | 0.00000 | 0.00000 | 0.00001 | 0.00006 | 0.00032 | 0.00122 | 0.00298 | 0.00483 | 0.00545 | 0.00457 |
| 43 | 0.00000 | 0.00000 | 0.00001 | 0.00003 | 0.00016 | 0.00084 | 0.00238 | 0.00413 | 0.00488 | 0.00428 |
| 42 | 0.00000 | 0.00000 | 0.00001 | 0.00002 | 0.00008 | 0.00061 | 0.00196 | 0.00357 | 0.00437 | 0.00396 |
| 41 | 0.00000 | 0.00000 | 0.00000 | 0.00002 | 0.00005 | 0.00047 | 0.00164 | 0.00308 | 0.00392 | 0.00371 |
| 40 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00004 | 0.00038 | 0.00139 | 0.00267 | 0.00352 | 0.00345 |
| 39 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00003 | 0.00030 | 0.00117 | 0.00230 | 0.00315 | 0.00321 |
| 38 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00002 | 0.00023 | 0.00096 | 0.00195 | 0.00278 | 0.00296 |
| 37 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00017 | 0.00076 | 0.00161 | 0.00243 | 0.00271 |
| 36 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00011 | 0.00054 | 0.00131 | 0.00213 | 0.00248 |
| 35 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00003 | 0.00012 | 0.00040 | 0.00104 | 0.00185 | 0.00226 |
| 34 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00010 | 0.00035 | 0.00095 | 0.00173 | 0.00210 |
| 33 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00009 | 0.00033 | 0.00091 | 0.00163 | 0.00195 |
| 32 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00011 | 0.00034 | 0.00090 | 0.00153 | 0.00180 |
| 31 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00003 | 0.00018 | 0.00039 | 0.00089 | 0.00143 | 0.00165 |
| 30 | 0.00000 | 0.00000 | 0.00000 | 0.00015 | 0.00023 | 0.00028 | 0.00046 | 0.00089 | 0.00134 | 0.00151 |
| 29 | 0.00000 | 0.00000 | 0.00000 | 0.00015 | 0.00026 | 0.00034 | 0.00052 | 0.00088 | 0.00124 | 0.00136 |
| 28 | 0.00000 | 0.00000 | 0.00000 | 0.00014 | 0.00026 | 0.00037 | 0.00056 | 0.00087 | 0.00115 | 0.00122 |
| 27 | 0.00000 | 0.00000 | 0.00000 | 0.00013 | 0.00027 | 0.00039 | 0.00060 | 0.00085 | 0.00106 | 0.00110 |
| 26 | 0.00000 | 0.00000 | 0.00000 | 0.00013 | 0.00028 | 0.00041 | 0.00061 | 0.00081 | 0.00097 | 0.00098 |
| 25 | 0.00000 | 0.00000 | 0.00002 | 0.00016 | 0.00029 | 0.00044 | 0.00061 | 0.00077 | 0.00088 | 0.00087 |
| 24 | 0.00000 | -0.00001 | 0.00015 | 0.00019 | 0.00030 | 0.00045 | 0.00060 | 0.00073 | 0.00080 | 0.00078 |
| 23 | 0.00000 | 0.00000 | 0.00013 | 0.00020 | 0.00032 | 0.00046 | 0.00059 | 0.00068 | 0.00073 | 0.00069 |
| 22 | 0.00000 | 0.00000 | 0.00012 | 0.00021 | 0.00033 | 0.00047 | 0.00057 | 0.00064 | 0.00066 | 0.00061 |
| 21 | 0.00000 | 0.00001 | 0.00012 | 0.00023 | 0.00036 | 0.00046 | 0.00054 | 0.00058 | 0.00059 | 0.00054 |
| 20 | 0.00001 | 0.00003 | 0.00017 | 0.00026 | 0.00038 | 0.00045 | 0.00051 | 0.00053 | 0.00052 | 0.00047 |
| 19 | 0.00013 | 0.00018 | 0.00022 | 0.00029 | 0.00037 | 0.00043 | 0.00047 | 0.00049 | 0.00047 | 0.00042 |
| 18 | 0.00014 | 0.00019 | 0.00024 | 0.00030 | 0.00036 | 0.00041 | 0.00043 | 0.00044 | 0.00041 | 0.00036 |
| 17 | 0.00015 | 0.00020 | 0.00024 | 0.00030 | 0.00035 | 0.00038 | 0.00040 | 0.00039 | 0.00036 | 0.00032 |
| 16 | 0.00017 | 0.00021 | 0.00025 | 0.00029 | 0.00033 | 0.00035 | 0.00036 | 0.00035 | 0.00032 | 0.00028 |
| 15 | 0.00018 | 0.00021 | 0.00025 | 0.00028 | 0.00031 | 0.00032 | 0.00032 | 0.00031 | 0.00028 | 0.00024 |
| 14 | 0.00019 | 0.00021 | 0.00024 | 0.00027 | 0.00029 | 0.00029 | 0.00029 | 0.00027 | 0.00025 | 0.00021 |



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| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 13 | 0.00019 | 0.00021 | 0.00023 | 0.00025 | 0.00026 | 0.00026 | 0.00026 | 0.00024 | 0.00022 | 0.00018 |
| 12 | 0.00019 | 0.00020 | 0.00022 | 0.00023 | 0.00024 | 0.00023 | 0.00022 | 0.00021 | 0.00018 | 0.00016 |
| 11 | 0.00018 | 0.00019 | 0.00020 | 0.00020 | 0.00020 | 0.00019 | 0.00018 | 0.00017 | 0.00015 | 0.00013 |
| 10 | 0.00017 | 0.00017 | 0.00017 | 0.00017 | 0.00017 | 0.00016 | 0.00015 | 0.00014 | 0.00012 | 0.00010 |
| 9 | 0.00012 | 0.00012 | 0.00010 | 0.00009 | 0.00007 | 0.00006 | 0.00004 | 0.00004 | 0.00003 | 0.00003 |
| 8 | 0.00005 | 0.00004 | 0.00003 | 0.00003 | 0.00002 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 |
| 7 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 6 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 5 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 4 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 3 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 2 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 1 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

| | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
|---|---|---|---|---|---|---|---|---|---|---|
| 81 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 80 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 79 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 78 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 77 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 76 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 75 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 74 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 73 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 72 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 71 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 70 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 69 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 68 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 67 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 66 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 65 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 64 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 63 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 62 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 61 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 60 | 0.00004 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 59 | 0.00010 | 0.00004 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 58 | 0.00019 | 0.00008 | 0.00003 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 57 | 0.00037 | 0.00015 | 0.00006 | 0.00003 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 56 | 0.00069 | 0.00028 | 0.00012 | 0.00005 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 55 | 0.00125 | 0.00052 | 0.00021 | 0.00009 | 0.00004 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 54 | 0.00156 | 0.00067 | 0.00028 | 0.00012 | 0.00005 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 53 | 0.00211 | 0.00091 | 0.00039 | 0.00016 | 0.00007 | 0.00003 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 52 | 0.00294 | 0.00129 | 0.00056 | 0.00024 | 0.00010 | 0.00004 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 51 | 0.00300 | 0.00138 | 0.00062 | 0.00027 | 0.00012 | 0.00005 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 50 | 0.00313 | 0.00151 | 0.00070 | 0.00032 | 0.00014 | 0.00006 | 0.00003 | 0.00001 | 0.00000 | 0.00000 |
| 49 | 0.00348 | 0.00175 | 0.00084 | 0.00039 | 0.00018 | 0.00008 | 0.00003 | 0.00001 | 0.00001 | 0.00000 |
| 48 | 0.00337 | 0.00179 | 0.00089 | 0.00042 | 0.00019 | 0.00009 | 0.00004 | 0.00002 | 0.00001 | 0.00000 |
| 47 | 0.00331 | 0.00182 | 0.00093 | 0.00045 | 0.00021 | 0.00010 | 0.00004 | 0.00002 | 0.00001 | 0.00000 |
| 46 | 0.00326 | 0.00185 | 0.00097 | 0.00048 | 0.00023 | 0.00010 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 45 | 0.00321 | 0.00188 | 0.00101 | 0.00051 | 0.00024 | 0.00011 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 44 | 0.00314 | 0.00189 | 0.00103 | 0.00053 | 0.00025 | 0.00012 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 43 | 0.00304 | 0.00188 | 0.00105 | 0.00054 | 0.00026 | 0.00012 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |



00400
00236

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 42 | 0.00290 | 0.00183 | 0.00104 | 0.00054 | 0.00027 | 0.00012 | 0.00006 | 0.00002 | 0.00001 | 0.00000 |
| 41 | 0.00281 | 0.00182 | 0.00105 | 0.00055 | 0.00027 | 0.00013 | 0.00006 | 0.00002 | 0.00001 | 0.00000 |
| 40 | 0.00271 | 0.00179 | 0.00105 | 0.00056 | 0.00027 | 0.00013 | 0.00006 | 0.00003 | 0.00001 | 0.00000 |
| 39 | 0.00259 | 0.00175 | 0.00103 | 0.00055 | 0.00027 | 0.00013 | 0.00006 | 0.00003 | 0.00001 | 0.00000 |
| 38 | 0.00247 | 0.00170 | 0.00101 | 0.00054 | 0.00027 | 0.00013 | 0.00006 | 0.00002 | 0.00001 | 0.00000 |
| 37 | 0.00233 | 0.00164 | 0.00099 | 0.00053 | 0.00027 | 0.00012 | 0.00006 | 0.00002 | 0.00001 | 0.00000 |
| 36 | 0.00219 | 0.00156 | 0.00095 | 0.00051 | 0.00026 | 0.00012 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 35 | 0.00205 | 0.00148 | 0.00090 | 0.00049 | 0.00024 | 0.00012 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 34 | 0.00190 | 0.00138 | 0.00084 | 0.00046 | 0.00023 | 0.00011 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 33 | 0.00176 | 0.00127 | 0.00078 | 0.00043 | 0.00022 | 0.00010 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 32 | 0.00162 | 0.00117 | 0.00072 | 0.00040 | 0.00020 | 0.00010 | 0.00004 | 0.00002 | 0.00001 | 0.00000 |
| 31 | 0.00147 | 0.00107 | 0.00066 | 0.00037 | 0.00019 | 0.00009 | 0.00004 | 0.00002 | 0.00001 | 0.00000 |
| 30 | 0.00134 | 0.00097 | 0.00061 | 0.00034 | 0.00017 | 0.00008 | 0.00004 | 0.00002 | 0.00001 | 0.00000 |
| 29 | 0.00120 | 0.00087 | 0.00055 | 0.00031 | 0.00016 | 0.00008 | 0.00004 | 0.00002 | 0.00001 | 0.00000 |
| 28 | 0.00107 | 0.00078 | 0.00050 | 0.00028 | 0.00015 | 0.00007 | 0.00003 | 0.00002 | 0.00001 | 0.00000 |
| 27 | 0.00095 | 0.00070 | 0.00045 | 0.00026 | 0.00014 | 0.00007 | 0.00003 | 0.00001 | 0.00001 | 0.00000 |
| 26 | 0.00084 | 0.00062 | 0.00040 | 0.00023 | 0.00012 | 0.00006 | 0.00003 | 0.00001 | 0.00001 | 0.00000 |
| 25 | 0.00074 | 0.00055 | 0.00035 | 0.00021 | 0.00011 | 0.00006 | 0.00003 | 0.00001 | 0.00001 | 0.00000 |
| 24 | 0.00066 | 0.00049 | 0.00032 | 0.00019 | 0.00010 | 0.00005 | 0.00003 | 0.00001 | 0.00001 | 0.00000 |
| 23 | 0.00058 | 0.00043 | 0.00028 | 0.00017 | 0.00009 | 0.00005 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 22 | 0.00051 | 0.00038 | 0.00025 | 0.00015 | 0.00008 | 0.00004 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 21 | 0.00044 | 0.00033 | 0.00022 | 0.00013 | 0.00007 | 0.00004 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 20 | 0.00039 | 0.00029 | 0.00019 | 0.00012 | 0.00007 | 0.00004 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 19 | 0.00034 | 0.00025 | 0.00017 | 0.00011 | 0.00006 | 0.00003 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 18 | 0.00029 | 0.00022 | 0.00015 | 0.00009 | 0.00005 | 0.00003 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 17 | 0.00026 | 0.00019 | 0.00013 | 0.00008 | 0.00005 | 0.00003 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 16 | 0.00022 | 0.00017 | 0.00011 | 0.00007 | 0.00004 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 15 | 0.00019 | 0.00015 | 0.00010 | 0.00006 | 0.00004 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 14 | 0.00017 | 0.00013 | 0.00009 | 0.00006 | 0.00003 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 13 | 0.00015 | 0.00011 | 0.00008 | 0.00005 | 0.00003 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 12 | 0.00013 | 0.00009 | 0.00007 | 0.00004 | 0.00003 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 11 | 0.00010 | 0.00008 | 0.00006 | 0.00004 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 10 | 0.00008 | 0.00006 | 0.00005 | 0.00003 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 9 | 0.00002 | 0.00002 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | -0.00001 | 0.00000 | |
| 8 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00000 | -0.00001 | -0.00002 | -0.00003 | -0.00003 | -0.00002 |
| 7 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00001 | 0.00001 | 0.00000 | -0.00001 | -0.00004 | -0.00005 |
| 6 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00001 | 0.00001 | 0.00000 |
| 5 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 4 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 3 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 2 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 1 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

| | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
|---|---|---|---|---|---|---|---|---|---|---|
| 81 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 80 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 79 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 78 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 77 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 76 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 75 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 74 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 73 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 72 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 71 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 70 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 69 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 68 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 67 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 66 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 65 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 64 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 63 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 62 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 61 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 60 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 59 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 58 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 57 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 56 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 55 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 54 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 53 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 52 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 51 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 50 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 49 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 48 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 47 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 46 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 45 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 44 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 43 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 42 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 41 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 40 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 39 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 38 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 37 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 36 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 35 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 34 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 33 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 32 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 31 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 30 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 29 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 28 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 27 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 26 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 25 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 24 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 23 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 22 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 21 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 20 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 19 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 18 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 17 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 16 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |



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| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 14 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 13 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 12 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 11 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 10 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 9 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 8 | -0.00002 | -0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 7 | -0.00003 | -0.00002 | -0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 6 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 5 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 4 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 3 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 2 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 1 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

K = 4

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 81 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 80 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 79 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 78 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 77 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 76 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 75 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 74 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 73 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 72 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 71 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 70 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 69 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 68 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 67 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 66 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 65 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 64 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 63 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 62 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 61 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 60 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 59 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 58 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 57 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 56 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 55 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 54 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 53 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 52 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 51 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 50 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 49 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 48 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 47 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 46 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 45 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 44 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 43 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 42 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 41 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 40 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 39 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 38 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 37 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 36 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 35 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 34 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 33 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 32 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 31 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 30 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 29 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 28 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 27 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 26 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 25 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 24 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 23 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 22 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 21 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 20 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 19 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 |
| 18 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 17 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00002 |
| 16 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00010 | 0.00014 |
| 15 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00011 | 0.00015 |
| 14 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00012 | 0.00015 |
| 13 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00001 | 0.00002 | 0.00004 | 0.00013 | 0.00016 |
| 12 | 0.00000 | 0.00000 | 0.00000 | 0.00004 | 0.00008 | 0.00010 | 0.00012 | 0.00013 | 0.00014 | 0.00016 |
| 11 | 0.00000 | 0.00000 | 0.00001 | 0.00005 | 0.00009 | 0.00011 | 0.00012 | 0.00013 | 0.00014 | 0.00016 |
| 10 | 0.00004 | 0.00005 | 0.00006 | 0.00007 | 0.00010 | 0.00011 | 0.00013 | 0.00013 | 0.00014 | 0.00015 |
| 9 | 0.00004 | 0.00005 | 0.00007 | 0.00008 | 0.00009 | 0.00010 | 0.00009 | 0.00009 | 0.00008 | 0.00008 |
| 8 | 0.00001 | 0.00003 | 0.00006 | 0.00006 | 0.00006 | 0.00006 | 0.00006 | 0.00006 | 0.00005 | 0.00005 |
| 7 | 0.00001 | 0.00003 | 0.00004 | 0.00004 | 0.00004 | 0.00003 | 0.00003 | 0.00003 | 0.00002 | 0.00002 |
| 6 | 0.00003 | 0.00003 | 0.00003 | 0.00003 | 0.00003 | 0.00003 | 0.00002 | 0.00001 | 0.00001 | 0.00001 |
| 5 | 0.00003 | 0.00003 | 0.00003 | 0.00002 | 0.00002 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 4 | 0.00002 | 0.00002 | 0.00002 | 0.00002 | 0.00001 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 3 | 0.00002 | 0.00002 | 0.00002 | 0.00001 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 2 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 1 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

| | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| 81 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 80 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 79 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 78 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 77 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 76 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 75 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 74 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |



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|---|---|---|---|---|---|---|---|---|---|---|
| 73 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 72 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 71 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 70 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 69 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 68 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 67 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 66 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 65 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 64 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 63 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00002 | 0.00002 | 0.00001 | 0.00001 | 0.00001 | 0.00000 |
| 62 | 0.00000 | 0.00000 | 0.00000 | 0.00005 | 0.00010 | 0.00009 | 0.00006 | 0.00004 | 0.00002 | 0.00001 |
| 61 | 0.00000 | 0.00000 | 0.00001 | 0.00033 | 0.00059 | 0.00048 | 0.00029 | 0.00015 | 0.00008 | 0.00004 |
| 60 | 0.00000 | 0.00002 | 0.00014 | 0.00231 | 0.00346 | 0.00235 | 0.00123 | 0.00058 | 0.00026 | 0.00012 |
| 59 | 0.00001 | 0.00015 | 0.00159 | 0.01615 | 0.02036 | 0.01087 | 0.00478 | 0.00203 | 0.00084 | 0.00035 |
| 58 | 0.00001 | 0.00003 | 0.00123 | 0.02494 | 0.03319 | 0.03259 | 0.01138 | 0.00427 | 0.00164 | 0.00064 |
| 57 | 0.00001 | -0.00015 | 0.00361 | 0.03165 | 0.04342 | 0.04657 | 0.02305 | 0.00867 | 0.00323 | 0.00122 |
| 56 | 0.00002 | -0.00029 | 0.00496 | 0.02398 | 0.03659 | 0.04189 | 0.03951 | 0.01764 | 0.00641 | 0.00230 |
| 55 | 0.00003 | -0.00022 | 0.00274 | 0.01874 | 0.03112 | 0.03778 | 0.03753 | 0.02308 | 0.01288 | 0.00431 |
| 54 | 0.00003 | 0.00020 | 0.00296 | 0.01556 | 0.02688 | 0.03455 | 0.03586 | 0.02741 | 0.01844 | 0.00746 |
| 53 | 0.00002 | 0.00007 | 0.00151 | 0.00932 | 0.01848 | 0.02917 | 0.03234 | 0.02726 | 0.02022 | 0.00836 |
| 52 | 0.00001 | 0.00002 | 0.00080 | 0.00558 | 0.01258 | 0.02134 | 0.02548 | 0.02300 | 0.01771 | 0.00868 |
| 51 | 0.00001 | 0.00001 | 0.00042 | 0.00331 | 0.00842 | 0.01546 | 0.01993 | 0.01931 | 0.01541 | 0.00846 |
| 50 | 0.00000 | 0.00000 | 0.00024 | 0.00199 | 0.00560 | 0.01110 | 0.01546 | 0.01611 | 0.01342 | 0.00808 |
| 49 | 0.00001 | 0.00003 | 0.00028 | 0.00147 | 0.00407 | 0.00816 | 0.01197 | 0.01339 | 0.01186 | 0.00799 |
| 48 | 0.00000 | 0.00002 | 0.00016 | 0.00091 | 0.00269 | 0.00579 | 0.00915 | 0.01097 | 0.01024 | 0.00729 |
| 47 | 0.00000 | 0.00001 | 0.00009 | 0.00055 | 0.00176 | 0.00409 | 0.00697 | 0.00897 | 0.00886 | 0.00666 |
| 46 | 0.00000 | 0.00000 | 0.00005 | 0.00032 | 0.00112 | 0.00284 | 0.00529 | 0.00734 | 0.00768 | 0.00608 |
| 45 | 0.00000 | 0.00000 | 0.00003 | 0.00017 | 0.00068 | 0.00194 | 0.00400 | 0.00602 | 0.00668 | 0.00556 |
| 44 | 0.00000 | 0.00000 | 0.00001 | 0.00009 | 0.00038 | 0.00129 | 0.00302 | 0.00495 | 0.00582 | 0.00509 |
| 43 | 0.00000 | 0.00000 | 0.00001 | 0.00004 | 0.00020 | 0.00085 | 0.00231 | 0.00410 | 0.00508 | 0.00465 |
| 42 | 0.00000 | 0.00000 | 0.00001 | 0.00004 | 0.00015 | 0.00063 | 0.00183 | 0.00338 | 0.00438 | 0.00424 |
| 41 | 0.00000 | 0.00000 | 0.00000 | 0.00003 | 0.00010 | 0.00047 | 0.00152 | 0.00292 | 0.00391 | 0.00388 |
| 40 | 0.00000 | 0.00000 | 0.00000 | 0.00002 | 0.00007 | 0.00037 | 0.00129 | 0.00255 | 0.00350 | 0.00356 |
| 39 | 0.00000 | 0.00000 | 0.00000 | 0.00002 | 0.00005 | 0.00029 | 0.00109 | 0.00222 | 0.00313 | 0.00327 |
| 38 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00003 | 0.00022 | 0.00090 | 0.00191 | 0.00280 | 0.00300 |
| 37 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00002 | 0.00015 | 0.00070 | 0.00162 | 0.00249 | 0.00275 |
| 36 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00001 | 0.00009 | 0.00049 | 0.00131 | 0.00221 | 0.00251 |
| 35 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00003 | 0.00010 | 0.00037 | 0.00103 | 0.00197 | 0.00229 |
| 34 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00009 | 0.00033 | 0.00094 | 0.00180 | 0.00211 |
| 33 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00009 | 0.00031 | 0.00093 | 0.00165 | 0.00193 |
| 32 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00011 | 0.00033 | 0.00095 | 0.00152 | 0.00176 |
| 31 | 0.00000 | 0.00000 | 0.00000 | 0.00001 | 0.00004 | 0.00019 | 0.00039 | 0.00096 | 0.00141 | 0.00159 |
| 30 | 0.00000 | 0.00000 | 0.00001 | 0.00016 | 0.00027 | 0.00030 | 0.00047 | 0.00096 | 0.00130 | 0.00144 |
| 29 | 0.00000 | 0.00000 | 0.00000 | 0.00016 | 0.00030 | 0.00037 | 0.00055 | 0.00093 | 0.00120 | 0.00129 |
| 28 | 0.00000 | 0.00000 | 0.00000 | 0.00015 | 0.00032 | 0.00041 | 0.00060 | 0.00089 | 0.00110 | 0.00116 |
| 27 | 0.00000 | 0.00000 | 0.00000 | 0.00013 | 0.00034 | 0.00044 | 0.00061 | 0.00084 | 0.00101 | 0.00104 |
| 26 | 0.00000 | 0.00000 | 0.00001 | 0.00013 | 0.00035 | 0.00045 | 0.00061 | 0.00080 | 0.00093 | 0.00093 |
| 25 | 0.00000 | 0.00000 | 0.00002 | 0.00016 | 0.00036 | 0.00046 | 0.00060 | 0.00075 | 0.00084 | 0.00083 |
| 24 | 0.00000 | 0.00001 | 0.00015 | 0.00021 | 0.00037 | 0.00046 | 0.00059 | 0.00070 | 0.00076 | 0.00073 |
| 23 | 0.00000 | 0.00000 | 0.00014 | 0.00021 | 0.00037 | 0.00046 | 0.00057 | 0.00065 | 0.00069 | 0.00065 |
| 22 | 0.00000 | 0.00001 | 0.00013 | 0.00021 | 0.00038 | 0.00046 | 0.00054 | 0.00060 | 0.00062 | 0.00058 |
| 21 | 0.00000 | 0.00001 | 0.00013 | 0.00021 | 0.00038 | 0.00046 | 0.00052 | 0.00056 | 0.00056 | 0.00051 |
| 20 | 0.00001 | 0.00003 | 0.00016 | 0.00023 | 0.00036 | 0.00045 | 0.00049 | 0.00051 | 0.00050 | 0.00045 |
| 19 | 0.00012 | 0.00017 | 0.00019 | 0.00025 | 0.00035 | 0.00043 | 0.00045 | 0.00046 | 0.00044 | 0.00039 |
| 18 | 0.00014 | 0.00018 | 0.00021 | 0.00026 | 0.00034 | 0.00041 | 0.00042 | 0.00042 | 0.00039 | 0.00035 |



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|---|---|---|---|---|---|---|---|---|---|---|
| 17 | 0.00015 | 0.00019 | 0.00022 | 0.00027 | 0.00032 | 0.00038 | 0.00038 | 0.00038 | 0.00035 | 0.00031 |
| 16 | 0.00016 | 0.00019 | 0.00022 | 0.00026 | 0.00030 | 0.00035 | 0.00035 | 0.00034 | 0.00031 | 0.00027 |
| 15 | 0.00017 | 0.00020 | 0.00023 | 0.00026 | 0.00029 | 0.00032 | 0.00031 | 0.00030 | 0.00028 | 0.00024 |
| 14 | 0.00017 | 0.00020 | 0.00022 | 0.00025 | 0.00027 | 0.00029 | 0.00029 | 0.00027 | 0.00025 | 0.00021 |
| 13 | 0.00018 | 0.00020 | 0.00022 | 0.00024 | 0.00026 | 0.00027 | 0.00026 | 0.00024 | 0.00022 | 0.00019 |
| 12 | 0.00017 | 0.00019 | 0.00021 | 0.00023 | 0.00024 | 0.00025 | 0.00024 | 0.00022 | 0.00020 | 0.00017 |
| 11 | 0.00017 | 0.00019 | 0.00020 | 0.00022 | 0.00023 | 0.00023 | 0.00022 | 0.00021 | 0.00019 | 0.00016 |
| 10 | 0.00016 | 0.00017 | 0.00017 | 0.00017 | 0.00017 | 0.00016 | 0.00016 | 0.00014 | 0.00013 | 0.00011 |
| 9 | 0.00007 | 0.00006 | 0.00006 | 0.00005 | 0.00004 | 0.00003 | 0.00003 | 0.00002 | 0.00002 | 0.00002 |
| 8 | 0.00004 | 0.00003 | 0.00002 | 0.00002 | 0.00002 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00001 |
| 7 | 0.00001 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 6 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 5 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 4 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 3 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 2 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 1 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

| | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
|---|---|---|---|---|---|---|---|---|---|---|
| 81 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 80 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 79 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 78 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 77 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 76 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 75 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 74 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 73 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 72 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 71 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 70 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 69 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 68 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 67 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 66 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 65 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 64 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 63 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 62 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 61 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 60 | 0.00005 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 59 | 0.00014 | 0.00006 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 58 | 0.00025 | 0.00010 | 0.00004 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 57 | 0.00046 | 0.00018 | 0.00007 | 0.00003 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 56 | 0.00085 | 0.00032 | 0.00013 | 0.00005 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 55 | 0.00154 | 0.00058 | 0.00022 | 0.00009 | 0.00004 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 54 | 0.00283 | 0.00106 | 0.00040 | 0.00016 | 0.00006 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 53 | 0.00329 | 0.00128 | 0.00050 | 0.00020 | 0.00008 | 0.00003 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 52 | 0.00371 | 0.00152 | 0.00062 | 0.00026 | 0.00011 | 0.00004 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 51 | 0.00393 | 0.00172 | 0.00074 | 0.00031 | 0.00013 | 0.00005 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 50 | 0.00409 | 0.00191 | 0.00086 | 0.00038 | 0.00016 | 0.00007 | 0.00003 | 0.00001 | 0.00000 | 0.00000 |
| 49 | 0.00448 | 0.00225 | 0.00106 | 0.00048 | 0.00021 | 0.00009 | 0.00004 | 0.00002 | 0.00001 | 0.00000 |
| 48 | 0.00431 | 0.00227 | 0.00111 | 0.00051 | 0.00023 | 0.00010 | 0.00004 | 0.00002 | 0.00001 | 0.00000 |
| 47 | 0.00413 | 0.00226 | 0.00114 | 0.00054 | 0.00025 | 0.00011 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |



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00048 22

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 46 | 0.00395 | 0.00224 | 0.00116 | 0.00056 | 0.00026 | 0.00011 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 45 | 0.00377 | 0.00221 | 0.00117 | 0.00058 | 0.00027 | 0.00012 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 44 | 0.00359 | 0.00217 | 0.00118 | 0.00059 | 0.00028 | 0.00013 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 43 | 0.00341 | 0.00213 | 0.00118 | 0.00060 | 0.00029 | 0.00013 | 0.00006 | 0.00002 | 0.00001 | 0.00000 |
| 42 | 0.00327 | 0.00213 | 0.00122 | 0.00064 | 0.00031 | 0.00014 | 0.00006 | 0.00003 | 0.00001 | 0.00000 |
| 41 | 0.00306 | 0.00203 | 0.00118 | 0.00062 | 0.00030 | 0.00014 | 0.00006 | 0.00003 | 0.00001 | 0.00000 |
| 40 | 0.00287 | 0.00194 | 0.00114 | 0.00060 | 0.00030 | 0.00014 | 0.00006 | 0.00003 | 0.00001 | 0.00000 |
| 39 | 0.00270 | 0.00184 | 0.00110 | 0.00058 | 0.00029 | 0.00013 | 0.00006 | 0.00003 | 0.00001 | 0.00000 |
| 38 | 0.00252 | 0.00175 | 0.00105 | 0.00056 | 0.00028 | 0.00013 | 0.00006 | 0.00003 | 0.00001 | 0.00000 |
| 37 | 0.00235 | 0.00165 | 0.00100 | 0.00054 | 0.00027 | 0.00013 | 0.00006 | 0.00002 | 0.00001 | 0.00000 |
| 36 | 0.00219 | 0.00155 | 0.00095 | 0.00051 | 0.00026 | 0.00012 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 35 | 0.00202 | 0.00145 | 0.00089 | 0.00048 | 0.00024 | 0.00011 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 34 | 0.00187 | 0.00135 | 0.00082 | 0.00045 | 0.00023 | 0.00011 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 33 | 0.00172 | 0.00124 | 0.00076 | 0.00042 | 0.00021 | 0.00010 | 0.00005 | 0.00002 | 0.00001 | 0.00000 |
| 32 | 0.00157 | 0.00114 | 0.00070 | 0.00039 | 0.00020 | 0.00009 | 0.00004 | 0.00002 | 0.00001 | 0.00000 |
| 31 | 0.00142 | 0.00103 | 0.00064 | 0.00036 | 0.00018 | 0.00009 | 0.00004 | 0.00002 | 0.00001 | 0.00000 |
| 30 | 0.00127 | 0.00093 | 0.00058 | 0.00032 | 0.00017 | 0.00008 | 0.00004 | 0.00002 | 0.00001 | 0.00000 |
| 29 | 0.00114 | 0.00084 | 0.00053 | 0.00030 | 0.00015 | 0.00007 | 0.00003 | 0.00002 | 0.00001 | 0.00000 |
| 28 | 0.00102 | 0.00075 | 0.00048 | 0.00027 | 0.00014 | 0.00007 | 0.00003 | 0.00001 | 0.00001 | 0.00000 |
| 27 | 0.00091 | 0.00067 | 0.00043 | 0.00025 | 0.00013 | 0.00006 | 0.00003 | 0.00001 | 0.00001 | 0.00000 |
| 26 | 0.00080 | 0.00059 | 0.00039 | 0.00022 | 0.00012 | 0.00006 | 0.00003 | 0.00001 | 0.00001 | 0.00000 |
| 25 | 0.00071 | 0.00053 | 0.00034 | 0.00020 | 0.00011 | 0.00005 | 0.00003 | 0.00001 | 0.00001 | 0.00000 |
| 24 | 0.00062 | 0.00046 | 0.00030 | 0.00018 | 0.00010 | 0.00005 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 23 | 0.00055 | 0.00041 | 0.00027 | 0.00016 | 0.00009 | 0.00005 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 22 | 0.00048 | 0.00035 | 0.00024 | 0.00014 | 0.00008 | 0.00004 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 21 | 0.00042 | 0.00031 | 0.00021 | 0.00013 | 0.00007 | 0.00004 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 20 | 0.00037 | 0.00027 | 0.00018 | 0.00011 | 0.00006 | 0.00003 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 19 | 0.00032 | 0.00024 | 0.00016 | 0.00010 | 0.00006 | 0.00003 | 0.00002 | 0.00001 | 0.00000 | 0.00000 |
| 18 | 0.00028 | 0.00021 | 0.00014 | 0.00009 | 0.00005 | 0.00003 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 17 | 0.00025 | 0.00018 | 0.00013 | 0.00008 | 0.00005 | 0.00003 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 16 | 0.00022 | 0.00016 | 0.00011 | 0.00007 | 0.00004 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 15 | 0.00019 | 0.00014 | 0.00010 | 0.00006 | 0.00004 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 14 | 0.00017 | 0.00013 | 0.00009 | 0.00006 | 0.00003 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 |
| 13 | 0.00015 | 0.00011 | 0.00008 | 0.00005 | 0.00003 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 12 | 0.00014 | 0.00010 | 0.00007 | 0.00005 | 0.00003 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 11 | 0.00013 | 0.00010 | 0.00007 | 0.00004 | 0.00003 | 0.00002 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 10 | 0.00009 | 0.00007 | 0.00005 | 0.00003 | 0.00002 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 0.00000 |
| 9 | 0.00002 | 0.00002 | 0.00001 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | -0.00001 | -0.00001 | -0.00001 |
| 8 | 0.00001 | 0.00001 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | -0.00001 | -0.00001 | -0.00002 | -0.00002 |
| 7 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | -0.00001 | -0.00001 | -0.00001 |
| 6 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 5 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 4 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 3 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 2 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 1 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

| | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
|---|---|---|---|---|---|---|---|---|---|---|
| 81 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 80 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 79 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 78 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 77 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 76 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 75 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 74 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 73 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 72 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 71 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 70 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 69 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 68 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 67 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 66 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 65 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 64 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 63 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 62 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 61 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 60 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 59 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 58 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 57 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 56 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 55 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 54 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 53 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 52 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 51 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 50 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 49 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 48 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 47 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 46 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 45 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 44 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 43 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 42 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 41 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 40 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 39 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 38 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 37 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 36 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 35 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 34 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 33 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 32 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 31 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 30 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 29 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 28 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 27 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 26 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 25 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 24 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 23 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 22 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 21 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 20 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |



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|---|---|---|---|---|---|---|---|---|---|---|
| 19 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 18 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 17 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 16 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 15 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 14 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 13 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 12 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 11 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 10 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 9 | -0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 8 | -0.00001 | -0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 7 | -0.00001 | -0.00001 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 6 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 5 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 4 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 3 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 2 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| 1 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

*** GLOBAL FLOW BALANCE SUMMARY ***

| CURRENT TIME STEP | RATES | | AMOUNTS | |
|---|---|---|---|---|
| FLUID INFLOW | 3.313035E+07 | (LB/D) | 8.514831E+08 | (LB) |
| FLUID OUTFLOW | 3.313015E+07 | (LB/D) | 8.514780E+08 | (LB) |
| CHANGE IN FLUID IN REGION | 1.787259E+02 | (LB/D) | 4.593434E+03 | (LB) |
| RESIDUAL IMBALANCE | -1.995228E+01 | (LB/D) | -5.127935E+02 | (LB) |
| FRACTIONAL IMBALANCE | | | 0.0000 | |
| SOLUTE INFLOW | 1.303015E+01 | (LB/D) | 3.348879E+02 | (LB) |
| SOLUTE OUTFLOW | 4.286880E-01 | (LB/D) | 1.101771E+01 | (LB) |
| CHANGE IN SOLUTE IN REGION | 1.189359E+01 | (LB/D) | 3.056773E+02 | (LB) |
| SOLUTE AMOUNT DECAYED | | | 2.079158E+01 | (LB) |
| RESIDUAL IMBALANCE | 1.011109E-01 | (LB/D) | 2.598651E+00 | (LB) |
| FRACTIONAL IMBALANCE | | | 0.0078 | |

CUMULATIVE SUMMARY

| | AMOUNTS | |
|---|---|---|
| FLUID INFLOW | 2.665681E+11 | (LB) |
| FLUID OUTFLOW | 2.656295E+11 | (LB) |
| CHANGE IN FLUID IN REGION | 3.141432E+09 | (LB) |
| FLUID IN REGION | 4.800643E+10 | (LB) |
| RESIDUAL IMBALANCE | 2.202889E+09 | (LB) |
| FRACTIONAL IMBALANCE | 0.0083 | |
| SOLUTE INFLOW | 2.053341E+04 | (LB) |
| SOLUTE OUTFLOW | 7.364163E+02 | (LB) |
| CHANGE IN SOLUTE IN REGION | 1.872637E+04 | (LB) |
| SOLUTE IN REGION | 1.872637E+04 | (LB) |
| SOLUTE AMOUNT DECAYED | 1.222777E+03 | (LB) |
| RESIDUAL IMBALANCE | 1.521460E+02 | (LB) |
| FRACTIONAL IMBALANCE | 0.0074 | |



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CUMULATIVE SPECIFIED P CELL FLUID NET INFLOW ..............  1.831798E+11  (LB)
CUMULATIVE FLUX B.C. FLUID NET INFLOW ......................  3.279666E+10  (LB)
CUMULATIVE LEAKAGE B.C. FLUID NET INFLOW ...................-1.930477E+11  (LB)
CUMULATIVE AQUIFER INFLUENCE FLUID NET INFLOW ..............  0.000000E+00  (LB)


CUMULATIVE SPECIFIED C CELL OR ASSOCIATED WITH
     SPECIFIED P CELL SOLUTE NET INFLOW.....................-3.677541E+01  (LB)
CUMULATIVE FLUX B.C. SOLUTE NET INFLOW .....................  2.053341E+04  (LB)
CUMULATIVE LEAKAGE B.C. SOLUTE NET INFLOW ..................-6.992490E+02  (LB)
CUMULATIVE AQUIFER INFLUENCE SOLUTE NET INFLOW .............  0.000000E+00  (LB)


                    ***** JOB COMPLETED *****
LAST TIME PLANE CALCULATED ......................................    6.94E+08  (S)
LAST TIME PLANE INDEX ...........................................      387
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